



# ROAD SAFETY CAMERAS

## Intelligent transport systems (ITS) delivery specification

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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>

## **Template version**

2.0, 02/02/2024

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# 1 Overview and outcomes

*This section defines the purpose of the equipment within the operational system.*

## 1.1 Purpose

The purpose of this document is to specify the minimum requirements for the procurement of road safety camera (RSC) systems used for traffic rule enforcement and road safety purposes by the client. These RSC systems are intended to be operated within the NZTA operational environment and networks.

## 1.2 Overview

The equipment for procurement as per this delivery specification are RSC Systems. The type of RSC systems used depends on the operational requirements:

- i. Spot speed
- ii. Average speed/point-to-point
- iii. Redlight
- iv. Dual redlight/speed
- v. Mobile spot speed

The RSC systems have significant impact to improve road safety and reduce the current level of harm on our streets and roads. They encourage people to drive at safe speeds within the legal speed limit and respect red lights.

This delivery specifications details system requirements to ensure compliance with NZTA operational and asset management systems.

### 1.2.1 Definition

An RSC system is a camera used for speed enforcements, redlight violation, and for monitoring breaches of other road safety rules as per the Land Transport (Road User) Rule 2004.

### 1.2.2 NZTA ITS class

006 Cameras

[Class definitions](#)

## 1.3 Scope

This delivery specification sets out the minimum requirement for the procurement of RSC systems. It defines the technical specifications and features required for the RSC systems.

Below are the types of RSC systems covered by this document:

- i. Speed Camera
  - Speed cameras monitor vehicles within the detection zone and capture evidence of vehicles traveling above the posted speed limit.
  - Both spot speed camera and mobile spot speed camera are covered.
- ii. Redlight Camera
  - Redlight cameras monitor vehicles within the detection zone and capture evidence of vehicles during the redlight phase.
- iii. Dual Camera
  - Dual cameras monitor vehicles within the detection zone and capture evidence of vehicles traveling above the posted speed limit and/or during the redlight phase.
- iv. Average speed/point-to-point (P2P)
  - Average speed/P2P cameras monitor vehicles at the detection zone of entry and exit point and capture evidence of vehicles traveling at an average speed above the posted speed limit.

The following are not covered in this specification:

- i. camera management server hardware
- ii. back-office equipment for offence file processing
- iii. mobile phone and seatbelt detection.

## 1.4 Outcomes

The intended outcomes of this delivery specification are to enable the client to procure cameras that will deliver the following outcomes:

- i. improve driver behaviour 24/7 by enforcing speed and redlight violations
- ii. improve road safety by lowering the risk of crash, injury and fatality
- iii. aligned with the vision for New Zealand where no one is killed or seriously injured in road crashes, and a targeted a 40% reduction in death and serious injuries (from 2018 levels) by 2030.

### 1.4.1 Operational

The intended operational outcomes of this delivery specification are to:

- i. ensure RSC systems are able to operate in normal and adverse conditions
- ii. provide the ability to detect speed and redlight offences
- iii. provide clear images in adverse environmental conditions such as but not limited to:
  - lighting
  - temperature
  - weather conditions

- iv. ensure RSC systems are able to generate infringement package
- v. ensure the fixed and mobile RSC systems are accessible for maintenance and testing by approved contractors.
- vi. ensure RSC systems are available for continuous use and out of service for maintenance for short periods.

#### **1.4.2 For users of the transport network**

Operational RSC systems are intended to ensure road users adhere to the road rules and posted speed limit on the road. The desired outcome is to improve road users' behaviour, road safety awareness and make the road environment safer.

#### **1.4.3 For road controlling authorities**

Operational RSC systems allow the controlling authorities to improve road safety and reduce the current level of harm on our streets and roads.

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## 2 Functional requirements

*This section outlines what the equipment and systems need to do (functional), and how they need to do it (non-functional).*

### 2.1 Vehicle Detection

#### 2.1.1 Speed detection

The RSC systems must have the ability to detect and calculate the speed and direction of all types of moving vehicles.

##### 2.1.1.1 Speed accuracy

The speed detection accuracy must be within a tolerance of  $\pm 2$ km/h from 30km/h to 250km/h across all vehicle types in both approaching and receding directions.

#### 2.1.2 Redlight detection

The RSC systems must have the ability to detect the vehicles that cross the stop line during a redlight phase.

#### 2.1.3 Lane detection

The RSC systems must be able to identify the lane on which vehicle is detected in a multi-lane (minimum of 2 lanes) road. This applies to vehicles traveling into 2 streams of traffic that flow in opposite directions.

#### 2.1.4 P2P

The RSC systems must be able to detect the travelling vehicle in a consistent position within the designated entry and exit zone.

#### 2.1.5 Vehicle classification detection

The RSC systems must be able to classify vehicle type based on the length of the vehicle and the threshold must be configurable.

### 2.2 Camera

#### 2.2.1 Static image

The camera must be able to capture an image within the detection range of the sensor and transmit data to the back-end system. The captured image must show:

- i. a detected vehicle
- ii. the lane of the detected vehicle
- iii. the number plate of the detected vehicle
- iv. roadway and, if a redlight camera, the traffic signal lights.

### **2.2.1.1 Resolution**

The camera must provide a minimum resolution of 5MP or higher.

### **2.2.1.2 Images (P2P)**

The camera must capture an image of the detected vehicle passing the entry and exit points of the enforcement zone.

### **2.2.1.3 Iris control**

The camera must have automatic iris control to maintain the light level as it changes throughout the day.

### **2.2.1.4 Frame rate**

The camera must be able to capture multiple images of vehicles with a minimum of two images per record for enforcement record.

### **2.2.1.5 Data bar**

The captured image must have a data bar with the information of:

- i. date and time of the detection
- ii. site location
- iii. lane the detected vehicle
- iv. speed of the detected vehicle
- v. elapsed time (redlight detection)

## **2.2.2 Automatic number plate recognition (ANPR)**

If the RSC systems have ANPR capability, then it must meet following requirements.

### **2.2.2.1 Number plate detection**

The ANPR system must be able to read the number plate which means isolate the number plate within the image, carry out optical character recognition and producing a machine-readable enumerated data field of the number plate.

### **2.2.2.2 Detection rate**

The ANPR system must detect a minimum of 95% of vehicles passing through the detection zone.

### **2.2.2.3 Capture rate**

The ANPR system must capture a minimum of 95% of all detected vehicles.

### **2.2.2.4 Accuracy rate**

The ANPR system must be able to read and match all numbers and/or letters on the number plate with a minimum of 95% accuracy of the captured images.

## **2.2.3 Illuminator**

The RSC systems must use infrared illuminator and must be able to capture the detected vehicle in low light and all environment conditions. Visible light illuminators are not allowed to be used.

## 2.2.4 Video

The camera must provide the functionality to produce videos to track the movement of vehicle or verify if the emergency services vehicle has the beacons.

### 2.2.4.1 Resolution

The video must provide a minimum resolution of 1080 pixels.

### 2.2.4.2 Duration

The video must provide a minimum of 10 seconds duration in total comprising of 5 seconds before and after the offences.

## 2.3 Log records

The RSC systems shall be able to produce a record of the following logs:

Types of logs	Description
Incident logs	To record the information about a detected incident
System logs	To record the operating status of the system
Radar logs	To record raw data from the sensor
Event logs	To record a system event such as system settings change, system alarm, etc.
Deployment logs	To record information about vehicle events

Table 1. Types of log records

### 2.3.1 Data storage

The RSC systems shall be able to store system files, incident records and log records. The following requirements shall apply for storage capacity:

- i. a minimum of 7 days of data or 70,000 incidents related data for speed, redlight and dual camera.
- ii. a minimum of 1 day of data or 200,000 detection related data for average speed/point-point (P2P).

## 2.4 Operational functions

### 2.4.1 Operating state

The RSC systems must be able to operate in minimum of 2 different states to fulfil operational requirements.

Operating state	Description
Enforcement state	System is in live infringement mode
Maintenance state	System is in testing and maintenance mode

Table 2. Types of operating states

## **2.4.2 Monitoring**

The RSC systems must allow remote monitoring of systems alarms within NZTA network.

## **2.4.3 Administration**

The RSC systems must allow remotely perform administration tasks within NZTA network such as but not limited to:

- i. allow for software update remotely and not rely on updates by physical means (eg the use of flash drive or direct laptop connection).
- ii. allow for roll back to the last previous version (n-1) as a minimum.

## **2.4.4 Configuration**

The RSC systems must allow remote access within NZTA network to modify configurable settings of systems.

## **2.4.5 Time synchronisation**

The RSC systems must allow time synchronisation through Network Time Protocol (NTP) to an accurate time source.

## **2.4.6 Security functions**

Please refer to security team and must comply with New Zealand Institute of Safety Management (NZISM) security control.

## **2.5 Compliance with NZTA protocols and other control interfaces**

The RSC systems shall be configured to comply with prevailing NZTA protocols, and other control interfaces.

## 3 Performance requirements

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

### 3.1 Operational life

The RSC systems shall be designed with a minimum operational life of not less than ten years without degradation of performance quality.

### 3.2 Resistance to the effects of external conditions

Equipment that is deemed fit for purpose is expected to continue to operate effectively exposed to the New Zealand environment. It is essential that materials and manufacturing processes take this into account.

The RSC systems shall be capable of continuous, normal operation (24 hours, seven days per week) and maintaining performance criteria in the conditions described below:

- i. installed and operated in direct sunlight
- ii. ambient temperature range between -25°C and +50°C
- iii. humidity between +5% and +95% non-condensing
- iv. lighting (dawn, dusk, day and night)
- v. weather (heavy rain, brilliant sunshine, overcast skies, snow and thick fog)
- vi. conditions, both permanent and temporary, that may be unique to the specified location, eg instances of thick smoke and electromagnetic interference
- vii. vibrations expected in the installed location
- viii. pollution effect such as surface corrosion.

### 3.3 Protection to dust and moisture

To prevent RSC systems from exposure to dust and water, the sensor housing and the enclosure shall provide a minimum IP65 based on IEC 60529:1989+AMD1:1999+AMD2:2013 *Degrees of protection provided by enclosures (IP code)*

### 3.4 Microwave beam

#### 3.4.1 Radio spectrum

The microwave beam transmitted from the radar shall operate within New Zealand's General User Radio License Spectrum of 24GHz to 24.25GHz.

#### 3.4.2 Frequency tolerance

The transmitted microwave beam frequency of the radar should be within  $\pm 300$ MHz of the centre frequency.

#### 3.4.3 Beam angle

The transmitted microwave beam medium angle shall be within 4 degrees each side of the centre of the main power beam.

#### **3.4.4 Beam power**

The output power level of the transmitted microwave beam shall not exceed 0dBW EIRP.

### **3.5 Certification**

The RSC systems shall allow the sensor to be removed for annual certification without the need for machinery. The certification shall be performed by an accredited independent testing facility demonstrating compliance with ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories* or IANZ Metrology and Calibration Laboratory.

### **3.6 Maintainability**

The RSC systems shall be designed:

- i. so all the components can be easily replaced in the field
- ii. to be installed and maintained by the contractor as per supplied documentation
- iii. to minimise operational downtime
- iv. to be easily cleaned (including graffiti).

### **3.7 Security requirement**

Please refer to security team and shall comply with NZISM security control.

## 4 Technical requirements

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

### 4.1 Electrical safety

All ITS equipment shall comply with and be installed in accordance with Electricity (Safety) Regulations 2010 (SR 2010/36).

#### 4.1.1 Installation of electrical equipment

The contractor is required to supply a certificate to confirm the equipment has been installed correctly and is compliant with AS/NZS 3000:2018 *Electrical installations – known as the Australian/New Zealand Wiring Rules*.

### 4.2 Electrical

#### 4.2.1 Power supply

The RSC systems shall be able to be powered from a 230V AC power supply.

#### 4.2.2 AC operating voltage and frequency variation

Variations in the nominal supply voltage and frequency shall not affect the RSC systems performance and shall conform to:

#### Declarations of conformity

AS/NZS 61000.2.2 Electromagnetic compatibility (EMC), Part 2.2 Environment - Compatibility levels for low frequency conducted disturbances and signalling in public low-voltage power supply systems.

#### 4.2.3 Radio standards

The RSC systems shall comply with Radiocommunications Regulations (Radio Standards) and shall conform to:

#### Declarations of conformity

AS/NZS 4268 Radio equipment and systems – Short range devices – Limits and methods of measurement

EN 302 288-1 V1.61 Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices; Road Transport and Traffic Telematics (RTTT); Short range radar equipment operating in the 24 GHz range; Part 1: Technical requirements and methods of measurement

#### 4.2.4 Electromagnetic compatibility

The RSC systems shall comply with Radiocommunications Regulations (EMC Standards). The RSC systems must not interrupt any external equipment/devices and shall conform to:

##### Declarations of conformity

AS/NZS CISPR 11 Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics  
– Limits and methods of measurement

#### 4.2.5 Electrical surge protection

All equipment shall be internally protected against damage resulting from:

- i. lightning strikes near the RSC systems
- ii. electrical transients on power cabling
- iii. electrical transients on internal and external wiring
- iv. electromagnetic interference
- v. static electrical discharge

### 4.3 Mechanical

#### 4.3.1 Vibration and shock resistance

The RSC systems shall be capable of withstanding vibration and shock and shall conform to:

##### Declarations of conformity

IEC 60068-2-31 Rough handling shocks, primarily for equipment-type specimens

IEC 60068-2-64 Vibration, broadband random and guidance

### 4.4 Environment

#### 4.4.1 Environment conditions

The RSC systems shall be capable of withstanding New Zealand environment conditions and shall conform to:

##### Declarations of conformity

IEC 60068-2-1 Cold

IEC 60068-2-2 Dry heat

IEC 60068-2-78 Test Cab: Damp heat, steady state

### 4.5 Physical obstruction (Mobile)

The operation of mobile RSC systems deployed inside a vehicle shall not be affected by all the windows of the vehicle.



## **4.6 System integration**

The RSC systems shall support the communication interface.

## **4.7 Documentation, software and licensing**

### **4.7.1 Documentation**

Contractor shall supply original equipment manufacturer maintenance, service and operations guidelines and manuals, which will include maintenance schedules and procedures, handling and storage instructions, and a spares list.

#### **4.7.1.1 Language**

The document must be written in English.

### **4.7.2 Software and licensing**

Contractor must supply all required software and licensing and ensure the RSC systems are running on an up-to-date software with the agreement from the client.

## **4.8 Security requirement**

Please refer to security team and shall comply with NZISM security control.

## 5 Appendix A: <Title>

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## 6 Appendix B: <Title>

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## 7 References

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

### 7.1 Industry standards

Standard number/name	Source
AS/NZS 3000:2018 Electrical installations – known as the Australian/New Zealand Wiring Rules.	Standards NZ <a href="#">website</a>
AS/NZS 4268 Radio equipment and systems – Short range devices – Limits and methods of measurement	Standards NZ <a href="#">website</a>
AS/NZS CISPR 11 Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement	Standards NZ <a href="#">website</a>
EN 302 288-1 V1.61 Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices; Road Transport and Traffic Telematics (RTTT); Short range radar equipment operating in the 24 GHz range; Part 1: Technical requirements and methods of measurement	ETSI <a href="#">website</a>
IANZ Metrology and Calibration Laboratory	IANZ <a href="#">website</a>
IEC 60068-2-1 Cold	IEC <a href="#">webstore</a>
IEC 60068-2-2 Dry heat	IEC <a href="#">webstore</a>
IEC 60068-2-31 Rough handling shocks, primarily for equipment-type specimens	IEC <a href="#">webstore</a>
IEC 60068-2-64 Vibration, broadband random and guidance	IEC <a href="#">webstore</a>
IEC 60068-2-78 Test Cab: Damp heat, steady state	IEC <a href="#">webstore</a>
IEC 60529:1989+AMD1:1999+AMD2:2013 Degrees of protection provided by enclosures (IP code)	IEC <a href="#">webstore</a>
ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.	ISO <a href="#">website</a>

## 7.2 NZTA standards, specifications and resources

### 7.2.1 Standards and specifications

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

Document name
ITS delivery specification: Closed-circuit television – operational cameras

### 7.2.2 Resources

Document name/code	NZTA website link

## 7.3 Legislation

Name	Website link
Electricity (Safety) Regulations 2010 (SR 2010/36)	<a href="https://www.legislation.govt.nz/regulation/public/2010/0036/latest/DLM2763501.html">https://www.legislation.govt.nz/regulation/public/2010/0036/latest/DLM2763501.html</a>
Land Transport Act 1998	<a href="https://www.legislation.govt.nz/act/public/1998/0110/latest/DLM433613.html">https://www.legislation.govt.nz/act/public/1998/0110/latest/DLM433613.html</a>
Radiocommunications Regulations (Radio Standards)	<a href="https://gazette.govt.nz/notice/id/2023-go2928">https://gazette.govt.nz/notice/id/2023-go2928</a>
Radiocommunications Regulations (EMC Standards)	<a href="https://gazette.govt.nz/notice/id/2015-go4671">https://gazette.govt.nz/notice/id/2015-go4671</a>

## 7.4 Other resources

Name	Website link
Road Safety Cameras	<a href="https://www.nzta.govt.nz/safety/driving-safely/safety-cameras/safety-camera-types/">https://www.nzta.govt.nz/safety/driving-safely/safety-cameras/safety-camera-types/</a>
Vehicle Classes	<a href="https://www.nzta.govt.nz/vehicles/vehicle-types/vehicle-classes-and-standards/vehicle-classes/">https://www.nzta.govt.nz/vehicles/vehicle-types/vehicle-classes-and-standards/vehicle-classes/</a>
Land Transport (Road User) Rule 2004	<a href="https://www.nzta.govt.nz/resources/rules/road-user-2004-index/">https://www.nzta.govt.nz/resources/rules/road-user-2004-index/</a>
AP-R415-12 AUSTRROADS RESEARCH REPORT – Point-to-Point Speed Enforcement	<a href="https://austroads.com.au/publications/road-safety/ap-r415-12">https://austroads.com.au/publications/road-safety/ap-r415-12</a>
New Zealand's General User Radio License Spectrum	<a href="https://www.rsm.govt.nz/">https://www.rsm.govt.nz/</a>

## 7.5 ITS standard drawings

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

Drawing number

Draft

## 8 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.
AC	Alternating current
ANPR	Automatic number plate recognition
AS/NZS	Australian/New Zealand standard
ATMS	Advanced traffic management system
dBW	Decibel watt
DC	Direct current
EIRP	Equivalent isotropic radiated power
EMC	Electromagnetic compatibility
fps	Frames per second
GHz	Gigahertz
IANZ	International Accreditation New Zealand
IEC	International Electrotechnical Commission
IP code	International Protection code (sometimes interpreted as Ingress Protection code)
ISO	International Organization for Standardization
ITS	Intelligent transport system(s)
km/h	Kilometre per hour
MHz	Megahertz
MP	Megapixels
mW	Milliwatts
NZISM	New Zealand Institute of Safety Management
NTP	Network time protocol
NZTA	New Zealand Transport Agency
OIML	International Organization of Legal Metrology
P2P	Point-to-point

Term	Definition
Radar	Radio detecting and ranging
RF	Radio frequency
RSC	Road safety camera
UPS	Uninterruptable power supply
V	Voltage

Draft

## 9 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

Draft

# 10 Document control

## 10.1 Document information

Document number	ITS-SPEC-RSC-202405
Previous document number/s (if applicable)	N/A
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/roads-and-rail/intelligent-transport-systems/standards-and-specifications/its-current-interim-and-legacy-standards-and-specifications</a>

## 10.2 Document owner

**Role** ITS S&S Steering Committee  
**Organisation** NZTA

## 10.3 Document approvers

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

Approval date	Approver	Role	Organisation
DD/MM/YYYY			



## 10.4 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	28/03/2024	Ee Chiang Sim Liang Zhao	Senior Engineer, SGS Australia Senior Engineer, SGS Australia	First draft for NZTA Expert Panel
0.2	10/05/2024	Ee Chiang Sim Liang Zhao	Senior Engineer, SGS Australia Senior Engineer, SGS Australia	Revised version after Expert Panel feedback
0.3	DD/MM/YYYY			