Master Specification
Part RD-ITS-S5

Imaging Equipment

September 2024

Government of South Australia
Department for Infrastructure and Transport

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Contents

RD-ITS-S5 Imaging Equipment

1 General

a) This Master Specification Part sets out the requirements for the design, supply, installation and integration of imaging equipment associated with the traffic management systems for roads, motorways and Tunnels, including:

i) the documentation requirements, as set out in section 2;

ii) the equipment requirements, as set out in section 3;

iii) the operation requirements, as set out in section 4;

iv) the recording and footage retention requirements, as set out in section 5;

v) the privacy requirements, as set out in section 6;

vi) the network and telecommunications requirements, as set out in section 7;

vii) the Hold Point requirements, as set out in section 8; and

viii) the verification requirements and records, as set out in section 9.

b) This Master Specification Part does not apply to:

i) video-based traffic signal vehicle or pedestrian detection systems:

A. used in lieu of other vehicle detection loops or pedestrian detectors; and

B. that only supply a detection input to a traffic signal controller; or

ii) imaging equipment associated with automatic number plate recognition systems used for law enforcement purposes.

c) For the purposes of this Master Specification Part, the concept of “imaging equipment” includes the following components necessary to operate the imaging equipment associated with the traffic management systems:

i) lens;

ii) camera;

iii) housing;

iv) pan-tilt unit;

v) mounts;

vi) poles;

vii) field cabinet (where it is used for imaging equipment);

viii) transmitters;

ix) receivers; and

x) cabling.

d) The design, supply, installation and integration of imaging equipment associated with the traffic management systems must comply with the Reference Documents, including:

i) A National Approach to Closed Circuit Television - National Code of Practice for CCTV Systems for the Mass Passenger Transport Sector for Counter-Terrorism (Agreed by the Transport and Infrastructure Senior Officials Committee), March 2012;

ii) ANSI/TIA-568 TIA Commercial Building Telecommunications Cabling Standard Set;

iii) AS 4806.1 Closed circuit television (CCTV), Part 1: Management and operation;

iv) AS 4806.2 Closed circuit television (CCTV), Part 2: Application guidelines;

v) AS/CA S009 Installation requirements for customer cabling (Wiring Rules);

vi) AS/NZS 1170 Structural design actions;

vii) AS/NZS 1768 Lightning protection;

viii) AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules);

ix) AS/NZS 3085.1 Telecommunications installations - Administration of communications cabling systems, Part 1: Basic requirements;

x) AS/NZS 62676 Video surveillance for use in security applications;

xi) AS/NZS ISO 9001 Quality management systems - Requirements;

xii) Office of the Australian Information Commissioner - 10 steps to undertaking a privacy impact assessment;

xiii) Office of the Australian Information Commissioner - Guide to undertaking privacy impact assessments; and

xiv) Open Network Video Interface Forum (ONVIF) Network Interface Specification Set, version 20.12 (December 2020) or later.

e) Without limiting the Contractor's obligation to comply with the Contract Documents, the Contractor must ensure that the design, supply, installation and integration of imaging equipment associated with the traffic management systems complies with the following:

i) RD-ITS-D1 "Design of Intelligent Transport System (ITS)";

ii) RD-ITS-S1 "General Requirements for the Supply of ITS Equipment";

iii) RD-ITS-S3 "ITS Enclosures";

iv) TUN-ME-DC4 "Tunnel Equipment Cabinets";

v) RD-ITS-C1 "Installation and Integration of ITS Equipment";

vi) RD-ITS-C2 "Mains Power Supplies for Roadside Traffic Management Equipment";

vii) RD-ITS-C3 "Telecommunications Cabling";

viii) PC-QA1 "Quality Management Requirements" or PC-QA2 "Quality Management Requirements for Major Projects" (as applicable); and

ix) PC-CN1 "Testing and Commissioning".

2 Documentation

2.1 CCTV Test and Commissioning Plan

a) The CCTV Test and Commissioning Plan must:

i) be submitted as part of the Construction Documentation;

ii) comply with the requirements of RD-ITS-C1 "Installation and Integration of ITS Equipment";

iii) comply with the requirements of PC-CN1 "Testing and Commissioning";

iv) be prepared in accordance with AS/NZS 62676.4 Video surveillance systems for use in security applications Part 4: Application guidelines, to test the full functionality and performance of all parts of the CCTV system supplied by the Contractor;

v) include a description of the methods to be used to ensure integration of the CCTV system with the Principal's existing systems at the time of commissioning; and

vi) where the design includes the use of hinged poles, detail how hinged poles are to be incorporated in the design to verify that the pole can be safely lowered to its full extent without conflicts with:

A. any pole-mounted or nearby roadside cabinets;

B. other infrastructure;

C. roads, cycling and pedestrian paths;

D. private property;

E. landscaping; or

F. vegetation.

2.2 Video Incident Detection Test and Commissioning Plan

a) Where the Contract Documents require video incident detection, the Contractor must produce a Video Incident Detection Test and Commissioning Plan, which must:

i) include testing for all incidents specified in the Contract Documents; and

ii) be submitted and updated in accordance with the requirements of PC-PM1 "Project Management and Reporting" or as part of the Construction Documentation (as applicable).

b) The Video Incident Detection Test and Commissioning Plan may be submitted as part of an overall ITS testing and commissioning plan rather than as a standalone plan.

c) The Video Incident Detection Test and Commissioning Plan must:

i) comply with the requirements of RD-ITS-C1 "Installation and Integration of ITS Equipment";

ii) comply with the requirements of PC-CN1 "Testing and Commissioning"; and

iii) include a description of the methods to be used to ensure integration of the video incident detection system with the Principal's existing systems at the time of commissioning.

2.3 Design Documentation

In addition to the requirements of PC-EDM1 "Design Management", the Design Documentation must include:

a) all design documentation required by RD-ITS-D1 "Design of Intelligent Transport Systems (ITS)" as relevant to the imaging equipment associated with the traffic management system;

b) evidence of compatibility of the imaging equipment with the Principal's existing video management systems as at the Commencement Date as required by this Master Specification Part;

c) details of protection measures (if any) resulting from the lightning risk assessment completed in accordance with AS/NZS 1768 Lightning protection, as required by section 3.8b)ii);

d) where images are unable to be transmitted by fibre, the details required by section 4.2.3b);

e) evidence that the Contractor's proposed network video recorder solution is compatible with:

i) the Principal's existing video management systems; and

ii) all imaging equipment being supplied by the Contractor under the Contract Documents,

as required by section 5.1b);

f) calculation of the required network video recorder storage, as required by section 5.2b);

g) design details of imaging equipment brackets and support connections which demonstrate compliance with clause 3.5 and camera manufacturer mounting specifications;

h) network bandwidth calculations as required by section 7.1b);

i) where the Contractor is responsible for determining any location, layout or site selection for any of the imaging equipment, fully detailed location and layout documentation showing:

   i) general layout;

   ii) coverage from each camera, demonstrating any contract specific coverage requirements and including any blind spots or occlusions;

   iii) reduced ground levels;

   iv) imaging equipment position, coordinates or offsets;

   v) speed zones;

   vi) conduit and pit locations;

   vii) mounting structure positions and any protective barriers; and

   viii) all nearby private property boundaries;

j) details of the Contractor's proposed list of products for supply and installation (including manufacturer's specifications) of all major components forming part of the imaging equipment associated with the traffic management systems, as required by RD-ITS-S1 "General Requirements for the Supply of ITS Equipment";

k) all layout, fabrication, interconnection and assembly design drawings and diagrams relevant to the imaging equipment associated with the traffic management systems; and

l) the privacy impact assessment report for those camera locations identified by the Contractor pursuant to sections 6a)or 6b) as requiring a privacy impact assessment and reasoning as to why such privacy impact assessment is not warranted for camera locations not captured by the privacy assessment report, as required by section 6e).

2.4 Construction Documentation

In addition to the requirements of PC-CN3 "Construction Management", the Construction Documentation must include:

a) acceptance test plans as required by RD-ITS-S1 "General Requirements for the Supply of ITS Equipment", providing full details of all tests necessary;

b) the CCTV Test and Commissioning Plan and Video Incident Detection Test and Commissioning Plan (as applicable) required by sections 2.1 and 2.2 respectively; and

c) evidence that maximum camera mounting deflection will not be exceeded by the camera mounting arrangement, as required by section 4.2.2b).

2.5 Quality Management Records

In addition to the requirements of PC-QA1 "Quality Management Requirements" or PC-QA2 "Quality Management Requirements for Major Projects" (as applicable), the Quality Management Records must include the verification requirements and records set out in section 9.

2.6 Maintenance Plan

In addition to the requirements of PC-CN2 "Asset Handover", the Maintenance Plan in relation to the imaging equipment associated with the traffic management system must include:

a) routine maintenance recommendations detailing safe access methods and any work one traffic management required;

b) critical parts and spare parts requirements as required by RD-ITS-S1 “General Requirements for the Supply of ITS Equipment”; and

c) a training plan as required by RD-ITS-C1 “Installation and Integration of ITS Equipment”.

3 Equipment requirements

3.1 General

The Contractor must ensure that all supplied imaging equipment associated with the traffic management system:

a) complies with all applicable requirements of ACMA; and

b) is manufactured under a quality system certified to AS/NZS ISO 9001 Quality management systems - Requirements.

3.2 Cameras

a) The Contractor must ensure that all supplied cameras associated with the traffic management system are colour and:

   i) integrate natively with the Principal’s video management systems, which are internet protocol (IP) based using multicast networked video transmission;

   ii) licences are provided for the integration of the CCTV cameras with the Principal’s video management system;

   iii) are compliant with ONVIF Profile S, as defined in the Open Network Video Interface Forum (ONVIF) Network Interface Specification Set, 20.12 (December 2020) or higher;

   iv) are integrated by the Contractor into the Principal’s existing IP video network, providing at least equivalent functionality to the Principal’s existing camera platforms as at the Commencement Date;

   v) use progressive scan image sensors capable of:

      A. at least 2 megapixel resolution (1920 x 1080 pixels); and

      B. a horizontal resolution of at least 540 LP/PH (Line pairs per picture height);

   vi) are capable of:

      A. streaming video at a digital resolution of 1920 x 1080 pixels non-interlaced (1080 p) at 30 frames per second; and

      B. simultaneously streaming multiple streams at different resolutions and frame rates;

   vii) provide automatic day and night mode switching which:

      A. uses a mechanical infra-red cut filter; and

      B. has a minimum:

         I. day-time mode sensitivity of 0.05 Lux; and

         II. night-time sensitivity of 0.005 Lux (monochrome),

         at 30IRE, F1.2, shutter speed 1/15 s; and

   viii) which are intended for use on motorways or unlit roads:

      A. include adaptive infra-red illumination capable of providing calibrated infra-red illumination up to a distance of 200 m; and

B. have a minimum night-time sensitivity of 0.0005 Lux (monochrome) at 30IRE, F1.5, shutter speed 1/30 s.

b) The Contractor must ensure that all supplied pan, tilt and zoom (PTZ) cameras associated with the traffic management systems, are:

i) suitable for outdoor installation and Tunnel environments;

ii) capable of 360^{o} degrees continuous rotation (panning);

iii) have a horizontal tilt range of at least 100^{o} degrees (10^{o} degrees above the horizontal to vertically downwards); and

iv) capable of a video overlay indicating the compass direction that the camera is facing at any given time.

c) The Contractor must ensure that all supplied camera housings associated with the traffic management systems are treated with an “anti-rain” formulation to prevent rain droplets from beading on the camera dome or housing viewport and obstructing the camera vision.

d) The Contractor must ensure that the supplied cameras associated with the traffic management systems comply with the following:

i) the cameras’ network interface must be:

A. IEEE 802.3 standard Ethernet; and

B. capable of at least 100 Mb/s (for example, 10/100 Base TX); and

ii) the Open Network Video Interface Forum (ONVIF) Network Interface Specification Set, 20.12 (December 2020) or higher.

3.3 Imaging equipment power requirements

The Contractor must ensure that the supplied imaging equipment associated with the traffic management system complies with the following power requirements:

a) power (including backup power) must be supplied to the imaging equipment in accordance with the requirements of:

i) RD-ITS-D1 “Design of Intelligent Transport Systems (ITS)”; and

ii) RD-ITS-C2 “Mains Power Supplies for Roadside Traffic Management Equipment”;

b) wherever imaging equipment can accommodate redundant power supplies, redundant power supplies must be installed and used;

c) all cameras must be powered via PoE++ Type 4 unless the total length of the cables between the switch and the camera exceeds 100 m;

d) where the total length of the cables between the switch and the camera exceeds 100 m, media convertors and fibreoptic cable must be used, with power provided to the camera via either:

i) a PoE media converter at the camera location; or

ii) a suitably rated ELV power supply at the camera location which is compliant with section 3.3g);

e) all PoE imaging equipment (including PoE sources) must comply with the following requirements:

i) the PoE imaging equipment must be compliant with IEEE 802.3af, IEEE 802.3at or IEEE 802.3bt (as updated at the time of supply of the imaging equipment);

ii) the PoE sources which provide power to the PoE imaging equipment must comply with the same standards as the PoE imaging equipment being powered; and

iii) the PoE source must be capable of providing the maximum power that the PoE imaging devices are capable of demanding;

f) where the Contract Documents or technical constraints inherent in the design requirements preclude the use of PoE, imaging equipment must be powered by a suitably rated ELV supply; and

g) for the purposes of the ELV power supply required by section 3.3f), the Contractor must ensure:

i) that a circuit breaker is supplied on:

A. the mains input to the power supply; and

B. the power supply output to each camera;

ii) that “B” curve circuit breakers are used on the ELV side; and

iii) circuit breaker and cable sizes are calculated in accordance with the requirements of AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules), taking into account device start-up (“in-rush”) current.

3.4 Video incident detection systems/thermal incident detection systems

a) Where the Contract Documents require video incident detection, the Contractor must design, supply and install a video-based incident detection system utilising products provided by Teledyne FLIR.

b) Where the Contractor otherwise believes that the Project requirements are best served by utilisation of thermal incident detection cameras, or a mix of thermal and video incident detection cameras, the Contractor’s design must include the most appropriate camera technologies.

c) The Contractor must ensure that:

i) the incident detection system cameras are capable of operating within the Principal’s existing video incident detection systems, as at the Commencement Date;

ii) the number and locations of incident detection cameras are sufficient to provide coverage of all areas specified by the Contract Documents, noting that the coverage may range from:

A. local area coverage;

B. 100% coverage of a specified area; and

C. fully redundant coverage (200%) of a specified area;

iii) incident detection cameras installed in Tunnels are capable of detecting smoke and fire; and

iv) the configuration and integration of the incident detection cameras into the Principal’s video incident detection systems is undertaken by:

A. the manufacturer of the video incident detection system; or

B. an authorised and appropriately qualified representative of the manufacturer of the video incident detection system.

d) The Contractor must ensure that incident detection cameras:

i) comply with the requirements of Open Network Video Interface Forum (ONVIF) Network Interface Specification Set, v20.12 or later; and

ii) are capable of integration with the Principal’s existing video management software and recording solutions (as at the Commencement Date).

e) The Contractor must ensure that the incident detection system satisfies the performance requirements set out in Table RD-ITS-S5 3-1.

f) The Contractor must, based on operator feedback, provide a service to fine tune the incident detection system settings, variables and zones to improve the video incident detection system performance at:

i) 3 months; and

ii) 6 months,

after completion of the commissioning of the incident detection equipment.

Table RD-ITS-S5 3-1 Incident detection system performance requirements

Incident	Detection rate	False alarm rate	Time to reliably detect (seconds)
Stopped or slow-moving vehicle	>95%	<0.3 false alarms, per camera, per day (cumulative for all incident functions)	<15
Queue	>98%		<15
Reverse direction	>95%		<15
Pedestrians or animals	>90%		<15
Fallen object (minimum 0.5 m x 0.5 m x 0.5 m)	>90%		<25
Smoke/thermal/fire detection (within Tunnels)	>98%		<15

3.5 Camera mounting arrangements

a) The Contractor must ensure that all camera mounting arrangements relevant to the imaging equipment associated with the traffic management systems comply with the following requirements:

i) all camera mounts (including poles), including incident detection camera mounts, must meet the resistance to vibration and maximum deflection requirements of AS4806.2 Closed circuit television (CCTV), Part 2: Application guidelines, as a minimum;

ii) for incident detection cameras, all associated mounts, brackets and fixings must also be designed and installed to ensure that any camera movement is within Teledyne FLIR specification extents for the intended detection range of the cameras;

iii) where cameras are installed within Tunnels, the resistance to vibration and maximum deflection requirements of the camera mounts required by section 3.5a)i) must include vibration and deflection arising as a result of Tunnel ventilation or other plant operation affecting the camera mounts within the Tunnels;

iv) “unistrut” or any other proprietary electrical framing system must not be used to mount cameras to the interior of Tunnels;

v) dedicated camera poles must be:

A. for CCTV cameras, a hinged type column designed for CCTV purposes;

B. for incident detection cameras, a fixed pole which complies with the maximum deflection requirements for the incident detection camera at the height at which the camera is to be installed;

C. of appropriate height and stability to provide clear and stable pictures under all expected, normal, local weather conditions;

D. of galvanized welded steel construction;

E. tapered with a round or polygonal section of smooth appearance; and

F. suitable for mounting on a rag bolt assembly in a concrete footing or equivalent;

vi) if the dedicated camera pole required by section 3.5a)v) is of a height that a standard column is not available, the pole must be designed in accordance with the requirements of:

A. RD-ITS-C1 “Installation and Integration of ITS Equipment”; and

B. AS/NZS 1170 Structural design actions;

vii) all PTZ cameras must be installed so that the camera horizon is horizontal, as measured with a spirit level or suitable equivalent means;

viii) hinged camera poles must be secured by the use of Principal-supplied padlocks and barrier bolts that cannot be removed without specific tools;

ix) a clear, all-weather walking area which prevents overgrowth of vegetation over time must be provided on either side of the camera pole:

A. to a length at least equal to 1.5 times the height of the camera pole;

B. in the plane of the lowering action; and

C. which allows the camera pole to be safely lowered;

x) where cameras are mounted on structures other than dedicated camera poles (including gantries, Tunnel infrastructure, and shared use poles) those camera mounts must satisfy the same stability requirements as the dedicated camera poles set out in this Master Specification Part; and

xi) mounts for incident detection cameras must meet or exceed the requirements specified by the incident detection system manufacturer, including with respect to:

A. resistance to vibration; and

B. maximum deflection.

b) The Contractor must provide camera pole and support deflection calculations and evidence of compliance with section 3.5a) to the Principal, the provision of which constitutes a **Hold Point**. The camera poles must not be supplied until this Hold Point has been released.

c) The Contractor must test the tilt operation of all hinged camera poles as a component of System Integration Acceptance Testing (SIAT) in accordance with RD-ITS-C1 “Installation and Integration of ITS Equipment”.

d) The Contractor must ensure that the testing required by section 3.5c):

i) is incorporated in the CCTV Test and Commissioning Plan; and

ii) verifies that the hinged camera pole can be safely lowered to its full extent without conflicts with:

A. any pole-mounted or nearby roadside cabinets;

B. other infrastructure;

C. landscaping; or

D. vegetation.

3.6 Field cabinets

a) The Contractor must ensure that camera-related equipment is not mounted inside poles or other support structures, with the exception of:

i) cable terminations; and

ii) lightning suppression devices.

b) Where cameras and ITS roadside cabinets can be co-located, the Contractor must ensure that the cameras are supplied with their power and network connection from the nearest roadside ITS cabinet.

c) Where cameras and ITS roadside cabinets are not co-located the Contractor must ensure that the following requirements are satisfied:

  i) weatherproof field cabinets must be supplied for each camera site to house the power supply and network access points (Ethernet switches);

  ii) the field cabinets must comply with the requirements of RD-ITS-S3 “ITS Enclosures”;

  iii) the field cabinets must be mounted to suitable brackets which are welded to the camera pole column;

  iv) where it is not possible for field cabinets to be attached to welded brackets on the camera pole column in accordance with the section 3.6c)iii), the field cabinets must be free-standing; and

  v) pole mounted cabinets must be mounted in such a way that:

    A. the tilt operation of the pole is not compromised;

    B. there is no fouling between the cabinet and any part of the pole or camera when lowering or lowered;

    C. access to the cabinet is not obstructed in any way when the pole is lowered; and

    D. the cabinet has safe, all-weather access for maintenance personnel.

d) Where the cameras are located within Tunnels, the Tunnel equipment cabinet housing camera power and communications equipment must:

  i) comply with the requirements of TUN-ME-DC4 “Tunnel Equipment Cabinets”; and

  ii) be provided within a dedicated electrical equipment room (EER).

e) For cameras which are to be mounted on shared traffic signal infrastructure at traffic signal sites, the Contractor must ensure that the camera is supplied with its own power and network connections from within the traffic signal controller extension housing.

f) The Contractor must ensure that:

  i) the length of network cabling between the designated network point and the camera does not exceed the maximum permissible length for an Ethernet Segment as defined in ANSI/TIA-568 Standards set for structured cabling (i.e. technically 100 m, but physically to 97 m); and

  ii) if a run of network cabling longer than that permitted by section 3.6f)i) is required, single mode optical fibre must be used for the camera’s connection to the designated network point.

3.7 Camera controls

The Contractor must ensure that CCTV cameras have control facilities for:

a) pan;

b) tilt;

c) zoom;

d) focus; and

e) saving and recalling pre-set positions,

that are compatible with the Principal’s existing TMC CCTV control system, as at the Commencement Date.

3.8 Lightning / surge protection

a) The Contractor must ensure that power and signal earthing/grounding to all equipment sites which incorporate electrical equipment incorporate surge protection and earth bonding designed to minimise any incidence of equipment damage or unreliability due to electrical surges, transients and stray currents.

b) Where the Contract Documents require protection against lightning strikes, the Contractor must ensure that:

   i) a lightning risk assessment is completed for each camera installation in accordance with AS/NZS 1768 Lightning protection; and

   ii) the results of the lightning risk assessment undertaken pursuant to section 3.8b)i) and the appropriate protection measures (if any) are incorporated into the Design Documentation.

c) The Contractor must ensure that each camera installation incorporates a lightning protection system that will control lightning surge energy on the pole and all cables before the lightning surge energy enters any associated or nearby equipment cabinet or building.

d) For cameras mounted on stand-alone support structures, including poles and gantries, the Contractor must ensure that:

   i) lightning protection systems are grounded to the camera support structure; and

   ii) the camera support structure is grounded to a properly designated lightning earth system.

e) For cameras mounted on buildings, the Contractor must ensure that the camera installation is considered as part of the building's overall lightning protection design in accordance with the requirements of AS/NZS 1768 Lightning protection.

f) The Contractor must ensure that:

   i) secondary surge protection is installed as close as practicable to the cable entry point into imaging equipment field cabinets and bonded to the field cabinet structure; and

   ii) equipotential bonding between the lightning protection system and the electrical service earth meets the requirements of AS/NZS 1768 Lightning protection.

4 Operation requirements

4.1 Functional requirements

The Contractor must ensure that all CCTV and video incident detection imaging equipment is installed, configured and integrated with the Principal's existing CCTV and video incident detection systems at the time of commissioning to allow TMC staff to:

a) detect, verify and manage traffic incidents and congestion;

b) monitor and control the imaging equipment from:

   i) the TMC; and

   ii) other nominated locations;

c) monitor pedestrian or cycleway activities and any other location nominated in Contract Documents;

d) monitor operation and ensure security of infrastructure; and

e) in the case of video incident detection systems, receive incident detection alarms via STREAMS.

4.2 Performance and configuration requirements

4.2.1 General

The Contractor must ensure that the imaging equipment associated with traffic management systems meets the following requirements:

a) images must be captured, transmitted and displayed by the imaging equipment at the highest quality and refresh rate possible;

b) end-to-end image compression and decompression must retain the maximum image quality to ensure that the functional requirements of this Master Specification Part are satisfied; and

c) image quality and resolution displayed at the TMC must satisfy the identification requirements specified in sections 4.2.3 to 4.2.6.

4.2.2 Camera mounting

a) Imaging equipment brackets, poles and support connections must comply with camera manufacturer mounting specifications to ensure that the required camera performance is achieved.

b) Where a camera manufacturer specifies a maximum allowable camera mounting deflection (i.e. camera movement) to achieve a required performance, the Contractor must submit evidence with the Construction Documentation that the maximum camera mounting deflection will not be exceeded by the camera mounting arrangement in the environmental conditions which it is likely to encounter.

4.2.3 Image data rate

The Contractor must ensure that the imaging equipment associated with traffic management systems satisfies the following image data rate requirements:

a) where the image will be transmitted entirely by fibre, the Contractor must ensure that the transmitted image is refreshed with:

   i) at least 30 frames per second;

   ii) at maximum camera resolution; and

   iii) over the dynamic ranges of the camera; and

b) where the image is unable to be transmitted by fibre, the Contractor must seek approval from the Principal as part of the Design Documentation to use transmission by means other than entirely by fibre. If approval is granted by the Principal as a part of the Design Documentation review process, the Contractor must ensure that the transmitted image:

   i) is refreshed at the highest rate achievable by the alternate transmission means and in any case with;

   ii) at least 8 frames per second;

   iii) at a minimum 352 x 288 pixel resolution (1CIF); and

   iv) over the full dynamic ranges of the camera.

4.2.4 Pedestrian identification

The Contractor must ensure that the imaging equipment associated with traffic management systems satisfies the following pedestrian identification requirements:

a) cameras installed for the purpose of monitoring pedestrian traffic (including site security cameras, cameras in Tunnel egress passageways or service corridors) must be configured to meet at least the “recognise” operational objective as defined in A National Approach to Closed Circuit Television - National Code of Practice for CCTV Systems for the Mass Passenger Transport Sector for Counter-Terrorism (Agreed by the Transport and Infrastructure Senior Officials Committee), March 2012; and

b) cameras installed for the purpose of monitoring facility entrance or exit points are configured to meet the “identify” operational objective as defined in A National Approach to Closed Circuit Television - National Code of Practice for CCTV Systems for the Mass Passenger Transport Sector for Counter-Terrorism (Agreed by the Transport and Infrastructure Senior Officials Committee), March 2012.

4.2.5 Vehicle applications

The Contractor must ensure that cameras associated with traffic management systems that are installed at intersections or on motorways are capable of:

a) positively identifying an individual vehicle; and

b) observing pedestrian activity,

at the full optical zoom range including:

c) vehicle make, colour (except in low light conditions) and body type; and

d) the vehicle registration plate number (if in the camera’s field of view).

4.2.6 CCTV control system latency

The Contractor must ensure that when a traffic management centre operator issues a command to a CCTV to pan, tilt, or zoom, the time between the commands issued by the operator and the visual feedback to the operator are observed by the operator within 200 ms.

5 Recording and footage retention requirements

5.1 Network video recorders

a) The Contractor must ensure that network video recorders associated with the traffic management system comply with the following requirements:

   i) video from all cameras must be recorded on network video recorders which are compatible with the Principal’s video management systems as at the Commencement Date;

   ii) video footage must be able to be retrieved using the Principal’s existing video management software from any of the Principal’s facilities, including:

      A. primary control centre;

      B. backup control centre; or

      C. subsidiary control centre; and

   iii) network video recorders must include remote lights-out hardware management capability (e.g. Dell’s iDrac Enterprise or similar).

b) As part of the Design Documentation, the Contractor must demonstrate that the proposed network video recorder solution is compatible with the Principal’s systems and all imaging equipment being supplied by the Contractor under the Contract Documents.

5.2 Network video recorder storage capacity

a) The Contractor must ensure that network video recorders associated with the traffic management system comply with the following storage capacity requirements:

   i) network video recorder storage must be based on redundant array of independent disk (RAID) technology;

   ii) if a large number of streams are being recorded, the network video recorder storage must be RAID level 10;

   iii) the network video recorder storage size must be calculated based on:

A. recording all required camera streams;

B. the maximum available resolution and frame rate; and

C. retaining footage for not less than 31 days,

in accordance with the requirements of AS 4806.1 Closed circuit television (CCTV), Part 1: Management and operation; and

iv) the network video storage size calculated pursuant to section 5.2a)iii) must include an allowance of at least 25% additional storage for future growth or expansion.

b) The Contractor must calculate the required network video recorder storage and provide the results of these calculations to the Principal as part of the Design Documentation.

c) Where the existing network video recorder storage infrastructure cannot meet the requirements of this clause 5.2, the Contractor must upgrade the infrastructure.

5.3 Redundancy and load sharing

The Contractor must ensure that the network video recorders associated with the traffic management system satisfy the following redundancy and load sharing requirements:

a) at least 2 network video recorders must be:

i) provided for each location; and

ii) configured for automatic failover; and

b) each network video recorder must:

i) meet the storage requirements set out in section 5.2;

ii) be capable of recording all required camera streams; and

iii) be configured to normally record half of the required camera streams and to act as a redundant failover recorder for its partner.

5.4 Monitoring and fault reporting

The Contractor must ensure that the network video recorders associated with the traffic management system satisfy the following monitoring and fault reporting requirements:

a) network video recorders must be capable of remote monitoring via simple network management protocol v2c or v3;

b) the required management information base files must be supplied to the Principal by the Contractor for integration into the Principal's simple network management protocol monitoring systems prior to or as a part of Site Acceptance Testing (SAT); and

c) network video recorders must automatically report alarms and faults:

i) via automatically generated email alerts to at least one configured email address; or

ii) via simple network management protocol traps.

5.5 Open Network Video Interface Forum compliance

The Contractor must ensure that network video recorders associated with the traffic management system:

a) meet the requirements of the Open Network Video Interface Forum (ONVIF) Network Interface Specification Set, v2.6 or higher; and

b) are capable of recording all cameras supplied by the Contractor pursuant to the Contract Documents.

6 Privacy considerations

a) The Contractor must determine whether the proposed locations of cameras associated with the traffic management system warrant carrying out a privacy impact assessment.

b) Without limiting the requirements of section 6a), where cameras are to be located near property boundaries, such that they are likely to be able to see into private property, a privacy impact assessment must be undertaken.

c) Where a privacy impact assessment is to be undertaken pursuant to sections 6a) or 6b), the Contractor must ensure that the privacy impact assessment is carried out in accordance with the requirements of:

   i) the Office of the Australian Information Commissioner Guide to Undertaking Privacy Impact Assessments; and

   ii) the Office of the Australian Information Commissioner 10 steps to Undertaking a Privacy Impact Assessment.

d) The Contractor must ensure that:

   i) views into private residential properties by cameras associated with the traffic management system are obscured, either by:

      A. using electronic means, such as “privacy zones” configurable in the cameras; or

      B. physical barriers; and

   ii) whichever obstruction method is adopted pursuant to section 6d)i), the Contractor must ensure that the obstruction method is configured or installed in a manner which does not impact on the operability of the cameras for the purposes for which they are installed.

e) The Design Documentation must include:

   i) the privacy impact assessment report for those camera locations identified by the Contractor pursuant to sections 6a) or 6b) as requiring a privacy impact assessment; and

   ii) reasoning as to why the Contractor believes that a privacy impact assessment is not needed for camera locations not captured by the privacy assessment report required by section 6e)i).

f) The Contractor must ensure that information about proposed camera locations and the methods employed to protect privacy is included in any community consultation processes that are undertaken as part of the Project.

7 Network and telecommunications requirements

7.1 Network bandwidth

a) The Contractor must ensure that the imaging equipment associated with the traffic management systems satisfies the following network bandwidth requirements:

   i) the network bandwidth must be calculated based on:

      A. transmission of all video streams;

      B. at their maximum resolution and frame rate;

      C. all expected network traffic; and

      D. an allowance of at least 25% for future growth or expansion; and

   ii) the overall network design must include the network bandwidth calculations required by section 7.1a)i).

b) The Design Documentation must include the network bandwidth calculations prepared by the Contractor pursuant to section 7.1a)i).

7.2 Telecommunications lines

a) The Contractor must ensure that all telecommunications lines to be supplied and installed for the purposes of imaging equipment associated with the traffic management system comply with the requirements of, and are installed in accordance with:

i) AS/CA S009 Installation requirements for customer cabling (Wiring Rules); and

ii) AS 3085.1 Telecommunications installations - Administration of communications cabling systems, Part 1: Basic requirements.

b) The Contractor must ensure that all telecommunication cables required for the purposes of imaging equipment associated with the traffic management system comply with the requirements of RD-ITS-C3 “Telecommunications Cabling”.

8 Hold Points

Table RD-ITS-S5 8-1 details the review period or notification period, and type (documentation or construction quality) for each Hold Point referred to in this Master Specification Part.

Table RD-ITS-S5 8-1 Hold Points

Section reference	Hold Point	Documentation or construction quality	Review period or notification period
3.5b)	Provision of camera pole and support deflection calculations	Documentation	10 Business Days review

9 Verification requirements and records

The Contractor must supply written verification as part of the Quality Management Records that the requirements listed in Table RD-ITS-S5 9-1 have been complied with.

Table RD-ITS-S5 9-1 **Verification requirements and records**

Reference	Subject
RD-ITS-S1 “General Requirements for Supply of ITS Equipment”	Where the Contract Documents require the supply of imaging equipment (but not the installation of such equipment) - all test documentation relating to the imaging equipment supplied pursuant to this Master Specification Part, as required by RD-ITS-S1 “General Requirements for the Supply of ITS Equipment” and PC-CN1 “Testing and Commissioning”.
RD-ITS-C1 “Installation and Integration of ITS Equipment”	Where the Contract Documents require both the supply and installation of imaging equipment - all test documentation relating to the imaging equipment supplied and installed pursuant to this Master Specification Part, as required by RD-ITS-C1 “Installation and Integration of ITS Equipment” and PC-CN1 “Testing and Commissioning”.