CLOSED CIRCUIT TELEVISION (CCTV) MONITORING CAMERAS

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# SPECIFICATION 703

## CLOSED CIRCUIT TELEVISION MONITORING CAMERAS

### REVISION REGISTER

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703.01 SCOPE

1. This specification defines the requirements for the supply, installation, testing and commissioning of closed circuit television (CCTV) cameras, including web cameras, for interfacing into the existing Main Roads Western Australia (MRWA) Traffic Operations Centre (TOC).

The scope of work covered by this specification includes:

   a) The supply and installation of the camera housing, and camera pole.
   b) The supply and installation of the communications cabinet or traffic signals top-hat extension.
   c) The supply, installation and testing of all communications and associated equipment.
   d) The interfacing of all camera sites into the existing MRWA TOC CCTV system.
   e) The supply of as-constructed documentation and any relevant training information.

2. CCTV ‘Tilt’ Pole Drawings provided by Main Roads WA are based on existing CCTV site installations.

These drawings are not intended to be design drawings for new installations. The supply of these drawings is to enable performance features required by the Main Roads Specifications to be included in new CCTV installations.

Some elements of the drawings, such as mounting spigot detail and lock box detail, allow for compatibility with existing infrastructure and provide for required operational features.

NOTE: The reference to the ‘Tilt’ Pole drawings are not intended to imply any intellectual property ownership by Main Roads of the ‘Tilt’ Pole design.

Actual construction details of the CCTV pole and footing will need to be designed to meet the performance criteria specified, and to meet any conditions specific to each site (such as soil conditions, likely maximum wind speed etc.).
703.02 REFERENCES

1. Australian Standards, MAIN ROADS Western Australia Standards and MAIN ROADS Western Australia Test Methods are referred to in abbreviated form (e.g. AS 1234, MRS 67-08-43 or WA 123). For convenience, the full titles are given below:

Acts and Regulations
Govt. of Western Australia Office of Energy WA Electrical Requirements
Electricity Act 1994 and associated Amendments and Regulations and Electrical Safety Act 2002 and associated Amendments, Regulations and Codes of Practice

Australian Standards
AS 100 Technical drawings
AS 1101 Graphical Symbols for General Engineering – Welding and Non-Destructive Examination
AS 1163 Structural Steel Hollow sections
AS 1289, F3.3 Soil Strength and Consolidation Tests
AS 1554.1 Welding of Steel Structures
AS 1554.2 Arc Stud Welding
AS 1939 Degrees of Protection Provided by Enclosure for Electrical Equipment (IP Code)
AS 2312 Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings.

AS 2578 Traffic Signal Controllers
AS 3100 General Requirements for Electrical Equipment
AS 3678 Hot Rolled Structural Steel plates
AS 3679 Hot Rolled Structural Steel bars
AS 4006 Software Test Documentation
AS 4100 Steel Structures
AS 4251.1 Electromagnetic compatibility – Generic emission standard – Part 1: Residential, commercial and light industry
AS 4262.1 Telecommunications over voltages - Part 1 Protection of Persons
AS 4262.2 Telecommunications over voltages - Part 2 Protection of Equipment
AS 4806.2 Closed Circuit Television (CCTV) Application Guidelines
AS 60529 Degrees of protection provided by enclosures for electrical equipment (IP code)

Australian and New Zealand Standards
AS/NZS 1170 Structural Design Actions, SAA Loading Code
AS/NZS 1170.2 Minimum Design Loads on Structures – Wind Loads
AS/NZS 1554.1 Structural steel welding – Welding of steel structures
AS/NZS 1768 Lightning Protection
AS/NZS 3000 Electrical Installations - Buildings, Structures and Premises (SAA Wiring Rules)
AS/NZS 3015 Electrical Installations – Extra low voltage d.c. power supplies and services earthing within public telecommunications networks
AS/NZS 3085.1 Telecommunications Installations – administration of communications cabling systems – Basic requirements
AS/NZS 3845 Road Safety Barrier Systems
AS/NZS 4117 Surge protection devices to telecommunication applications
AS/NZS 4676 Structural design requirements for utility services poles
AS/NZS 4680 Hot-Dip Galvanized (Zinc) Coatings on Fabricated Ferrous Articles
AS/NZS 60950.1 Information technology equipment - Safety - General requirements

Other Standards

ACMA Technical Planning Guidelines – Appendix 3, Emission Standard for the Australian Analog Terrestrial Television Service – Video Characteristics
AS/ACIF S009 Installation requirements for customer cabling
AUSTEL Technical Standard 009 Installation Requirements for Customer Cabling

MAIN ROADS Specifications and Documents

Guideline 67-08-71 Intelligent Transport Systems (ITS)
Specification 202 TRAFFIC
Specification 301 CLEARING
Specification 302 EARTHWORKS
Specification 404 CULVERTS
Specification 704 Cable Conduits & Pits for Intelligent Transport Systems (ITS)
Specification 908 Anti Graffiti Coatings Materials Specifications (various)

703.03 DEFINITION OF TERMS

ACMA Australian Communications and Media Authority
AGC Automatic Gain Control
AS Australian standard
AS/NZS Australian and New Zealand standard
AUSTEL Australian Telecommunication
CIF Common Intermediate Format (352 Horizontal x 288 Vertical pixels)

CCTV Camera Closed Circuit Television Camera used for traffic monitoring
703.04 CONTRACTOR RESOURCES

1. The Contractor shall ensure that all work is performed by technically competent persons, and that all electrical work shall be performed by licensed electricians.  

2. The Contractor shall provide all equipment necessary to perform the required work.

3. The Contractor shall have a temporary facility for testing the operation, visibility and range of motion of cameras at the nominated sites to accurately determine the final exact pole position and height. These shall be verified and approved by the Main Roads Project Manager prior to the ordering of any camera poles.

703.05 ORDER OF PRECEDENCE

The following order of precedence (in descending order of precedence) will apply to resolve any ambiguity or discrepancy in the referenced documents and standards to the extent necessary to resolve the conflict, ambiguity or discrepancy.

1) Main Roads Project Specific documentation.
2) This Specification.

3) Main Roads Standards, Specifications and Guidelines.

4) Australian Standards, Specifications and Guidelines.

5) Relevant General Arrangement Drawings and Other Supplementary Standards and Specifications.

703.06 – 703.09 NOT USED

PRODUCTS, MATERIALS AND WORKMANSHIP

703.10 PRODUCTS AND MATERIALS

1. All materials provided by the Contractor shall be new.

2. All materials provided by the Contractor shall satisfy the requirements of this specification. Where it is unclear that an item will fully satisfy these requirements, or the item does not satisfy the requirements, the Contractor shall submit details of the item to the Project Manager for approval, inclusive of manufacturers data and information sheets, and how the item does not meet the required specifications.

3. The Contractor shall demonstrate conformance to the requirements of this specification and project drawings, when using materials and equipment different to that specified.

703.11 WORKMANSHIP

1. All work shall conform to the requirements of the MRWA specifications and standards referenced in Section 703.02 as a minimum.

2. All electrical work relating to cabling and cabling conduits shall be carried out in accordance with AS/NZS 3000.

3. The requirements of the power supply authority and any other body (or bodies) having jurisdiction over such works in Western Australia, shall also be satisfied.

4. The Contractor shall lodge all notices required by the power supply and communications authorities, and any other authority having jurisdiction over the installation, and pay any fees required.

703.12 – 703.15 NOT USED

FUNCTIONAL AND PERFORMANCE REQUIREMENTS
703.16 GENERAL

All equipment installed using this specification forms part of the Traffic Management System at the TOC. As a result, all hardware and software must be fully compatible with MRWA's existing Traffic Management System, and must not interfere in any way with any other system already installed.

Non-interference with Existing Systems

703.16.01 IMAGE QUALITY

1. Images shall be captured, transmitted and displayed at the highest quality and refresh rate permitted by the capacity of the communications network and the imaging equipment system.

Images Transmitted in High Quality

2. CCTV video and control signals for each camera shall be transmitted digitally over the same telecommunications channel. Images shall be transmitted to the MRWA TOC and shall be compatible with the currently used DVTel CCTV control system.

CCTV Video & Control Signals Compatibility

3. Digital imaging technology may be used, however, the imaging equipment and images provided by this equipment shall be interoperable with the control systems in use at the TOC. In addition, imaging equipment shall utilise proven, industry standards that are current at the time of the provision of the equipment.

Digital Imaging Technology

4. During daylight hours, all CCTV cameras shall allow vehicle characteristics such as colour and shape to be easily discerned in the traffic stream at all visible points up to 400m from the CCTV camera installation (excluding geographic limitations such as road curves).

400m Visibility

5. Cameras shall provide high sensitivity for operating at night under low light conditions. Low light operation should have a minimum sensitivity of no less than 0.02 Lux at 1/15 sec shutter speed for a colour image.

Low light Operation

703.17 WEB CAMERAS

1. The image quality and resolution of Web cameras shall ensure that the internet displayed images are reliable and accurate. The cameras shall have the following features:

Web Cameras
a) 1/3 Inch CCD High resolution, Dual Stream H.264 / D1 MPEG4 Day/ Night camera with Wide Dynamic Range. (e.g. DVTel Pro Elite Altitude CF-2100 series Fixed Camera).

b) Multi video resolutions up to D1.

c) Up to 2 x 25 Frames per second.

d) With SD slot available.

e) Two Alarm inputs / One relay output.

f) Unicast or multicast operation.

g) 12 VDC/24 VDC and Power Over Ethernet (PoE) options.

h) Available Web interface for Viewing Configuration and Control.

i) Ruggedized, Corrosion resistant Outdoor housing (IP 66 NEMA 4) with Sunshield & thermostat controlled Heater /Demister.

j) Manually adjustable Pan /Tilt mounting.

2. The fixed web cameras shall provide a moderately wide view of traffic to adequately capture traffic flows over the covered range.

3. All images broadcast onto the Internet must comply with the Western Australian Government Privacy Policies. To ensure that the images are suitable for public display, sensitive areas such as residential and housing should not be viewable. In addition, all images displayed must not allow identification of people or vehicles.

4. All web cameras shall provide a 10/100 Base-T hub sensing Half/Full duplex capable RJ45 Ethernet communications port.

703.18 – 703.22 NOT USED

TECHNICAL REQUIREMENTS

703.23 GENERAL

1. Due to the rapid advancements in technology, only the minimum requirements of hardware selection and technical requirements are included in this specification. Specific projects may need to have some of this information updated to include current requirements.
2. Imaging equipment shall include motorized zoom lens, camera, housing, Pan-Tilt unit, mounts, pole, field cabinets & hardware, camera controls, encoders, associated cabling and surge protection and any other equipment and Works necessary to operate as intended. Node/field cabinets will be provided by others.

3. All camera locations are detailed in the Project documentation.

4. Cameras, lenses, mounting support, control heads, enclosures and associated facilities shall be designed and installed to provide for the optimum quality of the road network images for each location.

5. 240V AC and 24V AC, 50 Hz Power shall be available from the nearest field/node cabinet as shown in the relevant drawings. The preferred operating power for cameras is 24V AC.

703.24 POLES, BRACKETS & POLE HARDWARE

1. Poles, brackets and all associated hardware shall be supplied to support CCTV cameras for traffic monitoring. All CCTV Cameras shall have a full pan, tilt and zoom capability as outlined in this specification.

2. All poles shall be fabricated in accordance with AS/NZS 4677.

3. All poles shall be sufficiently sealed to ensure that moisture running down the side of the column or vermin cannot enter the column.

4. All fastenings shall be stainless steel 304 or 316 grade.

703.24.01 TILT POLE REQUIREMENTS

1. CCTV cameras shall be mounted on poles to provide a secure and stable platform for cameras and pan tilt heads. Each pole, associated assemblies and all parts and accessories shall be corrosion resistant material suitable for salt atmosphere (i.e. zinc galvanised steel or marine grade stainless steel).

2. Typically poles for CCTV cameras shall be 12m or 10m in height however some cameras may need to be a specific height based on a location. In any case the final pole details shall be confirmed by the Project Manager in consultation with the MRWA Systems Development Manager.

3. Each pole shall be a mid-hinged tilt-down arrangement and supplied with appropriate counterweight compatible with the weight of the top of pole installation to provide rotational balance. The structural design of the poles shall be in accordance with AS/NZS 4676.
4. Poles shall be tapered with a polygonal section, with a minimum of eight sides. The pole shall be base plate mounted and supplied with a matching foundation, rag bolt assembly and associated fixing template. The top of the pole shall have a width of no less than 150 mm (AF) to minimise wind caused vibration at the top of the pole. **Pole Profile**

5. An access door shall be provided near the base of the pole. The opening shall be minimum 125 mm wide by 500 mm high. The bottom of the opening shall be minimum 0.5m above the pole bottom. The door shall provide weatherproof resistance to IP43 or better. **Pole Access Panel**

6. The pole shall be designed such that it is not possible for the camera equipment to touch the lower section of the pole and the ground when lowered. Pulling eyes shall be located on the flap and at the pole base so that a rope may be used to raise the hinged section and regulate the lowering speed of the hinged section. **Pole Design**

7. The pole shall have two independent latching systems to hold the hinged section in place. The first latching system shall comprise a tamper proof stainless steel bolt of appropriate strength to fix the hinged top section rigidly to bottom section. The second latching system shall comprise a lug welded to the inside face of the hinged top section and protruding through a hole in the lower pole section when in the upright position. It shall be possible to install a padlock through the lug on the inside of the pole via the hatchway. **Latching System**

8. A 'lock box' shall be welded to the pole surrounding the hole in the hinged top section. The 'lock box' limits unwanted access to the lug and locking mechanism. It shall be fitted symmetrically over the hole. When the pole is in an upright position with the lug protruding through the hole, the lower edge of the lock box shall be 25 mm below the lower edge of the hole in the lug. The general dimensions of the lock box shall be 130 mm wide, 100 mm height, 75 mm depth and 4 mm minimum thickness (galvanised steel). Only the lower side of the lock box shall be open to enable fitting the padlock. **Lock Box**

9. The base plate shall allow the protrusion of 2 x 50mm underground plastic conduit into the base of the pole. If necessary a tapped hole shall be provided in the side of the pole near the top to accept screwed 50mm conduit fittings. The hole shall be within 150mm of the top. Threads shall be cleaned after galvanising. **Base Plate & Upper conduit connection**

10. The foundation bolts shall be provided in a single assembly. The assembly will be made from the appropriate grade of steel commensurate with this specification. The assembly shall be galvanised in accordance with AS4680 and minimum coating thickness shall be 100 microns with no pitting or protrusions. Strength of the assembly shall be commensurate with the pole for which it is intended and a 50-year life in the Perth Region according to AS1170 parts 1 and 2. (For cameras installed in other areas, e.g. cyclone prone areas, the design shall meet the area requirements.) Two nuts and two flat washers per foundation bolt for fixing each pole to its foundation shall be provided. They shall be galvanised to AS4680. Spacing between the bolts shall allow the passage of 2 x 50mm underground plastic conduit sweep bend (250 mm minimum radius). **Foundation Bolts**
11. Fixing templates shall be provided for each of the different assemblies to allow the correct orientation and placing of the assembly in the concrete foundation. The template shall accurately reflect the shape of the pole base to +/- 1mm. The template shall be made of strong waterproof material to prevent movement of the assembly as the concrete is poured.

12. Deflection from wind loading with the camera, pan tilt head and enclosure mounted, shall be less than 0.1 degrees for 28m /sec. wind speed.

703.24.02 FIXED (TCS) POLE REQUIREMENTS

1. Generally for cameras at traffic signals sites a ‘dual use’ camera pole (fixed) shall be installed. This pole is also likely to be used for mounting traffic signal aspects, and as such there will be specific installation requirements.

2. Any work involving Traffic Signals infrastructure must be carried out in co-ordination with ISA Contractor.

3. The column shaft and base shall comply with Australian Standards of Grade and thickness determined in the guideline drawings as listed in Annexure 703A. Any other camera column must be authorised by the Project Manager in consultation with the MRWA Asset Manager Traffic Systems.

4. The construction of the column shall be from steel, square in shape with four equal sides, 150x150 SHS 5056 cut to length, conforming to Australian Standards.

5. The steel plate sections shall be seam welded by a continuous automatic gas shielded electric arc process in accordance with Australian Standard 1554.1/1991.

6. The column shall be fully hot dip galvanised in accordance with Australian Standard 1650 / 1989 following completion of the fabrication.

7. The general finish of all columns shall be of a high quality with all holes and surfaces free from burrs and sharp edges to allow the installation, without damage, of electrical cables into the pole. The surface shall be free of kinks, ripples and galvanising defects.

8. The TCS / Camera column shall be finished in a polyester powder coat golden yellow according to the manufacturers’ specification. The bottom 400mm of the column shall be treated with DuPont ‘Nap-gard’ or similar corrosion protection that conforms to Australian Standards AS/NZS 2312:2002.
Where TCS / Camera Poles are to be used, a terminal box and terminal block assembly shall be provided and installed. The terminal box shall be heavy duty, vandal resistant and constructed from marine grade aluminium sheeting not less than 2mm thickness. It should be finished in a powder coat (blue/grey) according to the manufacturer's specifications, and fitted to the TCS/Camera pole using the screw mounting points provided. A waterproof sealant shall be used between the post and the terminal box cable entry and screw mounting points, to prevent the ingress of moisture. (Terminal Box details are available from the Main Roads Web site.)

703.25 CAMERA HOUSING & PAN/ TILT / ZOOM FACILITY

703.25.01 GENERAL

1. Camera housings shall be robust aluminium construction, weatherproof with baked enamel finish and able to tolerate a corrosive atmosphere.

2. The viewing window shall be an optically clear, free of distortion, tempered glass sheet of at least 5.5 mm thickness. The housing shall be fitted with a with a screen wiper (for non-Dome camera).

3. Pan and tilt units shall be robust and able to give trouble free service in harsh environments. The camera housing and pan-tilt unit may constitute a single assembly (e.g. Pelco Esprit). Integrated dome housings may be used where a ‘dome’ camera is allowed or specified.

703.25.02 CAMERA HOUSING REQUIREMENTS

1. Each camera shall be enclosed in a housing, which protects it from external climate weather effects, without degradation of picture lucidity. All housings shall meet the following minimum requirements:

   a) Provide protection for the camera from driving rain, moisture and dust (IP65 or better).

   b) Housings shall be corrosion resistant, structurally rigid aluminium in construction, weatherproof with baked enamel finish. External fastenings and lock attachments shall be stainless steel 304 grades or better. Coatings and fittings shall tolerate exposures to salt atmosphere and motor vehicle fumes.

   c) A sunshield shall be fitted which shall be corrosion resistant aluminium in construction with baked enamel finish and resistant to corrosion in salt atmosphere.

   d) Ease of access for maintenance shall be provided.
e) Cable entries shall be provided, which are able to accept all cables required to enter the housing. The cable entries shall be weatherproof to IP65 as a minimum.

f) Internal free space shall be provided such that the camera, lens and cables do not interfere with the housing itself. The fan shall not intrude into this space.

g) The camera housing window shall not introduce any distortion to the video picture.

h) A thermostat controlled heater shall be included (as required) to prevent misting.

703.25.03 PAN-TILT REQUIREMENTS

The pan and tilt unit shall be robust and able to give trouble free service in a harsh environment. The pan and tilt unit shall conform to the following as a minimum requirement:

a) The pan-tilt head shall be a heavy duty unit with a MTBF rating of better than 10,000 hours on a 26% duty cycle.

b) Panning arc of travel shall be 360 degrees continuous rotation. Panning speed shall be variable between 0.1 and 40 degrees per second or greater.

c) Tilting minimum arc of travel to be infinitely variable between plus 33 degrees and minus 83 degrees of the horizontal datum. Tilting speed shall be variable from 0.1 to 20 degrees per second or greater.

d) Pan and Tilt mechanisms shall permit aiming of the camera within 0.5 degree of arc. Total backlash of the mechanism shall be less than 0.2 degree.

e) Position feedback shall be fitted for both pan and tilt mechanisms. Where potentiometers are used they shall have a maximum resistance of 10 kilohms and a minimum electrical and mechanical life of 100,000 rotations. Feedback resolution shall be better than 0.2 degrees.

f) The weight of the unit should be less than 15kg.

g) The unit will operate from extra low voltage 24V AC power supply.

h) The pan-tilt head shall function to this specification over the free air temperature range –10°C to +50°C;

i) If the pan and tilt unit is not part of an integrated dome camera housing then it shall be weatherproof to IP65 and resistant to corrosion from salt air and motor vehicle fumes.
703.26 CAMERA & LENS

703.26.01 GENERAL

1. Cameras are to be PAL colour, semiconductor imager charge-coupled device (CCD) type which shall be sensitive for night-time use and resistant to blooming and vertical smear.

2. All Cameras except web cameras shall be provided with PTZ facilities. Cameras shall be available for testing by Main Roads WA on request prior to installation.

703.26.02 CAMERA REQUIREMENTS

1. All CCTV cameras shall meet the following minimum requirements:

   a) Cameras are to be PAL colour, semiconductor imager (CCD) type providing day and night operating modes.

   b) The camera output shall conform to the ACMA Technical Planning Guidelines, 625 lines interlaced, at least 25 frames per second with a composite PAL video signal output of 1V peak to peak, negative sync.

   c) CCD shall consist of 750 Horizontal by 580 Vertical effective pixels minimum. There shall be no more than two defective pixels over the area of a central circle whose diameter is equal to the picture height with no cluster and no column defects.

   d) The imager chip shall be 1/4 inch format minimum.

   e) High Sensitivity cameras shall be used for a usable picture that is un-enhanced by averaging techniques.

   f) Signal to noise ratio shall be as specified on the project (possibly better than 50dB for 10 lux faceplate illumination) or, no AGC and no gamma correction. Transfer smear, blooming and streaking induced by highlights shall be almost zero (eg headlights at night)

   g) AGC shall be included as well as an auto-iris output of 0.7-1 Vp-p. Light range adaption for AGC / auto-iris lens combination shall exceed 10,000:1.

   h) Cameras shall include automatic white balance to compensate for colour temperature of the scene illumination and shall be compatible with the incident street lighting.

   i) Lens mount shall be standard C or CS lens mount type and lockable. A simple form of Back Focus adjustment shall be provided.
j) The camera shall perform to this specification from 24V AC power supply.

k) The camera must be capable of continuous, normal operation over the free air temperature range between –10°C to +50°C and relative humidity up to 90 percent (As per AS 2578-2009, Section 1.4 General Requirements).

l) Preference will be given to those cameras which include noise reduction and sensitivity enhancement techniques such as frame averaging and dynamic range adjustment.

2. Lenses shall be motorised zoom (minimum 24:1 optical zoom) with auto iris and position feedback and shall meet the following minimum requirements:

- **a)** Zoom lenses shall be compatible with the cameras installed.
- **b)** Focus tracking shall be such that the lens will not require focus adjustment for an object at infinity (>10m) over the entire zoom range.
- **c)** Minimum focal length shall be 3.8 mm or less and maximum focal length shall be 91 mm or greater.
- **d)** Maximum aperture number shall be at least F1.2. In combination with the camera AGC the auto iris shall provide a light adaption range of at least 10,000:1.
- **e)** Focus range shall be at least 2 m to infinity.
- **f)** Focus tracking shall be such that the lens will not require focus adjustment for an object at infinity (>10m) over the entire 24:1 zoom range at night. There shall be no visible distortion or lens artefacts to the image over the entire zoom range.
- **g)** Both zoom and focus shall be fitted with position feedback.
- **h)** Both the zoom and auto iris control shall be compatible with the camera and the Extra Low Voltage 24V AC supply. The auto iris servo shall also accept a video signal (0.7v p-p) or composite video (1.0 V p-p) with a minimum 10 kilohm input impedance.
- **i)** The iris shall close if power is lost from the lens iris control.

### 703.27 CAMERA CONTROL

#### 703.27.01 GENERAL

1. Camera control shall be compatible with the existing DVTel CCTV system currently in use at the TOC. Camera control shall include preset positions, which encompass both the pan and tilt angles and zoom settings. Operators shall be able to set and recall positions from the TOC. All cameras shall meet the following general requirements as a minimum:
a) For each pan, tilt and zoom camera site the camera control system shall be capable of setting configurable preset camera positions.

b) The presets for pan and tilt shall be able to be set within 1 degree of arc while zoom and focus shall be able to be set for at least eight distinct focal lengths.

c) On returning to a preset, the pan and tilt repeatability shall be within 0.5 degrees and zoom and focus repeatability shall be within 3%.

d) The camera control shall be compatible with the DVTEL control system used at TOC.

e) At each pan, tilt and zoom camera site the control receiver shall receive and decode information from the TOC without error for ambient free air temperatures in the range -10°C to +50°C and humidity range of 10 to 90 percent.

703.28 CAMERA COMMUNICATIONS

703.28.01 GENERAL

1. The roadside IP/Ethernet based transmission system shall be used to transmit video and control data between the camera and the TOC.

2. The video transmission system shall provide a bi-directional data channel for camera selection and control. Pictures shall be transmitted in full motion and colour. The video transmission system shall meet or exceed in quality the specifications set out in this section.

   a) A minimum resolution of 704 (Horizontal) times 576 (Vertical) pixels (CIF times 4) at a minimum frame rate of 25 frames per second with minimal artefacts and compression effects for each of the camera images.

   b) Full motion colour video shall be provided and the total time lag between the scene and the corresponding displayed image at any monitor at the TOC shall be less than one second, subject to any limitations of the communications system proposed. (e.g. use of 3G communications). Any such limitations shall be taken into consideration and the project stakeholders advised by the Project Manager.

   c) Video terminations at the encoder/decoder shall be BNC socket.

   d) Video bandwidth of any analogue interface of the completed link shall be 10 Hz to 6.0 MHz plus or minus 2dB.
703.29 POWER SURGE & LIGHTNING PROTECTION

703.29.01 GENERAL

1. The Contractor shall provide all required cabling between the field/node cabinet and the Camera pole installation. The Contractor shall provide multi-stage surge protection devices in the field/node cabinet to protect each metallic core for all CCTV power, video and data lines at the field/node cabinet.

2. The protection provided for each circuit shall be by way of a DIN rail mounted device providing primary, secondary and tertiary protection. The device(s) shall be mounted on the communications cabinet 19” rack (DIN rail to be included), or in the ‘Top Hat’ cabinet extension where utilised. The three stage protection consists of:

   a) Clamping of transient excessive voltages diverting the bulk of the current to neutral or ground (at input end).

   b) Filtering of the clamped waveform reducing the rate of residual voltage rise.

   c) Provision for the final stage diversion of surge currents to provide protection from surge currents induced onto the output cables or caused by the load itself. This includes High Frequency filtering.

3. The protective device on each circuit shall include a means for indicating (visually) when it has been ‘tripped’ and is no longer providing protection to the circuit.

4. Each device shall connect to an approved earthing system at the site in accordance with the manufacturer’s recommendations and sound engineering practices.

5. All surge protection devices shall be multi-stage devices complying with AS/NZS 4117 with the following minimum characteristics (Ref Waveforms in Figure F1, Table F1, Appendix F of AS/NZS 1768 and AS 4262.2):

   a) Power line protection: Maximum discharge current (8/20μs) = 6.5kA;

   b) Video and signal line protection; maximum discharge current (8/20μs) = 20kA.

703.29.02 PROTECTION - VIDEO CIRCUITS

1. Each camera video circuit shall be surge/lightning protected using a DIN rail mounted multistage protection device.

2. Video coaxial cables shall first terminate at the surge/lightning protection devices before connection to the video patch panel.
3. Each protective device shall as a minimum meet the protective characteristics of a Novaris Technologies combined surge protector type SF102DIN-CLB.

703.29.03 PROTECTION - POWER SUPPLY CIRCUITS

1. Each camera power supply circuit shall be surge/ lightning protected using a DIN rail mounted multistage protection device.

2. Camera power supply cables shall first terminate at the surge/ lightning protection devices before connection to the camera power supply output terminals.

3. Each device shall meet or exceed the protective characteristics of a Novaris Technologies combined surge protector type SF102DIN-CLB.

703.29.04 PROTECTION - DATA CIRCUITS

1. Each wire of each camera PTZ control circuit shall be surge/ lightning protected using a DIN rail mounted multistage protection device.

2. The PTZ camera control cables shall first terminate at the surge/lightning protection devices before connecting to the camera control circuit distribution equipment.

3. For RS 485 control circuits, the device shall provide similar functionality and performance to a Novaris Technologies surge protector as specified in item 3 above.

703.30 CAMERA SCREEN WASH & WIPE FACILITY

1. All CCTV Cameras (except where Dome cameras are specified) shall be provided with a screen wash / wiper facility.

2. The screen wash reservoir shall store a minimum of five (5) litres, and be contained in proximity to the camera unit. When utilising 'dual use' TCS camera poles the water storage container would normally be located in a pit close to the signal pole. The contractor shall install the pit, container, pump and associated controlling equipment for control from the TOC.

703.31 SPARE PARTS & TOOLS

1. The Contractor shall maintain sufficient spares where a device or component is known to have a high fault rate or a high ordering delay time.

2. Where operation, maintenance, dismantling, reassembling, adjusting or aligning requires special tools or instruments, these are to be supplied with the equipment.
703.32 – 703.35  NOT USED
CIVIL REQUIREMENTS

703.36 CONFLICT WITH DRAINAGE PIPES AND OTHER SERVICES

1. Before commencing any work, the Contractor shall make all enquiries and inspections as may be necessary to become fully conversant with the type and location of surface and underground utility services at the site of works. The Contractor shall ensure that care is taken during the progress of the work to avoid any possibility of damage to any public utility.

2. Any trenching near services shall be carried out manually. Damage caused by the activities of the Contractor shall be made good by the Contractor. If made good by others, the cost of repair shall be recoverable from the Contractor.

Note:

All drawings supplied showing existing Main Roads services, equipment and structures (including existing conduits) are provided for information purposes only and may not be accurate in every detail. The Contractor shall verify the exact location of services and structures that are to be utilised, modified, or in any way affected by the proposed installations. Utilisation of any existing services or structures for installation purposes shall be subject to verification and approval by the Main Roads Project Manager.

703.37 Trenching and Backfill

1. All the excavations necessary for the installation of cable pits and conduits shall be backfilled and any surface disturbance that may have been necessary during the course of installation made good.

2. The backfill shall be compacted to match the surrounding soil density and graded to match surrounding surface level. The top 100mm layer above the top of the conduits shall be clean sand.

3. The Contractor shall gain verbal approval from the Main Roads Project Manager prior to initiating any backfilling, as the Project Manager may elect to inspect trenches or excavations, including the pits and conduits, prior to authorisation.

703.38 Reinstatement and Clean-Up

1. Disturbed pavement surfaces for non-motorised traffic such as concrete or brick paved areas and pathways shall be reinstated to original condition to the satisfaction of the Main Roads Project Manager.
2. Any surplus or waste materials such as unused conduits, off-cuts, packaging, etc. shall be removed from the site by the Contractor who shall also be responsible for all cartage and tipping charges.  

703.39 ROAD CROSSINGS

1. Where a crossing is under the road pavement, the crossing shall be installed by directional drilling. Under no circumstances shall the pavement or surfacing be cut to install the crossing.

703.40 – 703.44 NOT USED

INSTALLATION

703.45 GENERAL

703.45.01 NOTICES

1. The Contractor shall lodge all notices required by the power supply authority and any other authority having jurisdiction over the installation and pay any fees required.

703.45.02 PUBLIC SAFETY

1. The Contractor shall progress the works such that the length of open trench is kept to a minimum. No open trenches shall be left unattended or accessible by the public.

2. Where necessary, control of traffic including pedestrians and cyclists shall be undertaken by the Contractor in accordance with Specification 202 TRAFFIC.

703.45.03 CLEARING

1. Clearing shall be undertaken in accordance with Specification 301.

703.45.04 ANTI-GRAFFITI COATINGS

1. Anti-graffiti coating shall be applied in accordance with the MRWA Specification for Anti-graffiti Coatings.

703.45.05 PROVISION FOR TRAFFIC

1. Any work which may disrupt vehicular traffic shall not be carried out during morning and evening peak periods between the hours of 7:30 am – 9:30 am and 3:45 pm – 6:00 pm Monday to Friday and on Saturday from 8:00 am – 1:00 pm.
2. The Contractor shall notify the Project Manager in writing of any scheduled works which require lane closures or is likely to cause significant disruptions to traffic, at least seven (7) working days prior to commencement.

3. Where lane closures are required to perform the work, the Contractor shall submit a detailed traffic management plan to the Project Manager at least seven (7) working days prior to the commencement of work. The plan shall include:
   a) Proposed working hours.
   b) Traffic volume data.
   c) Sequence of work.
   d) Type and placement of signs and other traffic control devices.
   e) Plan of work area including all approach roads.
   f) Details of work vehicles and other large plant.

703.45.06 LOCATIONS

1. Camera installations shall be installed in accordance with this specification in locations indicated by the project specific documentation.

2. The Contractor shall undertake testing at each camera site using temporary facilities to test the operation, suitability of image and range of the camera in the nominated position (including at the proposed height) to accurately determine the final camera type, position, mounting equipment and final pole installation height details. The Main Roads Project Manager will verify these details prior to the ordering of equipment.

3. Camera locations must consider occlusion from vegetation and other objects such as signs and existing structures in order to minimise visual obstructions in the CCTV imagery.

4. All CCTV camera poles and associated roadside equipment shall be easily and safely accessible for maintenance purposes.

703.46 CAMERA AND POLE INSTALLATION

703.46.01 CAMERA INSTALLATION

1. Each camera and associated housing shall be securely mounted on the column via the PTZ platform in accordance with the manufacturer’s recommendations.

2. The camera shall be mounted at a height nominated in the specific design documentation for the project within ± 10mm. (This will incorporate the final decision(s) based on the onsite tests required by this specification).
3. The camera shall be wired to operate the heater (where fitted), screen wash and wipe facility, pan, tilt, zoom remotely from the monitoring location.

4. The field of view of each camera shall be in accordance with what is agreed to by the Main Roads Project Manager through the preliminary testing process as outlined in Section 703.04.

5. If installing in a cyclone prone area, cyclone installation requirements shall be adhered to.

703.46.02 CAMERA POLE INSTALLATION

1. The following camera poles are approved for installation and mounting of cameras, provided they meet the requirements of this specification:
   - Tapered Tilting Galvanised steel pole (height and performance details as specified).
   - Joint Use TCS/Camera pole

2. Each camera pole shall be fully hot dip galvanised in accordance with Australian Standard 4680/1999 following completion of the fabrication.

3. TCS / Camera Poles shall be base plate mounted.

4. The preparation details for installing the steel reinforced slab type CCTV pole base shall include:
   - removal of loose soil and material;
   - placement of crushed limestone in layers not exceeding 300 mm; and
   - Compaction of each layer to produce a total thickness of 600 mm.

The compaction shall be tested with a standard Perth falling weight penetrometer in accordance with AS 1289, F3.3 -1984. The minimum acceptable blow count is 8 blows per 300 mm for the whole of the 600 mm depth below the footing.

A 50 mm thick blinding (concrete) layer shall be placed to prepare for the slab base. The slab base design shall take into account the actual pole and camera system dimensions and weight.

Assembly and installation of the columns shall be in accordance with the Manufacturer's Instructions. Apart from the foundation bolts, all fixings and bolts shall be stainless steel grade M0316.

5. Prior to the installation of the pole footing the excavated hole shall be presented to the Construction Manager for approval to proceed.
6. All concrete shall be minimum Class N32 in accordance with Specification 901 CONCRETE - GENERAL WORKS, dependant on site requirements.

Concrete

7. Should the water table be such that the concrete cannot be placed in a dry hole, it shall be placed by tremie. Water shall not be allowed to flow through the space in which the concrete is to be cast. Should the walls of the hole be likely to collapse before pouring the concrete, a simple sheet metal, Spirolock or plastic sleeve shall be inserted to prevent the collapse. The tremie shall consist of a sheet metal hopper with a metal pipe leading out of the bottom that has a simple outlet valve at its lower end. It shall be water tight with a minimum diameter of 100mm. The tremie shall be kept filled with concrete at all times during placing. Should the concrete charge be lost, the tremie shall be withdrawn and refilled. The tremie shall be operated in such a manner as to discharge below the surface of the fresh concrete and to maintain as nearly as practicable uniform flow. Concrete shall not be dropped through water. No agitation or vibration of the concrete shall be permitted during placing. Compaction shall take place after concrete pouring has been completed and the water displaced.

Tremie

8. Prior to the drilling of any bridge or other structural element all locations, sizes and depths of the penetrations and of any reinforcement likely to be affected by the drilling operations shall be accurately identified for approval by the Engineering Manager to proceed.

HOLD POINT

9. Provision shall be made in the footing of all camera poles for three (3) cable entry points via large sweep conduit bends of radius no less than 320 mm:

- two 50mm conduits (orange)
- one 32mm conduit (orange)

Footing Conduit Entry

10. A pit shall be installed as close as practical to the camera pole. This shall allow the installation of the water container for the screen wash facility (where used). The conduits leading to the camera pole shall terminate at this pit. The pit details shall be confirmed with the Project Manager to ensure site specific details are taken into account.

Provision of Pit Adjacent to Pole

11. The orientation of the sweep bends shall be compatible with the cable runs proposed to link into the CCTV communications cabinet.

Cable Entry Bends Orientation

12. If a TCS / Camera pole is to be installed and will replace an existing traffic signal pole, the footing shall be installed prior to the removal of an existing traffic signal pole and positioned as close as possible to the existing traffic signal pole or at a location nominated by the Main Roads Project Manager. Where the existing traffic signal reticulated ring main cables are not terminated in ground termination pits, provision shall be made to install a traffic signal termination pit, in accordance with Main Roads specifications, at a location as close as possible to the new TCS/Camera pole footing or at a location nominated by the Main Roads Project Manager.

Order of Works
13. All pole footings shall be designed by a qualified structural engineer (eligible for corporate membership with the Institution of Engineers), using the relevant Australian Standard, and taking into account wind, soil, and clearance conditions at the nominated site. This shall include cyclone specific requirements.

703.46.03 CAMERA POLE ASSEMBLY

1. For the dual use camera pole assembly all work involving wiring and connection of the traffic signals shall be carried out in conjunction with the current MRWA ISA Contractor. For an existing TCS site the dual use pole installation will normally require the disconnection of the signal pole being replaced. Removal of signal hardware and the re-wiring of the dual use pole will be required. The signal aspects (and any other signals hardware) shall be re-connected to the new terminal box that shall be supplied and installed as part of the requirements for the camera installation.

2. Poles (tilting type) shall be installed to articulate in a direction that will not cause disturbance or danger to traffic, pedestrians and workers.

3. Poles shall be erected in accordance with the manufacturer’s published procedures. Care must be taken when handling the poles so that the galvanising is not damaged. Metal slings, if used, shall have adequate protection so that metal to metal contact does not occur. Poles must be erected in a safe way approved by the construction manager.

4. Each pole shall be bolted truly vertical on its footing.

703.46.04 EXCAVATIONS

1. The Contractor shall ensure that full information is obtained regarding any underground services in the vicinity of any excavation for footings or underground conduits, and that care is taken during the progress of the work to avoid any possibility of damage to any public utility.

2. Any trenching near services shall be carried out manually.

3. The exact location of all services that are in the vicinity of any excavation shall be accurately determined with the assistance of the relevant authority.
703.47 INSTALLATION OF COMMUNICATIONS CABINET OR ‘TOP-HAT’ FOR SIGNALS CONTROLLER CABINET

703.47.01 GENERAL

1. Each ‘Top-Hat’ or stand alone CCTV cabinet shall be installed at the location depicted in the specific project documentation, or location approved by the Main Roads Project Manager. Work on the traffic signals controller shall only be carried out in conjunction with the current MRWA ISA contractor.

2. The video data processing, data compression and interface equipment, camera power supply and other control equipment shall be housed in the cabinet or ‘Top-Hat’ Signals controller cabinet extension.

3. All CCTV cabinets shall be installed in accordance with MRWA Drawing numbers 0648-3015 or 0648-3016.

4. All top-hat installations shall be installed in accordance with MRWA drawing numbers 0948-0202/0948-0203 (depending on controller type).

703.47.02 COMMUNICATIONS

1. The Contractor shall request the Main Roads Project Manager to liaise with the Main Roads Systems Development Manager in order to coordinate the most suitable communications method for each particular CCTV installation.

2. Where a Telstra connection is to be used, a conduit shall be installed between the Telstra pit and the communications cabinet to meet Telstra requirements.

703.48 MAINS CONNECTION

703.48.01 CONNECTION OF ELECTRICAL MAINS SUPPLY

1. Where a source of supply is available from a nearby MRWA lighting switchboard or traffic signal controller, a connection shall be made to the CCTV communications cabinet.

2. Where the supply is not available, arrangements shall be made with Western Power to provide a consumer main supply meeting Western Power’s requirements. In such cases a meter box to Western Power’s requirements shall be provided if no exemption to this is authorised by them due to the low power requirement.

703.48.02 MAINS SUPPLY METER BOX

1. Where a meter box is required, it shall be installed in the location required in the project specific design documentation.
2. Two keys for the meter box shall be supplied and given to the MRWA Project Manager at the completion of the work.

3. All power from this connection point shall be reticulated underground. No power or other conduits shall be mounted externally on any pole or structure (including aerial pole).

4. All electrical equipment shall be internally protected from damage from electrical transients in power or signal wiring, from radio frequency interference or static electrical discharge (including lightning strikes in the vicinity) as outlined in Section 703.29

**703.49 ELECTRICAL INSTALLATION**

**703.49.01 CONDUITS AND PITS**

1. All conduits and pits installed for any CCTV traffic monitoring camera sites shall be supplied and installed in accordance with Specification 704 – Cable Conduits for Intelligent Transport Systems.

2. Unless otherwise specified, conduit shall be installed between the communications cabinet base and the camera mounting pole footing incorporating the following:
   - 1 x 50mm diameter, white, heavy duty PVC conduit for communications cables
   - 1 x 50mm diameter, orange, heavy duty PVC conduit for power cables

3. Conduits shall have a bend radius of 320 mm or greater.

4. The conduits shall be installed such that water which may enter the conduits always drains into the cable pits.

5. All cables in the pit, whether joined or not, shall be taken over the conduit wedged into and across the top of the pit and securely fixed with a nylon cable tie to the conduit as detailed in Main Roads Standard Drawing No. 200231-0063.

6. All cables shall be clearly identified with permanent water resistant cable markers showing each outgoing cable in the node/field cabinets.

**703.50 INTEGRATION WITH TOC DVTEL CAMERA SYSTEM**

1. The cameras installed under this Specification shall be fully integrated with the current TOC DVTEL CCTV camera control system. The installed cameras shall be able to be controlled via the TOC system, including full control of the pan, tilt zoom, screen wash and wipe functions and shall provide a clear image from the camera.
703.51 INSTALLATION OF SAFETY BARRIERS

703.51.01 GENERAL

1. Guard railing shall be erected to conform to AS/NZS 3845:1999 - Road Safety Barrier Systems. However this requirement might vary as per the location and the availability of the space around the pole.

703.51.02 VERTICALITY OF POSTS

1. All posts shall be vertical. The Contractor’s attention is drawn to the need to detail individually angled brackets and joints to ensure that this requirement is met.

703.51.03 CURVING OF RAILS

1. Where rails are shown to be curved, they shall be curved to form that shape without “springing” forces being applied to the posts. The methods adopted or curving the rails shall be such as not to excessively distort the section or damage the material.

703.51.04 PAINTING OF KERBSIDE FACE

1. On completion of assembly the kerbside face of all RHS guardrails shall receive one (1) coat of an each primer complying with Government Paint Committee Specification number GPC-P-13-1. This shall be followed by two coats of white acrylic paint complying with Specification number GPC-C-29/1A. The colour shall be as detailed in the design of the installation.

703.51.05 EXISTING GUARDRAILS

1. Where extension of existing guardrail is required or where a guardrail is in close proximity to an existing guardrail, the Contractor shall ensure that the design of the guardrail is compatible to the design of the existing guardrail as well as complying fully with the specifications and drawings. The Contractor shall take care to ensure that the railings are erected to smooth curves which reflect the design profiles of the existing guardrail. In particular, the Contractor shall ensure that a smooth profile is maintained in the top rail after the site connections have been completed.

703.52 – 703.54 NOT USED

ACCEPTANCE AND TEST CRITERIA

703.55 ACCEPTANCE TESTING

703.55.01 GENERAL
1. The Contractor shall supply all labour, materials and equipment required to fully test and commission the installation. Commissioning/Acceptance Testing shall be carried out in the presence of a representative of the MRWA.

2. Installation and/or equipment will be accepted only after satisfactory completion of commissioning tests. If a test is unsuccessful the equipment shall be repaired and re-erected as appropriate and subject to retest until successful.

3. The cost of any retesting if necessary shall be borne by the Contractor.

703.55.02 SEQUENCE

1. The Contractor shall undertake Testing and Commissioning in the following sequence:

   a) Submit draft Inspection and Test Plan (ITP)
   b) Update ITP based on MRWA requirements
   c) Undertake Inspection and Testing
   d) Submit completed ITP for review, complete any additional items as required
   e) Undertake Commissioning/Acceptance Testing with MRWA

703.55.03 REQUIREMENTS

1. Receipt of the following by MRWA shall constitute advice by the Contractor that the installation is complete and ready for Acceptance Testing:

   a) The completed signed ITP
   b) Supporting details
   c) Draft manuals and ‘as-constructed’ documentation

2. MRWA will review the completed ITP and supporting details and will advise the Contractor if any further work or submission is required prior to Acceptance Testing.

703.55.04 ARRANGEMENTS

1. Prior to Acceptance Testing, the Contractor shall make all necessary access arrangements and confirm with MRWA of the need for and nature of any necessary site inductions.
2. During Acceptance Testing the Contractor shall attend site and make available for the use of MRWA, tools, plant, equipment, operators and escorts as necessary to enable access to all system components.

3. Acceptance testing with MRWA may include repeat of any or all elements of the ITP plus a detailed verification of the correct operation of each device and function.

703.55.05 ACCEPTANCE TESTING DELAYS

1. Once the Acceptance Testing commences, MRWA reserves the right to delay or abort Acceptance Testing if:

   a) The status of the work does not match the status verified by the Contractor on the ITP;
   b) The status of the work does not allow full and complete operation of the system;
   c) A component failure renders any part of the system inoperable;
   d) The site owner/operator denies access to any part of the works;
   e) The works are not accessible due to inadequate or incorrect access provision being made by the Contractor;
   f) The Acceptance Testing work cannot proceed with reasonable certainty that the installation is in its final state due to outstanding/ongoing work by the Contractor.

2. If the cause of the delay or cancellation is within the responsibility of the Contractor as assigned under the Contract, any associated costs will be borne by the Contractor.

703.56 INSPECTION AND TEST PLAN

703.56.01 GENERAL

1. In addition to the Contractor’s own Quality Assurance requirements the Contractor shall provide a complete ITP. The ITP shall include test schedules designed to incorporate the following information:

   a) Name of Test and its status - original test or repeat (due to a previous test failure), date, time and location of the test;
   b) Record of all values measured during installation/commissioning;
c) List of test equipment used and statement of software and software version number used

d) A description of how the test is to be conducted (connection to test equipment, configuration of test equipment, test process)

e) Reference back to this specification to confirm compliance with each individual requirement clause

703.56.02 DRAFT SUBMISSION

1. Four weeks prior to the proposed date for commencement of Inspection and Testing, the Contractor shall submit a draft ITP for assessment by MRWA. Update the ITP based on the requirements of MRWA and conduct Inspection and Testing in accordance with the Plan.

703.56.03 UNDERTAKING THE ITP

1. Inspect, test and tick/cross off each item on the ITP. Each page of the ITP shall be signed and dated by the person conducting the site inspection and testing.

2. Where a specific item on the ITP cannot be checked off by the inspection personnel, place a cross against the incomplete item, note the reason for the omission and identify the required rectification action:

   a) All crossed items shall be completed before Acceptance Testing with MRWA

   b) On completion, the overall ITP shall be signed and dated by the Contractor

   c) Forward a scanned electronic copy of the completed signed ITP to MRWA

   d) On receipt of the ITP and supporting details, MRWA will confirm dates for Acceptance Testing

703.57 - 703.64 NOT USED
DOCUMENTATION

1. The Contractor shall provide the following staged documentation during the progress of the project.

703.65 CCTV DESIGN DOCUMENTS

1. The CCTV design documents shall include as a minimum the following documented information:

   a) CCTV Block Diagrams
   b) CCTV Functional Description
   c) CCTV Wiring Diagrams
   d) CCTV Equipment Specifications

703.66 EQUIPMENT SPECIFICATIONS

1. The Equipment Specifications shall include the hardware and software data sheet specifications to show the equipment offered for the CCTV System complies with the levels of functionality, performance and suitability required in this specification. Not less than the following equipment specifications shall be provided:

   a) Structural Specifications of Camera and Camera Head Mounting Components
   b) Camera Enclosure Component Environmental Specifications
   c) CCTV Camera Data Sheets and Functional Descriptions
   d) CCTV Camera Lenses Data Sheets
   e) Video/Data Encoder Data Sheets

703.67 CCTV INSPECTION AND TEST PLAN

1. The Contractor shall provide an inspection and test plan in accordance with Acceptance and Test Criteria (sections 703.55 – 703.56) of this specification.

703.68 INFRASTRUCTURE INFORMATION

1. Inventory records shall be adjusted to reflect the installation of the monitoring camera and all associated items.

703.69 - 703.74 NOT USED
AS BUILT AND HAN.DOVER REQUIREMENTS

703.75 AS-BUILT INFORMATION

The Contractor shall provide all drawings, documentation, and training enabling the long-term maintenance and management of all newly installed camera systems. All drawings shall comply with the standard Main Roads format “MAIN ROADS WESTERN AUSTRALIA - AUTOCAD DRAWING STANDARDS”.

The Contractor shall provide documentation in the form of drawings, plans and diagrams showing camera system site installations, all components, interconnections and the location of all services. This information, provided in two sets of manuals, should include:

a) Finalised design phase documentation.

b) Specifications, technical manuals, software manuals and operator manuals for all CCTV Equipment.

c) Drawings and datasheets for all equipment, including requirements for maintenance fault finding and repair.

d) A complete inventory of all major components installed at each camera site, including camera(s), lens(s), video data and control data transmission equipment, camera pole(s), mounting platforms, equipment housings etc.

e) The modification of existing as-constructed maintenance drawings (in CAD format) to show all changes implemented as part of any new contract, including both physical layout (pits, cabinets, conduits, cables and other equipment) and schematics (electrical and optic fibre). This applies to existing optic fibre backbone drawings, camera site drawings and drawings related to the TOC site.

f) CCTV Communication Network drawings related to the new installation

g) Cable schedules for the CCTV system.

h) GPS Co-ordinates for each camera location.

i) Final test and commissioning specifications with results and dispositions of non-conformances.

The Contractor shall provide a set of as-constructed drawings in line with Main Roads asset drawing guidelines (MRWA ELECTRICAL INFRASTRUCTURE ASSET DRAWING GUIDELINES – sections 1 and 5) consisting of, but not limited to, the following:
1. A CCTV General Arrangement drawing in 1:250 scale showing:
   - The physical layout of the installation including all equipment installed both above and below ground i.e. Camera poles, footings, crash barriers communications cabinets etc.
   - The location and route of each conduit run for power, communications and camera connections.
   - All electrical and communications cable sizes, cable runs and points of attachment.
   - General background, including the kerb line of roads and islands (this can be imported from drawings supplied by the Principal).
   - An asset number in the format of CAM#####, where #### is an asset number advised by the Principal.

2. Communications cabinet layout drawing showing:
   - Electrical equipment layout incoming electrical cables, switchboard, power supply and surge protection
   - Communications equipment layout including transceiver equipment (ISDN/ Optical), termination points, outgoing and incoming communications cables

3. Electrical wiring diagrams of the complete installation including interconnections and interfaces between all equipment.

4. Upgraded electrical layout drawings, where a camera is installed at a traffic signals site. The electrical cable charts (laminated) shall also be updated and re-issued to reflect all changes made.

5. Where applicable, provision of optical fibre test results and updated “as constructed” information in accordance with main roads “Speciation for the Design, Supply and Installation of Optical Fibre Communications Networks”

6. The Contractor shall make an accurate record of all changes where the actual installation differs from that shown in the contract drawings and specification. This record shall be forwarded to the MRWA Project Manager.

7. Each submitted drawing shall be supplied in four (4) A2 and two (2) A3 paper copies, plus an electronic copy in AutoCAD R14 format.

703.76 – 703.84 NOT USED
703.85 – 703.90 NOT USED
The following Main Roads standard sign drawings are available on the Main Roads web site.

<table>
<thead>
<tr>
<th>Drawing No.</th>
<th>Ref.</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>0648-3015</td>
<td>MRWA Web Page</td>
<td>CCTV /VDS Cabinet</td>
</tr>
<tr>
<td>9430-0506</td>
<td>MRWA Web Page</td>
<td>Wind Speed Region and Terrain Category Chart</td>
</tr>
<tr>
<td>0148-2429</td>
<td>MRWA Drawing</td>
<td>Camera Mounting Brackets (Dome Camera)</td>
</tr>
<tr>
<td>201231-0033</td>
<td>Combined CCTV and Traffic Pole Elevation and Sections - CHS Pole</td>
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</tr>
<tr>
<td>201231-0034</td>
<td>Combined CCTV and Traffic Pole Details - CHS Pole</td>
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<tr>
<td>201231-0035</td>
<td>Combined CCTV and Traffic Pole Elevation and Sections - SHS Pole</td>
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<td>201231-0054</td>
<td>Combined CCTV and Traffic Pole Details - SHS Pole</td>
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<tr>
<td>201231-0055</td>
<td>Combined CCTV and Traffic Pole - Camera Mounting Details</td>
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</table>
CONTRACT SPECIFIC REQUIREMENTS TO ADD OR DELETE

The following clauses are to be placed under the CONTRACT SPECIFIC REQUIREMENTS as required.

NONE AT THIS TIME.
1. SCOPE

1.1 This Specification primarily covers the requirements for new Closed Circuit Television (CCTV) Cameras for Traffic Monitoring on the freeways, arterial and local roads, both in metropolitan and country areas from the Main Roads Traffic Operations Centre (TOC). It also provides the requirements for ‘web’ cameras providing traffic images directly to the public via the Internet.

1.2 Where modifications to existing CCTV Cameras are proposed, then the scope (Clause 703.01) will need careful editing to clearly outline the extent of the Works. The relevant clauses in the document would also need to be updated to ensure the information provided accurately outlines the extent of the works required.

2. CROSS REFERENCING TO OTHER CONTRACTS

2.1 The final CCTV Camera specification shall include cross-referencing to other relevant specifications, as likely to be required, such as:

Specification 100   GENERAL REQUIREMENTS

Specification 301   CLEARING

Specification 302   EARTHWORKS

Specification 704   CABLES, CONDUITS & PITS FOR INTELLIGENT TRANSPORT SYSTEMS

Specification 712   SIGNALS

Specification 901   CONCRETE WORKS

Specification 908   ANTI-GRAFFITI
## SPECIFICATION AMENDMENT CHECKLIST

Specification Name: No: 703 Revision No: ____ Title: CLOSED CIRCUIT TELEVISION MONITORING CAMERAS

Project Manager: Name: _____________ Signature: ___________ Date: __________

Checked By: Name: ______________ Signature: ______________ Date: __________

Contract No: ______ Contract Description: _____________________________________

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>SIGN OFF</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Project Manager has reviewed Specification and identified Additions and Amendments.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Any unlisted Materials/Products proposed and approved by the Project Manager? – if “Yes” provide details at 15.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Standard Clauses amended? – <strong>MUST SEEK</strong> approval from MCP.</td>
<td></td>
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<tr>
<td>5.</td>
<td>Clause deletions shown as ‘NOT USED’.</td>
<td></td>
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<tr>
<td>6.</td>
<td>Appropriate <strong>INSPECTION &amp; TESTING</strong> parameters included in Spec 201 (Test Methods, Minimum Testing Frequencies verified).</td>
<td></td>
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<tr>
<td>7.</td>
<td><strong>ANNEXURES</strong> completed (Refer Specification Guidance Notes).</td>
<td></td>
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<tr>
<td>8.</td>
<td><strong>HANDOVER</strong> and <strong>AS BUILT</strong> requirements addressed.</td>
<td></td>
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<tr>
<td>9.</td>
<td>Main Roads QS has approved changes to SMM.</td>
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<tr>
<td>10.</td>
<td>Project Manager certifies completed Specification reflects intent of the design.</td>
<td></td>
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<tr>
<td>11.</td>
<td>Completed Specification – independent verification arranged by Project Manager</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Project Manager’s review completed.</td>
<td></td>
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<tr>
<td>13.</td>
<td><strong>SPECIFICATION GUIDANCE NOTES</strong> deleted.</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td><strong>TABLE OF CONTENTS</strong> updated.</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Supporting information prepared and submitted to Project Manager.</td>
<td></td>
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Further action necessary:

Signed: ___________________ *(Project Manager)* Date: ______________