ITS specification
Roadside cabinets (ITS-02-04)

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NZ TRANSPORT AGENCY
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Document management plan

1) Purpose

The purpose of this document is to specify the requirements for ITS equipment and systems roadside control and network node cabinets design and installation.

2) Document information

Document name	ITS specification: Roadside cabinets
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3) Key words

ITS Roadside Cabinets Supply and Installation.

Record of amendments

Amendment number	Section amended	Description of change	Updated by	Effective date
Draft R0	All	ITS Draft Specifications Issue	TLH & JF	20/9/2010
Draft R1	All	AMA Specifications Review	JF & TLH	25/1/2011
Final R2	All	Final	BW & JS	14/2/2012

Contents

1.0 General

1.1 Scope

This Section sets out the requirements for the installation of roadside control cabinets and network node cabinets.

The roadside control cabinets shall provide the following functions:

a. Local control facility for operation, maintenance and testing of field equipment i.e.: CCTV, VMS and VDS;

b. Physical communications interface to the ITS fibre optic cable network;

The network node cabinets shall provide the following functions:

a. ITS fibre optic cable network Ethernet communications node equipment;

b. Local control facility for operation, maintenance and testing of field equipment connected at the roadside cabinet site;

1.2 Drawings

The standard drawings attached in Appendix B are provided for information to provide a basis for design. Site specific detailed design drawings for the cabinet location and ducting connections shall be provided for review prior to commencement of installation.

1.3 Roadside cabinet numbering

1.3.1 Roadside control and network node cabinets

Roadside control and network node equipment cabinets shall be labelled in the format "E-CCC-D" typically E-202-W.

a. where "E" is E for equipment cabinet.

b. where "CCC" is the first three digits of the site number assigned to the Jointing Chamber.

c. where "D" is the direction of traffic on the carriageway on which the chamber is located, e.g.: N (northbound), S (southbound), E (eastbound) or W (westbound).

1.3.2 Ramp signal controller cabinets

Ramp signal controller cabinets shall be labelled in the format "E-RRRR-D" typically E-8006-N.

a. where "E" is E for equipment cabinet.

b. where "RRRR" is the SCATS identifier number assigned to the Ramp Meter and used for all the ramp meter equipment connected to the controller.

c. where "D" is the direction of traffic on the carriageway on which the chamber is located, e.g.: N (northbound), S (southbound), E (eastbound) or W (westbound).

2.0 Design criteria

2.1 General cabinet requirements

All Roadside Control and Network Node Cabinets shall:

a. Be of a common design for all sites;

b. Be of similar type to the existing cabinets.

c. Be free standing with front and rear opening doors;

d. must utilise standard 19 inch racks for mounting of hardware;

e. Be lockable with a padlock common to all cabinets (including existing);

f. Be fully equipped to withstand the specified environmental conditions;

g. Be fully equipped to maintain the required operation conditions for the equipment which is to be enclosed within;

h. Be fitted with a unique and permanently fastened engraved cabinet identification nameplate so as to be easily seen when approaching along the motorway; and

i. Each cabinets colour shall be Karaka Green unless otherwise specified

Details of the final layout, connections and construction details shall be submitted to the Engineer for review of before commencing manufacture.

2.2 Network node cabinets

Network node cabinets shall be double bay cabinets with external dimensions of 1350mm (H) x 860mm (D) x 1500mm (W).

2.3 Roadside control cabinets

Roadside control cabinets shall be single bay cabinets with external dimensions of 1350mm (H) x 620mm (D) x 750mm (W).

2.4 Ramp signal controller cabinets

Ramp signal controller cabinets shall be the standard signal controller cabinets supplied with the signal controller units.

A hard standing, where practical, shall be located adjacent to any roadside communications cabinet to allow ease of access for maintenance, where this is not possible a suitable location shall be identified and agreed with the maintenance organisation.

2.5   Equipment layout

The equipment installed within the cabinet will vary dependant on the requirements, but typically all electrical terminations shall occur at the bottom of the cabinet in a dedicated Power Distribution Unit.

Equipment layouts shall be symmetrical and allow a minimum of 25% space for future additions. Equipment shall be positioned to allow easy maintenance access.

Sufficient space shall be provided to allow all internal components such that they are mounted to their manufacturer's requirements.

3.0 Cabinet supply and installation

3.1 Cabinet manufacture

The controller cabinet shall have the following features:

a. Dimensions: Minimum internal dimensions of 1205 mm high by 410 mm deep by 565 mm wide.

b. Materials: 2.5 mm aluminium alloy.

c. A front door with three internal hinges on the left-hand side.

d. Rust resistant recessed handles complete with top and bottom rods and side tongue for locking and using a key

e. The door is to be constructed so the levering of the door open with a screwdriver or crow bar is not possible and be earth bonded.

f. Have welded construction with no rivets or nuts or bolts visible from the outside.

g. Be stiffened to prevent the cabinet from flexing once installed.

h. Be ventilated at the bottom and top to facilitate circulating airflow.

i. Be weather proof with a minimum IP55 rating and vermin proof (including the ventilation grills)

j. Include a document holder, capable of holding 4 A4 laminated sheets, securely fixed to the inside of the door. The holder must be at least 2/3rds the height of an A4 sheet and be free draining.

k. A shelf installed across the full width of the cabinet but with 50 mm clearance from the front face. The clearance between the top of the cabinet and the shelf shall be 450 mm or sufficient to hold the controller logic module.

l. Have sufficient mounting rails to secure all field wiring terminations and internal hardware.

m. A switchboard mounted on the gear plate facing forward or on the right-hand side cabinet wall, pre-wired for the Local Electrical Supply Authority's requirements.

n. The transformer and contactors are to be easily accessible.

o. Provision for mounting the 3 pole facility switch on the top front right hand side of the cabinet.

p. Be designed to prevent direct access to 230V potential wiring when the front door is open. This may be achieved by the use of a 3 mm clear plastic cover.

q. All internal and external surfaces shall be powder coated to a minimum dry film thickness of 50 microns. Unless specified, the coating colour shall be Beige.

Manufacture shall be by a firm specialising in this type of work and approved by the Engineer.

The exterior of cabinet shall be painted according to the Principal's standard colour requirements for cabinets. Paint shall be suited for outdoor conditions.

All cabinets are to be graffiti guarded prior to installation.

3.2   Cabinet installation

Installation locations of the cabinets shall be according to the scheme drawings.

The cabinet shall be orientated so that the personnel working on the front of the cabinet are able to see oncoming traffic.

Cabinets shall be mounted on an existing concrete plinth located beyond the hard shoulder and located so that both the front and rear doors can be accessed from the hard shoulder and opened without obstruction.

The cabinet name plate shall be black 300mm x 60mm x 1.5mm thick laminated ABF plastic with the cabinet number engraved in white 48mm Times New Roman letters and numerals.

The cabinet name plate shall be installed near the top of the cabinet facing the motorway approaching traffic with four 3mm stainless steel fasteners. Clean boards on completion and repair satisfactorily any internal or external paint damage or any other defect.

3.3   Cabinet equipment installation

Mounting of equipment shall be either on standard DIN mounting rails or mild steel panels.

Equipment that cannot be mounted using 19 inch rack mounting will be mounted on 19 inch rack mount shelves.

Panel mounted equipment and mounting panels shall be fixed by screws into captive nuts using rust resistant screws.

Self-tapping screws are not acceptable.

The Contractor shall follow the manufacturer's recommendations for handling and installation of all equipment, including access considerations.

All equipment bases and base plates mounted on concrete shall be grouted.

Attachment of supports to concrete foundations shall be made with power driven or 'Chemset' studs as required, to provide structural stability. Attachments to masonry shall be by the use of Dynabolts.

There are 24 slots on the standard ATMS 19 inch cabinet racks and below are the slots allocations which tend to be used by default, where stirrer fans aren't present the equipment can be moved up 2 slots.
19 inch Rack mount equipment allocations.

1	Stirrer fans (where applicable)
2	Blank (Cooling)
3	Fibre Tray
4	Blank (Cooling)
5	Network Switch
6 - 16	Equipment Space
17 - 24	Power Distribution

3.4   Optical fibre interface

The optical fibre patch tray shall be a 19 inch, 1 rack unit (RU) shelf pivoting optical fibre distribution frame with 12 or 24 simplex adaptor positions.

The optical fibre patch tray shall be selected such that the required number of connections by field installations is met at each cabinet.

In Roadside Control cabinets generally provision for termination of only 12 fibres is required.

In Network Node cabinets termination will be undertaken of all fibres from each ITS backbone fibre optic cable. The quantity of fibres will depend upon the type of cable used and maybe up to 96 terminations..

The optical fibre patch trays shall be mounted at the top of the cabinet.

Allied Telesis AT-8624T/2M Ethernet Switches will be supplied and programmed by the Principal for connection to the fibre optic cable as the NZTA ITS Ethernet interface. The Ethernet switch shall be mounted directly below the optical fibre patch tray.

The Contractor shall be responsible for the installation of the switch in the cabinets.

3.5   ITS network change control

For Auckland regional changes, the attached NZTA ITS Network Change Request Form shall be completed and submitted to the NZTA ITS Network Change Manager at the Auckland Traffic Operations Centre with the detailed design drawings for all the fibre routes and jointing details proposed. For other regions, the relevant TOC should be consulted.

No change or new connection to the NZTA ITS communications network shall be made without the written confirmation that the proposed change or new connection has been approved by the NZTA ITS Network Change Manager.

3.6   Power supply

3.6.1   MCB protection

Miniature circuit breakers shall comply with AS/NZS 4898

Miniature circuit breakers shall be selected such that its fault withstands rating and trip setting shall be suitable for each installation.

Miniature circuit breakers shall be lockable.

3.6.2   HRC protection

Fuses shall be HRC cartridge type providing excess current protection.

Spare fuses shall be housed in a spares compartment in each switchboard.

Provide three spare fuse cartridges for each size.

3.6.3   Isolation switches

Type shall be rotary switches.

Contacts shall be suitable for on load operation.

Speed of operation shall be independent of the operator.

Comply with IEC 60947-3 rated for Utilization Category AC-22 minimum or an approved equivalent standard for general use and Utilization Category AC-23, uninterrupted duty or an approved equivalent standard for use with motor circuits.

Terminals and contacts fully shrouded.

Switches fitted with approved operating handle and engraved escutcheon plate.

Control switches shall be 10 A minimum rating.

Control switches shall be flush mounted on door and surface mounted inside cabinets.

Switches rated above 63 Amps shall not to be mounted on a door.

3.6.4 Circuit ways

Circuit ways shall be complete with fuse bases, fuse carriers and cartridge fuses or with miniature circuit breakers as indicated.

Where spare ways are required these shall be provided with spare fuse base and carrier (without fuse cartridge) or miniature circuit breaker as indicated on the drawings.

Where space for future extension is shown the board shall be constructed so that no metal cutting or busbar extensions are required for the fitting of additional fuse ways or miniature circuit breakers.

3.6.5 Circuit identification charts

Circuit identification charts for all distribution boards shall give full circuit information and identification in line with the drawings. A chart showing the cabinet power source and route shall be included.

Charts shall be a reduced floor plan (A4 size), mounted in a clear plastic envelope fixed to the inside of the cabinet door.

3.6.6 Connections

Where several conductors terminate at a common terminal each wire shall be removable without dislodging the remaining conductors.

All terminals and live metal shall be shrouded.

3.7 Cable glands

3.7.1 Cable glands

Proprietary cable glands shall be used for "making off" all metal sheathed, armoured, and neutral screened cables entering or exiting any enclosure.

Cable entries/exits for external cables shall be provided as follows:

a. TPS – bushed holes (sealed);

b. MICC – MICC glands;

c. MIMS/PVC – MIMS glands with plastic sleeves;

d. NS – compression type glands;

e. PLYSS – sealing box and brass wiping gland;

f. PLSWAS – sealing box and armour clamping gland;

g. XLPE/HT-PVC – compression type glands;

h. XLPE/SWA/PVC and PVC/PVC/SWA/PVC – compression type glands with armour clamp.

Cable glands used shall be sealed appropriately so as not to compromise the IP rating of its enclosure.

Cable bends shall be followed by a minimum of 50mm of straight cable before the cable enters a gland where practical.

Earthing rings shall be used in conjunction with armour clamps.

3.8 Back-up power facility

The Contractor shall design, supply and install a suitable power supply and back-up power facility that shall meet the requirements shown on the drawing and project specification.

The UPS shall provide on-line power to the controller and any other components that are necessary to maintain communication with the ATMS.

The UPS shall be sized to maintain the systems for a period of one hour. The UPS shall be an on-line type and shall provide a no-break transfer to battery backed power in the event of mains power failure.

The UPS shall utilise low maintenance, sealed gel type lead acid batteries. A bypass switch shall be provided to enable the UPS to be either:

a. Switched into circuit;

b. Switched out of circuit;

c. Disconnect the mains to test the UPS.

The UPS requirements for Variable Message Signs are specified in the NZTA's ITS specification: *Variable Message Sign supply and installation* (ITS-06-02).

4.0 Appendices

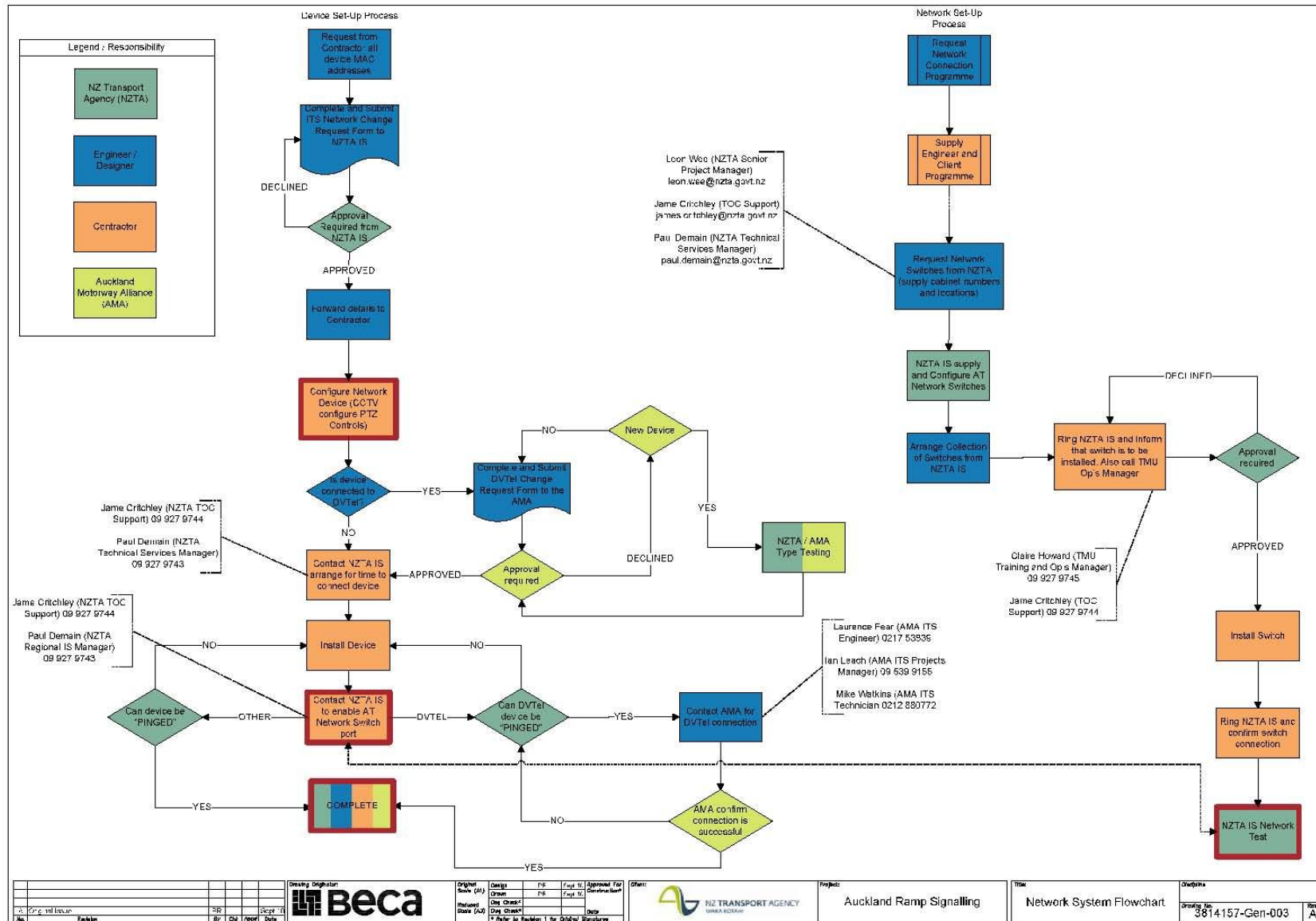## 4.1 Appendix A: ITS network change request forms

NZTA ITS network system flowchart
NZTA ITS network change request form
DVTel support change request flowchart
DVTel change request form

NZTA ITS Network System Flowchart

NZTA ITS network change request form

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On completion of change request form, please forward to: ITS Network Change Manager, NZTA , PO Box 1459, Auckland, Or Email: Paul.Demain@nzta.govt.nz or James.critchley@nzta.govt.nz

Change requested by

Company name:		Project:	
Contact name:		Contact number:	
Requested date of change:		Requested duration of change:	

Type of Change

Physical (eg removal, relocation) ☐   Logical (eg change of device, livening of port) ☐

Device Information

This section must be completed in full, failure to provide adequate information will result in the change request being refused.
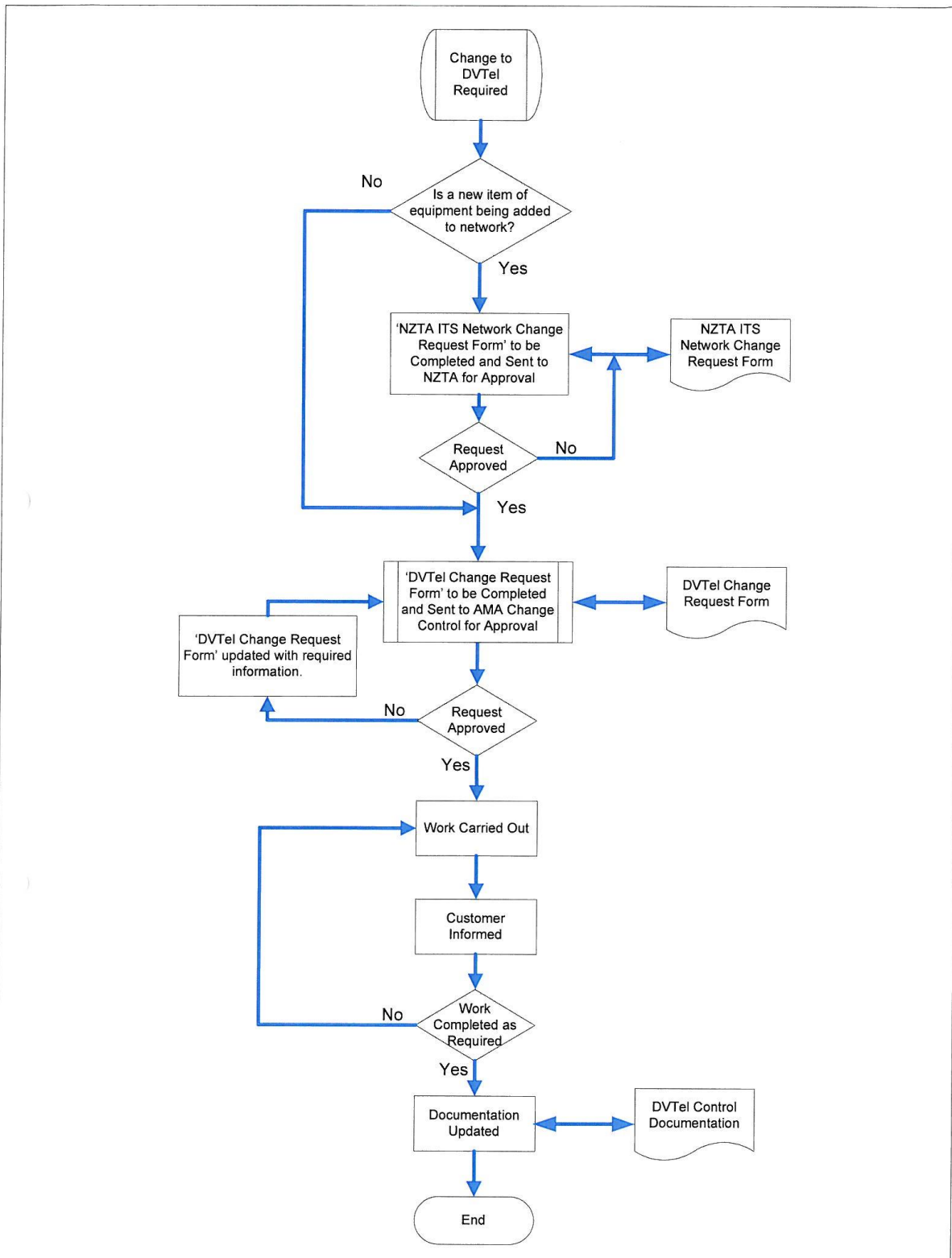
								Completed by the NZTA			
Device Name (Must be unique)	Device Make/Model	Protocols/ Ports	MAC Address	Location	Details of Change	Bandwidth Required	Multicast Yes / No	Switch & Port fields	IP address, Subnet Mask, DG, DNS	VLAN	Date Attached

Total bandwidth:

IP address allocation number: **R**

Approved by IS change control:

Name:		Signature:		Date:	

For DV-Tel please also fill Forms Approved by DV-Tel Support From Dvteladmin@ama.nzta.govt.nz

DVTel support change request flowchart

DVTel change request form

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On completion of Change request form, please forward to: DVTELADMIN@ama.nzta.govt.nz

Change Request Date:

Change requested by

Company name   Project

Contact name   Contact number

Proposed date of change:

Type of Change (tick as applicable)

Physical Change (eg new device, add, removal, relocation) Please fill-in pg. 3 for additions/relocations   ☐

Logical Change (eg configuration change, software update)   ☐

Reason for Change (e.g. change summary, roll back process, risk etc)

Change Description:

Devices Affected:

Resources for Task:

Approval

Approved by the **NZTA**'s representative:

Name:

Signature:

Date:

Approved by the **NZTA**'s representative:

Name:

Signature:

Date:

Approved by **AMA**'s representative:

Name:

Signature:

Date:

Completion

Work completed:

Name:

Signature:

Date:

Change control closed:

Name:

Signature:

Date:

	Example:	DEVICE 1	DEVICE 2	DEVICE 3
Site or Camera Name	Wiri Station Rd Cabinet E-489-S			
Camera Make & Model	Bosch HSPS			
Camera Serial Port	1			
Camera Address	1			
Serial Protocol 2 or 4 wire	RS-485			
Camera Protocol	Pelco D 2 wire			
Encoder Make & Model	Bosch VIP-X1			
Firmware Version	2.33			
IP Address	192.168.115.25			
Subnet Mask	255.255.255.0			
Gateway	192.158.115.254			
Device Logon Device Password	U: admin P: admin			
Connection Method & Link Description; Detail of all networks and links for data.	Wireless to MCC network, 100mbps fibre link to NZTA ITS network.			
Encoder Make & Model	Bosch VIP-X1			

Standard Settings for Wired Networked Encoders

	Bosch Network Attached	DVTel Network Attached
Bit Rate	6Mbps	6Mbps
Frame Rate	25fps	25fps
Key Frame	1	1
Image Quality	1	5
Resolution	4 CIF	4 CIF
Rate Control Mode	CBR	CFR
Compression	MPEG4	MPEG4

Note:

- If the encoder has a wireless the optimum settings will be configured once the device is installed.

- If the encoder is networked and alternative settings are required then please contact DVTELADMIN@ama.nzta.govt.nz

Forward completed forms and questions to: DVTELADMIN@ama.nzta.govt.nz

For devices that are to be connected to the network a NZTA network change request form must be completed before completing this form.

Guide to filling in form:

Change Request Date – Date of form submission.

Company Name – Insert name of company requesting change.

Contact Name – Insert name of contact for this change.

Project – Insert the project name and/or number.

Contact Number – Insert contact number for contact. Mobile numbers preferred.

Proposed Date of Change – Proposed date for change.

Reason for Change – Describe why this change is required.

Type of Change – If the change is physical or logical.

Site/Camera Name – Insert the site cabinet number and the required name for the equipment

Camera Make & Model – Insert the make and model of a camera / encoder.

Camera Serial Port – Enter the serial port for the camera

Camera Address – Enter the address for the serial port on for the camera.

Serial Protocol – Enter the serial protocol here. E.g. RS485,

Camera Protocol – Enter the camera protocol here and whether it is a 2 or 4 wire.. E.g. Pelco D

Camera Baud Rate - Insert baud rate for camera.

Encoder Make & Model – Insert the make and model of a encoder.

Firmware Version – Insert the firmware version of the encoder.

IP Address – Insert the IP address.

Subnet Mask - Insert the Subnet address.

Gateway - Insert the Ethernet gateway.

Device Logon & Password – Add any logons and passwords required to change the settings on the device.

Codec – Insert the required codec.

Connection Method & Link Description; Detail of all networks and links for data – Insert the details of the connections from the device back to the NZTA fibre network, in particular details of any wireless links.

Link Bandwidth Limit – Insert any bandwidth limits here such as wireless bandwidth constraints.

4.2   Appendix B – Drawings

000-0000-0-7104-03-R1	Roadside Control Cabinet
000-0000-0-7104-04-R1	Roadside Control Cabinet & Apron Details
000-0000-0-7104-05-R1	Network Node Cabinet
000-0000-0-7104-06-R1	Network Node Cabinet & Apron Details

000-0000-0-7104-03-R1

000-0000-0-7104-04-R1

000-0000-0-7104-05-R1

000-0000-0-7104-06-R1

Superseded