Standard

OCMS - OCS - Communications Rooms

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PROUD OPERATOR OF yarra trams

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1 PURPOSE

The purpose of this standard is to specify the minimum requirements for the design, configuration, operation and maintenance of communications rooms and cabinets containing Operational Control Systems (OCS) equipment.

2 SCOPE

The scope of this standard is technical requirements for design, configuration, operation and maintenance only of Yarra Trams OCMS communications rooms and cabinets containing OCS equipment.

Because the environmental conditions within communications rooms are critical to the performance of the communications equipment, this standard also covers requirements for setting and maintaining environmental conditions.

Communications rooms, cabinets and associated equipment are assets within the Yarra Trams Operational Control and Management Systems (OCMS) group.

This standard is not applicable to Yarra Trams Data Centres and or business-related Information and Communications Technology (ICT) infrastructure.

3 COMPLIANCE

This standard shall be fully complied with.

Deviation from this standard is only permitted when a waiver has been sought and approved by the Engineering Design Authority at Yarra Trams.

The Yarra Trams Management of Change process must be followed in all circumstances where change is proposed to this standard.

All designs are subject to a consultation and review process with Yarra Trams and external stakeholders including but limited to: TfV, TSV, DoT, VicTrack, utility service authorities, Yarra Trams suppliers, and special user groups. Yarra Trams approvals are required on completion of designs, prior to execution.

Unless otherwise stated, application of this standard is effective from the date of publication and is not retrospective.

‘Shall’ statements are mandatory in the context of compliance with requirements stipulated in this standard.

‘Should’ statements are considerations in the context of compliance with requirements stipulated in this standard.

‘Information’ statements provide additional content for clarification purposes only and are not requirements in the context of compliance with this standard.

‘So far as is reasonably practicable’ statements must result in the provision of a risk assessment including proposed list of design controls to demonstrate compliance to this standard.

Any third party or contractor undertaking design activities on the Yarra Trams network shall complete and return a compliance schedule for this standard. Assessment of compliance shall be provided for each requirement, defined by one of three permissible responses:

a) Compliant;

b) Partially Compliant;

c) Non-Compliant.

4 REQUIREMENTS

4.1 General

4.1.1 Design Principles

4.1.1.1 The communications room and or field cabinet shall provide a controlled and secure environment capable of accommodating OCS and carrier network equipment.

4.1.1.2 The OCS communications room design and review process shall comply with requirements of the Yarra Trams 'Manage Design' procedure CE-021-PR-0006.

Information: This procedure requires consideration of design constructability, Safety in Design, RAM, Human Factors, design sustainability, security in design, design competency and all relevant statutory requirements.

4.1.1.3 All design activity shall be undertaken by engineers with engineering design competency accepted and delegated by Yarra Trams in accordance with 'Engineering Design Authority' procedure CE-021-PR-0019.

4.1.1.4 Where ambiguity exists between referenced documents, requirement conflicts shall be identified by designers, brought forward for consultation and agreement with Yarra Trams, taking reference from VicTrack standard TS-ST-042 in the first instance.

4.1.1.5 The designer shall seek approval for all deviations from standards whenever a requirement cannot be met in accordance with the Yarra Trams 'Deviation from standards' procedure CE-021-PR-0004.

4.1.1.6 Design Drawings submitted to Yarra Trams shall clearly identify any departures from standards with red cloud, including relevant explanatory comments with cross-reference to requirement clauses from standards.

4.1.1.7 Drawings submitted to Yarra Trams and management of drawings by third parties shall comply with requirements of PTV Infrastructure Drafting Standard and PTV-NTS-012 Drawing Management System Standard Processes.

4.1.1.8 The designer shall prepare a comprehensive test plan for Yarra Trams review and acceptance, required to reveal any installation and or maintenance errors during commissioning of new systems.

4.1.2 Human Factors and Safety

4.1.2.1 Infrastructure requiring frequent maintenance access shall be easily accessible so far as is reasonably practicable.

4.1.2.2 The designer shall identify single points of failure, including sources of human error that could result in equipment failure, so far as is reasonably practicable.

4.1.2.3 The designer shall identify potential reasons for deliberate vandalism or misuse of OCS equipment, to ensure proposed design controls minimise violation risk so far as is reasonably practicable.

4.1.2.4 The safety in design process shall be managed in accordance with the Yarra Trams 'Safety in Design' procedure SS-021-PR-0001.

4.2 Authorised Access

4.2.1 Physical Security

4.2.1.1 Communications rooms and or cabinets which contain OCS equipment shall be secured within a lockable room or enclosure, to be accessible 24 hours a day, 7 days a week by authorised personnel.

Information: This requirement enables Yarra Trams to mitigate the risk of equipment fail and restricting access to avoid unnecessary change to the facility environmental conditions, providing access to persons with malicious intent, providing access to incompetent persons, allowing joint use of the room.

4.2.1.2 Joint use of communications room for storage of any items other than those which are OCS equipment related shall not be permitted.

4.2.1.3 Any equipment room walls and doors on the outside of the respective building shall be of construction capable of withstanding malicious vandal attacks.

4.2.1.4 Any equipment room doors shall be of solid timber construction, at least 45mm thick, flush panel, block timber, solid core door, that meets the requirements of AS 2688 and the one-hour minimum fire rating.

4.2.1.5 OCS communications room access shall be via swipe card.

Information: In the event of power failure doors will be configured to fail in the open position.

4.2.1.6 OCS communications room access shall be monitored via the security system so that any unauthorised entry attempt will trigger an alarm logged by the OCMS team.

4.2.1.7 Equipment room server racks shall be lockable, both front and rear access.

4.2.1.8 OCS communications room entrances shall be CCTV monitored.

4.2.2 Authorised Personnel

4.2.2.1 The swipe card security system shall be configured for access control in accordance with Yarra Trams User Access Control and Review Procedure - OCS (OC-012-PR-0006).

4.2.3 Warning Signage

4.2.3.1 Equipment rooms an or enclosures containing OCS equipment shall be provided with warning signage in accordance with the AS/ACIF S009:2013.

4.2.3.2 The door to each communications room or cabinet (if not within a room) shall be clearly signed immediately above the door handle as per figure 1 below.

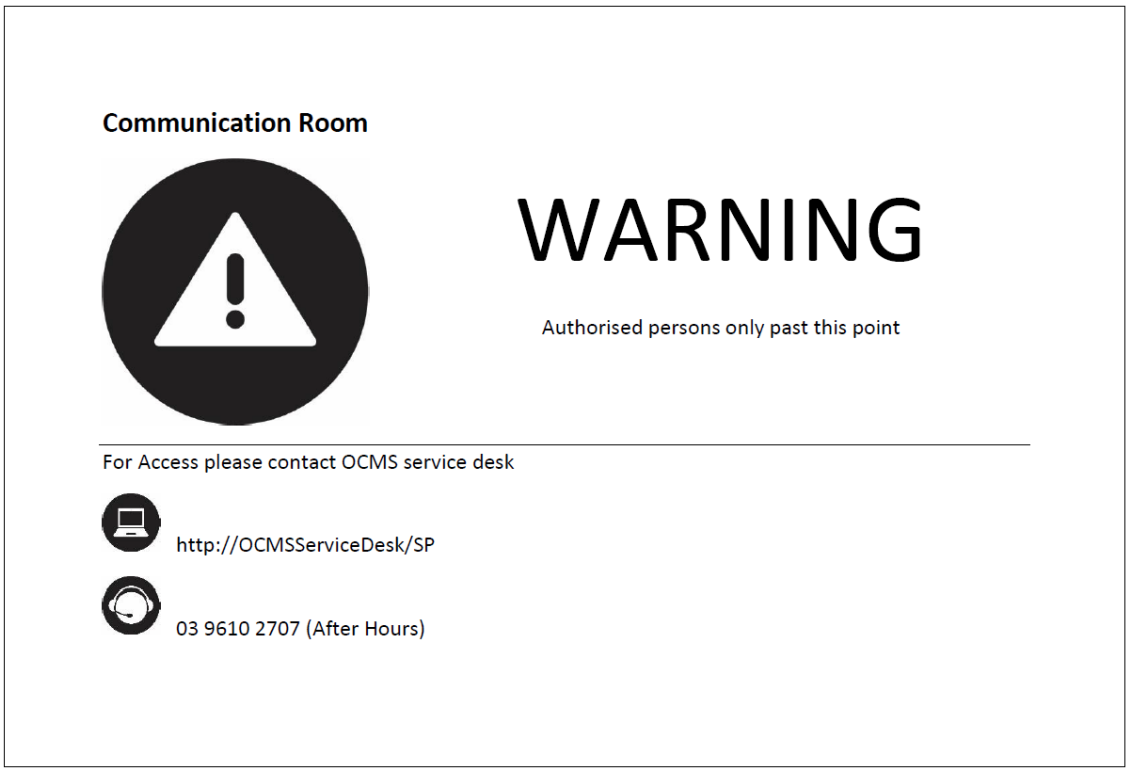


Figure 1 - Authorised persons access warning signage

4.3 Environmental Conditions

4.3.1 Equipment Facilities

4.3.1.1 The communications room shall be planned and equipped to comply with all normative requirements of AS 3084.

4.3.1.2 The communications room shall be provided with single phase flat pin double pole switched, captive screw type outlets for power supply to rack positions.

4.3.1.3 The communications room floor covering shall be selected to minimise the effects of electrostatic generation.

4.3.1.4 The communications room should be designed to control the effects of electrostatic discharge in accordance with AS 1020.

4.3.1.5 Fire sprinkler systems shall not be provided inside communications rooms.

4.3.1.6 Fire extinguishers inside communications rooms shall be selected and located in accordance with AS 2444.

4.3.1.7 All ceiling, wall and floor penetrations shall be kept to a minimum and sealed with fire resistant pillows for larger openings and fire-resistant sealants for smaller openings.

4.3.2 Equipment Clearances

4.3.2.1 OCS server racks shall be positioned to ensure clearances specified in table 1 below are maintained.

Table 1 - OCS Server Rack Clearances

Position	Clearance (mm)
Front of rack to wall	1200
End of rack bay line to wall	900
Rear of rack to wall behind	900
Top of rack to ceiling or cable tray	200

4.3.3 Climate Control

4.3.3.1 Communications rooms shall be air conditioned.

4.3.3.2 Heat sensitive electronic equipment which cannot meet the environmental conditions of a typical field cabinet exceeding 45 degrees Celsius ambient temperature shall be installed in a self-contained climate-controlled cabinet.

4.3.3.3 The communications room air conditioning total cooling capacity shall be determined using the calculated peak heat load generated by the equipment, personnel and power distribution located in the communications room.

4.3.3.4 The air conditioning system selected shall be rated for continuous 24-hour, 7 day a week operation with a minimum field service life of 5 years.

4.3.3.5 The indoor noise level generated by the air conditioning system (as measured with other systems switched off) shall not exceed 60dB.

4.3.3.6 The air conditioning system shall be provided with a thermostat located clear of potential hot zones, mounted in the vicinity of the rack air intake to ensure ambient air temperature entering the rack is maintained at 23±2°C.

4.3.3.7 The air conditioning system shall maintain the relative humidity of the communications room between 40% and 60%.

4.3.3.8 The indoor air conditioning unit shall not be located above equipment racks or wall distribution frames to ensure that any leaks during the service life do not put equipment or interconnections at risk.

4.3.3.9 The air conditioning system shall be capable of registering and sending the following warning alarms: air conditioner ‘Fail’, air conditioner ‘Fault’ and air conditioner ‘High Temperature’.

4.3.3.10 The air conditioning system shall be capable of interfacing with the existing Yarra Trams site “Building Management System” to ensure the required warning alarm outputs can be monitored.

4.4 Communications Racks

4.4.1 General

4.4.1.1 Each depot communications rack shall be configured in the same way to assist operators and maintainers to carry out important inspection and maintenance tasks.

Information: In fault conditions, it is critical that this configuration is maintained to avoid preventable outages to OCS equipment that is used to operate the Tram System.

4.4.1.2 The configuration of OCS racks is demonstrated in diagram 5.1 Typical OCS Rack Layout in this standard.

4.4.2 Labelling

4.4.2.1 All communications infrastructure shall be labelled and recorded in accordance with VicTrack Standard TS-ST-044 ICT Nomenclature specification.

4.4.2.2 OCS racks shall be labelled at the top centre of each rack, front and back, so that the label is legible with the doors shut.

4.4.2.3 OCS rack and field cabinet naming convention shall follow the Yarra Trams adopted structure as per table 2 below.

Table 2 - Yarra Trams Rack and Field Cabinet Naming Structure

<Site Name>	<Equipment>	<Number>
Allocated in accordance with Appendix B	RK - Rack FC - Field Cabinet	00 - two-digit number

4.4.3 Equipment Management

4.4.3.1 Equipment shall be installed in accordance with diagram 5.1 Typical OCS Rack Layout, with any non-specified equipment to be agreed and approved via the Architecture Review Forum.

4.4.3.2 Each rack mounted component shall be installed in its corresponding rack section as per diagram 5.1 Typical OCS Rack Layout.

4.4.3.3 All OCS rack equipment shall be powered by the in rack supplied UPS.

4.4.4 Rack Records

4.4.4.1 Rack elevation drawings and other relevant documentation shall be maintained and kept in a document sleeve attached to the front of the rack cabinet door.

4.4.4.2 Any changes to equipment and or patching shall be updated on documentation (soft and hard copies) for configuration management.

4.4.5 Earthing Protection

4.4.5.1 All rack and or communications equipment enclosures, including cable trays shall be earthed in accordance with AS/ACIF S009:2013.

4.4.5.2 Power supply distribution to racks and OCS equipment shall be earthed in accordance with AS 3000 earthing requirements.

4.5 Optical Fibre Cabling

4.5.1 Cable Allocation and Type

4.5.1.1 Where required, a 12 core fibre cable will be used at each site.

4.5.1.2 Single mode optical fibre (SMOF) will be used for the feeder cable (provided by VicTrack or Nextgen) and a combination of SMOF and or OM3 class multimode optical fibre (MMOF) shall be used within the Yarra Trams facilities dependent on the bandwidth requirements.

4.5.1.3 Reserved usage of fibre cable cores shall be allocated in accordance with table 3 below.

Table 3 - Fibre Cable Core Allocation

Cores	Reserved Usage
1 and 2	CCTV
3 and 4	Data Network (including Wi-Fi)
5 and 6	PA intercom system
7 and 8	Run-In boards
9 and 10	Spare (future use – fire or alarm system)
11 and 12	Spare (future use)

4.6 Patch Cabling

4.6.1 Cable Management

4.6.1.1 Communications rack patch cabling, defined as any cabling from the network boundary (point where the feeder cable is connected to Yarra Trams equipment) to any output cable on any equipment fixed and located within the rack, shall use CAT6 cabling only.

4.6.1.2 All patch cabling shall follow the Yarra Trams approved colour coding scheme as outlined in table 4 below.

Table 4 - Yarra Trams Cable Colour Coding

Colour		Reserved Usage
Blue		Data Network & desk patching
Purple		Wi-Fi Access Points
Green		CCTV
Black		AVM
Yellow		PA intercom system
Orange		External service
White		Radio
Red		SCADA
Pink		Spare 1
Grey		Spare 2

4.6.1.3 All patch cabling shall utilise the existing rack cable management.

4.6.1.4 Data and power cabling shall be segregated in accordance with AS/ACIFS009:2013.

4.7 Field Cabinets

4.7.1 General

4.7.1.1 Field Cabinets shall be installed in accordance with AS 3000.

Information: Field Cabinets will generally co-locate communications equipment with power fittings including UPS.

4.7.1.2 Field cabinets shall be designed for electromagnetic compatibility in accordance with applicable AS/NZS 61000 standards to protect the equipment within from electromagnetic interference.

4.7.1.3 Field cabinets shall be designed to ensure OCS equipment contained within can operate safely without exceeding operating temperature limits up to and including external ambient temperatures of 45 degrees Celsius.

Information: Field cabinets will need to be designed specifically for the equipment they contain. Equipment more susceptible to temperature will require additional measures to ensure safe operation in external ambient temperatures of up to and including 45 degrees Celsius can be achieved.

4.7.1.4 Field cabinets shall be fit for purpose to meet site specific weather, fire and security conditions subject to a risk assessment completed in consultation with Yarra Trams.

4.7.1.5 The typical configuration of a field cabinet is shown in diagram 5.2 Typical Field Cabinet Layout.

4.7.1.6 The specific configuration of a field cabinet used for CCTV equipment at Southbank is shown in diagram 5.3 Field Cabinet (CCTV) Southbank.

4.7.1.7 Field cabinets shall be protected against dust and water ingress, subject to an application assessment with a minimum acceptable rating of IP66.

4.7.1.8 Field cabinets shall be constructed from stainless steel to prevent corrosion.

4.7.1.9 Field cabinets shall be rodent proof so far as is reasonably practicable.

4.7.1.10 Field cabinets shall be lockable using 3-point locking system.

4.7.1.11 Field cabinets located in unsheltered outdoor environments shall be protected against internal condensation using thermostatically controlled heaters.

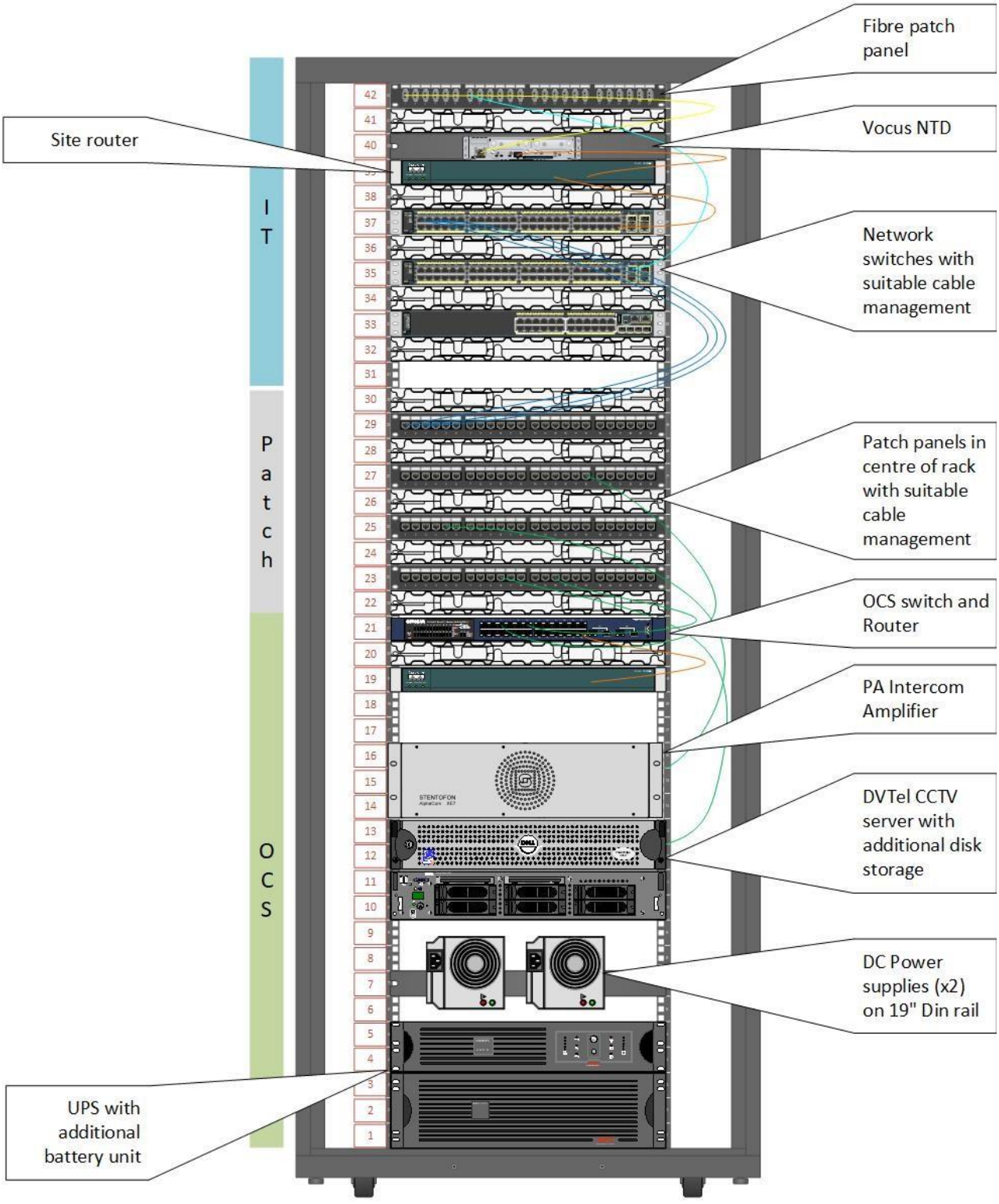
4.7.1.12 Field cabinets shall have door stays to ensure cabinet doors can be fixed in the open position.

4.7.1.13 Field cabinets shall be installed in a position to ensure safe access for maintenance personnel so far as is reasonably practicable.

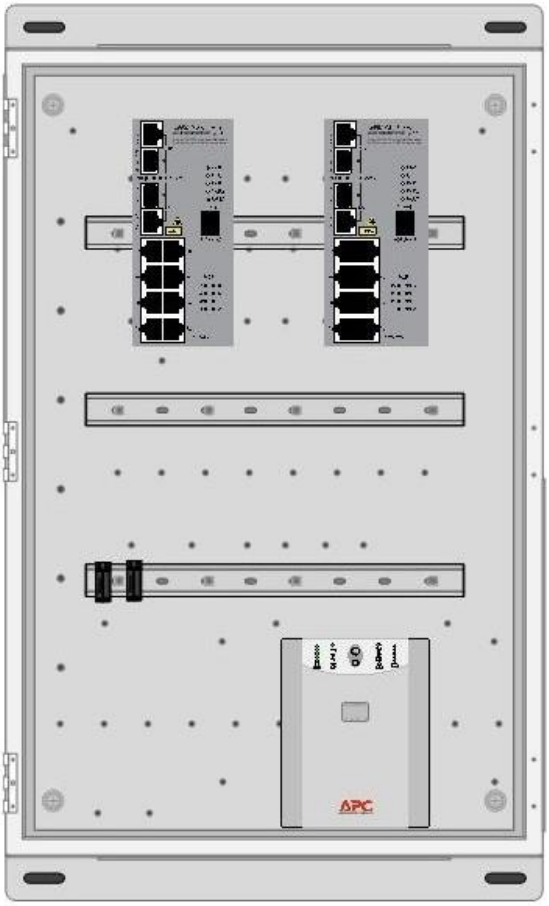
4.7.1.14 Field cabinets located in close proximity to electrically conductive tram infrastructure shall be equipotential bonded in accordance with the typical arrangement details provided in standard drawing STD_T6110.

5 DIAGRAMS

5.1 Typical OCS Rack Layout

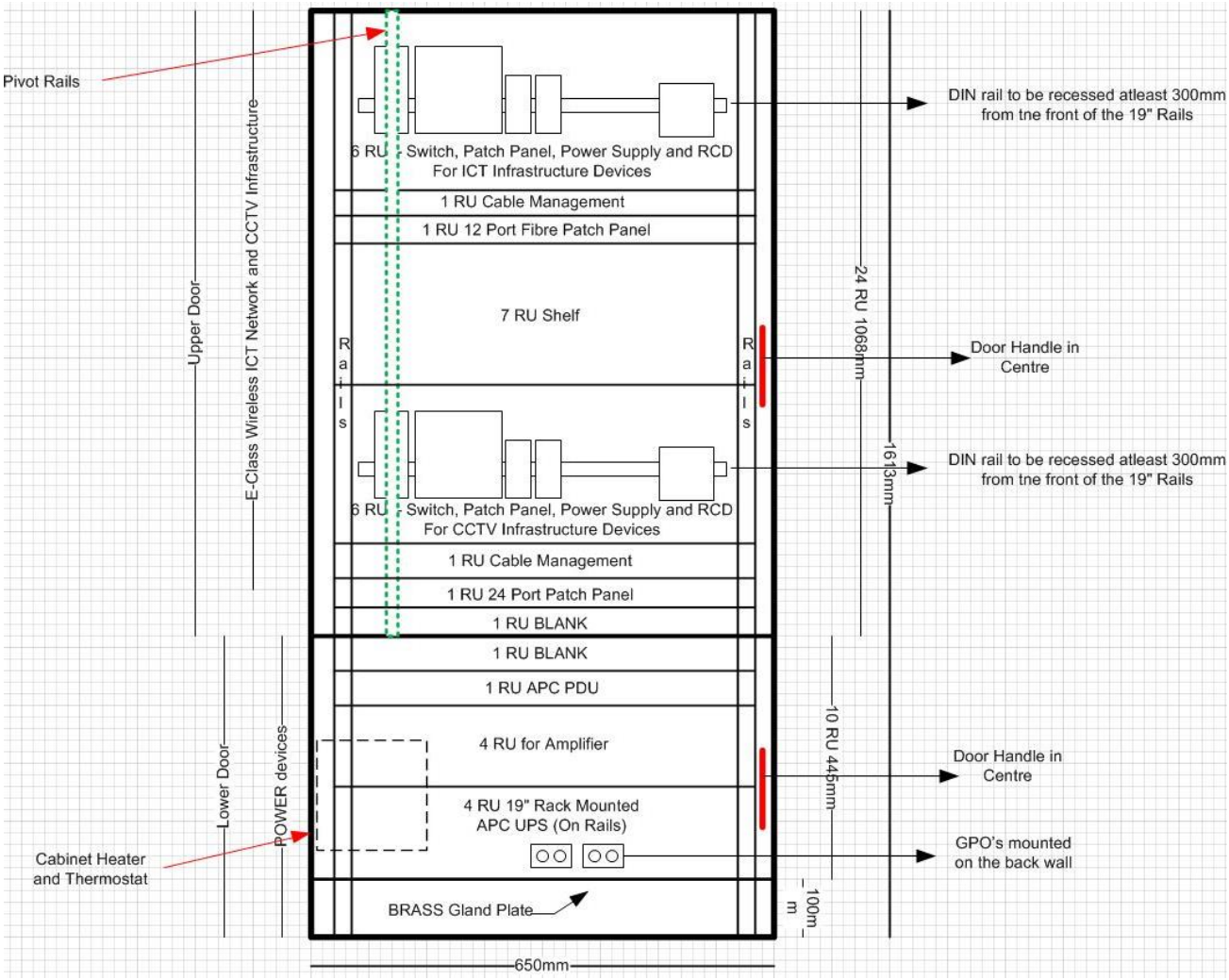


5.2 Typical Field Cabinet Layout



Typical field cabinet (all industrially rated equipment)

5.3 Field Cabinet (CCTV) Southbank



6 RELATED LEGISLATION & DOCUMENTS

Name	Document number
Installation requirements for customer cabling (Wiring Rules)	AS/ACIF S009:2013
The control of undesirable static electricity	AS 1020
Automatic fire detection and alarm systems	AS 1670
Emergency escape lighting and exit signs	AS 2293
Portable fire extinguishers and fire blankets - Selection and location	AS 2444
Timber and composite doors	AS 2688
Wiring Rules (Including published amendments to date)	AS 3000
Telecommunications installations – Telecommunications pathways and spaces for commercial buildings	AS 3084
Manage Design Procedure	CE-021-PR-0006
Engineering Design Authority Procedure	CE-021-PR-0019
Deviation from Standards Procedure	CE-021-PR-0004
National Construction Code (Australian Building Codes Board)	NCC
User Access Control and Review Procedure - OCS	OC-012-PR-0006
Safety in Design Procedure	SS-021-PR-0001
ASHRAE Data Canter Power Equipment Thermal Guidelines and Best Practices	TC9.9
VicTrack Standard Procedure – Telecommunications Installations	TS-SP-013
VicTrack Standard – Environmental Conditions – Telecommunications	TS-ST-040
VicTrack Standard – Communications Equipment Room Brief	TS-ST-042
VicTrack Standard – ICT Nomenclature specification	TS-ST-044

DOCUMENT VERSION CONTROL

Version History	Date	Detail
1.0	12 Mar 2020	Original approved issue

APPENDIX A – GLOSSARY

Word	Definition
AFFL	Above False Floor Level
DOT	Department of Transport
OCS	Operational Control Systems
OCMS	Operational Control and Management Systems
POE	Power Over Ethernet
PTV	Public Transport Victoria
TfV	Transport for Victoria
TSV	Transport Safety Victoria
UPS	Uninterruptible Power Supply

APPENDIX B – SITE DESIGNATION

Abbreviation	Site Name
BR	Brunswick Depot
CW	Camberwell Depot
EP	East Preston Depot
ES	Essendon Depot
GL	Glenhuntly Depot
HW	Hawthorn Depot
KE	Kew Depot
MA	Malvern Depot
NF	North Fitzroy Depot
SB	Southbank Depot
PR	Preston Workshops / New Preston Depot
EG	E-gate
TH	Tram Hub