

Standard

Infrastructure – Facilities – Depot Sites – Design, Construction and Maintenance

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1 PURPOSE

The purpose of this standard is to define the minimum requirements to for design, construction and maintenance of Facilities – Depot Sites within the Melbourne Metropolitan Tram Network (MMTN).

This standard and the Yarra Trams Safety Management System – Operational Risk Management form the Safety in Design (SID) requirements for all Depot Sites.

2 SCOPE

The scope of this standard is functional, performance, compliance requirements for the design, construction and maintenance of new depots, buildings and structures within depot sites.

This standard is applicable when Yarra Trams is:

- designing a new green-fields depot sites,
- designing a refurbishment of an existing depot,
- modifying an existing or other brown-fields site as a new depot,
- modifying or upgrading an existing depot, or
- modifying an existing depot which affects the buildings and structures within it.

This standard ensures that consideration is given to appropriate compliance outcomes for safety, engineering and business and use of facilities.

This standard provides design context to the Asset Hierarchy for Depot Sites.

The scope of this standard incorporates Facilities such as Depot Buildings, Car Parks, Rainwater Recovery, HVAC, Tram Stabling and Communication Rooms. Facilities are physical systems and equipment that form part of the tram network, not including Rolling Stock and OCMS.

This Standard does not describe design and construction of track and overhead infrastructure within depots as these are covered in other internal engineering Standards.

Signs and road markings involved with the movement of trams and personnel interacting with trams are covered in the Signalling standard.

Plant and equipment used in the maintenance and operational readiness of trams are covered within the Facilities – Plant and Equipment standard.

Unless otherwise stated, application of this Standard is effective from the date of publication and is not retrospective, except where provided by law.

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 Yarra Trams.

‘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 at a minimum result in the provision of a technical risk assessment including proposed list of design controls to demonstrate compliance to this standard.

Any third party or contractor undertaking activities on Yarra Trams assets 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:

- Compliant;
- Partially Compliant;
- Non-Compliant.

Absolute requirements in this standard are defined within square brackets i.e. [AM 4000mm +/-1%]. Absolute values shall not be accepted without prior consultation and acceptance by Yarra Trams. Deviation beyond Absolute values shall not be accepted under any circumstances.

4 REQUIREMENTS

Information: Depot Sites provide many and varied services to all aspects of Yarra Trams operations. For the construction of new depots and the refurbishment of existing depots, this Standard provides governance as to the compliance requirements to the various standards applicable to Depots, the buildings that make them up and the services provided to those buildings.

4.1 Depot Design and Layout

Information. Design of a facility is an inherently business driven exercise. At the time of design, the intended depot functions and roles will dictate the clauses in this section to which compliance is required with this Standard. The person or entity designing the change to a facility (new or existing) must state the clauses to which Yarra Trams will fully or partially comply with from this standard at the time of Design Acceptance. Any clause that is not selected for compliance should be highlighted in the Design Acceptance submission with explanatory notes.

4.1.1 General requirements

- 4.1.1.1 Safety in and around tram tracks within the design of new or refurbishment of existing depots shall be ensured through compliance with the requirements of legislation *Rail Safety National Law National Regulations*.
- 4.1.1.2 Depot layout design for all functional activities to be carried out at the depot shall consider the impact to neighboring properties with respect to noise, vibration and light pollution and with respect to hours of operation.
- 4.1.1.3 State and local council by-laws and restrictions on noise, vibration and light levels shall be applied to the layout design of new and refurbished depots, in support of the requirements of 4.1.1.1 above.
- 4.1.1.4 Banned substances such as products containing asbestos and paints containing lead shall not be considered for selection within the design of new or the refurbishment of existing depots.
- 4.1.1.5 Confirmation shall be obtained that goods imported for installation in depots do not contain banned substances, such as asbestos and lead based paints, in accordance with Australian legislation as overseas standards and legislations may not meet Australian requirements.
- 4.1.1.6 Designers of the refurbishment of existing depots shall consult the Yarra Trams Asbestos Register to confirm the likely presence of Asbestos, during the design phase.



- 4.1.1.7 Design for refurbishment of existing depots shall consider the likelihood that depots may contain undetected and unidentified banned substances and building materials such as lead based paints and asbestos.
- 4.1.1.8 Contingency shall be allowed for within refurbishment plans to address banned substances and their disposal or treatment as provided by law or legislation.

4.1.2 Tram Operations

Information: Tram Depots provide stabling facilities from which trams may be despatched to operate on the network. Operation of trams requires the following facilities and / or design considerations made:

- 4.1.2.1 For Tram Depots whose functional requirements include the operation of trams; the following clauses shall apply.
- 4.1.2.2 In consideration of the constraints imposed by the depot location and surrounding infrastructure, the depot layout shall provide more than one tram runout road that allows trams to join the network main line as required by the timetable, SFAIRP.
- 4.1.2.3 Tracks entering the maintenance and stabling areas shall provide protection from trams rolling onto the main line.
- 4.1.2.4 Depots shall provide facilities to enable operations to direct each tram to the correct network road from any stabling road in accordance with the Yarra Trams internal standard for Signaling.
- 4.1.2.5 Depot Tram Roads shall be designed in accordance with the Yarra Trams internal standard for Track design and construction.
- 4.1.2.6 Traction power shall be provided to the trams in accordance with the Yarra Trams internal standard for overhead design and construction.
- 4.1.2.7 Provision should be considered and made where possible to enable the operational offices visual oversight of the run in and run out roads for the depot.

4.1.3 Tram Stabling

Information: Stabling of trams requires the provision of safe, secure and protected storage of trams when not in use. Protection extends to the activities carried out to the trams by personnel whilst trams are stabled.

- 4.1.3.1 For depots whose functional requirements include the stabling of trams; the following clauses shall apply.
- 4.1.3.2 The depot layout design shall consider the requirements for Maintenance Depot and Stabling.
- 4.1.3.3 The depot track layout shall facilitate trams being stabled without touching another tram.
- 4.1.3.4 The depot layout shall ensure that trams are not stabled across track points or turn outs.
- 4.1.3.5 Consideration shall be given to a layout that prevents stabled trams from interfering with the runout or shunting path of other trams.
- 4.1.3.6 The depot track layout shall facilitate protection from weather conditions to personnel and activities sensitive to weather conditions (EG: Sand Replenishment must not allow entry of water to the sand systems, therefore protection from rain must be provided during the sand replenishment operation).
- 4.1.3.7 The depot track layout for stabling of trams shall provide sufficient distance between the sides of stabled trams to allow safe access for the mobile sand dispensing equipment to replenish the sand in stabled trams where mobile sand replenishment is, or is to be, used at that depot.



- 4.1.3.8 The depot track layout for stabling of trams shall incorporate the installation of safe personnel pathways to facilitate access to the trams for operational activities such as access to trams, the cleaning of trams and the sand replenishment provided for in clause 4.1.3.7.

4.1.4 Tram Maintenance

- 4.1.4.1 For depots whose functional requirements include the maintenance of trams; the following clauses shall apply, commensurate with the specific types of maintenance to be at that depot.
- 4.1.4.2 Provision for safe access to the roof of trams shall be made available.
- 4.1.4.3 Provision for safe access to the underneath of trams shall be made available.
- 4.1.4.4 Supervisors office facilities overseeing the maintenance area shall be provided.
- 4.1.4.5 Materials and repair parts storage facilities shall be provided in accordance with the nature of maintenance activity intended to be carried out at the depot; defined in clause 4.1.6.
- 4.1.4.6 In provision of materials and repair parts storage facilities; facilities for the delivery, receipt and dispatch of materials and repair parts shall be provided.

4.1.5 Tram Cleaning

- 4.1.5.1 For depots whose functional requirements includes the cleaning of trams; the following clauses shall apply.
- 4.1.5.2 Provision shall be made within the layout design of the depot for plant and equipment to be installed to facilitate the washing of trams.
- 4.1.5.3 Requirements for selection of plant and equipment used to carry out the washing of trams is defined within the internal Yarra Trams Standard, *Infrastructure – Facilities – Plant Equipment – Specification, Design Maintenance (CE-021-ST-0040)* and shall not be repeated here.
- 4.1.5.4 Provision of the infrastructure and support requirements of tram wash equipment selected for installation using requirements mandated within the internal Yarra Trams Standard, *Infrastructure – Facilities – Plant Equipment – Specification, Design Maintenance (CE-021-ST-0040)* shall refer to the selected tram wash manufacturer and associated documentation for specific requirements such as electrical power, compressed air, water and drainage.
- 4.1.5.5 Provision shall be made within the depot track and overhead design to allow trams access to the tram wash installation from within the depot and without affecting main line operations.

4.1.6 Storage and Maintenance of Inventory

- 4.1.6.1 For depots whose functional requirements include maintenance and project works on trams and therefore storage of materials and repair parts inventory; the following clauses shall apply.
- 4.1.6.2 Safe and sufficient facilities for the delivery, receipt, unload, load and dispatch of materials and repair parts inventory of the type anticipated for the type and nature of works for which the depot is designed, shall be provided.
- 4.1.6.3 Adequate space shall be allocated to the storage of materials and repair parts in consideration of the maintenance and project activity levels for which the depot has been designed.
- 4.1.6.4 Allocation of adequate space for the storage of material and repair parts inventory shall be made in consultation with the tram maintainers and the Yarra Trams supply chain to determine how much space is adequate.



- 4.1.6.5 Design of storage facilities shall consider the storage conditions required by the type and nature of the materials and repair parts inventory to be stored at the facility; to ensure that the materials and repair parts are issued in usable condition when required. Consideration shall be given to at least the following storage conditions:
- Acceptable dampness, moisture and humidity levels
 - Temperature sensitivity
 - Stacking limitations (EG: top stowage)
 - Light level
 - Lighting type (EG: UV content of lighting may degrade certain plastics)
 - Direct sunlight constraints
- 4.1.6.6 Consideration shall be given to the configuration and layout of storage facilities allow installation as well as subsequent maintenance and compliance inspection requirements of the racking and stillage equipment within the layout design of the storage facilities.

Information: Requirements for storage racks and other stillage equipment is described in the internal Yarra Trams Standard for Plant and Equipment and shall not be repeated here. Such equipment is subject to regular safety compliance inspections for which easy access to the stillages is required by the inspectors.

4.1.7 Solid Waste Collection and Disposal

Information: Within depots, parking for heavy vehicles is often required to provide services such as waste disposal.

- 4.1.7.1 Depot layout design shall consider the requirements of the site for solid waste collection with particular regard to centralised collection points.
- 4.1.7.2 Solid waste collection point layout within the overall design of the site shall ensure safe and easy access by large, heavy vehicles that may be used by third parties for the collection of waste.
- 4.1.7.3 Solid waste collection point design shall consider mass, loading configuration and manoeuvring capabilities of large, heavy vehicles that may be used by third parties for the collection of waste, including all leading and maneuvering paths.

4.2 Depot Buildings

This section lists and describes the specific assets and items that comprise the Depot Buildings within the Depot Sites portfolio. Applicable external standards are referenced in mandating requirements for the construction of new buildings and the refurbishment of existing buildings.

4.2.1 Heritage

Information: Buildings and other property features may have been heritage listed or exist within a local council heritage overlay.

A general outline of Heritage and Cultural considerations is provided in APPENDIX B – Heritage and Cultural Significance.

- 4.2.1.1 Planning for the refurbishment, modification or upgrade of any existing Depot Site shall first establish heritage constraints in the form of heritage listings or other constraints imposed by local council heritage overlays.
- 4.2.1.2 Depots and their buildings that are classified as heritage sites or exist under local council heritage overlay shall adhere to Heritage Victoria and Local Council laws, by-laws and policies in



relation to the construction of new buildings or other structures as covered by the heritage classification or overlay.

- 4.2.1.3 Depots that are classified as heritage sites or exist under local council heritage overlay shall adhere to Heritage Victoria and Local Council laws, by-laws and policies in relation to the modification and change to any aspect of the building or structure as covered by the heritage classification or overlay.
- 4.2.1.4 Design of additional or infill buildings shall, where mandated by heritage listing or council heritage overlays, comply with applicable laws, council by-laws and heritage listing.

4.2.2 Cultural Significance

Information: Buildings and other property features may be located amongst culturally significant Places.

A general outline of Heritage and Cultural considerations is provided in APPENDIX B – Heritage and Cultural Significance.

- 4.2.2.1 Planning for the refurbishment, modification or upgrade of any existing Depot Site shall first establish cultural significance constraints which may be imposed upon such activities.
- 4.2.2.2 Depots located amongst culturally significant Places shall adhere to the requirements of the interested cultural group in respecting the significance of the Place, in relation to the construction of new buildings or other structures.
- 4.2.2.3 Depots located amongst culturally significant Places shall adhere to the requirements of the interested cultural group in respecting the significance of the Place, in relation to the modification or change to any aspect of the building or structure which has the potential to impact the cultural significance of the Place.
- 4.2.2.4 Design of additional or infill buildings shall, where mandated by registers of cultural significance, comply with and / or respect applicable law and council by-laws regarding cultural requirements.

4.2.3 Sustainability and Environment

Information: Sustainability and environmental aspects of depots are described in the internal Yarra Trams standard SMS 6.6.5 Green Depot Standard (SS-023-ST-0001). Additional compliance requirements are prescribed within this document at 4.3.5 and 4.3.6.

- 4.2.3.1 New depots or for the refurbishment, modification or upgrade of existing depots, shall incorporate all applicable Compulsory Sustainability Initiatives outlined in the internal Yarra Trams standard SMS 6.6.5 Green Depot Standard (SS-023-ST-0001).
- 4.2.3.2 New depots or for the refurbishment, modification or upgrade of existing depots, shall consider all applicable Discretionary Sustainability Initiatives outlined in the internal Yarra Trams standard SMS 6.6.5 Green Depot Standard (SS-023-ST-0001) to determine if any of these initiatives are able to be incorporated within the design on a cost / benefit basis.

4.2.4 Hazardous Material Handling

- 4.2.4.1 Hazardous material storage shall be designed with appropriate bunding and containment facilities in accordance with *NOHSC:1015 - Storage and Handling of Workplace Dangerous Goods*.
- 4.2.4.2 Hazardous material storage facilities shall provide applicable ventilations and atmospheric controls in accordance with the manufacturer's safety data sheets and aligned with *NOHSC:1015 - Storage and Handling of Workplace Dangerous Goods*.



- 4.2.4.3 Hazardous materials used within depots shall be substituted with equivalent non-hazardous or reduced-hazard materials where practicable and cost effective to do so.
- 4.2.4.4 Volumes and quantities of hazardous materials stored within depots shall be minimized wherever possible to reduce the impact of a lack of containment.
- 4.2.4.5 Where the volume, quantity or nature of hazardous materials stored within depots requires registration with an authority or official body, all steps shall be taken to prepare for and comply with the requirements for registration; including but not limited to storage, containment, warning signage and security of the facility.

4.2.5 Building External

Information: Building External consists of the external structure of the depot building. It provides a safe environment for personnel on site.

Depot sites may contain building units to house

- Administration offices
 - Works Delivery offices
 - Infrastructure works delivery workshops
 - Storage facilities
 - Tram service delivery offices
 - Maintenance offices for tram maintenance and / or
 - Maintenance sheds covering tram road pit areas
- 4.2.5.1 Design, construction and material selection for all new designs shall comply with the requirements and references of clause 4.2.1 *Heritage* in this Standard.
 - 4.2.5.2 Structure design shall comply with Building Code BD 006 - General Design Requirements and Loading on Structures.
 - 4.2.5.3 Steel Structure design shall comply with Building Code *BD 001 - Steel Structures*.
 - 4.2.5.4 Concrete Structure design shall comply with Building Code *BD 002 - Concrete Structures*.
 - 4.2.5.5 Brick and other Masonry Structure design shall comply with Building Code *BD 004 - Masonry Structures*.
 - 4.2.5.6 Structural painting and corrosion protection shall comply with AS 2311 – *Guide to the painting of buildings*.
 - 4.2.5.7 Structural painting and corrosion protection shall comply with the requirements and references of clause 4.2.1 *Heritage* in this Standard.
 - 4.2.5.8 Security lighting requirements are provided in the Yarra Trams internal Standard for Security and shall not be repeated in this Standard.



4.2.6 Building Internal

Information: Building Internal consists of the internal structure of the depot building. Building Internal provides a safe, comfortable and clean environment for personnel on site.

All depot sites contain the following interior aspects

- Painting
- Floor coverings
- Interior fixtures – cupboards, lockers, doors, cubicles, windows internal, and so on.

In some instances; local council heritage overlays and cultural significance requirements govern alterations that may be made to the internals of buildings.

- 4.2.6.1 Heritage or cultural constraints shall be incorporated to the modification or alteration of building internals to existing buildings as applicable under the relevant authority or heritage overlay for that particular depot or the heritage status of that building.
- 4.2.6.2 Internal painting and corrosion protection shall comply with AS 2311 – *Guide to the painting of buildings* to ensure provision of the safety and fire ratings required by the design.
- 4.2.6.3 Internal floor coverings selected for installation shall have fire resistance compliant to NCC.2 – National Construction Code – Volume 1.
- 4.2.6.4 Installation of internal floor coverings specified as Textile (EG: Carpet) shall be installed in compliance with AS 2455.1 – *Textile floor coverings – Installation practice – General* to ensure provision of the safety and fire ratings required by the design.
- 4.2.6.5 Installation of internal floor coverings specified as Carpet Tiles shall be installed in compliance with AS 2455.2 – *Textile floor coverings – Installation practice – Carpet Tiles* to ensure provision of the safety and fire ratings required by the design.
- 4.2.6.6 Lighting of all maintenance, project and tram operational readiness preparation work areas shall comply with the requirements of AS/NZS 1680.2 – *Interior lighting – Industrial tasks and processes*.
- 4.2.6.7 Lighting of all maintenance, project and tram operational readiness preparation work areas shall comply with the requirements of AS/NZS 1680.2 – *Interior lighting – Industrial tasks and processes*.

4.2.7 Roofs

Information: Roofs, including skylights, form the upper covering of the buildings of the depot to provide shelter. Roofs across depots are constructed of various materials such as slate, tiles, and corrugated iron.

Drains and down pipes are part of the roof drainage system. Roof Drainage including drains and downpipes is covered elsewhere within this Standard

- 4.2.7.1 Performance requirements for roofs on depot buildings and structures shall comply with the performance requirements set out in NCC Volume 1, with consideration to all Victorian State variations and additions.
- 4.2.7.2 Where roof tiles are specified as the roofing material for the design and construction of new buildings and for the refurbishment of existing buildings impacting the roof structure, the design shall comply with BD 008.
- 4.2.7.3 Where metal roof cladding is specified as the roofing material for the design and construction of new buildings and for the refurbishment of existing buildings impacting the roof structure,



the design of guttering and eaves shall comply with *HB 114 – Guidelines for the design of eaves and box gutters*.

- 4.2.7.4 Roof design for all new buildings, Infill buildings and for the redesign of existing buildings shall adhere to Heritage Victoria and Local Council laws and policies in relation to the selection of materials and the design of the roof structure.

4.2.8 Doors and Windows

- 4.2.8.1 Doors and windows included within the design of new buildings or the refurbishment of existing buildings shall comply with Building code BD-021.
- 4.2.8.2 Doors and windows included within the design of new buildings or the refurbishment of existing buildings shall comply with *Disability (Access to Premises – Buildings) Standards*.
- 4.2.8.3 Selection of external doors and windows included within the design of new buildings or the refurbishment of existing buildings shall comply with Heritage Victoria and Local Council laws and policies where the building is heritage listed or local council heritage overlays have selection requirements.

4.2.9 Amenities

- 4.2.9.1 Depots shall provide amenities to staff in compliance to local council requirements and certificates of occupancy.
- 4.2.9.2 In addition to minimum requirements, styling for provided amenities shall be derived from the Yarra Trams refurbishment style guidelines.

4.3 Plumbing

- 4.3.1.1 Pipes and drains, including non-potable water such as recovered rainwater piping, shall be appropriately labeled as per the requirements of *AS 1345 – Identification of the contents of pipes, conduits and ducts*.

4.3.2 Plumbing Fixtures

Information: Plumbing Fixtures consists of fixtures and facilities such as water taps, toilet facilities, water coolers, showers, and so on. These fixtures include the associated plumbing, pipe works, and sewer.

All depot sites contain similar plumbing fixtures, but vary in quantity, age, and type. Example fixtures are - portable water coolers, ice machines, and Zip multi-functional boiler/cooling taps.

- 4.3.2.1 Toilets and water closets shall comply with the requirements of *AS 1172 - Water Closets*.
- 4.3.2.2 Toilet seats and fittings shall comply with the requirements of *AS 1371 - Toilet Seats and Fittings*.
- 4.3.2.3 Sinks and basins in toilet areas shall comply with the requirements of *AS 1756 - Household Sinks*.
- 4.3.2.4 Where fitted or proposed in future designs, Bidettes and Bidets shall comply with the requirements of *AS 3494 - Bidettes and Bidets*.
- 4.3.2.5 Contents of all piping installations for the construction of new depot buildings and structures shall be identified in compliance with *AS 1345 – Identification of the contents of pipes, conduits and ducts*.
- 4.3.2.6 Contents of all piping installations for all refurbishments to existing depot buildings and structures shall be identified in compliance with *AS 1345 – Identification of the contents of pipes, conduits and ducts*.



4.3.3 Liquid Trade Waste

Information: Operations, activities and process plants producing Liquid Trade Waste that is to be discharged to sewer must be treated to appropriate levels prior to discharge.

Liquid Trade Waste containing chemicals and other pH altering substances must be treated and pH balanced prior to discharge to sewer.

- 4.3.3.1 Liquid trade waste from all areas of the depot generating waste from activities such as maintenance and washdowns shall be treated in accordance with the performance requirements mandated by AS/NZS 4494 - *Discharge of Commercial and Industrial Liquid Waste to Sewer – General Performance Requirements*.

4.3.4 Backflow Prevention

Information: Backflow Prevention devices prevent contamination from the depot into the mains water supply.

- 4.3.4.1 All depot sites shall have backflow prevention compliant with AS/NZS 3500.1 - Plumbing and drainage Water services.
- 4.3.4.2 Hazard levels and protection methodologies in line with AS 3500.1 shall be determined and protection solutions specified for all new buildings and alterations to existing buildings requiring connection to the mains water supply.
- 4.3.4.3 Hazard levels and protection methodologies in line with AS 3500.1 shall be determined and protection solutions specified for the introduction of any new equipment or process falling under the scope of Depots Buildings and requiring connection to the mains water supply.

4.3.5 Water Tanks (Pumps and Rain Banks)

Information: Water Tanks (Pumps) are part of the water tank mechanism that pump captured rainwater to toilets and other areas, including tram washing, toilet bowls, and urinals where rainwater is used within the depot.

4.3.6 Rainwater distribution

- 4.3.6.1 Rainwater distribution systems shall provide isolation from the mains supply in compliance to AS/NZS 3500.1 - *Plumbing and drainage – Water services*.

4.3.7 Flood Mitigation

- 4.3.7.1 The layout of Tram Stabling and Maintenance areas, within new or refurbished depots, shall be designed to provide protection against flood in the first instance through depot, tram road and building placement, amongst any other available options that prevent water entering tram stabling and maintenance areas, SFAIRP.
- 4.3.7.2 Tram Stabling and Maintenance areas within depots shall provide drainage to mitigate the risk of residual flood waters from affecting stabled trams using the requirements, designs, layouts and methodologies provided in AS/NZS 3500.3 - *Plumbing and drainage – Stormwater Drainage*.



4.4 Electrical

4.4.1.1 Safety of electrical installations shall be ensured through compliance with the requirements of legislation *Electrical Safety (Installations) Regulations*.

4.4.1.2 Conduits and ducts carrying electrical cables shall be appropriately labeled as per the requirements of *AS 1345 – Identification of the contents of pipes, conduits and ducts*.

4.4.2 Electrical Fixtures

4.4.2.1 Electrical Fixtures, fittings and wiring installations for all new depot buildings and structures shall comply with *AS/NZS 3000 - Electrical Installations "Wiring Rules"*.

4.4.2.2 Electrical Fixtures, fittings and wiring installations within the refurbishment of existing depot buildings and structures shall comply with *AS/NZS 3000 - Electrical Installations "Wiring Rules"*.

4.4.2.3 Contents of all electrical conduits and wiring installations for all new depot buildings and structures shall be identified in compliance with *AS 1345 – Identification of the contents of pipes, conduits and ducts*.

4.4.2.4 Contents of all electrical conduits and wiring installations for all refurbishments to existing depot buildings and structures shall be identified in compliance with *AS 1345 – Identification of the contents of pipes, conduits and ducts*.

4.4.2.5 Electrical Fixtures, fittings and wiring installations for all relocatable premises installed to depots from time to time shall comply with *AS/NZS 3001 - Electrical installations - Relocatable premises*.

4.4.3 Switch Boards

Information: For the purpose of this Standard; the term Switch Board is inclusive of Main Switch Boards, Distribution and Sub-Distribution panels.

4.4.3.1 New switch boards installed to Depot Sites shall comply with *AS/NZS 3000 - Electrical Installations "Wiring Rules"* for all wiring into and within the switch board itself.

4.4.3.2 New switch board internal design shall comply with *AS/NZS 3439 - Low-voltage switchgear and control gear assemblies*.

4.5 Communications

4.5.1.1 Conduits and ducts carrying communication cabling shall be appropriately labeled as per the requirements of *AS 1345 – Identification of the contents of pipes, conduits and ducts*.

4.5.2 Communication Infrastructure

4.5.2.1 Communication cabling installations intended for connection to a telecommunication network, excluding installations communicating over mains power supply through appropriate interface devices, for new, upgraded and refurbished depot buildings shall comply with the requirements described in *AS/ACIF S009 – Installation requirements for customer cabling "Wiring Rules"* and referenced in the Internal Yarra Trams Standard, *OCMS - OCS - Communications Rooms, (CE-021-ST-0021)*.

4.5.3 Communication Rooms

4.5.3.1 Communication Rooms forming a part of any refurbishment, upgrade or for new depots, shall comply with the requirements of the Internal Yarra Trams Standard, *OCMS - OCS - Communications Rooms, (CE-021-ST-0021)*.



4.6 Essential Safety Measures

Information: The scope and configuration of Essential Safety Measures vary across depot sites depending upon the unique nature of the site and in reference to existing Certificates of Occupancy or Maintenance Determinations, as issued in the absence of a Certificate of Occupancy, for each site.

A general outline of the expected outcomes is described in APPENDIX C – Essential Safety Measures.

- 4.6.1.1 Essential Safety Measures within new buildings and for all refurbishments to existing buildings shall comply with Australian Building Regulations 2006 and all updates thereto in the future.
- 4.6.1.2 Emergency Exit Signs shall comply with AS 2293.1 – *Exit Signs* for all new buildings and refurbishments to existing buildings
- 4.6.1.3 Safety Signs and their placement in and around buildings shall comply with AS 1319 – *Safety signs for the occupational environment* for all new buildings and refurbishments to existing buildings.
- 4.6.1.4 Fire Protection and control shall be installed in accordance with the requirements of AS 1851 – *Fire Protection and Control* for all new buildings and refurbishment of existing.

4.7 Heating, Ventilation and Air Conditioning (HVAC)

4.7.1 HVAC General Considerations

- 4.7.1.1 HVAC shall be considered within the design of all new and refurbishment to existing depot buildings and refurbishment of existing HVAC assets to provide task appropriate climatic control.
- 4.7.1.2 For HVAC requirements of Communication Rooms, the internal Yarra Trams Standard, *OCMS - OCS - Communications Rooms, (CE-021-ST-0021)* shall be the source.
- 4.7.1.3 HVAC designed for new buildings, refurbishment of existing buildings or refurbishment of existing HVAC assets shall comply with the requirements of AS 1668 - *The use of ventilation and air-conditioning in buildings Set*.
- 4.7.1.4 Requirements for elements of HVAC applicable to Essential Safety Measures shall be incorporated within the design; including, but not limited to smoke and fire damping and exhausting of smoke from paths of egress.

Information: AS 1851.5 and AS 1851.6 may be referenced within the design of performance-based HVAC fire protection solutions, however, this approach is not mandated.

4.7.2 Heating Types

- 4.7.2.1 Heating proposed to be provided by Gas Fired Heaters within Depot Sites shall comply with AS 4556 - *Indirect gas-fired ducted air heaters*.
- 4.7.2.2 Heating proposed to be provided by Heating Furnace within Depot Sites shall comply with.
- 4.7.2.3 Heating proposed to be provided by Heat Exchanger within Depot Sites shall comply with.
- 4.7.2.4 Heating proposed to be provided by a Boiler within Depot Sites shall comply with AS 1228 - *Pressure Equipment – Boilers*.
- 4.7.2.5 Heating proposed to be provided by a Boiler within Depot Sites shall incorporate Safety Valves that comply with AS 1271 - *Safety Valves*.
- 4.7.2.6 Pressure piping designed for use in heating proposed to be provided by a Boiler within Depot Sites shall comply with AS 4041 - *Pressure Piping*.



4.7.3 Ventilation Types

- 4.7.3.1 Exhaust Fans used for ventilation within Depot Sites shall comply with AS 1668.2 – The use of mechanical ventilation and air-conditioning in buildings.

4.7.4 Air Conditioning Types

- 4.7.4.1 Packaged Air Conditioners provided for in the design of Depot Sites shall comply with the requirements of AS 1668.2 – *The use of mechanical ventilation and air-conditioning in buildings.*
- 4.7.4.2 Room Air Conditioners provided for in the design of Depot Sites shall comply with the requirements of AS 1668.2 – *The use of mechanical ventilation and air-conditioning in buildings.*
- 4.7.4.3 HI Wall Air Conditioning Units provided for in the design of Depot Sites shall comply with the requirements of AS 1668.2 – *The use of mechanical ventilation and air-conditioning in buildings.*
- 4.7.4.4 Ducted Split System Air Conditioners provided for in the design of Depot Sites shall comply with the requirements of AS 1668.2 – *The use of mechanical ventilation and air-conditioning in buildings.*
- 4.7.4.5 Cassette Unit Air Conditioners provided for in the design of Depot Sites shall comply with the requirements of AS 1668.2 – *The use of mechanical ventilation and air-conditioning in buildings.*
- 4.7.4.6 Evaporative Cooler Air Conditioners provided for in the design of Depot Sites shall comply with the requirements of AS 1668.2 – *The use of mechanical ventilation and air-conditioning in buildings.*
- 4.7.4.7 Condenser type Air Conditioners provided for in the design of Depot Sites shall comply with the requirements of AS 1668.2 – *The use of mechanical ventilation and air-conditioning in buildings.*
- 4.7.4.8 Console Unit Air Conditioners provided for in the design of Depot Sites shall comply with the requirements of AS 1668.2 – *The use of mechanical ventilation and air-conditioning in buildings.*

4.7.5 HVAC Control Types

- 4.7.5.1 Control Boards of HVAC System Controls within Depot Sites shall comply with AS 1668.2 – The use of mechanical ventilation and air-conditioning in buildings.

4.8 Depot Security

Information: Depot Security is mandated in the Yarra Trams Safety Standard Physical Security Control Standard and shall not be repeated within this standard. Refer to the Physical Security Control Standard for all depot security design considerations and requirements.

A general outline of the expected outcomes is described in APPENDIX D – Security of Depots and Buildings. The following requirements mandate adherence to the Yarra Trams *Physical Security Control Standard* for all design and refurbishment of Depot Buildings.

- 4.8.1.1 Design or redesign of depots and any parts thereof shall comply with the Yarra Trams *Physical Security Control Standard* for all requirements involving security.
- 4.8.1.2 Yarra Trams shall maintain a secure environment for the protection of its people, information, capabilities and assets through application of the requirements of Yarra Trams *Physical Security Control Standard*, in conjunction with any and all guidance provided in support of that Standard.
- 4.8.1.3 Yarra Trams shall protect its information, capabilities and assets by adopting the measures and controls necessary to prevent loss, theft, misuse or unauthorised access through compliance with the requirements of Yarra Trams *Physical Security Control Standard*.



4.8.2 Visitor Management

- 4.8.2.1 Facilitation, in the form of physical and electrical infrastructure, for existing or planned Visitor Management technology shall be incorporated within the design of new buildings and within the design of alterations to existing buildings affecting site visitation.
- 4.8.2.2 The visitor management requirements of the Yarra Trams *Physical Security Control Standard* shall be referenced as the minimum requirements that are to be provided within the design and construction of all new buildings and within alterations to existing buildings to facilitate the management of visitors.
- 4.8.2.3 Visitor management facilities shall, at a minimum, include the capability for the visitor to sign in, sign out, provide their contact number and have the ability to contact or notify the Yarra Trams employee, who is their site contact, upon their arrival.

4.9 Paths, Platforms and Accessibility

Information: Paths and Platforms are the defined safe access paths for people moving around depots. Requirements for paths, platforms and their accessibility are described in this section.

4.9.1 Paths and Pavements for Pedestrian Traffic

Information: Pavement comprises of asphalt and concrete areas within the depots (excluding Tram Hub). Pavement enables staff and personnel access different areas of the site.

- 4.9.1.1 Construction or refurbishment of pavements intended solely for use by pedestrians shall comply with the requirements of AS 3727.1 – *Pavements*.
- 4.9.1.2 Any works affecting existing pavements intended solely for use by pedestrians shall ensure that those pavements remain in; or are brought into compliance with AS 3727.1 – *Pavements*.
- 4.9.1.3 Pavement design for new or refurbishment of existing pavements not intended solely for use by pedestrians shall be designed to comply with applicable standards for the worst-case activity intended for the pedestrian pathway.

Information: Pavements and pathways interacting with other paved surfaces such as car parks, internal tram roads and road vehicle paths are examples of where the design for the pavement would need to take account of the worst-case activity.

4.9.2 Depot Walkways

Information: Asphalt or concrete walkways provide safe passage for pedestrians to access various areas of the depots such as tram access, admin office, and so on.

- 4.9.2.1 Construction, modification or refurbishment of fixed platforms, walkways and all methods of changing elevations shall comply with AS 1657 – *Fixed Platforms, Walkways, Stairways and Ladders – Design, Construction and Installations – Victoria*.

4.9.3 Maintenance Pits and Walkways

Information: Maintenance Pits and Walkways include:

- *Walkways (timber, fibre glass mesh, and steel)*
- *Steps*
- *Safety fencing*
- *Rail supports*
- *Pit workspaces used for tram maintenance*



- 4.9.3.1 For the building of new or the upgrade of existing walkways, including ladders, stairways and any other means to change elevation under one's own volition, shall comply with AS 1657 - *Fixed platforms, walkways, stairways and ladders - Design, construction and installation*.
- 4.9.3.2 Tram maintenance pits and other maintenance access pits create open voids. Covers and grates used to for the prevention of falls into voids shall comply with AS 3996 – *Access covers and grates*.

4.9.4 Building and Depot Accessibility

- 4.9.4.1 All new buildings and refurbishments to existing buildings that require building approval shall be designed to comply with the Access to Premises Standards as applicable to discrimination in the workplace.
- 4.9.4.2 Where continuous access paths already exist from the Principal Entrance to any proposed refurbishment requiring building approval, these shall be designed to comply with Access to Premises Standards.
- 4.9.4.3 All new buildings and applicable refurbishments to existing buildings shall be made compliant to DDA for common areas such as kitchens, toilets, meeting rooms, etc.
- 4.9.4.4 Where workplace risk assessment by a competent person finds that DDA compliance is not practical for certain operational activities, one possible example being the wheel lathe area, all other areas, particularly paths of egress, shall be made to comply with DDA.

4.10 Depot General

Requirements for general aspects of depot buildings are described below.

4.10.1 Pest Control

Information: Pest control mechanisms within the depot are devices to prevent and trap pests such as rodents, white ants, birds and other pests.

All depot sites have same pest control mechanisms.

- 4.10.1.1 Exclusion or control of pests shall be considered SFAIRP within the design and in material selection for new buildings.
- 4.10.1.2 Exclusion or control of pests shall be considered SFAIRP within the design and material selection for renovation or refurbishment of existing buildings.

Information: Bird Control mechanisms are situated in the tram running sheds within the depot yard. They provide a safe and clean environment for Rolling Stock personnel and associated personnel for tram maintenance.

General bird control measures such as spiking and netting are used at various depot sites. Bird shoot and capture programs are also used at various depot sites.

- 4.10.1.3 Exclusion or control of birds shall be considered SFAIRP within the design for new buildings, especially within open covered areas such as tram stabling sheds.
- 4.10.1.4 Exclusion or control of birds shall be considered SFAIRP within the design for renovation or refurbishment of existing buildings, especially within open covered areas such as tram stabling sheds.



4.10.2 Car and Bicycle Parks

Information: Car parks are car spaces within the depot that are used by depot staff and any visitors. Bicycle parking facilities are designated areas within the depot providing secure parking facilities for bicycles.

Car parks are provided at all depot sites. Tram Hub car park is basement car park (part of leased building) at 555 Bourke St and is not considered in this design standard. Bicycle parking facilities are provided at some depots.

- 4.10.2.1 Construction of new car parks and the refurbishment or modification of existing car parks shall comply with the requirements of *AS 2890.1 – Parking Facilities – Off-street car parking*.
- 4.10.2.2 Car parks altered as a result of any construction, rearrangement or redevelopment of any depot site shall comply with the requirements of *AS/NZS 2890.1 – Parking Facilities – Off-street car parking*.
- 4.10.2.3 During construction, rearrangement or redevelopment of any depot site, temporary car parking arrangements shall comply with the requirements of *AS/NZS 2890.1 – Parking Facilities – Off-street car parking*, SFAIRP in appreciation of the time required for the works.
- 4.10.2.4 Construction of new bicycle parking facilities and the refurbishment or modification of existing bicycle parking facilities shall comply with the requirements of *AS/NZS 2890.3 – Parking Facilities – Bicycle parking*.

4.10.3 Fencing

Information: Fencing provides perimeter security for the depot.

- 4.10.3.1 Design of new fences and refurbishment of existing fences shall comply with the Yarra Trams *Physical Security Control Standard* which is not reproduced here, however, a precis of its content is available in *APPENDIX D – Security of Depots and Buildings*.

4.10.4 Gates

Information: Gates provide entry and exit security for the depot, including vehicles, pedestrians and trams where applicable.

The sites contain manual and automated gates, including swipe card access gates at various sites.

- 4.10.4.1 Design of new gates and refurbishment of existing gates shall comply with the Yarra Trams *Physical Security Control Standard* which is not reproduced here, however, a precis of its content is available in *APPENDIX D – Security of Depots and Buildings*.

4.10.5 Depot Vegetation

Information: Vegetation within the depot, primarily for aesthetics. Each depot site contains different types and layouts of vegetation.

- 4.10.5.1 For the design of new areas of vegetation within the redevelopment of areas within the depot for which gardens or other vegetation is sought, consideration shall be given to the maintainability of the installation.
- 4.10.5.2 All design for vegetation within depots shall incorporate Compulsory and consider Discretionary Sustainability Initiatives outlined in the internal Yarra Trams standard *SMS 6.6.5 Green Depot Standard* with respect to vegetation.
- 4.10.5.3 Specific consideration to water gardens used for the filtration of stormwater runoff from the site shall be considered in line with the Sustainability Initiatives outlined in the internal Yarra Trams standard *SMS 6.6.5 Green Depot Standard* with respect to vegetation.



4.10.5.4 Selection and placement of Vegetation for inclusion in the design of depots in the vicinity of boundary fencing shall comply with the security requirements of the Yarra Trams *Physical Security Control Standard* with respect to type and size of vegetation allowed close to a boundary and / or security fence.

4.10.6 Safety Line Marking

Information: Safety Line Markings are all painted lines and images that enable safe passage for pedestrians and vehicles within depot. All sites contain safety line markings, except Tram Hub.

4.10.6.1 Safety Line Markings shall comply with; or take guidance from *AS 1742 Set – Manual of uniform control traffic devices set* for road and pedestrian line marking design within depots; including car parks and all interactions between motor vehicles and pedestrians except trams.

4.10.6.2 Safety Line Marking shall be painted using paints and materials compliant to *AS 4049 - Paints and related materials-Road Marking Materials* with specific consideration given to slip resistance, especially in areas where pedestrian traffic is likely.

4.10.7 Tram Control and Personnel Interactions

4.10.7.1 All line markings involved with the control of trams within Depots and the interaction of Trams with personnel are mandated in the Yarra Trams Signaling Standard and shall not be repeated within this standard. Refer to the Signaling Standard for all depot line marking involved in Tram Control.

4.10.8 Signage

Information: Signage is the safety and advisory signage around the depot to influence behaviour of drivers, pedestrians and the public.

4.10.8.1 For the design of new buildings and structures and for the refurbishment of existing, Safety Exit Signage shall comply with *AS 2293.1 - Exit Signs*.

4.10.8.2 For the design of new buildings and structures and for the refurbishment of existing, Safety Signage shall comply with *AS 1319 – Safety Signs for the Occupational Environment*.

4.10.8.3 For the design of new buildings and structures and for the refurbishment of existing, all advisory signage shall comply with *AS 1742 Set – Manual of uniform control traffic devices set*.

4.10.9 Leasing of Premises

4.10.9.1 Leased premises shall be chosen on the basis of compliance with this Standard and the standards referenced within.

5 RELATED LEGISLATION & DOCUMENTS

Name	Document number
Accessibility	
Disability Discrimination Act	DDA
Disability Standard for Accessible Public Transport 2002	DSAPT:2002
Disability (Access to Premises - Buildings) Standards 2010	



Name	Document number
Building Codes	
National Construction Code – Volume One – Building Code of Australia	NCC – Volume One
National Construction Code – Volume Three – Plumbing Code of Australia	NCC – Volume Three
Building Standards Sector Board	B-000
Steel Structures	BD-001
Concrete Structures	BD-002
Masonry Structures	BD-004
General Design Requirements and Loading on Structures	BD-006
Roof Tiles	BD-008
Interior Board Linings	BD-011
Doors and Windows	BD-021
Communications	
OCMS - OCS - Communications Rooms	CE-021-ST-0021
Installation requirements for customer cabling “Wiring Rules”	AS/ACIF S009
Electrical	
Electrical Installations “Wiring Rules”	AS/NZS 3000
Electrical installations - Relocatable premises	AS/NZS 3001
Low-voltage switchgear and control gear assemblies	AS/NZS 3439
Signalling (Yarra Trams Standard) Regulations	
External Structures and Facilities	
Parking Facilities	AS 2890
Fire Protection and Essential Safety Measures	
Fire Protection and Control	AS 1851
Exit Signs	AS 2293.1
Safety signs for the occupational environment	AS 1319
Physical Security Control Standard (Yarra Trams Standard)	SS-012-ST-0001
Floor Coverings	
Textile floor coverings – Installation practice – General	AS 2455.1
Textile floor coverings – Installation practice – Carpet Tiles	AS 2455.2
Floor Coverings – Resilient sheet and tiles – Installation practices	AS 1884



Name	Document number
Reaction to fire tests for flooring – Part 1 Determination of the burning behaviour using a radiant heat source	AS ISO 9239.1
Heritage and Culture	
Victorian Heritage Database	
Victorian Aboriginal Heritage Register	ACHRIS
Victoria – Aboriginal Heritage Act 1975	
Victoria – Heritage Act 2017	
HVAC	
The use of ventilation and airconditioning in buildings Set	AS 1668
Indirect gas-fired ducted air heaters	AS 4556
Pressure Equipment – Boilers	AS 1228
Safety Valves	AS 1271
Pressure Piping	AS 4041
Painting and Corrosion Protection	
Paints and related materials-Road Marking Materials	AS 4049
Guide to the painting of buildings	AS/NZS 2311
Plumbing	
Plumbing and drainage – Water services	AS/NZS 3500.1
Water Closets	AS 1172
Toilet Seats and Fittings	AS 1371
Household Sinks	AS 1756
Bidettes and Bidets	AS 3494
Guidelines for the design of eaves and box gutters	HB 114
Sanitary Plumbing Fixtures	WS 003
Safety	
Yarra Trams Safety Management System – Operational Risk Management	SMS 7.1
Rail Safety National Law National Regulations	
Electrical Safety (Installations)	
Signage	
Identification of the contents of pipes, conduits and duct	AS 1345
Sustainability and Environment	



Name	Document number
SMS 6.6.5 Green Depot Standard	SS-023-ST-0001
Storage and Handling of Workplace Dangerous Goods	NOHSC:1015
Tools and Equipment	
Infrastructure – Facilities – Plant Equipment – Specification, Design Maintenance	CE-021-ST-0040
Tram Operations	
Network Technical Standard – Track Structure – Tramway	PTV-NTS-007
Walkways and Safe Pedestrian Access	
Access covers and grates	AS 3996
Fixed platforms, walkways, stairways and ladders - Design, construction and installation	AS 1657
Pavements	AS 3727

6 DOCUMENT VERSION CONTROL

Version History	Date	Detail
1.0	28 Mar 2020	Original approved issue.
1.01	18 May 2020	Minor corrections to errors



APPENDIX A - GLOSSARY

Word	Definition
Accessibility	In the context of this Standard; Accessibility is taken to be the degree of access provided to persons with a disability
Accessible	In the context of this Standard; reference to a place or thing as accessible is taken to mean that the place or thing is of such a design as to allow access to persons with a disability
Infill	In the context of this Standard; Infill is taken to be a building or other structure constructed in an existing gap or space in an area covered by a local council heritage overlay.
Liquid Trade Waste	In the context of this Standard; Liquid Trade Waste is taken to mean all liquid waste other than sewage of a domestic nature.
OCMS	Operational Control and Management Systems.
Place	In the context of this Standard; Place is taken to refer to a location, building or any other thing that from a cultural or heritage perspective, is a place of significance.
Principal Entrance	In the context of this Standard; the Principal Entrance is taken to be the main pedestrian entrance to the building or depot.
Refurbishment	In the context of this Standard; Refurbishment refers to the refreshing, revitalising and / or redecoration of the buildings, structures and depot site facilities to which this Standard applies. Refurbishment does not refer to the like-for-like replacement or repair of the facilities; as far as provided by law.
SFAIRP	So Far As Is Reasonably Practicable
Standard	<p>In the context of this Standard, reference to a “Standard” is reference to a specific document or documents accepted and approved by an accredited and organised body, whereas reference to “standard” is a common or generally accepted concept, approach or thing that is not necessarily accredited.</p> <p>References to “this Standard” refer to this document, currently being read.</p>
Tram Depots	In the context of this Standard, reference to Tram Depots is taken to be a depot within which trams are operated, stabled and / or maintained. In this context, Tram Depots excludes the Tram Hub and E Gate for the purpose of describing depot layout, infrastructure and facilities to support tram operations.



APPENDIX B – Heritage and Cultural Significance

The following depot sites are classified as heritage sites for their external structural aspects.

- New Preston
- Essendon
- Malvern
- Kew

All depots fall under local council heritage overlays. Although this does not mean that all aspects of all sites are therefore heritage listed, this does mean that the heritage overlay may impact modifications to the site.

Inclusions to the heritage constraints may extend to building materials, surface finishes, colour pallets, aesthetic details (examples include cast iron lace or support pole decorative finishes), allowable demolition, internal alteration controls, significant tree controls and many other aspects of the site which may be effected by proposed site works.

Detailed information on sites classified as heritage sites and the heritage preservation constraints applicable are available on the Heritage Victoria Database and the local council heritage protection groups for the municipality in which the depot building is located.

Detailed information on Places classified as culturally significant and the respect to be afforded the Place in the form of preservation constraints are available on the Heritage Victoria Database, Victorian Aboriginal Heritage Register and the local council cultural significance protection groups for the municipality in which the depot building is located.



APPENDIX C – Essential Safety Measures

Essential Safety Measures are various aspects of a building, as per Building Regulations 2006, whose maintenance is vital for the life, safety and health of occupants over a building's lifetime. Some examples are Egress; Emergency Lighting, Fire Protection and Control Service.

Egress - All aspects of egress, including pathways; doors and exit mechanisms; and associated structures (handrails, ramps, stairways etc.); exit signs (as per AS 2293.1); warning signs. These facilitate safe evacuation in the case of an emergency.

Emergency lighting – All aspects of lighting devices to allow safe evacuation in the case of an emergency when the main lighting system fails.

Fire Protection and Control - Equipment to provide fire extinguishing and protection to staff and property within the depots. The equipment comprises items such as sprinkler systems, hydrants, hose reels, portable extinguishers, as per AS 1851.



APPENDIX D – Security of Depots and Buildings

This appendix is an excerpt from the Yarra Trams *Security of Depots and Buildings Standard* and is quoted here to provide context to this Standard. At the time of writing this Standard, the *Security of Depots and Buildings Standard* is in draft and yet to be published.

Physical Security

Yarra Trams has an obligation to provide and maintain a secure environment for the protection of its people, information, capabilities and assets. An appropriate physical security environment minimises risks to the efficient and effective performance of Yarra tram goals and objectives and underpins the application of other protective security measures.

The Yarra Tram Security Manual details the security policy, processes and technical requirements to be adopted throughout Yarra Trams in order to establish an appropriate physical security environment. The security policy, processes and technical requirements detailed in the Security Manual cover the spectrum from facility construction to security containers, locks and electronic surveillance and detection systems.

Policy

Yarra Trams is to protect its information, capabilities and assets by adopting the measures and controls necessary to prevent loss, theft, misuse or unauthorised access. Yarra tram physical security controls will take into account its operating environment and imperatives and be risk-based.

Yarra Trams is to give assurance in sharing arrangements by applying the Physical Security Zone methodology and the minimum controls determined by the consequences of the loss of Confidentiality, Integrity or Availability (CIA) of information or security-protected assets. Where a risk assessment identifies the need for security controls that exceed the minimum level, Yarra Trams is to apply stronger security controls.

Process

Physical security is a combination of physical and procedural measures designed to prevent or mitigate threats or attacks against people, information and security-protected assets. A physical security program aims to:

Deter - these are measures that a threat actor perceives as too difficult or needing special tools and training to defeat.

Detect - these are measures implemented to determine if an unauthorised action is occurring or has occurred.

Delay - these are measures implemented to:

impede an adversary during an attack; or

slow the progress of a detrimental event to allow a response before information or physical assets is compromised.

Respond - these are measures taken once an agency is aware of an attack or event to prevent, resist or mitigate the attack or event.

Recover - these are measures taken to restore operations to normal (as possible) following an incident.



Often a measure designed to meet one physical security goal may address others. Physical security measures complement personnel security, information handling, communications and OCMS security procedures; all of which are to be addressed in relevant facility security plans.

Physical security measures are designed to protect people, information, security-protected assets and functions from compromise, loss of integrity, unavailability, damage or harm. They are capable of mitigating a range of risks. However, given enough time and determination, an adversary can compromise almost any physical security measure. Where measures fail to deter, they need to detect unauthorised access. Protection measures are to be evaluated in terms of their ability to detect and delay for an acceptable designated minimum period of time.

The effectiveness of physical security controls is measured by the probability of detection at the point where there is enough time for a response team to interrupt an adversary. The critical path is the adversary path with the lowest probability of interruption. An adversary path is an ordered sequence of actions against an asset that could result in it being compromised. Adversaries could normally be expected to take the easiest and most direct route.

Early detection of unauthorised access enables a quicker response. Ideally, interception should occur before access to the asset, but this depends on the asset and the security objectives. This concept is illustrated below.

The effectiveness of security measures will influence:

Probability of detection - the cumulative probability of detecting an adversary;

Cumulative delay - the combined minimum delay time along the adversary path;

Interruption - the response is less than the delay provided, measured from the first point of detection.