



# Tram Stop – Shelters

## Engineering Standard

Asset Management

CS2-DOC-003443

**DOCUMENT AMENDMENT RECORD**

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## 1. Introduction

The primary function of shelters is to provide passengers with safe, efficient and equitable cover and protection in all weather and light conditions whilst waiting at Adelaide Metropolitan Railway Network (AMPRN) tram stops.

## 2. Purpose

The purpose of this standard is to outline the fundamental requirements for the design, construction and maintenance of shelters at tram stops.

This standard must be read in conjunction with The Rail Commissioner's tram stop standards, relevant tram system standards and The Department's Master Specifications.

## 3. Scope

This standard applies to all new or upgraded tram stop shelters.

Existing shelters may be rated against this standard. In the context of this standard, 'rating' is the compliance review of shelters that have been designed and installed prior to this standard being published.

## 4. Compliance

There are 3 types of provisions contained within this standard:

1. Requirements
2. Recommendations
3. Permissions

**Requirements** – it is mandatory to follow all requirements to claim full compliance with the standard. Requirements are identified within the text by the term '**must**'.

**Recommendations** – do not mention or exclude other possibilities but do offer the one that is preferred. Recommendations are identified within the text by the term '**should**'. Recommendations recognise that there could be limitations to the universal application of the control, i.e. the identified control is not able to be applied or other controls are more appropriate or better.

**Permissions** – conveys consent by providing an allowable option. Permissions are identified within the text by the term '**may**'.

Deviation from a mandatory requirement noted within this standard is only permitted when an Engineering Waiver has been provided to and approved by the Rail Asset Management.

## 5. Related Documents

Table 1 – Related Documents

DOCUMENT NAME	DOCUMENT NUMBER
Platform Clearance - 1600 mm Gauge Track	301-A3-2010-2389
Practices & Requirements for Tramline Signalling on the Adelaide Tram Network	SG2-DRG-002021
Standard Drawing – Tram System – Allowable Infringements – General Layout	TP2-DRG-006979
Standard Drawing - Signage Schedule - Drawing Register	CS2-DRG-365085
Standard Drawing - Tram Stop - Platform Arrangements - General Layout	CS2-DRG-365079
Standard Drawing - Tram Stop - Marginal Platform – Urban Standard Amenity Shelter - General Layout	CS2-DRG-365080

Standard Drawing - Tram Stop - Island Platform – Urban Standard Amenity Shelter - General Layout	CS2-DRG-365082
Standard Drawing – Tram Stop –Marginal Platform - Closed Corridor Standard Amenity Shelter – General Layout	CS2-DRG-365274
Standard Drawing – Tram Stop –Island Platform – Closed Corridor Standard Amenity Shelter – General Layout	CS2-DRG-365275
Standard Drawing - Tram Stop - TGSi & Pavement Marking - General Layout	CS2-DRG-365084
Guidelines for Low Voltage Electrical Earthing and Bonding for the Adelaide Metro Tram Network	TPS-DOC-002020
Standard - Tram Stop Furniture	CS2-DOC-003444
Standard Tram Stop Station Signage and Pavement Marking	CS2-DOC-003445
Public Transport Standard – Electrical Infrastructure	CS5-DOC-003511
Public Transport Infrastructure Security Systems Engineering Specification	PI5-DOC-003517
Design – Trams & Buses – Passenger Information Systems	PI6-DOC-003515

## 6. References

The following referenced documents are used by this standard for information only:

- AS 1170 Structural Design Actions
- AS 1428.1-2009 Design for access and mobility – General requirements for access – New building work
- AS 1428.2-1992 Design for access and mobility – Enhanced and additional requirements – Buildings and facilities
- AS 1580 Paints and Related Materials
- AS 1627 Metal Finishing – Preparation and pre-treatment of Surfaces
- AS 1891 Industrial Fall-arrest Systems and Devices
- AS 2312.2 Guide to the Protection of Structural Steel against Atmospheric Corrosion by the use of Protective Coatings Part 2 Galvanising
- AS 2700 Colour Standards for General Purpose
- AS 3500.3 Plumbing and Drainage – Stormwater drainage
- AS 3894 Site Testing of Protective Coatings
- AS 4680 Hot-dip Galvanised (zinc) Coatings on Fabricated Ferrous Articles
- AR-EL-STD-0102 Guidelines for the Protective Provisions related to Electrical Earthing and Bonding for the Electrified Rail
- HB 295.3.21 Product Safety Framework – Gaps and openings – Finger Entrapment
- Disability Discrimination Act 1992 (DDA)
- Disability Standards for Accessible Public Transport 2002 (DSAPT)

## 7. Design Requirements

### 7.1. Design Life

Structural elements of the shelter must be constructed of materials that have a 50 year design life with minimal maintenance and easy cleaning. All elements of the shelters must be robust and durable. Weather screens, cladding and attachments must have a minimum design life of 25 years.

### 7.2. General

The shelter must provide passengers with shelter from the elements including sun, wind, rain and glare. Given that wet weather can increase the risks of slips, trips and falls, adequate protection from the elements will mitigate some of these risks.

Shelters must be designed to encourage natural light entry and enhance spatial quality. Appropriate material selection can help increase natural light entry. To improve spatial

quality, passengers must be able to move through the space with purpose and there must be good visibility around the tram stop precinct.

The shelter must minimise crime and vandalism by facilitating Crime Prevention Through Environmental Design (CPTED) principles such as passive surveillance, natural access control and territorial reinforcement. Clear sightlines and good visibility facilitates territorial reinforcement and passive surveillance. Territorial reinforcement supports psychological ownership of the tram stop in order to increase the vigilance of patrons.

The shelter must minimise climbing opportunities, for example by recessing shelter columns so that they are difficult to climb. Graffiti opportunities must be minimised through material choice and coating, and surfaces must be coated with an approved anti-graffiti coating without compromising on luminance contrast requirements.

General requirements for all shelters are:

1. must be compliant with TPS-DOC-002020 Guidelines for Low Voltage Electrical Earthing and Bonding for the Adelaide Metro Tram Network.
2. must be designed in modular / sectional manner to allow cost effective extension in the future;
3. designed for and provided with appropriate fall-arrest points for maintenance in accordance with AS 1891 and Safework SA.

### 7.3. Tram Stop Amenity Types

#### 7.3.1. Closed Corridor Standard Amenity Stops

Closed Corridor Standard Amenity Stops are stops located within the ballasted tram corridor.

#### 7.3.2. Urban Standard Amenity Stops

Urban Standard Amenity Stops are stops located within the non-ballasted tram corridor (urban environment).

These stops generally provide higher patronage than the Closed Corridor stops.

#### 7.3.3. Enhanced Amenity Stops

Enhanced Amenity Stops are stops that provide enhanced facilities that accommodate generally the highest patronage across the tram network.

### 7.4. Shelter Styles

#### 7.4.1. Closed Corridor Standard Amenity Stops

Shelters must comply with minimum requirements specified in:

- CS2-DRG-365274 Standard Drawing - Marginal Platform – Closed Corridor Standard Amenity Shelter - General Layout; and
- CS2-DRG-365275 Standard Drawing - Island Platform – Closed Corridor Standard Amenity Shelter - General Layout

The Closed Corridor Island Platform must utilise the Urban Standard Amenity Shelter design.

#### 7.4.2. Urban Standard Amenity Stops

Shelters must comply with minimum requirements specified in:

- CS2-DRG-365080 Standard Drawing - Marginal Platform – Urban Standard Amenity Shelter - General Layout; and
- CS2-DRG-365082 Standard Drawing - Island Platform – Urban Standard Amenity Shelter - General Layout

#### 7.4.3. Enhanced Amenity Stops

The new shelter must:

1. consist of a full-length structure spanning both platforms with covered core waiting areas;
2. use high quality, robust and durable materials that promote civic character for the tram stop precinct and address the local environment and context;
3. allow for easy installation, repair, replacement and incremental extension of the roof covering as required in the future;
4. allow access and maintenance in a safe environment for both workers and passengers;
5. be designed to limit climbing opportunities and prevent roosting opportunities for vermin;
6. include fully integrated signage;
7. use materials and finishes that do not interfere with way finding and decision-making; and
8. incorporate finishes and details that allow easy cleaning as well as not collecting dust and dirt in inaccessible areas.

Proposed Enhanced Amenity Shelter designs must be approved by Rail Asset Management.

## 7.5. Shelter Structure

The shelter structure must comply with sight line requirements and must not obstruct signal sighting, in accordance with SG2-DRG-002021-Practices & Requirements for Tramline Signalling on the Adelaide Tram Network.

Shelters must be positioned on the platform so as to optimise the useable space on the platform. For marginal platforms, the shelter should be located as close to the back of the platform as possible.

### 7.5.1. Closed Corridor Standard Amenity Stops

The shelter structure must comply with minimum measurements specified in:

- CS2-DRG-365274 Standard Drawing - Marginal Platform – Closed Corridor Standard Amenity Shelter - General Layout; and
- CS2-DRG- 365275 Standard Drawing - Island Platform – Closed Corridor Standard Amenity Shelter - General Layout.

### 7.5.2. Urban Standard Amenity Stops

The shelter structure must comply with minimum measurements specified in:

- CS2-DRG-365080 Standard Drawing - Marginal Platform – Urban Standard Amenity Shelter - General Layout; and
- CS2-DRG-365082 Standard Drawing - Island Platform – Urban Standard Amenity Shelter - General Layout.

### 7.5.3. Enhanced Amenity Stops

Shelters must:

1. provide weather protection to the physical structure zone of the platform as a minimum;
2. locate columns centrally on island platforms and in the physical structure zones for marginal platforms;
3. integrate shelter canopy with all operational equipment (integrated system); and
4. consider adjacent properties and their views onto roof elements of the shelter, in terms of colour and glare.

All structural elements must be sealed against water ingress.



## 7.6. Shelter Roof

The roof shelter must be designed for the following loading:

1. category “R1” loading in accordance with AS 1170.1, Clause 3.5.1; and
2. any other requirements of AS 1170.

Roof sheeting must be suitably waterproof so that it protects users from the elements.

The lowest point of any component on the underside of and shelter roof must be 2200mm above the platform surface level and the roof must not protrude more than 700mm from the platform coping edge.

Shelter roofs must not radiate heat to provide an environment more uncomfortable than if a roof was not provided. Where metal roof canopies are used, they shall be light coloured and with a solar absorbance factor no greater than 0.45.

### 7.6.1. Closed Corridor Standard Amenity Stops

The roof coverage must be for the entire shelter structure, in accordance with:

- CS2-DRG-365274 Closed Corridor Standard Drawing Standard Amenity Shelter for Marginal Platform General Layout; and
- CS2-DRG-365275 Closed Corridor Standard Drawing Standard Amenity Shelter for Island Platform General Layout.

The underside of the roof must not have exposed structural members and must be light in colour.

The shelter must be positioned over/above the boarding indicator patches to provide cover.

### 7.6.2. Urban Standard Amenity Stops

The roof coverage must be for the entire shelter structure, in accordance with:

- CS2-DRG-365080 Urban Standard Drawing Standard Amenity Shelter for Marginal Platform General Layout; and
- CS2-DRG-365082 Urban Standard Drawing Standard Amenity Shelter for Island Platform General Layout.

The shelter must be positioned over/above the boarding indicator patches to provide cover. Island platforms or marginal platforms with bi-directional track must have two boarding indicator patches.

### 7.6.3. Enhanced Amenity Stops

A number of factors will influence the design of the roof structure and choice of waterproof cladding, including location, size of spans and aesthetics.

The up track platform shelter roof must cover an equal or higher percentage of the platform than the down track shelter roof due to typical boarding / alighting patterns at an Enhanced Amenity Stop.

The location of the shelter roof on the down track platform must be adjacent to the shelter roof on the up track platform and must consider typical alighting patterns and platform access.

For a marginal Enhanced Amenity Stop, the roof should cover minimum 60% of the platform on the up track and minimum 30% of the platform on the down track.

For an island Enhanced Amenity Stop, the roof should cover the full length of the platform.

#### **7.6.4. Roof Drainage**

Drainage systems must be designed to prevent leakage into or onto the shelter structure. Drainage must fall into a department approved outlet and must be in accordance with AS 3500.3.

Where possible, rainwater runoff should not be allowed to drain onto the platform as this creates a slip hazard.

##### **7.6.4.1 Gutters**

The shelter roof must have a gutter system to collect and direct rainwater into a drainage system (with the expectation of a Closed Corridor shelter, which may drain to the back of the shelter into a vegetated area). Stormwater must not be allowed to drain onto the track.

Roof gutters should be steel (galvanised or suitably treated) and designed to drain to downpipes. Gutters must be design so as to minimise the occurrence of blockages of the roof drainage system.

##### **7.6.4.2 Downpipes**

Downpipes must be enclosed within the tram shelter structure and be HDPE or equivalent.

#### **7.7. Weather Screens**

Prevailing winds and weather conditions for each site must be considered, and this must inform the design of the weather screen orientation in order to best protect customers at the tram stop from inclement weather.

##### **7.7.1. Perforated Weather Screens**

Perforated weather screens must:

1. be designed so as to minimise deflection;
2. where required, be fixed to the shelter frames and spot welded at all joint and connection points;
3. have connectors (i.e. rivets) that are similar metals to that of the weather screen so as to prevent electrolysis;
4. incorporate suitable edge protection from sharp edges;
5. be protected from weathering and vandalism with a suitable coating;
6. have sufficient transparency to enable passive surveillance and meet CPTED principles;
7. weather screens must be dark in colour and may have perforations with free area as little as 30% (max, 50%), to enable better protection; and
8. be 3mm aluminum (or equivalent lifespan material – passivated if required) with perforations that do not introduce finger entrapment risks (in accordance with HB295.3.21).

##### **7.7.2. Solid Weather Screens**

Solid weather screens must:

1. be designed so as to minimise deflection; and
2. have sufficient transparency to enable passive surveillance and meet CPTED principles.

##### **7.7.3. Closed Corridor Standard Amenity Stops**

Perforated weather screens must be provided for the full width and height of the back of the shelter structure.

For marginal platforms, perforated weather screens may be used instead of fencing for the length of the shelter, but the weather screens must meet the design loadings equivalent to fence design loads. Refer AR-PW-PM-SPE-00129009 Fencing.

#### **7.7.4. Urban Standard Amenity Stops**

Perforated weather screens must be provided for the full width and the bottom half of the back of the shelter structure.

Solid weather screens must be provided for the full width and the top half of the shelter structure.

### **7.8. Furniture**

Furniture includes seats and litter bins to be located on the platform. Refer to CS2-DOC-003444 Standard - Tram Stop Furniture for furniture design requirements.

#### **7.8.1. Seats**

Seats should be fixed directly to the platform deck and should not be fixed to the shelter.

#### **7.8.2. Litter Bins**

For Standard Amenity Stops, litter bins must not be placed under the shelter area.

### **7.9. Integrated System**

All shelters must have the following system elements integrated into the shelter structure:

#### **7.9.1. Shelter Lighting**

The lighting must be fully integrated into shelters and fixed to the structure to minimise vandalism opportunities and unauthorised access. To reduce the reliance on artificial lighting, the shelter must be designed so that natural light is sufficient during the day. Artificial light must be specified to have high efficacy and minimal maintenance.

The design for the shelter lighting must allow for easy maintenance and must be in accordance with CS5-DOC-003511 Public Transport Standard – Electrical Infrastructure.

#### **7.9.2. CCTV**

CCTV must be integrated into the shelter and must be provided in accordance with PI5-DOC-003517 Public Transport Infrastructure Security Systems Engineering Specification.

#### **7.9.3. Public Address System**

A PA system must be integrated into the structure and must be provided in accordance with PI6-DOC-003515 Design – Trams & Buses – Passenger Information Systems.

#### **7.9.4. Passenger Information Display Screens**

The PIDs should be a top of shelter mounted timetable display, and must be provided in accordance with PI6-DOC-003515 Design – Trams & Buses – Passenger Information Systems.

*Table 2 – Minimum number of Display Screens at tram stops*

TYPE OF STOP	TYPE OF PLATFORM	MINIMUM NUMBER OF SCREENS PER PLATFORM	LOCATION
Standard Amenity <sup>(1)</sup>	Marginal	2 <sup>(2)</sup>	Either end of shelter
	Island	2 <sup>(2)</sup>	Either end of shelter
Enhanced Amenity	Marginal	2 <sup>(2)</sup>	Either end of shelter
	Island	2 <sup>(2)</sup>	Either end of shelter

Note:

(1) Closed Corridor and Urban stops

(2) Dependant on platform access

**7.9.5. General Purpose Outlet**

General purpose outlets must be provided in accordance with CS5-DOC-003511 Public Transport Standard – Electrical Infrastructure and PI6-DOC-003515 Design – Trams & Buses – Passenger Information Systems.

**7.10. Voice Annunciator and Hearing Impaired Induction Loop**

The Voice Annunciator (VA) must be stand-alone columns and be painted to AS 2700 – Y14 “Golden Yellow” to ensure clear identification by passengers. Refer to Wayfinding Rulebook for more information.

The VA and Hearing Impaired Induction Loop (HIIL) design must be provided in accordance with PI6-DOC-003515 Design – Trams & Buses – Passenger Information Systems.

**7.11. Emergency Help Phone**

Emergency Help Phones (EP) must be stand-alone columns and be painted to AS 2700 – B12 “Royal Blue” to ensure clear identification by passengers. Refer to Wayfinding Rulebook for more information.

The EP must be provided in accordance with PI5-DOC-003517 Public Transport Infrastructure Security Systems Engineering Specification.

**7.12. Allocated Spaces**

A minimum of two allocated spaces of 5% of the waiting area must be provided under the shelter in accordance with DSAPT. This waiting area must be located as close as possible to the accessible boarding indicator patch.

The allocated space must have no pavement marking, however its location must be indicated on the drawings.

**7.13. Signage and Pavement Marking**

Signage and Pavement Marking must be provided in accordance with CS2-DOC-003445 Standard Tram Stop Station Signage and Pavement Marking.

**7.14. Conduits, Wiring and Pit Access Covers**

All conduits must be concealed from view within the shelter framework and shelter name sign, refer to CS5-DOC-003511 Public Transport Standard – Electrical Infrastructure, PI6-DOC-003515 Design – Trams & Buses – Passenger Information Systems and Engineering Specification PI5-DOC-003517 Public Transport Infrastructure Security Systems to co-ordinate the conduiting requirements.

### 7.15. Vermin Proofing

Shelters and furniture must be designed to prevent opportunities for vermin to nest in the tram stop precinct. Appropriate measures must be taken to prevent vermin infestation.

### 7.16. Electrical Clearances

All clearances must comply with the requirements of TPS-DOC-002020 Guidelines for Low Voltage Electrical Earthing and Bonding for the Adelaide Metro Tram Network. The roof of the shelter must be designed to optimise cover, between the structural clearance of the rolling stock and the clearance of the pantograph.

Electrical clearances must comply with Electrical Safety (Installations) Regulations and EN 50119.

### 7.17. Public Art

Public art is not required at the tram stops however may be included to improve ambience and give the site a sense of identity. Public art should be developed to meet the needs of the location, minimise vandalism, and to meet general community expectations. Any public art included at tram stops must be appropriately durable and weatherproof.

## 8. Materials, Fixtures and Finishes

Materials, fixtures and finishes for shelters must be approved by Rail Asset Management and comply with the following minimum requirements:

1. provide high quality and high durability with a minimum design life of 50 years;
2. minimise discolouration, mold growth and general deterioration as a result of weathering and UV light;
3. enhance visual surveillance and spatial quality by encouraging natural light entry;
4. eliminate hazards to passengers such as slips, trips and falls, rips and cuts;
5. support CPTED principles and enhance passive surveillance and perceived passenger and public levels of safety;
6. be easily maintained and cleaned without disrupting operations or material performance;
7. be independent of adjacent materials and components so that spot repairs can take place in the case of minor damage and can be easily replaced;
8. discourage and provide a high level of resistance to vandalism through appropriate material selection and approved anti-graffiti coatings;
9. minimise surfaces and ledges that collect dirt, dust and soiling;
10. withstand damage from vibration generated by trams;
11. satisfy and maintain accessibility requirements for workers and passengers;
12. achieve sustainability requirements and objectives; and,
13. be coordinated with public art, signage and any of The Departments branding elements.

All metal finishes must have no sharp edges, be de-burred, smooth and must provide a minimum radius of 3mm. Use of potentially reflective materials in areas that could cause glare for tram drivers must be avoided.