Structures – Train System

Engineering Standard

Rail Commissioner

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Government of South Australia
Rail Commissioner

DOCUMENT CONTROL

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1. Introduction

The Department of Planning, Transport and Infrastructure (DPTI) operates and maintains the Adelaide Metropolitan Passenger Rail Network (AMPRN) under the Rail Accreditation assigned to the Rail Commissioner.

This standard is intended to ensure public transport safety and customer service levels are efficiently and effectively supported by ensuring a whole of life approach is taken in managing railway structures and does not create any risks not deemed to meet the So Far As Is Reasonably Practicable (SFAIRP) principles under Rail Safety National Law (RSNL).

Railway structures include:

Structure Asset Class	Structure Asset Type
Air Space Development	Air Space Development
Bridge	Overbridge
	Underbridge
	Footbridge
Culvert	Culvert
Miscellaneous Structure	Access stairway and walkway
	Buffer Stop
	Overhead services crossing
	Overhead wiring and signal gantry structure
	Sound barrier
	Track slab
	Vehicle inspection pit and associated structure
	Wingwall
Pedestrian Subway	Pedestrian Subway
Retaining Wall	Retaining Wall
Station Platform	Station Platform
Subway	Subway
Tunnel	Tunnel

Table 1: Railway structure asset class and types

This standard supersedes Sections 1, 2 and 4 of CP-TS-957 *TransAdelaide Code of Practice Volume 2-Train System Structures.*

2. Purpose

The purpose of this standard is to provide mandatory requirements for the documentation, design, manufacture, construction and commissioning and decommissioning and disposal of all railway structures located on, adjacent, under and/or over tracks within the AMPRN train corridors.

The monitoring and maintenance of structures is defined in CG4-DOC-001259 *Structures – Technical Maintenance Plan for the AMPRN.*

3. Scope

This standard is applicable to all new railway structures on the AMPRN train system as noted in Table 1.

Existing structures may be rated against this standard.

This standard is not applicable to structures within the AMPRN tram system – refer to CP-TS-977 *Structures –Tram.*

4. Related Documents

DOCUMENT NAME	DOCUMENT NUMBER
Code of Practice – Structure and Application	CP-TS-952
Code of Practice – Infrastructure Management and Principles	CP-TS-953
Management of Change	PR-RC-MC-009
Management of Change – AMPRN Asset Baseline	PR-AM-GE-674
Structures – Technical Maintenance Plan for the AMPRN	CG4-DOC-001259
Design for access and mobility – General requirements for access – New building work	AS1428.1

5. References

a) The following standards, guidelines and/or codes of practice are referred to in the Standard:

- RISSB Glossary National Guideline: Glossary of Railway Technology
- AS 7636 *Railway Structures*
- AS 5100: *Bridge Design*
- AS 1170.4: *Minimum Design Loads on Structures*
- CP-TS-962 Guardrails/Checkrails, Buffer Stops & Derails
- Structural Clearances: PTS-MS-10-TR-STD-00000047
- Station – Platforms (D062): AR-PW-PM-SPE-000129003
- Electrical and Mechanical Clearances for the 25kV Electrified Train Network: TP1-DOC-000389
- Overhead Wiring System for the 25kV Electrified Train Network: TP1-DOC-000390
- Electrical Safety Instructions: PR-EM-EE-112
- AS 4678: *Earth-Retaining Structures*
- AS 4100: *Steel Structures*
- AS 3600: *Concrete Structures*
- AS 2327: *Composite Structures – Composite Steel-Concrete Construction in Buildings*

b) Refer to Section 1.7 of AS 7636 for further referenced documents.

6. Acronyms

ACRONYM	FULL NAME
AMPRN	Adelaide Metropolitan Passenger Rail Network
DPTI	Department of Planning, Transport and Infrastructure
RISSB	Rail Industry Safety and Standards Board

7. Definitions

TERM	DEFINITION
Rail Infrastructure Manager	The person who has effective control and management of the rail infrastructure.
RISSB	Rail Industry Safety and Standards Board
Unit Manager Track and Civil Engineering	The person who has been delegated the Engineering Authority for track and civil structures by the Railway Infrastructure Manager.
Underbridge	A bridge where the railway is constructed on top of the superstructure of a bridge.
Overbridge	A bridge where the railway is constructed below the bridge superstructure.

Note:

1. The Rail Infrastructure Manager (RIM); as per the RISSB definition; for DPTI is the Rail Commissioner.
2. AS 7636 refers to the responsibilities of the RIM. This standard clarifies the nominated delegation of Engineering Authority by the RIM.

3. Refer to the RISSB Glossary National Guideline: Glossary of Railway Technology for further definitions.

8. AS 7636 Railway Structures

DPTI adopts all the Mandatory and Recommended requirements as specified in AS 7636 *Railway Structures (*excluding Section 6: Monitoring and Maintenance), unless modified as specified in Section 9.

Where ambiguity arises, the relevant DPTI standard shall apply.

Where relevant, the Unit Manager Track and Civil Engineering can nominate a representative to undertake duties assigned to the Unit Manager Track and Civil Engineering in AS 7636, i.e. Project Managers.

9. DPTI Addendum to AS 7636 Railway Structures

9.1. General Requirements for the Management of Railway Structures

9.1.1 Clearances

Horizontal and vertical clearances for bridges, structures and services shall comply with PTS-MS-10-TR-STD-00000047 *Structural Clearances,* TP1-DOC-000389 *Electrical and Mechanical Clearances for the 25kV Electrified Train Network* and other relevant DPTI documentation.

9.2. Design

9.2.1 Design Management

Where required by the RIM or the Unit Manager Track and Civil Engineering, a Design and Engineering Management Plan shall be developed that clearly details the design requirements and constraints, strategy, planning, resource requirements and financial management of the design project.

9.2.2 Design Loads

9.2.2.1 Live Loads

a) AS 5100.2 requires that train under bridges be designed to a 300LA (300KN) loading and axle configuration as detailed in Clause 9.2 of the Australian standard.
AS 5100.2 Clause 9.1 also states:
'A railway under bridge shall be designed for the loads specified in this Clause (9), unless otherwise specified by the rail authority'

This enables the RIM to specify an alternative design loading that better reflects the local operating regime. This allows for more economic design without compromising safety.

The operating regime for the AMPRN train lines is noted in the DPTI Code of Practice: CP-TS-952 *Structure and Application*.

DPTI has determined that the minimum design loading for all train under track structures on the AMPRN shall be 230LA (230KN) and applied using the 300LA axle configurations specified in AS 5100.2.

Certain locations on the AMPRN may require higher than the minimum 230LA loading.

The Unit Manager Track and Civil Engineering shall approve the design loading for all train under track structures.

All other design requirements shall be as specified in AS 5100.

b) The Unit Manager Rollingstock Engineering Unit shall provide train consist information.

9.2.2.2 Environmental Loads

Wind loading for all structures shall be designed in compliance with TP1-DOC-000390 *Overhead Wiring System for the 25kV Electrified Train Network* and AS 1170.2 *Wind Loads*.

9.2.3 Adequacy of Structure Gauging, Clearances and Dimensions

The design shall comply with the required horizontal, vertical and below rail clearances and dimensions in accordance with PTS-MS-10-TR-STD-00000047 *Structural Clearances*.

9.2.4 Hydrology, Drainage and Waterway Requirements

Hydraulic design for a bridge or drainage structure shall conform to the requirements of Track & Civil Engineering Standard, CS1-DOC-001218 and AS 7637.

9.3. Design Criteria

9.3.1 Bridges

a) Metal arch bridges shall not be installed on the AMPRN.

b) Transom deck bridges shall not be installed on the AMPRN.

9.3.2 Culverts

Buried corrugated metal pipe culverts supporting railway tracks shall not be installed on the AMPRN.

9.3.3 Tunnels

a) All overhead wiring, tunnel lighting and all other electrical wiring shall be designed and installed in compliance with the relevant Australian standards, unless otherwise noted in relevant DPTI standards.

b) Tunnels shall include refuges for personnel.

9.3.4 Platforms

All railway platforms shall be designed in accordance with AR-PW-PM-SPE-000129003 *Station – Platforms*.
AS 4678, AS 4100, AS 3600, AS 2327 shall also be used.

9.3.5 Overhead Wiring Structures and Gantry Systems

The components of overhead wiring structures and gantry structures shall be designed and installed in compliance with the relevant Australian standards; unless otherwise noted in relevant DPTI standards, including those listed in Section 3.5.6 of AS 7636.

9.3.6 Buffer Stops

Buffer stops shall comply with Code of Practice CP-TS-962 *Guardrails/Checkrails, Buffer Stops and Derails* and requirements within this standard.

9.3.7 Guardrail and Checkrail System

Guardrails and checkrails are to comply with DPTI Code of Practice CP-TS-962 Guardrails/Checkrails, Buffer Stops and Derails.

9.4. Construction Procedures

9.4.1. Earthworks and Preparation

Embankment batters and slopes shall be designed in accordance with Track & Civil Engineering Standard, CS1-DOC-001538, AS 7638, AS 4678, AS 1289 and other relevant standards.

9.4.2. Platforms

All railway platforms shall be constructed in accordance with AR-PW-PM-SPE-000129003 *Station – Platforms* and the relevant DPTI standards.

9.5. Working Restrictions

References to AS 7633 in Section 5.3 of AS 7636 shall be replaced with PTS-MS-10-TR-STD-00000047 Structural Clearances.

9.5.1. Railway Traffic Requirements

9.5.5.1 Clearances

No loads should pass within the clearances specified in PTS-MS-10-TR-STD-00000047 *Structural Clearances,* TP1-DOC-000389 *Electrical and Mechanical Clearances for the 25kV Electrified Train Network* or AS 7633, whichever provides the greater clearance.

9.5.5.2 Electrification Restrictions

All works conducted near live overhead electrification wires (contact, catenary or feeder) shall not be carried out within the clearances specified in PR-EM-EE-112 *Electrical Safety Instructions* and AS 7633 unless mitigating measures have been put in place (e.g. power-off) due to risk of electrical arcing.

9.6. As Built Drawings

The DPTI Asset Management standards shall be adhered to.