

# Master Specification

## Part RW-ST-D1

### Structures

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## RW-ST-D1 Structures

### 1 General

- a) This Master Specification Part sets out the requirement for the design of railway structures as defined in AS 7636 Railway Structures, including bridges, tunnels, culverts, subways, retaining walls and miscellaneous Railway Infrastructure, including:
  - i) the documentation requirements, as set out in section 2;
  - ii) the design requirements for railway structures, as set out in section 3; and
  - iii) the construction and commissioning requirements, as set out in section 4.
- b) The design of railway structures must comply with the Reference Documents, including:
  - i) AR-EL-STD-0102 - Rail Commissioner - Guidelines for the Protective Provisions Related to Electrical Safety and Earthing for the Adelaide Metro Electrified Rail Network (available at [www.keolisdowneradelaide.com.au/files/AR-EL-STD-0102.PDF](http://www.keolisdowneradelaide.com.au/files/AR-EL-STD-0102.PDF));
  - ii) AS 5100.2 Bridge design, Part 2: Design loads;
  - iii) AS 7636 Railway structures;
  - iv) CP-TS-977 Structures Volume Three Tram System;
  - v) TC1-DOC-000384 - Engineering decision - Structural clearance for electrification mast;
  - vi) TP1-DOC-000389 - Electrical and mechanical clearances for the 25kV electrified train network;
  - vii) TC1-DOC-001642 Structures - Train System; and
  - viii) TP2-DOC-002020 - Guideline for low voltage electrical earthing and bonding for the Adelaide Metro tram network.

### 2 Documentation

#### 2.1 Design Documentation

In addition to the requirements of PC-EDM1 “Design Management” and PC-RW30 “Design”, the Design Documentation must include:

- a) details of the railway structure bearing type and details, as required by section 3.2b); and
- b) the joint details and details of the integration with the management of rail stress, as required by section 3.3b).

#### 2.2 Design Basis Report

In addition to the requirements of PC-EDM1 “Design Management” and ST-SD-D1 “Design of Structures”, the Design Basis Report must include:

- a) details of the structure type, as required by section 3.1b); and
- b) rail axle loading, as required by section 3.1j).

### 3 Design requirements for railway structures

#### 3.1 General

- a) The design of railway structures must comply with:

- i) TC1-DOC-001642 Structures - Train system;
  - ii) CP-TS-977 Structures Volume Three Tram System;
  - iii) ST-SD-D1 "Design of Structures";
  - iv) ST-RE-D1 "Reinforced Soil Structures Design";
  - v) PC-RW30 "Design";
  - vi) PC-EDM1 "Design Management"; and
  - vii) the Disability Standards for Accessible Public Transport 2002 made under subsection 31(1) of the *Disability Discrimination Act 1992*.
- b) In addition to the requirement of ST-SD-D1 "Design of Structures" the Contractor must provide details in the Design Basis Report of the structure type (or structure types) to achieve the project objectives, including:
- i) nature of structure (type / simply supported / multi span, etc.);
  - ii) optimal span lengths; and
  - iii) rail stress to joint interaction.
- c) The railway structure design must include provisions for future OHWS in accordance with the Contract Documents and RW-OHW-D1 "Overhead Wiring".
- d) The aesthetics of railway structures must be integrated with the aesthetics and architectural form of the reference urban design (where applicable) and otherwise in accordance with PR-LS-D1 "Landscape and Urban Design" or PR-LS-D2 "Landscape Design" as relevant.
- e) The railway structure design must have cast in fixing details for future installation of advertising signage where specified in the Contract Documents.
- f) The railway structure design must consider pedestrian and cycling connectivity in accordance with the Contract Documents.
- g) The railway structure design must ensure that all concrete elements that are able to be accessed by the public within a height of 3.0 m are treated with an approved anti-graffiti coating in accordance with ST-SD-D1 "Design of Structures". Where surfaces are able to be accessed by the public adjacent to horizontal or near-horizontal surfaces, this distance must be increased to 4.0m.
- h) Earthing and bonding must be designed in accordance with:
- i) AR-EL-STD-0102 - Rail Commissioner - Guidelines for Protective Provisions Related to Electrical Earthing and Bonding for the Adelaide Metro Electrified Rail Network;
  - ii) TC1-DOC-000384 - Engineering decision - Structural clearance for electrification mast;
  - iii) TP1-DOC-000389 - Electrical and mechanical clearances for the 25kV electrified train network; and
  - iv) TP2-DOC-002020 - Guidelines for low voltage electrical earthing and bonding for the Adelaide metro tram network.
- i) On all railway bridges, the design must include approach slabs when transitioning to ballast, unless specified otherwise in the Contract Documents.
- j) The Contractor must provide details of the rail axle loading in the Design Basis Report including:
- i) trams in accordance with AS 5100.2: Bridge design, Part 2: Design loads; and
  - ii) trains in accordance with the TC1-DOC-001642 Structures - Train System.

### 3.2 Bearings

- a) The railway structure design must enable efficient and safe replacement of bridge bearings. The uplift of bearings must be avoided.
- b) The Design Documentation must include the railway structure bearing type and details.

### 3.3 Expansion joints

- a) Where the railway structure is a bridge, the Contractor must ensure that bridge expansion joints are integrated with the management of rail stress and rail joint requirements set out in RW-TC-D1 "Track and Civil".
- b) The Contractor must submit the bridge expansion joint details and details of the integration with the management of rail stress as part of the Design Documentation.

## 4 Construction and commissioning

- a) In addition to the construction specification requirements in PC-RW30 "Design", the requirements of this section 4 must be included in the construction specification for railway structures.
  - b) The railway structure must be constructed and commissioned in accordance with:
    - i) TC1-DOC-001642 Structures - Train System;
    - ii) CP-TS-977 Structures Volume Three Tram System; and
    - iii) AS 7636 Railway structures.
  - c) The Contractor must submit the construction methodology and commissioning requirements in accordance with:
    - i) PC-CN3 "Construction Management"; and
    - ii) PC-RW50 "Inspection Testing and Commissioning".
  - d) The Contractor must remove graffiti from any structural element until asset handover.
  - e) Where the railway structure is a bridge, the Contractor must provide details of the inspection, maintenance and replacement requirements of the bearings in the O&M Manual in accordance with PC-RW60 "Asset Management Handover".
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