Civil Engineering Technical Requirement
CIVIL-SR-001

DESIGN OF ROAD OVERBRIDGES

Revision: G
Updated: 30 May 2011

© Queensland Rail 2011

Reproduction by any means (including electronic, mechanical, photocopying, microcopying or otherwise), except for the purposes permitted by the Copyright Act, is prohibited without prior written permission of Queensland Rail.

This publication has been created for use in the design, construction, maintenance and operation of Queensland Rail infrastructure and infrastructure owned by others that adjoins Queensland Rail’s operational corridors. Every effort has been made to ensure that the information contained in this document is correct at the time of authorisation for issue. It is the responsibility of the user to ensure that the information is interpreted correctly and is up to date before it is applied. It is strongly recommended that the user consults with Queensland Rail to ensure relevancy for the specific circumstance and correct interpretation.

When the document is used in other than Queensland Rail projects, Queensland Rail gives no warranties as to the completeness; accuracy or adequacy of the publication or any parts of it and accepts no responsibility or liability upon any basis whatsoever.
# Document Information

<table>
<thead>
<tr>
<th>Current Revision:</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Released:</td>
<td>18/09/1996</td>
</tr>
<tr>
<td>Last Updated:</td>
<td>30 May 2011</td>
</tr>
<tr>
<td>Review Before:</td>
<td>30 May 2014</td>
</tr>
<tr>
<td>Approved by:</td>
<td>Ian McColl</td>
</tr>
<tr>
<td>Authorised by:</td>
<td>Chris Keye</td>
</tr>
</tbody>
</table>

## Document Amendment History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Section(s) Amended</th>
<th>Summary of Amendment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>05.03.1997</td>
<td></td>
<td>Minor editing prior to authorisation.</td>
</tr>
<tr>
<td>A</td>
<td>14.05.1997</td>
<td></td>
<td>QUEENSLAND RAIL costs updated; Definition of terms altered.</td>
</tr>
<tr>
<td>B</td>
<td>16.01.2001</td>
<td></td>
<td>Safety Induction course costs updated.</td>
</tr>
<tr>
<td>C</td>
<td>04.02.2002</td>
<td></td>
<td>Definition of Terms altered.</td>
</tr>
<tr>
<td>D</td>
<td>30.06.2005</td>
<td></td>
<td>Complete Revision.</td>
</tr>
<tr>
<td>F</td>
<td>27.09.2010</td>
<td></td>
<td>Minor changes, rebranded.</td>
</tr>
<tr>
<td>G</td>
<td>30.05.2011</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

APPROVED BY: [Signature]  DATE: 30 May 11

AUTHORISED BY: [Signature]  DATE: 30/5/11

© 2011 Queensland Rail Limited  UNCONTROLLED COPY WHEN PRINTED  Page 2 of 7
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>INTRODUCTION</td>
<td>4</td>
</tr>
<tr>
<td>2.0</td>
<td>SCOPE</td>
<td>4</td>
</tr>
<tr>
<td>3.0</td>
<td>DESIGN AND DOCUMENTATION</td>
<td>4</td>
</tr>
<tr>
<td>3.1</td>
<td>General</td>
<td>4</td>
</tr>
<tr>
<td>3.2</td>
<td>Clearances</td>
<td>5</td>
</tr>
<tr>
<td>3.3</td>
<td>Earthquake Protection</td>
<td>5</td>
</tr>
<tr>
<td>3.4</td>
<td>Durability</td>
<td>5</td>
</tr>
<tr>
<td>3.5</td>
<td>Demolition</td>
<td>5</td>
</tr>
<tr>
<td>4.0</td>
<td>SUBSTRUCTURE - FOUNDATIONS</td>
<td>5</td>
</tr>
<tr>
<td>5.0</td>
<td>PIERS - COLLISION PROTECTION</td>
<td>5</td>
</tr>
<tr>
<td>5.1</td>
<td>General</td>
<td>5</td>
</tr>
<tr>
<td>5.2</td>
<td>Upgrading of Existing Road Overbridges</td>
<td>5</td>
</tr>
<tr>
<td>5.3</td>
<td>Design Report</td>
<td>5</td>
</tr>
<tr>
<td>6.0</td>
<td>SUPERSTRUCTURE</td>
<td>5</td>
</tr>
<tr>
<td>6.1</td>
<td>General</td>
<td>5</td>
</tr>
<tr>
<td>6.2</td>
<td>Deck Drainage</td>
<td>6</td>
</tr>
<tr>
<td>7.0</td>
<td>TRAFFIC BARRIERS</td>
<td>6</td>
</tr>
<tr>
<td>8.0</td>
<td>PROTECTION SCREENS</td>
<td>6</td>
</tr>
<tr>
<td>9.0</td>
<td>SERVICES</td>
<td>6</td>
</tr>
<tr>
<td>10.0</td>
<td>WATERPROOFING</td>
<td>6</td>
</tr>
<tr>
<td>11.0</td>
<td>ANTI-GRAFFITI COATING</td>
<td>6</td>
</tr>
<tr>
<td>12.0</td>
<td>ADVERTISING SIGNS</td>
<td>6</td>
</tr>
<tr>
<td>13.0</td>
<td>CERTIFICATION OF DESIGN AND CONSTRUCTION</td>
<td>6</td>
</tr>
<tr>
<td>14.0</td>
<td>AS CONSTRUCTED DRAWINGS</td>
<td>7</td>
</tr>
<tr>
<td>15.0</td>
<td>ASSOCIATED COSTS INCURRED BY QUEENSLAND RAIL</td>
<td>7</td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION
This Technical Requirement details the criteria which must be met by external party designs for road bridges over railway property (Road Overbridges). 

Definition: Road Overbridge is a road bridge crossing over a railway.

Reference is made to the following additional Queensland Rail Technical Requirements which must also be satisfied:

- CIVIL-SR-002 Work in or about Queensland Rail property,
- CIVIL-SR-003 Work adjacent to overhead line equipment,
- CIVIL-SR-007 Design and selection criteria for road / rail interface barriers,
- CIVIL-SR-008 Protection screens, and
- CIVIL-SR-012 Collision protection of supporting elements adjacent to railways.

Copies of these documents may be obtained from Queensland Rail.

2.0 SCOPE
This Technical Requirement applies to the
- design of new overbridges, and
- upgrading of existing overbridges.

It covers the design criteria for road overbridges which pass over Queensland Rail property. Only those matters which will affect or are affected by the presence of the railway are covered. For example, the aesthetics of the bridge are not considered.

3.0 DESIGN AND DOCUMENTATION
3.1 General
The design of road overbridges is to comply with:

- AS 5100 Bridge Design for collision protection and collision loads;
- All other relevant Australian Standards, and
- This Technical Requirement and associated Technical Requirements.

The design of the overbridge is to take into account the available access to the site and the need to minimise interference with train operations, passengers and railway activities during construction and maintenance.

Designers are to liaise with Queensland Rail to minimise the effect of construction on train services and to determine whether Queensland Rail will accommodate any speed restrictions, track closures and/or isolations of the overhead line equipment (OHLE) anticipated during construction.

Queensland Rail reserves the right to restrict construction methods to those that minimise interference to train operations, passengers and other railway activities.

Existing access to Queensland Rail property for maintenance and emergencies is to be maintained at all times during construction work.

All documentation for the construction of overbridges is to allow for and include:

- CIVIL-SR-002 Work in or about Queensland Rail property,
- CIVIL-SR-003 Work adjacent to overhead line equipment,
- CIVIL-SR-007 Design and selection criteria for road / rail interface barriers,
- CIVIL-SR-008 Protection screens, and
- CIVIL-SR-012 Collision protection of supporting elements adjacent to railways.

The drawings are to show:
- design loads, including the heavy load platform used,
- any special provisions, e.g. structural redundancy and use of precast or prefabricated elements
- railway centrelines in the vicinity of the proposed overbridge,
- distances from overbridge to track and OHLE,
- railway kilometrage at the intersection of railway and road centrelines, and
- details of all existing railway infrastructure, including maintenance and emergency access, under and in the vicinity of the proposed overbridge,
- demolition scheme (see 3.5).

All structural drawings, including temporary works such as falsework and formwork shall be certified by an RPEQ as having been designed in compliance with the Professional Engineers Act.

Prior to construction, copies of the drawings and documentation consisting of:
- overall scope of construction works,
- demolition scheme,
- collision protection measures, and
- details of work within / over / adjacent to Queensland Rail property are to be submitted to Queensland Rail for review and a compliance check against Queensland Rail’s Technical Requirements and Standards.

Construction is not to commence until permission has been received from Queensland Rail.
3.2 Clearances
Clearances to railway tracks are to satisfy the minimum requirements of the following, unless otherwise approved by Queensland Rail:
- Queensland Rail Standard Drawing No 2754,
- trackside access roads,
- formation drainage,
- sighting requirements for railway signal sighting (copy of SAF/STD/0024/SIG and advice provided on receipt of request)
- sighting requirements for level crossings (SAF/STD/0044/CIV/NET provided on receipt of request)
- special items of overhead traction wiring equipment, e.g. switches, transformers, wiring at turnouts,
- passenger platform requirements, and
- access to clean and maintain the overbridge

For overbridges across existing and future electrified lines, the overbridge’s support structure is to be located clear of the overhead wiring system and to have protection screens installed in accordance with Queensland Rail Technical Requirement CIVIL-SR-008 Protection screens.

Overbridge abutments adjacent to existing tracks are to be located sufficiently clear of the tracks to avoid any delays to train services from speed restrictions, track closures and / or isolations of the OHLE. This may require clearances greater than the minimum clearances shown on Standard Drawing No. 2754. Queensland Rail will advise of clearances required in excess of the minimum.

The drawings of the proposed overbridge are to show the railway clearance outline superimposed on an elevation of the overbridge at 90° to the track alignment.

3.3 Earthquake Protection
Road overbridges are to be classified as “importance level 2 structures” for the purposes of AS 1170.4 Structural design actions: Part 4 Earthquake actions in Australia and in accordance with AS 5100.

Overbridges are to be designed to minimise the risk of collapse during earthquakes, with particular attention being given to:
- bearing arrangements,
- widths of bearing shelves, and
- reinforcing steel in columns.

3.4 Durability
The design life of road overbridges shall be a minimum of 100 years.

Road overbridges are to be designed to minimise maintenance (such as maintenance painting of steelwork) and such work when required shall have no effect on Queensland Rail’s operations. No access from the railway corridor will be allowed.

3.5 Demolition
A road overbridge is to be designed so that it can be demolished progressively without causing interference to train operations, passengers and any railway activities. A demolition scheme is to be included in the drawings and documentation to be submitted to Queensland Rail as required by Section 3.1.

4.0 SUBSTRUCTURE - FOUNDATIONS
Foundations are to be designed to be installed with minimum interference to railway operations.

The design of shoring systems for excavations adjacent to operating railway tracks is to be submitted to Queensland Rail for review before construction commences.

Provision is to be made for railway formation drainage. Drains are to be lined where appropriate and are to be clear of the track and shall have sufficient capacity to prevent the rainfall from a one in 50 year rainfall event accumulating to the base of the ballast. Overbridge piers and foundations are to be designed to allow free drainage along the formation and are not to cause ponding.

5.0 PIERS - COLLISION PROTECTION
5.1 General
Road overbridges are to have a single clear span between abutments over existing and future railway tracks, unless agreed otherwise by Queensland Rail.

Collision protection and collision loads are to be in accordance with AS 5100 Bridge Design and Queensland Rail Technical Requirement CIVIL-SR-012.

5.2 Upgrading of Existing Road Overbridges
Existing piers and columns which do not satisfy the requirements of Section 5.1 are to have deflection walls provided. Independent deflection walls are to be provided where space permits. For details refer to Queensland Rail Technical Requirement CIVIL-SR-012.

5.3 Design Report
A design report on the measures adopted for collision protection is to be included in the drawings and documentation to be submitted to Queensland Rail as required by Section 3.1.

6.0 SUPERSTRUCTURE
6.1 General
Overbridge superstructures over existing tracks are to be designed to minimise the time needed for erection, e.g. through the use of precast /
prefabricated components. The aim is to minimise any delays to train services during construction from speed restrictions, track closures and / or isolations of the overhead traction wiring equipment.

The connections between the deck and piers are to be designed to minimise the risk of collapse in the event of an earthquake or collision from railway traffic.

6.2 Deck Drainage
Overbridge deck drainage shall discharge in a manner which does not adversely affect railway tracks, associated railway facilities or property occupied by Queensland Rail. Deck drainage discharge via scuppers is not permitted from spans over existing and future railway tracks. Deck drainage pipes are to comply with the requirements for services in Section 9.

7.0 TRAFFIC BARRIERS
Traffic barriers are to be provided across the overbridge and on the approaches to prevent vehicles from leaving the roadway and accessing Queensland Rail tracks and property.

Traffic barriers on overbridges are to be designed in accordance with AS 5100 Bridge Design and Queensland Rail Technical Requirement CIVIL-SR-007. Designers are to reach agreement with Queensland Rail on the barrier performance level.

8.0 PROTECTION SCREENS
Protection screens are to be designed to protect the railway by preventing:

- construction worker and public access to overhead traction wiring equipment and the track, and / or
- the throwing of objects at trains, stations and staff / public on the railway corridor.

The minimum requirements for protection screens are provided in Queensland Rail Technical Requirement CIVIL-SR-008.

9.0 SERVICES
Neither Road Overbridges nor their construction works are to disturb Queensland Rail services (signal, telecommunications and OHLE) and other externally-owned services. If disturbances of these services are unavoidable, the full cost of relocating and protecting the services will be to the external party’s account. Existing underground services that are to remain in place are to be protected from loads during construction and operation of the building. Design details are to be submitted to Queensland Rail for review.

Services, including pipes for deck drainage, are not to be attached to the sides or undersides of overbridges over or adjacent to the railway.

Services and their attachment to the overbridge are to have a 100 year design life and are to be designed for replacement without affecting railway operations. Design and material selection is to be subject to review and approval by Queensland Rail. Drainage systems are to be designed to prevent leakage onto the railway corridor.

10.0 WATERPROOFING
Overbridge decks are to be waterproofed to prevent water leaking through to the railway. Details of the material and extent of application are to be shown on the construction drawings.

11.0 ANTI-GRAFFITI COATING
Except in remote areas, piers, parapets and any other parts of overbridges vulnerable to graffiti are to be protected by an approved non-sacrificial coating.

12.0 ADVERTISING SIGNS
Advertising signs and other hoardings are not to be placed on overbridges, unless approved by Queensland Rail.

If existing advertising signs on Queensland Rail property will require removal or relocation because of the proposed works, Queensland Rail must be advised as early as possible. Failure to do so may cause delays in the start of work. All costs associated with the removal and relocation of these signs are to be borne by the owner of the Road Overbridge.

13.0 CERTIFICATION OF DESIGN AND CONSTRUCTION
The overbridge design is to be carried out in compliance with the Professional Engineers Act (QLD) 2002. The designer is to specify the functional requirements and the standards used for the design.

Design is to include verification by competent professional engineers, not directly involved in the design, that the design complies with the specified functional requirements and related standards.

The designer is to provide formal certification to Queensland Rail that the Road Overbridge design and verification requirements have been met. The certification is to include a summary of the specified functional requirements and related standards.

The completed Road Overbridge must be certified by a Registered Professional Engineer of Qld as having been constructed in accordance with the drawings and any approved variations.
14.0 AS CONSTRUCTED DRAWINGS

Within six (6) weeks of practical completion of construction, the constructing authority is to provide Queensland Rail with:

- as constructed drawings (plan and section) for the overbridge, showing the relationship to the railway tracks and all adjacent railway infrastructure, and
- collision protection elements for the overbridge.

Drawings are to be in electronic pdf format.

15.0 ASSOCIATED COSTS INCURRED BY QUEENSLAND RAIL

All of Queensland Rail’s costs associated with the review, design and construction of the overbridge and the implementation of Queensland Rail’s Technical Requirements will be charged to the overbridge owner or its agent. This includes any remedial work necessary to Queensland Rail property as the result of this work and any accidental damage, as well as costs associated with train delays. Rates will be set by Queensland Rail.