

TRANSPORT FOR NSW (TfNSW)

QA SPECIFICATION R16

PRECAST REINFORCED CONCRETE BOX CULVERTS

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REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1/Rev 2	R7.3 Pay Item R7P1	Discretion by Superintendent regarding blinding layer. Compaction adjacent to walls. Payment includes blinding layer and invert slab.	GM, CEC (R. Neal)	03.07.92
Ed 1/Rev 3	2	Clause numbers and lists restructured to suit the new format. Hold point removed and Supplier Quality System introduced.	GM, CEC per JW (MCQS)	27.03.95
Ed 1/Rev 4	1 - 4, Annex R16/1 1 2, 3 4	Specification Number changed from R7 to R16. Converted to MS Word 6.0c. References to RTA Specifications changed. Clauses renumbered Rewritten AS 3902 changed to ISO 9002. Methods required to be in PROJECT QUALITY PLAN	GM, RNIC; (J Woodward)	03 Jan 97
Ed 2/Rev 0		Completely rewritten.	GM, RNIC	03.08.98
Ed 2/Rev 1	Annexure R16/3	New schedule listing Identified Records	GM, RNIC	23.05.00
Ed 3/Rev 0	Various	Text revised to direct imperative style "Contractor" replaced by "you" "Superintendent" replaced by "Principal" Reformatting and minor editing "Shall" replaced by "must".	GM, RNIC	05.10.05

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 3/Rev 0 (cont'd)	Foreword 1.2 1.4 1.5 R16/1, R16/2 R16/3	New clause after the Table of Contents New clause, references transferred to Annexure R16/M Transferred to Clause 1.2.1 Transferred to Annexure R16/D Renumbered R16/A, R16/E, respectively Renumbered R16/C		
Ed 3/Rev 1	Guide Notes	Guide Notes deleted.	GM, IC	17.09.10
Ed 3/Rev 2	Global	References to “Roads and Maritime Services” or “RMS” changed to “Transport for NSW” or “TfNSW” respectively.	DCS	22.06.20



PRECAST REINFORCED CONCRETE BOX CULVERTS

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VERSION FOR: DATE:

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FOREWORD

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When this document forms part of a contract

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REVISIONS TO PREVIOUS VERSION

This document has been revised from Specification TfNSW R16 Edition 3 Revision 1.

All revisions to the previous version (other than minor editorial and project specific changes) are indicated by a vertical line in the margin as shown here, except when it is a new edition and the text has been extensively rewritten.

PROJECT SPECIFIC CHANGES

Any project specific changes are indicated in the following manner:

- (a) Text which is additional to the base document and which is included in the Specification is shown in bold italics e.g. ***Additional Text***.
- (b) Text which has been deleted from the base document and which is not included in the Specification is shown struck out e.g. ~~Deleted Text~~.

TfNSW QA SPECIFICATION R16

PRECAST REINFORCED CONCRETE BOX CULVERTS

1 GENERAL

1.1 SCOPE

This Specification sets out requirements for the design, testing, manufacture and delivery of precast reinforced concrete rectangular box culverts covering:

- (a) small precast culvert units, up to 1200 mm span and 1200 mm height, and associated link slabs; and
- (b) large precast culvert units from 1500 mm span and up to 4200 mm span and 4200 mm height, and associated link slabs.

This Specification does not cover installation requirements. Installation must be in accordance with Specification TfNSW R11, Stormwater Drainage.

1.2 STRUCTURE OF THE SPECIFICATION

This Specification includes a series of annexures that detail additional requirements.

1.2.1 Details of Work

Project specific requirements consistent with Appendix A of AS 1597.2 for culvert units and link slabs are given in Annexure R16/A.

1.2.2 Schedules of HOLD POINTS, WITNESS POINTS and Identified Records

The schedules in Annexure R16/C list the **HOLD POINTS** and **WITNESS POINTS** that must be observed. Refer to Specification TfNSW Q for the definitions of **HOLD POINTS** and **WITNESS POINTS**.

The records listed in Annexure R16/C are **Identified Records** for the purposes of TfNSW Q Annexure Q/E.

1.2.3 Planning Documents

The PROJECT QUALITY PLAN must include each of the documents and requirements listed in Annexure R16/D and must be implemented.

1.2.4 Referenced Documents

Unless specified otherwise or is specifically supplied by the Principal, the applicable issue of a referenced document, other than a TfNSW Specification, is the issue current at the date one week before the closing date for tenders or, where no issue is current at that date, the most recent issue.

Standards, specifications and test methods are referred to in abbreviated form (eg AS 1597). For convenience, the full titles are given in Annexure R16/M.

1.3 DEFINITIONS

The definitions of AS 1597.2 apply. The following interpretations apply to terms used in this Specification:

Small Culvert Unit: Culvert unit with a span up to 1200 mm and a height up to 1200 mm

Large Culvert Unit: Culvert unit with a span from 1500 mm and up to 4200 mm and a height up to 4200 mm

1.4 BASIC REQUIREMENTS

Design, test, manufacture and deliver all culverts and link slabs in accordance with AS 1597.2 and the additional requirements of this Specification.

2 DESIGN REQUIREMENTS AND PROCEDURES

Design requirements and procedures of AS 1597.2 must apply.

Design assurance and verification must comply with the requirements of Clause 7.3 of ISO 9001.

Include in the design records, the calculations produced during both the design and verification processes.

Provide certification demonstrating that the design complies with all the requirements of this Specification.

HOLD POINT

Process Held: Delivery to site of culverts.

Submission Details: Design output and certification of compliance at least 5 working days prior to commencement of delivery to site.

Release of Hold Point: The Principal will consider the submitted documents for compliance with the Specification, prior to authorising the release of the Hold Point.

3 DESIGN BASED ON LOAD TESTING

Where a design based on load testing is adopted, provide certification, supported by testing and calculation records, demonstrating that the design complies with the requirements of AS 1597.2 for each different culvert / load combination.

Tables of basic test loads for standard small culvert units and link slabs are given in Annexure R16/E.

HOLD POINT

Process Held:	Delivery to site of culverts.
Submission Details:	Testing and calculation records and certification of compliance at least 5 working days prior to commencement of delivery to site.
Release of Hold Point:	The Principal will consider the submitted documents, prior to authorising the release of the Hold Point.

4 CONCRETE WORK

Concrete, reinforcement and embedments must comply with TfNSW B80.

5 ROUTINE SAMPLING AND TESTING

Routinely sample and test for each quality parameter, except concrete strength, in accordance with AS 1597.2. Sample and test for concrete strength in accordance with TfNSW B80.

Tables for serviceability test loads for standard small culvert units and link slabs are given in Annexure R16/E.

WITNESS POINT

Process Witnessed:	Each crack serviceability test.
Submission Details:	At least 2 working days' notice of intention to carry out the test. Prior to the proposed commencement of testing, make available a certificate of compliance in respect of test loads and other relevant details supported by verification checklists.

6 CERTIFICATION BY THE CONTRACTOR

Prior to units being incorporated into the Works, submit to the Principal a certificate for each culvert unit or link slab, or batch of culvert units and slabs, which states that the units conform to the Specification and that all nonconformities have been rectified.

7 DELIVERY TO SITE

Do not transport any unit to site until at least seven days after casting and until the concrete has reached the specified 28 day strength.

ANNEXURE R16/A – PROJECT SPECIFIC REQUIREMENTS

A1 GENERAL INFORMATION

Item	List of Available Parameters	Job Specific Parameters
Concrete Exposure Classification	B1 / B2 / C / U	
Type of Joint	Butt joint / Other	
Construction Loads	Standard / Other	

A2 DELIVERY INFORMATION

Place of Delivery	
Rate of Delivery	
Place of Acceptance	

A3 CLASS AND QUANTITY INFORMATION

Type	Class	Quantity

ANNEXURE R16/B – (NOT USED)

ANNEXURE R16/C – SCHEDULES OF HOLD POINTS, WITNESS POINTS AND IDENTIFIED RECORDS

Refer to Clause 1.2.2.

C1 SCHEDULE OF HOLD POINTS AND WITNESS POINTS

Clause	Type	Description
2	Hold	Submission of design output and certification of compliance
3	Hold	Submission of testing and calculation records and certification
5	Witness	Notice of intention to carry out each crack serviceability test.

C2 SCHEDULE OF IDENTIFIED RECORDS

The records listed below are Identified Records for the purposes of TfNSW Q Annexure Q/E.

Clause	Description of Identified Record
2	Design output and certification of compliance
3	Testing and calculation records and certification of compliance
6	Certificate which states that the items conform to the Specification and all nonconformities have been rectified

ANNEXURE R16/D – PLANNING DOCUMENTS

Refer to Clause 1.2.3.

The following documents are a summary of documents that must be included in the PROJECT QUALITY PLAN. The requirements of this Specification and others included in the Contract must be reviewed to determine additional documentation requirements.

The information to be supplied as part of the PROJECT QUALITY PLAN must include the following:-

- (a) Drawings showing the culvert unit/link slab type and class, complete dimensions including tolerances, concrete exposure classification, and construction loading capability;
- (b) Provisions for lifting of culverts and link slabs;
- (c) The method of culvert unit and link slab manufacture and testing; and
- (d) Sampling and testing plans and procedures (refer to Clause 6).

ANNEXURE R16/E – BASIC AND SERVICEABILITY TEST LOADS FOR SMALL CULVERT UNITS AND LINK SLABS

(a) General

The tables in Clauses (b) and (c) of this annexure must be used in conjunction with the requirements of AS 1597.2 for design based on load testing and for serviceability load testing, respectively.

The size and load class used in the tables must be in accordance with Clause 1.8 of AS 1597.2. Loads for culvert units and link slabs of 1200 mm span apply to culvert units and link slabs with spans less than 1200 mm.

(b) Basic Test Loads

Basic test loads for link slabs and culvert units are given in Tables R16/E.1 and R16/E.2 respectively.

Table R16/E.1 – Link Slabs - Basic Test Loads

Class	Load per metre width (kN/m)			
	Class 2-A	Class 3-A	Class 4-A	Class 5-A
Size	V2	V2	V2	V2
1200 or less	205	110	137	165

Table R16/E.2 – Culvert Units - Basic Test Loads

Size/Class	1206/2-A			1206/3-A			1206/4-A			1206/5-A		
Loading Type	Load per metre width			Load per metre width			Load per metre width			Load per metre width		
	H1	H3	V2	H1	H3	V2	H1	H3	V2	H1	H3	V2
U1			205			110			137			165
U4	15	15	205	17	17	110	19	19	137	23	23	165

Size/Class	1209/2-A			1209/3-A			1209/4-A			1209/5-A		
Loading Type	Load per metre width			Load per metre width			Load per metre width			Load per metre width		
	H1	H3	V2	H1	H3	V2	H1	H3	V2	H1	H3	V2
U1			205			110			137			165
U4	30	30	205	34	34	110	37	37	137	44	44	165

Size/Class	1212/2-A			1212/3-A			1212/4-A			1212/5-A		
Loading Type	Load per metre width			Load per metre width			Load per metre width			Load per metre width		
	H1	H3	V2	H1	H3	V2	H1	H3	V2	H1	H3	V2
U1			205			110			137			165
U4	42	42	205	45	45	110	48	48	137	59	59	165

(c) Serviceability Test Loads

Serviceability test loads for link slabs and culvert units are given in Table R16/E.3 and R16/E.4, respectively.

Table R16/E.3 Link Slabs – Crack Test Loads

Size Class	Load per metre width (kN/m)			
	Class 2-A	Class 3-A	Class 4-A	Class 5-A
1200 or less	75	55	70	85

Table R16/E.4 Culvert Units – Crack Test Loads

Size Class	Load per metre width (kN/m)			
	Class 2-A	Class 3-A	Class 4-A	Class 5-A
1206, 1209, and 1212	75	50	60	75

ANNEXURES R16/F TO R16/L – (NOT USED)**ANNEXURE R16/M – REFERENCED DOCUMENTS**

Refer to Clause 1.2.4.

TfNSW Specifications

TfNSW B80	Concrete Work For Bridges
TfNSW Q	Quality Management System
TfNSW R11	Stormwater Drainage

Australian Standards

AS 1597.2	Precast reinforced concrete box culverts – Large culverts
ISO 9001	AS/NZS ISO 9001 Quality management systems – Requirements