



CONSTRUCTION SPECIFICATION FOR
DEVELOPMENTS AND SUBDIVISIONS

C220 – Stormwater Drainage

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GENERAL

C220.01 INTRODUCTION

Drainage works shall form a complete system carrying water through and away from the Works. **Purpose**

This is the general Specification applicable to all types of drainage lines, open drains, kerb and gutter, and drainage structures and shall be read in conjunction with the following drainage specifications:

C221 - *Pipe Drainage*

C222 - *Precast Box Culverts*

C223 - *Drainage Structures*

C224 - *Open Drains, including Kerb and Gutter*

C220.02 SCOPE

This Specification is for: **Scope**

- (a) Preparation for stormwater drainage construction;
- (b) Temporary drainage during construction;
- (c) Siting of pipes, pipe arches and box culverts;
- (d) All activities and quality requirements associated with excavation, bedding and backfilling; and
- (e) All concrete work associated with stormwater drainage.

Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in *CQC-Quality Control Requirements Sub-Annexure B2*. **Quality**

C220.03 REFERENCE DOCUMENTS

Documents referenced in this Specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated. **Documents Standards Test Methods**

Where not otherwise specified in the relevant Tamworth Regional Council (TRC) Specifications or the approved design drawings, the Constructor shall use the latest versions of the Reference documentation, including amendments and supplements, listed in the TRC Construction Specifications at the time of the Works approval. **Currency**

(a) Tamworth Regional Council (TRC) Specifications

C211 - *Control of Erosion and Sedimentation.*

C213 - *Earthworks.*

C221 - *Pipe Drainage*

C271 - *Minor Concrete Works.*

C290 - *Road Openings.*

CQC - *Quality Control Requirements.*

(b) Australian Standards

References in this Specification or on the approved design drawings to Australian Standards are noted by their prefix AS or AS/NZS.

AS 1289.5.4.1 - Compaction control test - Dry density ratio, moisture variation and moisture control .

(c) Other Publications

NSW Workcover Excavation Work Code of Practice.

(d) TRC Standard Drawings Applicable to this Section

SW001 - Inlet Capacity Chart - On Kerb Inlet with Grate.

SW002 - Inlet Capacity Chart – Kerb Inlet / Grate in Sag.

SW003 - Kerb Inlet Pit with Lintel and Grate – Pipe Under Kerb.

SW004 - Kerb Inlet Pit with Lintel and Grate – Pipe Behind Kerb.

SW005 - Kerb Inlet Pit with Lintel and Grate – Pipe Under Carriageway.

SW006 - Kerb Inlet Pit with Lintel and Grate – Roll Type Kerb.

SW007 - Junction Pit with Grated Inlet Pit.

SW008 - Surface Inlet Pit and Surcharge Pit.

SW009 - Inter Allotment Drainage Pit.

SW010 - Subsoil Drainage.

SW011 - Access Chamber Roof Slab Reinforcement Details.

SW012 - Pipe Bedding.

SW013 - Pipe to Box Culvert Connection.

SW014 – Stormwater Pipe Bulkhead and Concrete Pipe Extension

TRC Standard Drawings shall take precedence over ALL other drawings related to the Works.

Precedence

Where any TRC Standard Drawings conflicts with this Specification, the requirements of this Specification shall take precedence. Proposals to deviate from this Specification shall constitute a **HOLD POINT**.

TRC HOLD POINT

All proposed deviations from the approved design drawings, TRC Standard Drawings, this Specification or the documents referenced within it, shall be submitted for approval to the TRC Representative with supporting evidence at least five (5) working days prior to the work being undertaken.

PROCESS HELD: The lot or element affected by the proposed deviation.

TRC Hold Point

CONSTRUCTION

C220.04 TEMPORARY DRAINAGE DURING CONSTRUCTION

All drainage works carried out by the Constructor shall comply with *C211 - Control of Erosion and Sedimentation*. Where the drainage works are located either near or under a roadway then *C290 - Road Openings* shall apply.

Controls and Permits

The Constructor shall make adequate provision for runoff flows at drainage works under construction to avoid damage or nuisance due to scour, sedimentation, soil erosion, flooding, diversion of flow, damming, undermining, seepage, slumping or other adverse effects to the Works or surrounding areas and structures as a result of the Constructor's activities.

Constructor's Responsibility

The Constructor shall not implement any proposals to dam up or divert existing watercourses (either temporarily or permanently) unless specifically shown on the approved design drawings.

Limitations

The Constructor's material and equipment shall be located clear of watercourses or secured so that they will not cause danger or damage in the event of large runoff flows.

Location of Equipment

C220.05 SITING OF CULVERTS (BOX AND PIPE)

Before commencing construction of any culvert, the Constructor shall set out on the Works site, the culvert inlet and outlet positions to the location and levels shown on the approved design drawings and shall present this set-out for inspection by the TRC Representative.

Set-out

TRC HOLD POINT

Inspection by the TRC Representative of the set out of the culvert inlet and outlet positions at the location and levels shown on the approved design drawings. The Constructor shall provide at least two (2) working days notice to the TRC Representative of the required time of the inspection.

TRC Hold Point

PROCESS HELD: Construction of the culvert.

The Constructor may submit proposed amendments to the approved stormwater drainage design provided concurrence has been obtained first from the Designer of the Works and subsequently from the TRC Representative.

Amendments to Planned Work

C220.06 EXCAVATION

Before undertaking stormwater drainage excavation, topsoil shall be removed in accordance with the *C213 - Earthworks*.

Topsoil

In undertaking trench excavation, the Constructor shall provide any shoring, sheet piling or other stabilisation of the sides necessary to comply with statutory requirements including the NSW Workcover Excavation Work Code of Practice. Records documenting compliance with this Code, and other Statutory requirements shall be kept on the Works site.

Safety

Where public utilities exist in the vicinity of stormwater drainage work, the Constructor shall obtain the approval from the relevant authority to the method of excavation before commencing excavation.

Approval by Public Utility Authorities

Trench or foundation excavation for stormwater drainage work shall be undertaken to the planned level for the bottom of the specified bedding or foundation level. The Constructor shall remove all loose material.

Excavation Level

TRC HOLD POINT

The floor of the trench shall be inspected by the TRC Representative. Where applicable, supporting documentation verifying conformance shall be made available from the Constructor to the TRC Representative either prior to or during the inspection.

Process Held: Placement of bedding material.

TRC Hold Point

Any material at the bottom of the trench or at foundation level, which the TRC Representative deems to be unsuitable, shall be removed and disposed in accordance with the C213 - *Earthworks* by the Constructor and replaced with backfill material in accordance with the requirements of this Specification and TRC Standard Drawing SW012. The bottom of the excavated trench or foundation, after any unsuitable material has been removed and replaced, shall be parallel with the specified level and slope of the culvert.

Unsuitable Material

The excavated material shall be used in the construction of embankments backfilling or spoiled in accordance with C213 - *Earthworks*.

Spoil

C220.07 BACKFILLING

Backfilling shall be carried out in accordance with the requirements of the relevant TRC Construction Specifications for culverts or drainage structures and to the compaction requirements specified below.

Backfilling

C220.08 COMPACTION

Foundations, bedding (other than for pipe drainage) and backfilling shall be compacted to the requirements in Table C220.1 when tested in accordance with AS 1289.5.4.1 (standard compaction).

Foundation	Compaction
Foundations or trench base to a depth of 150mm below foundation levels	95%
Material replacing unsuitable material	95%
Bedding material (other than for pipe drainage)	95%
Selected backfill and ordinary backfill material below 1.5m of finished surface	98%
within 1.5m of finished surface	100%
Backfill material within the selected material zone	100%

Compaction

Table C220.1 - Compaction

Compaction requirements adjacent to pipe drainage for concrete, or UPVC (storm pro) Fibre Reinforced Concrete pipes are set out in accordance with C221 - *Pipe Drainage*.

All material shall be compacted in layers not exceeding 150mm compacted thickness. Each layer shall be compacted to the relative compaction specified before the next layer is commenced.

Layers

At the time of compaction, the moisture content of the material shall be adjusted so as to permit the specified compaction to be attained at a moisture content which is neither less than 60% nor more than 90% of the apparent optimum moisture content, as determined by AS 1289.5.4.1 (standard compaction).

Moisture Content

When compacting adjacent to culverts or drainage structures, the Constructor shall adopt compaction methods, which will not cause damage or misalignment to any drainage structure nearby utilities or buildings.

Precautions

Any damage caused shall be rectified, and all costs of such rectification shall be borne by the Constructor.

Constructor's Cost

C220.09 CONCRETE WORK

For all concrete work, the Constructor shall comply with C271 - *Minor Concrete Works* in relation to the supply and placement of normal class concrete and steel reinforcement, formwork, tolerances, construction joints, curing and protection.

Specification

LIMITS AND TOLERANCES

C220.10 SUMMARY OF LIMITS AND TOLERANCES

The limits and tolerances applicable to the various clauses in this Specification are summarised in Table C220.1 below:

Item	Activity	Limits/Tolerances	Spec Clause
1	Relative Compaction (Standard)		
	(a) Foundations or trench base to a depth of 150mm below foundation levels	95%	C220.08
	(b) Material replacing unsuitable material	95%	C220.08
	(c) Bedding material	95%	C220.08
	(d) Selected backfill and ordinary backfill material:		C220.08
	• below 1.5m of finished surface	98%	
	• within 1.5m of finished surface	100%	
	(e) Backfill material within the selected material zone	100%	C220.08
2	Backfill		
	(a) Layers	≤ 150mm	C220.08
	(b) Moisture Content	> 60%, < 90%	C220.08

Table C220.1 - Summary of Limits and Tolerances