



# **Construction Specification for Civil Works**

**C220 – Stormwater Drainage**

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**ORIGIN OF DOCUMENT, COPYRIGHT**

This document was originally based on AUS-SPEC - Development Construction Specification C220 - Stormwater Drainage General. Substantial parts of the original AUS-SPEC document have been deleted and replaced in the production of this Armidale Regional Council Specification for Civil Works. The parts of the AUS-SPEC document that remain are still subject to the original copyright.

This document has been developed for use with the construction of civil works within the Armidale Regional Council local government area.

This is not a controlled document. A full copy of the latest version of this document can be found on the Armidale Regional Council Internet website: <https://www.armidaleregional.nsw.gov.au/development/planning-controls-guidelines/construction-specifications/construction-specifications>

**REVISIONS: C220 - STORMWATER DRAINAGE**

REVISION	CLAUSES AMENDED	AMENDMENT DETAILS	DATE
0		Original Issue	25/09/2023

## 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: **Associated 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 DEFINITIONS

**The Works** – Defined as follows: **The Works**

- **Developer Infrastructure Works** - work includes subdivisions and any public infrastructure work associated with an approved Development in the ARC local government area requiring a construction certificate.
- **Contracted Works** – infrastructure work undertaken by a Principal Contractor or subcontractor formally appointed by ARC and supervised by ARC.
- **Internal Works** - infrastructure work undertaken by ARC’s day labour workforce.

**Constructor** – Defined as the organisation responsible for construction of the Works and the Principal Contractor as defined in the *Work Health and Safety Act 2011*. **Constructor**

**ARC Representative** – Defined as follows: **ARC Representative**

- **Developer Infrastructure Works** – Nominated ARC officer(s) for the approved Development.
- **For Contracted Works** – the Superintendent.
- **For Internal Works** – ARC Asset Owner.

**Constructor’s Representative** – Defined as follows: **Constructor’s Representative**

- **Contracted Works** – the Principal Contractor’s nominated representative as per the relevant contract.
- **Internal Works** – ARC officer responsible for delivery.

**Developer’s Representative**– Defined as the person or organisation appointed by the Developer to administer the Constructor responsible for the delivery of Developer Infrastructure Works. **Developer’s Representative**

### C220.04 REFERENCE DOCUMENTS

Documents referenced in this Specification are listed in full below whilst being cited in the **Documents**

text in the abbreviated form or code indicated.

**Standards Test  
Methods**

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

**Currency**

**(a) Armidale Regional Council (ARC) Specifications**

- C211 - Control of Erosion and Sedimentation
- C213 - Earthworks.
- C221 - Pipe Drainage
- C271 - Minor Concrete Works.
- C290 - Road Openings.
- CQC - Quality Control Requirements.

**ARC  
Specifications**

**(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.

**Australian  
Standards**

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

**(c) Other Publications**

- Safework NSW Excavation Work Code of Practice.

**Safework NSW**

**(d) ARC Standard Drawings Applicable to this Section**

- 080-026 Inter-allotment Property Drainage Connections.
- 080-027 Property Stormwater Connection to Kerb Inlet Gully Pit.
- 080-028 Precast Components for Kerb Inlet Lintels.
- 080-029 Precast Components for Stormwater Pits.
- 080-031\_1 Rear Access Gully Pit Pipes up to DN600.
- 080-031\_2 Rear Access Gully Pit Pipes greater than DN600.
- 080-032 Standard Junction Pit.
- 080-033 Standard Grated Gully Pit in Concrete Accessways.
- 080-034 Surface Inlet Pit Concrete Lid.
- 080-035 Standard Grated Kerb Inlet Pit.
- 080-036 Standard Surface Inlet Surcharge Pits.
- 080-037 Standard Pathway Grated Kerb Inlet Pit.
- 080-038 Standard Straight Headwall.
- 080-039 Cast Insitu Grated V Drain Pit For Rollover Kerb or Dish Drain.
- 080-040 Precast Stormwater Pit Installation.
- 080-041 Bandage Joint Details.
- 080-042 Sandbag Headwall.
- 080-043 Riprap Outlet Protection DN300 to DN600.
- 080-044 Riprap Outlet Protection DN750 to DN2100.

**ARC Standard  
Drawings**

080-045\_1 Drainage Pit Inlet Capacities.

080-045\_2 Drainage Pit Inlet Capacities.

080-046 Pit Static Head Loss Coefficients.

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

**Precedence**

Where any ARC 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**.

**HOLD POINT**

**Hold Point**

All proposed deviations from the approved design drawings, ARC Standard Drawings, this Specification or the documents referenced within it, shall be submitted for approval to the ARC 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.

**CONSTRUCTION**

**C220.05 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**

**C220.06 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 ARC Representative.

**Set-out**

**HOLD POINT**

**Hold Point**

Inspection by the ARC 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 ARC Representative of the required time of the inspection.

**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 ARC Representative.

**Amendments to Planned Work**

**C220.07 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 *Safework NSW 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**

**HOLD POINT**

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

**Process Held:** Placement of bedding material.

**Hold Point**

Any material at the bottom of the trench or at foundation level, which the ARC 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. 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**

**C220.08 BACKFILLING**

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

**Backfilling**

**C220.09 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).

	<b>Compaction</b>	
Foundation		<b>Compaction</b>
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%	

**Table C220.1 - Compaction**

Compaction requirements adjacent to pipe drainage for concrete, or flexible 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**

### **C220.10 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

### C220.11 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
<b>1</b>	<b>Relative Compaction (Standard)</b>		
	(a) Foundations or trench base to a depth of 150mm below foundation levels	95%	C220.09
	(b) Material replacing unsuitable material	95%	C220.09
	(c) Bedding material	95%	C220.09
	(d) Selected backfill and ordinary backfill material:		C220.09
	• below 1.5m of finished surface	98%	
	• within 1.5m of finished surface	100%	
	(e) Backfill material within the selected material zone	100%	C220.09
<b>2</b>	<b>Backfill</b>		
	(a) Layers	≤ 150mm	C220.09
	(b) Moisture Content	> 60%, < 90%	C220.09

**Table C220.1 - Summary of Limits and Tolerances**

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