

**Construction Specification  
for Civil Works**

**C231 – Subsoil and  
Foundation Drains**

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**ORIGIN OF DOCUMENT, COPYRIGHT**

This document was originally based on AUS-SPEC - Development Construction Specification C231 – Subsoil and Foundation Drains. 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: C231 – SUBSOIL AND FOUNDATION DRAINS**

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

## GENERAL

### C231.01 SCOPE

The work to be executed under this Specification covers the excavation, bedding, installation and backfilling of subsoil and foundation drains. **Scope**

Subsoil and foundation drains shall be constructed where and as shown on the approved design drawings. **Location**

This Specification should be read in conjunction with C230 – *Subsurface Drainage*. **Associated Specification**

Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in *CQC-Quality Control Requirements Sub-Annexure B3*. **Quality**

### C231.02 TERMINOLOGY

Subsoil drains are intended for the drainage of ground water and/or the pavement in cuttings. **Subsoil Drains**

Foundation drains are required for the drainage of seepage, springs and wet areas within and adjacent to the foundations. **Foundation Drains**

### C231.03 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**

### C231.04 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 Armidale Regional Council (ARC) Construction 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**

C213 – Earthworks.

C230 – Subsurface Drainage.

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 ratio.

**C231.05 ORDER OF CONSTRUCTION**

**a) Subsoil Drains**

Subsoil drains shall be constructed as soon as possible after necessary earthworks are completed in the area of the drain. Where stabilisation of the subgrade is required, subsoil drains shall be constructed after completion of stabilisation except that, where excessive ground water is encountered, they may be constructed prior to stabilisation of the subgrade.

**Timing of Work**

Where a Selected Material Zone (SMZ) is specified and excessive ground water is encountered, subsoil drains may be installed in two stages as follows:

**Two Stage  
Construction**

Stage 1: Standard subsoil drains installed below the base of the cutting prior to placement of select material in the SMZ.

Stage 2: Extension of subsoil drain to top of the SMZ after placement of selected material.

**(b) Foundation Drains**

Foundation drains shall be constructed after completion of clearing and stripping operations, and preceding the commencement of embankment construction.

**Timing of  
Construction**

**CONSTRUCTION**

**C231.06 SUBSOIL DRAINS**

**a) Excavation**

Excavation shall be undertaken in accordance with the requirement of C230 – Subsurface Drainage.

**Associated  
Specification**

The bottom of the trench shall be excavated to the same grade as the design pavement surface in the direction of the trench except where the grade of the design pavement surface in the direction of the trench is less than 0.5%. In which case the trench depth shall be increased to provide a minimum grade of fall in the trench of 0.5%. The bottom of the trench shall be excavated so that no localised ponding of water occurs.

**Minimum Grade**

If at any location the trench is excavated below the specified floor level, the trench shall be backfilled with non-porous subgrade material so that when the subgrade material is compacted to a relative compaction, determined by AS 1289.5.4.1, of at least 95% (standard compaction), the bottom of the trench shall be at the specified floor level.

**Over-excavation**

Where a subsoil drain is constructed in two stages, the excavation for Stage 2 shall be carried out after placement and compaction of the selected material zone or the stabilised subgrade layer. The Stage 2 trench shall be excavated to the same line and width as the Stage 1 trench and to a depth to provide a clean, full contact with the filter material placed in Stage 1. All excavated material shall be disposed to waste or incorporated into fills.

**Two Stage  
Construction**

**(b) Laying of Pipe**

The 100mm diameter corrugated slotted plastic piping, complying with C230 – *Subsurface Drainage*, shall be laid on a bed of filter material 50mm in thickness and shall be laid to the specified line and grade. The pipe shall not deviate from the specified line by more than 100mm at any point.

**Bedding**

The type of filter material shall be as shown on the approved design drawings, ARC Standard Drawings.

**Filter Material**

Joints in the pipeline shall be kept to the minimum number and, where required, shall be made using a suitable external joint coupling. The inlet end of the pipe shall be fitted with a cap.

**Joints and Capping**

**(c) Backfilling**

The trench shall be backfilled with filter material to the level specified. The type of filter material shall be as shown on the approved design drawings. The filter material shall be placed and compacted in layers with a maximum compacted thickness of 300mm. Tamping around and over the pipe shall be done in such a manner as to avoid damage or disturbance to the pipe.

**Filter Material**

The filter material shall be compacted for its full depth to a relative compaction of not less than 100% (standard compaction) as determined by AS 1289.5.4.1.

**Compaction of Filter Material**

The upper section of the trench, above the level specified for filter material backfill, shall be backfilled with selected free draining backfill material, conforming to the requirements of C213 - *Earthworks*, compacted for its full depth to a relative compaction of not less than 100% (standard compaction) as determined by AS 1289.5.4.1.

**Select Material**

Where shown on the approved design drawings, ARC Standard Drawings or as directed by the ARC Representative, a geotextile conforming with the requirements of C230 – *Subsurface Drainage*, shall be provided at the interface between the filter material and adjoining materials. 500mm laps shall be provided at joints in the fabric.

**Geotextile**

**(d) Outlets**

Outlets are to be provided as shown on the approved design drawings or at maximum intervals of 150m. Subsoil drains shall discharge into gully pits and other stormwater drainage structures. Outlets shall be constructed of unslotted plastic pipe of the same diameter as the main run when outside the targeted subsurface water catchment. An outlet structure in accordance with the approved design drawings shall be constructed at the discharge end.

**Pipes and Structures**

**(e) Cleanouts**

Cleanouts are to be provided at the commencement of each run of subsoil drain line and at intervals of approximately 60m or as shown on the approved design drawings.

**Locations**

Details of the required cleanout construction are shown on the approved design drawings. The standard CI caps as shown on the approved design drawings shall be supplied by the Constructor.

**Details**

**C231.07 FOUNDATION DRAINS**

**(a) Excavation**

Excavation shall be undertaken in accordance with the requirements of C230 – *Subsurface Drainage* and Clause C231.06.

**Associated Specification**

**(b) Laying of Pipe**

The 100mm diameter corrugated slotted plastic piping, complying with C230 – *Subsurface Drainage*, shall be laid on a bed of filter material 50mm in thickness and shall be laid to the required line and grade.

**Bedding**

The type of filter material shall be as shown on the approved design drawings, ARC Standard Drawings or as directed by the ARC Representative.

**Filter Material**

Joints in the pipeline shall be kept to the minimum number and, where required, shall be made using a suitable external joint coupling. The inlet end of the pipe shall be fitted with a PVC cap.

***Jointing of Pipe***

**(c) Backfilling**

The trench shall be backfilled with filter material in accordance with the provisions of Clause C231.06(c).

***Filter Material***

The upper section of the trench, above the level specified for filter material backfill, shall be backfilled with suitable earth backfill material, compacted for its full depth to a relative compaction of not less than 95% (standard compaction) as determined by AS 1289.5.4.1.

***Backfill Material***

Where shown on the approved design drawings or as directed by the ARC Representative, a geotextile, conforming with the requirements of *C230 – Subsurface Drainage*, shall be provided at the interface between the filter material and adjoining materials. Laps of 500mm shall be provided at joints in the fabric.

***Geotextile***

**(d) Outlets**

An outlet structure in accordance with the detail shown on the approved design drawings and *C230 – Subsurface Drainage* shall be constructed at the discharge end. The outlet shall be located so that erosion of the adjacent area does not occur or shall be protected by the placement of selected stone in the splash zone of the outlet.

***Outlet Structure***

## LIMITS AND TOLERANCES

### C231.08 SUMMARY OF LIMITS AND TOLERANCES

The limits and tolerances applicable to the various clauses in this Specification are summarised in Table C231.1 below.

Item	Activity	Limits/Tolerances	Spec Clause
<b>1</b>	<b>Excavation</b>		
	(a) Trench Grade	≥ 0.5%	C231.06(a)
<b>2</b>	<b>Laying of Pipe</b>		
	(a) Alignment	Deviation < 100mm from specified line at any point	C231.06(b)
<b>3</b>	<b>Subsoil Drain Backfill</b>		
	(a) Layer Thickness	300mm (maximum)	C231.06(c)
	(b) Compaction (Relative) Filter and Backfill Material	100% Standard	C231.06(c)
<b>4</b>	<b>Outlet Spacing</b>		
	(a) Outlet Spacing	150m (maximum)	C231.06(d)
<b>5</b>	<b>Cleanout Spacing</b>		
	(a) Cleanout Spacing	60m (approximate)	C231.06(e)
<b>6</b>	<b>Foundation Drain Backfill</b>		
	(a) Layer Thickness	300mm (maximum)	C231.06(c)
	(b) Compaction (Relative) Filter Material Backfill Material	100% Standard >95% Standard	C231.07(b)

**Table C231.1 - Summary of Limits and Tolerances**



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