

CONSTRUCTION SPECIFICATION

C231

SUBSOIL AND FOUNDATION DRAINS

SPECIFICATION C231 - SUBSOIL AND FOUNDATION DRAINS

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CITATION

This document is named “Kempsey Shire Council, Construction Specification C231 – Subsoil and Foundation Drains”.

ORIGIN OF DOCUMENT, COPYRIGHT

This document was originally based on PMHC AUS-SPEC. Parts of the AUS-SPEC document that remain are still subject to the original copyright.

VERSIONS, C231 – Subsoil and Foundation Drains

VERSION	AMENDMENT DETAILS	CLAUSES AMENDED	DATE ISSUED (The new version takes effect from this date)	Authorised by the Director of Infrastructure
1.0	Version 1 – First Draft Version		March 2025	

SPECIFICATION C231 : SUBSOIL AND FOUNDATION DRAINS

GENERAL

C231.01 SCOPE

- | | |
|--|---------------------------------|
| 1. The work to be executed under this Specification covers the excavation, bedding, installation and backfilling of subsoil and foundation drains. | <i>Scope</i> |
| 2. Subsoil and foundation drains shall be constructed where and as shown on the Approved Plans or as directed by the Principal Certifier. | <i>Location</i> |
| 3. This Specification should be read in conjunction with Specification C230 SUBSURFACE DRAINAGE - GENERAL. | <i>Associated Specification</i> |
| 4. Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in the Construction Specification - Quality Control Requirements (CQC). | <i>Quality</i> |

C231.02 REFERENCE DOCUMENTS

- | | |
|--|---|
| 1. Documents referenced in this specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated. | <i>Documents
Standards Test
Methods</i> |
| (a) Council Specifications | |
| C213 - Earthworks | |
| C230 - Subsurface Drainage - General | |
| (b) Australian Standards | |
| AS 1289.5.4.1 - Methods of testing soils for engineering purposes - Soil compaction and density tests – Compaction Control Test - Dry density ratio, moisture variation and moisture ratio | |
| (c) State Authorities | |
| (d) Other | |
| (e) Standard Drawings | |

C231.03 ABBREVIATIONS

C231.04 DEFINITIONS

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

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

C231.05 ORDER OF CONSTRUCTION

(a) Subsoil Drains

1. 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

2. Where a Selected Material Zone 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 Selected Material Zone.

Stage 2: Extension of subsoil drain to top of the Selected Material Zone after placement of selected material.

(b) Foundation Drains

1. 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

Associated Specification

1. Excavation shall be undertaken in accordance with the requirement of Specification C230 SUBSURFACE DRAINAGE - GENERAL.

2. Trenches for subsoil and foundation drains shall be excavated to the line, grade, width and depth as shown on the Approved Plans or as directed by the Principal Certifier.

Dimensions and Grade

3. 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 per cent. In which case the trench depth shall be increased to provide a minimum grade of fall in the trench of 0.5 per cent. The bottom of the trench shall be excavated so that no localised ponding of water occurs.

Minimum Grade

- | | |
|---|---|
| <p>4. 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 per cent (standard compaction), the bottom of the trench shall be at the specified floor level.</p> | <p>Over-
excavation</p> |
| <p>5. 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.</p> | <p>Two Stage
Construction</p> |
| <p>(b) Laying of Pipe</p> | <p>Bedding and
Tolerance</p> |
| <p>1. The 100mm diameter corrugated slotted plastic piping, complying with Specification C230 SUBSURFACE DRAINAGE - GENERAL, shall be laid on a bed of filter material 50mm in thickness and shall be laid to the required line and grade. The pipe shall not deviate from the specified line by more than 10mm at any point with the trench material encased in geotextile.</p> | |
| <p>2. The type of filter material shall be as shown on the Approved Plans or as directed by the Principal Certifier.</p> | <p>Filter Material</p> |
| <p>3. 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.</p> | <p>Joints and
Capping</p> |
| <p>(c) Backfilling</p> | <p>Filter Material</p> |
| <p>1. The trench shall be backfilled with filter material to the level specified. The type of filter material shall be as shown on the Approved Plans or as directed by the Principal Certifier. 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.</p> | |
| <p>2. The filter material shall be compacted for its full depth to a relative compaction of not less than 100 per cent (standard compaction) as determined by AS 1289.5.4.1.</p> | <p>Compaction of
Filter Material</p> |
| <p>3. The upper section of the trench, above the level specified for filter material backfill, shall be backfilled with selected backfill material, conforming to the requirements of Specification C213 EARTHWORKS, compacted for its full depth to a relative compaction of not less than 100 per cent (standard compaction) as determined by AS 1289.5.4.1.</p> | <p>Select Material</p> |
| <p>4. A geotextile conforming with the requirements of Specification C230 SUBSURFACE DRAINAGE - GENERAL, shall be provided at the interface between the filter material and adjoining materials. Laps of 500mm shall be provided at joints in the fabric.</p> | <p>Geotextile</p> |
| <p>(d) Outlets</p> | <p>Pipes and
Structures</p> |
| <p>1. Outlets are to be provided at maximum intervals of 150m. Where possible, subsoil drains shall discharge into gully pits and other stormwater drainage structures. Where not possible, an outlet shall be constructed of unslotted plastic pipe of the same diameter as the main run to discharge below the edge of the road</p> | |

shoulder. An outlet structure in accordance with the Approved Plans shall be constructed at the discharge end.

C231.07 FOUNDATION DRAINS

(a) Excavation

1. Excavation shall be undertaken in accordance with the requirements of Specification C230 SUBSURFACE DRAINAGE - GENERAL and Clause C231.05 of this Specification.

***Associated
Specification***

(b) Laying of Pipe

1. The 100mm diameter corrugated slotted plastic piping, complying with Specification C230 SUBSURFACE DRAINAGE - GENERAL, shall be laid on a bed of filter material 50mm in thickness and shall be laid to the required line and grade.

Bedding

2. The type of filter material shall be as shown on the Approved Plans or as directed by the Principal Certifier.

Filter Material

3. 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

1. The trench shall be backfilled with filter material in accordance with the provisions of Clause C231.05(c). Should the Principal Certifier elect to construct a subsoil trench within or beneath the pavement, the backfill material shall consist of No Fines Concrete 20 in accordance with RMS 3222.

Filter Material

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

***Earth Backfill
and
Compaction***

3. A geotextile, conforming with the requirements of Specification C230 SUBSURFACE DRAINAGE - GENERAL, 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

1. An outlet structure in accordance with the detail shown on the Approved Plans and Specification C230 SUBSURFACE DRAINAGE - GENERAL 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.

***Construction
Detail***

LIMITS AND TOLERANCES

C231.08 SUMMARY OF LIMITS AND TOLERANCES

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

Item	Activity	Tolerances	Spec Clause
1.	Excavation Trench Grade	≥0.5%	C231.06(a)
2.	Laying of Pipe Alignment	Deviation <10mm from specified line at any point	C231.06(b)
3.	Subsoil Drain Backfill		
	(a) Layer thickness	300mm max	C231.06(c)
	(b) Compaction (Relative) Filter and Backfill material	100% standard	C231.06(c)
4.	Outlet Spacing	150m max	C231.06(d)
5.	Removed	-	-
6.	Foundation Drain Backfill		
	(a) Layer thickness	300mm max	C231.06(c)
	(b) Compaction (Relative) Filter material	100% Standard	C231.06(c)
	Backfill material	>95% Standard	C231.07(b)

Table C231.1 - Table of Limits and Tolerances