

CAPRICORN MUNICIPAL DEVELOPMENT GUIDELINES

SUBSOIL & FOUNDATION DRAINS

C231

CONSTRUCTION SPECIFICATION

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Keeping the Capricorn Municipal Development Guidelines up-to-date

The Capricorn Municipal Development Guidelines are living documents which reflect progress of municipal works in the Capricorn Region. To maintain a high level of currency that reflects the current municipal environment, all guidelines are periodically reviewed with new editions published and the possibility of some editions to be removed. Between the publishing of these editions, amendments may be issued. It is important that readers assure themselves they are using current guideline, which should include any amendments which may have been published since the guideline was printed. A guideline will be deemed current at the date of development approval for construction works.

GENERAL

C231.01 SCOPE

- C231.01.01 The work to be executed under this Specification covers the excavation, bedding, installation and backfilling of subsoil and foundation drains. **Scope**
- C231.01.02 Subsoil and foundation drains shall be constructed where and as shown on the Drawings **Location**
- C231.01.03 This Specification should be read in conjunction with the Specification for SUBSURFACE DRAINAGE – GENERAL C230. **Associated Specification**
- C231.01.04 The following order of priority for interpretation of documents will apply: (Please note that reference to a Guideline or Standard, is reference to the latest version of the relevant document, unless specifically a version number is specifically stated) **Order of Priority**
- (a) CMDG D4 Subsurface Drainage
 - (b) CMDG C231 Subsoil and Foundation Drains – Construction Specification
 - (c) AS 1289.5.4.1

C231.02 TERMINOLOGY

- C231.02.01 Subsoil drains are intended for the drainage of ground water and/or the pavement in cuttings. **Subsoil Drains**
- C231.02.02 Foundation drains are required for the drainage of seepage, springs and wet areas within and adjacent to the foundations. **Foundation Drains**

C231.03 REFERENCE DOCUMENTS

- C231.03.01 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**
- (a) CMDG 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

C231.04 ORDER OF CONSTRUCTION

(a) Subsoil Drains

C231.04.01 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 where excessive ground water is encountered they may be constructed prior to stabilisation of the subgrade.

Timing of Work

C231.04.02 Where a Selected Material Zone is specified and excessive ground water is encountered, subsoil drains may be installed in two stages as follows:

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.

Two Stage Construction

(b) Foundation Drains

C231.04.03 Foundation drains shall be constructed after completion of clearing and stripping operations, and preceding the commencement of embankment construction.

Timing of Construction

CONSTRUCTION

C231.05 SUBSOIL DRAINS

(a) Excavation

C231.05.01 Excavation shall be undertaken in accordance with the requirement of the Specification -EARTHWORKS C213.

Associated Specification

C231.05.02 Trenches for subsoil and foundation drains shall be excavated to the line, grade, width and depth as shown on the Drawings.

Dimensions and Grade

C231.05.03 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

C231.05.04 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.

Over-excavation

C231.05.05 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

SUBSOIL AND FOUNDATION DRAINS

(b) Laying of Pipe

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| C231.05.06 | The 100mm diameter drainage pipe as specified in the drawing shall be laid on a bed of filter material 50mm in thickness and shall be laid to the required line and grade. | <i>Bedding</i> |
| C231.05.07 | Requirements for filter materials shall be in accordance with the Specification for D4 Subsurface Drainage Design and C230 Subsurface Drainage General. | <i>Filter Material</i> |
| C231.05.08 | Joints in the pipeline shall be kept to the minimum number and, where required, shall be made using a suitable external joint coupling. | <i>Joints and Capping</i> |

(c) Backfilling

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| C231.05.09 | The trench shall be backfilled with filter material to the level specified. The type of filter material shall be as shown on the Drawings. Requirements for filter materials shall be in accordance with the Specification for SUBSURFACE DRAINAGE GENERAL C230. 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. | <i>Filter Material</i> |
| C231.05.10 | The filter material shall be 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. | <i>Compaction of Filter Material</i> |
| C231.05.11 | 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 the Specification – EARTHWORKS C213, 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. | <i>Select Material</i> |
| C231.05.12 | Alternatively, for pipe subsoil drains, no fines concrete with nominal aggregate size of 20mm that complies with MRTS70 - Concrete, and the requirements of the Specification for SUBSURFACE DRAINAGE C230 can be used as backfill material. | <i>No Fines Concrete</i> |
| C231.05.13 | Where shown on the Drawings or as directed by the Superintendent, a geotextile conforming to the requirements of the Specification for SUBSURFACE DRAINAGE – GENERAL C230, shall be provided at the interface between the filter material and adjoining materials. Laps of 500mm shall be provided at joints in the fabric. | <i>Geotextile</i> |

(d) Outlets

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| C231.05.14 | Outlet structures shall comply with the requirements of the specification for SUBSURFACE DRAINAGE GENERAL C230. | <i>General</i> |
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(e) Cleanouts

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| C231.05.15 | Cleanouts are to be provided at the commencement of each run of subsoil drain line and at intervals of no greater than 60m. Cleanouts shall <i>comply</i> with the requirements of the specification for SUBSURFACE DRAINAGE GENERAL C230 | <i>General</i> |
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C231.06 FOUNDATION DRAINS

(a) Excavation

C231.06.01	Excavation shall be undertaken in accordance with the requirements of the Specification for SUBSURFACE DRAINAGE – GENERAL C230 and Clause C231.05(a) of this Specification.	<i>Associated Specification</i>
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(b) Laying of Pipe

C231.06.02	The 100mm diameter drainage pipe as specified in the drawings shall be laid on a bed of filter material 50mm in thickness and shall be laid to the required line and grade.	<i>Bedding</i>
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C231.06.03	The type of filter material shall be as shown on the Drawings. Requirements for filter materials shall be in accordance with the Specification for SUBSURFACE DRAINAGE GENERAL C230	<i>Filter Material</i>
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C231.06.04	Joints in the pipeline shall be kept to the minimum number and, where required, shall be made using a suitable external joint coupling.	<i>Jointing of Pipe</i>
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(c) Backfilling

C231.06.05	The trench shall be backfilled with filter material in accordance with the provisions of Clause C231.05(c). Requirements for filter materials shall be in accordance with the Specification for SUBSURFACE DRAINAGE GENERAL C230	<i>Filter Material</i>
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C231.06.06	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 per cent (standard compaction) as determined by AS 1289.5.4.1.	<i>Earth Backfill and Compaction</i>
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C231.06.07	Where shown on the Drawings a geotextile, conforming to the requirements of the Specification for SUBSURFACE DRAINAGE – GENERAL C230, shall be provided at the interface between the filter material and adjoining materials. Laps of 500mm shall be provided at joints in the fabric.	<i>Geotextile</i>
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(d) Outlets

C231.06.08	An outlet structure in accordance with the detail shown on the CMDG Standard Drawing and the Specification for SUBSURFACE DRAINAGE – GENERAL C230 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.	<i>Construction Detail</i>
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C231.07 MATERIALS

C231.07.01	All materials to comply with the specification for SUBSURFACE DRAINAGE GENERAL C230.	<i>Requirements</i>
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LIMITS AND TOLERANCES

C231.08 SUMMARY OF LIMITS AND TOLERANCES

C231.08.01 The limits and tolerances applicable to the various clauses in this Specification are summarised in **Table C231. 08.1** below.

Table C231. 08.1 - Summary of Limits and Tolerances

Item	Activity	Limits/Tolerances	Spec Clause
1.	Excavation Trench Grade	≥0.5%	C231.05(a)
2.	Subsoil Drain Backfill		
	(a) Layer thickness	300mm max	C231.05(c)
	(b) Compaction (Relative) Filter and Backfill material	95% standard	C231.05(c)
3.	Cleanout Spacing	60m maximum	C231.05(e)
4.	Foundation Drain Backfill		
	(a) Layer thickness	300mm max	C231.05(c)
	(b) Compaction (Relative) Filter material	95% Standard	C231.05(c)
	Backfill material	>95% Standard	C231.06(c)