



AUS-SPEC

Infrastructure Specifications

1172 Subsoil and formation drains

1172 SUBSOIL AND FORMATION DRAINS

General IMPORTANT: This document has been adapted from the NATSPEC suite of specification templates for use in the Cessnock City Council area by both Council and industry. NATSPEC regularly updates the base templates (currently in April and October each year), and Council may incorporate changes into its version of AUS-SPEC from time to time. To assist in highlighting any changes made by Council to the NATSPEC templates, the following conventions are used.

- See ANNEXURE M at the end of this document which contains (where practical) Cessnock City Council customisations (also known as 'office master' text). References to the Annexure are to also be inserted at relevant clauses in the main body of the document.
- Where content is added to the main body of the document, it is to be shown **in brown text like this**.
- Where content is deleted or excluded from the main body of the document, it is to be shown ~~struck through like this~~. Such clauses are to have no effect.

Where there is a conflict between main body text and Cessnock City Council specific clauses, Council's specific clauses shall prevail.

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide subsoil and formation drains, as documented.

1.2 CROSS REFERENCES**General**

Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:

- 0136 *General requirements (Construction)*.
- 0152 *Schedule of rates (Construction)*.
- 0161 *Quality management (Construction)*.
- 1101 *Traffic management*.
- 1102 *Control of erosion and sedimentation (Construction)*.
- 1112 *Earthworks (Road reserve)*.
- 1171 *Subsurface drainage*.

1.3 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection the following abbreviations apply:

- CI: Cast Iron.
- HDPE: High Density Polyethylene.

Definitions

General: For the purposes of this worksection the following definitions apply:

- Formation drains: Drainage of seepage, springs and wet areas within and adjacent to the road formations.
- Pavement interface drains: Drain the interface between pavements with different structures and may be oriented transversely or longitudinally.
- Selected material zone: The top part of the upper zone of formation in which material of a specified higher quality is required.
- Subsoil drains: Drainage of ground water and/or the pavement in cuttings.

1.4 SUBMISSIONS

Tests

Results: Submit results of testing to **ANNEXURE – MAXIMUM LOT SIZE AND MINIMUM TEST FREQUENCIES**.

1.5 INSPECTIONS

Notice

General: Give notice so that inspection may be made of the following:

- Grading: Survey of minimum pipe grade.
- Laying of pipe: Compacted filter material, laid to documented line and grade.

2 MATERIALS

2.1 GENERAL

Pipes and geotextiles

Requirement: To the **SUBSURFACE DRAINAGE PIPES** and **GEOTEXTILE** in *1171 Subsurface drainage*.

Pipes: 100 mm diameter corrugated slotted plastic piping or rigid geocomposite drain.

Filter material

Requirement: Type A or Type B filter material to the **FILTER MATERIAL** in the *1171 Subsurface drainage*.

No fines concrete

Requirement: To **NO FINES CONCRETE** in *1171 Subsurface drainage*.

Trial mix: Conduct trial mixes to check complete cementitious paste coverage of the aggregate, and check that the paste does not flow during mixing, handling or placing.

Types of subsoil drains

General: To Austroads AGPT10 (2009) Figure 3.1.

3 EXECUTION

3.1 GENERAL

Documentation

Requirement: To *1171 Subsurface drainage*.

3.2 ORDER OF CONSTRUCTION

Subsoil drains

General: Construct subsoil drains immediately after road earthworks are completed in the area of the drain.

For moderate ground water: If stabilisation of the road subgrade is required, construct subsoil drains after completion of stabilisation.

For excessive groundwater: Conform to the following:

- Construct subsoil drain before stabilisation of the subgrade.
- If a selected road material zone is required and excessive ground water is encountered, install subsoil drains in two stages as follows:
 - . Stage 1: Install standard subsoil drains below the base of the cutting before placement of select material in the selected material zone.
 - . Stage 2: Extend subsoil drain to the top of the selected material zone after placement of selected material.

3.3 EXCAVATION

General

Over-excavation: Backfill the trench to the required level, with non-porous subgrade material compacted to a relative compaction of 95% minimum (Standard compaction).

Two stage construction: After placement and compaction of the selected material layer or the stabilised subgrade layer, excavate the Stage 2 trench to the same line and width as the Stage 1 trench, and to a depth for clean, full contact with the filter material placed in Stage 1.

3.4 LAYING OF PIPES

General

Bedding: Lay 50 mm thick compacted filter material or no fines concrete to the documented line and grade in the trench.

Filter material: Nominal aggregate size, 5 or 7 mm or blue metal quarry crusher dust or quarry scalplings.

Seamless tubular sock filter fabric: Install around the pipe or install fabric trench geotextile wrap around the trench filter aggregate with overlap.

Pipe: Place pipes centrally within the trench on the filter material bedding.

Joints: Minimise joints in the pipeline.

3.5 BACKFILL

General

Filter material: Backfill the trench with filter material or no fines concrete to the documented level.

No fines concrete: Backfill with no fines concrete if drains are located under trafficked area of pavement.

Layers: Place and compact the filter material in layers with a maximum compacted thickness of 300 mm.

Upper section of the trench: Backfill above the level documented for filter material backfill, with selected free draining backfill material, conforming to **FILL ADJACENT STRUCTURES**, backfill in *1112 Earthworks (Road reserve)*.

3.6 GEOTEXTILE

General

Requirement: To **GEOTEXTILE** in *1171 Subsurface drainage*.

3.7 OUTLET STRUCTURES

General

Requirements: Conform to **OUTLET STRUCTURES** in *1171 Subsurface drainage*.

3.8 PAVEMENT INTERFACE DRAINS

General

Application: Used to drain the interface between pavements with different constructions.

Interface: Transverse or longitudinal.

Drain extension: 300 mm below selected material zone.

Filter material: No fines concrete.

Transverse interface: Connect to adjacent formation drains or discharge into stormwater pits or batter outlets.

Longitudinal interface: Create outlets at the same intervals required for formation drains.

- Pipe discharge: Conform to the following:
- Into non-perforated parallel carrier pipe in the same trench or
- Into formation drain or pit at the outer edge of the pavement by a transverse non-perforated pipe.

Discharge to parallel carrier pipe: Widen trench and place additional pipe and conform to the following:

- Spacing between pipes: 50 mm.
- Pipe connection: Connect perforated pipe to the non-perforated carrier pipe with Y-coupling to manufacturer's recommendation.
- Pipe capping: Cap the upstream end of the perforated pipe.

Discharge to transverse non-perforated pipe: Conform to the following:

- Trench dimension: 300 mm width and 300 mm depth.
- Bedding: Lay pipe on a 100 mm thick bed of selected material or backfill.

- In sags or low points: Place pipe on the base of the excavation.
- Relative compaction: 95%.

3.9 TESTING

Quality

Requirement: Test for all characteristics in conformance with **ANNEXURE - MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES**.

Completion tests

- Subsoil drain line: After completion of backfilling, pump clean water into the clean-out at the start of each run, until only clean water discharges at the outlet.
- Minimum rate of flow of flushing water: 100 l/min at the inlet.

4 ANNEXURE A

4.1 ANNEXURE - SUMMARY OF HOLD AND WITNESS POINTS

For private developments, certain Hold and Witness Points where specifically noted below require representatives of both the Superintendent and the Principal Certifier (e.g. Council) to authorise release.

| Clause and description | Type | Submission/Inspection details | Submission/Notice times | Process held |
|---|---|--|---|--|
| INSPECTIONS Notice Grading | H | Survey top of subsoil pipe every 10 metres. | 1 day before backfill with filter material over pipe. | Survey of laid pipe levels and location of centre of pipe. |
| INSPECTIONS, Notice Laying of pipes | H – Superintendent and Principal Certifier | Compacted filter bedding material to the required depth, line and grade. | 1 days before laying of pipe | Trench alignment and compaction of bedding prior to pipe placement |

Note: H = Hold Point, W = Witness Point

4.2 ANNEXURE - MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES

| Activity | Key quality verification requirements | Maximum lot size | Minimum test frequency | Test method |
|------------------------------|---|------------------|------------------------|----------------------|
| Excavation of subsoil trench | Over excavation: Relative compaction of backfill prior to trench bedding filters | 1 contract/size | 1 per type | AS 1289.5.4.1 (2007) |

4.3 ANNEXURE - PAY ITEMS

This Annexure applies to Council projects. For private development works use of this schedule is optional, at the Superintendent's discretion.

| Pay items | Unit of measurement | Schedule rate inclusions |
|--------------------------|--|--|
| 1172.1 Excavation | m ³ solid bank Calculated from width, depth and length of the trench as documented and determined at the time of excavation. The sides of the trench are taken as vertical. | All costs associated with: <ul style="list-style-type: none"> - Excavation of all types of material – separate rates for earth or rock are not acceptable. - Replacement for over excavation for any reason. - Control of stormwater run-off, temporary drainage and erosion and sedimentation control to <i>1102 Control of erosion and sedimentation (Construction)</i>. - The disposal of material from drain excavation. |

| Pay items | Unit of measurement | Schedule rate inclusions |
|---|--|--|
| | | - The schedule quantity is a provisional quantity. |
| 1172.2 Supply, placement and compaction of backfill material (other than filter material) for subsoil and formation drains | m ³ compacted soil Calculated from width, depth and length of compacted backfill in the trench as documented and determined at the time of excavation. The sides of the trench are taken as vertical. | All costs associated with: - Supply, placement and compaction of documented backfill material. - The schedule of quantity is a provisional quantity. |
| Subsurface drainage | | To 1171 <i>Subsurface drainage</i> |
| Earthworks | | To 1112 <i>Earthworks (Road reserve)</i> |
| Traffic management | Lump sum | To 1101 <i>Traffic management</i> |

4.4 ANNEXURE - REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

| | |
|-------------------|--|
| AS 1289 | Methods of testing soils for engineering purposes |
| AS 1289.5.4.1 | 2007 Soil compaction and density tests - Compaction control test - Dry density ratio, moisture variation and moisture ratio |
| Austrroads AGPT | Guide to pavement technology |
| Austrroads AGPT10 | 2009 Subsurface drainage |

5 ANNEXURE M – CESSNOCK CITY COUNCIL SPECIFIC CLAUSES

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|-----|--|----------------------------|
| M1. | Variations to or non-conformances with Council's AUS-SPEC are to be evaluated with reference to the procedure in Council's <i>Development Engineering Handbook</i> . Acceptance is to be obtained in writing from: an authorised representative of Council's Director of Infrastructure and Engineering Services. | Variation procedure |
| M2. | This specification applies in addition to any development consent (DA) conditions. If there is any inconsistency, the conditions of consent shall prevail. | DA Conditions |
| M3. | Refer to the Cessnock City Council <i>Development Engineering Handbook</i> for final inspection, works-as-executed and handover requirements. | Completion |

6 AMENDMENT HISTORY

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|---|------------|-----------------|
| 0 | 15/01/2024 | First Published |
|---|------------|-----------------|