



AUS-SPEC

Infrastructure Specifications

1173 Pavement drains

1173 PAVEMENT DRAINS

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 sub-pavement drains, intra-pavement drains and edge 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*.
- 1112 *Earthworks (Road reserve)*.
- 1141 *Flexible pavement base and subbase*.
- 1144 *Asphalt (Roadways)*.
- 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:

- Edge drains: Drainage of rigid pavements from the interface between the base and subbase.
- Intra-pavement drains: Drainage of pavement layers of a flexible pavement on steep grades and sag curves where water flows are likely to be more parallel than transverse to road alignment. The subbase material is a macadam crushed rock or open graded asphaltic concrete.
- Selected material zone: The top part of the upper zone of formation in which material of a specified higher quality is required.
- Sub-pavement drains: Drainage of the pavement layers where the subbase is not a macadam crushed rock.

1.4 SUBMISSIONS

Execution details

Intra-pavement drains: Conform to the following:

- Submit details of the proposed method and locations for installing transverse pavement drain pipes .
- Submit test results of the permeability of the base and subbase material based on the type of treatment selected from Austroads AGPT10 (2009) Figure 3.2.
- Submit evidence of suitability of pipes selected to resist crushing damage if in the pavement compaction work zone.

Edge drains: Conform to the following:

- Excavation: If proposed, submit details of strip filters.
- Laying of pipe: Submit details of the proposed method of locating the pipes within the rigid flexible pavement without crushing of the pipes during subgrade compaction.

1.5 INSPECTIONS

Notice for inspections

Laying of pipes: Inspect compaction of pipe bedding and placement of pipes.

2 MATERIALS

2.1 GENERAL

Pipes and geotextiles

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

Sub-pavement drains: 100 mm diameter corrugated plastic piping or prefabricated geocomposite drain on the compacted bed, as documented.

Intra-pavement drains: Slotted thick walled PVC-U pressure pipe.

Edge drains: Conform to the following:

- Corrugated circular plastic pipe: 65 mm diameter pipe enclosed in seamless tubular filter fabric to conform to **Corrugated plastic pipe and fittings**, and **Seamless tubular filter fabric** to *1171 Subsurface drainage*.
- Rigid geocomposite drains: To **Prefabricated geocomposite drains and fittings** in *1171 Subsurface drainage*.

Filter material

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

Edge drains: Install geotextile wrapping trench extremities. Backfill the pipe bedding and after the subsoil pipe laid in trench with Type A or B filter material to **FILTER MATERIAL** in *1171 Subsurface drainage*.

3 EXECUTION

3.1 GENERAL

Documentation

Requirement: To *1171 Subsurface drainage*.

Pipe

Continuous length without junction pit: Less than 100 to 150 m dependent on gradient.

3.2 ORDER OF CONSTRUCTION

Sub-pavement drains

Requirement: Construct sub-pavement drains immediately after road earthworks are completed in the area of the drains.

Stabilisation: If stabilisation of the subgrade is required, construct the sub-pavement drain after completion of stabilisation except where excessive ground water is encountered; construct sub-pavement drains before stabilisation of the subgrade.

Excessive groundwater: Where a Selected Material Zone is required and excessive ground water is encountered, sub-pavement drains may be installed in two stages as follows:

- Stage 1: Install standard sub-pavement drains below the base of the cutting before placement of select material in the selected material zone.
- Stage 2: Extend sub-pavement drain to top of the selected material zone after placement of selected material.

Intra-pavement drains

Requirement: Construct intra-pavement drains after construction of the road impervious subbase gravel and below the pervious base road pavement.

Edge drains

Requirement: Construct edge drains (geocomposite strip filters) after the construction of the rigid pavement and before the placement and compaction of verge table drain material.

3.3 SUB-PAVEMENT DRAINS

Excavation

Two stage construction: If two stage construction of the sub-pavement drain is required, for Stage 1 trim the trenches 300 mm wide to the required line and to a depth of 600 mm below the bottom of the subbase or below the base of the cutting and conform to the following:

- Carry out excavation for Stage 2 after placement and compaction of the Selected Material Zone.
- Excavate the Stage 2 trench to the same line and width as Stage 1 and maintain a clean, full contact with the filter material previously placed in Stage 1.

Laying of pipe

Bedding: Lay 50 mm thick compacted filter material to the documented line and grade.

Filter material type: As documented.

Joints: Minimise joints in the pipeline.

Backfilling

Filter material: Backfill the trench with filter material to the documented level.

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

Pipe outlets: Conform to the following:

- Backfill the trench on the outlet section of pipes discharging through the fill batters with the selected filter material to a depth of 50 mm above the pipe.
- Backfill the balance of trench with earth backfill material of maximum particle size of 50 mm and compact for the full depth to a relative compaction of 95% (Standard compaction).
- Provide a paved area around the outlet to prevent scour, growth of grass and to make the outlet easy to find. Provide a marker post and a smooth bore unslotted pipe of sufficient crush strength to bear maintenance plant.

3.4 INTRA-PAVEMENT DRAINS

Excavation

Trench dimensions: Cut a 'V' shaped trench 75 mm deep to the documented line in the pavement layer immediately below the crushed rock macadam subbase pavement layer to Austroads AGPT10 (2009) Figure 3.2.

Discharge pipe: If the pipe is to discharge through the fill batter, construct a trench on a grade suitable for the pipe to discharge its contents without scour. After laying the pipe, backfill the trench with fill material and compact for the full depth to a relative compaction of not less than 95% (Standard compaction).

Laying of pipe

Subbase: Conform to either of the following:

- Crushed rock subbases: Less than 10% of material passing the 9.5 mm AS sieve and with a layer thickness between 150 mm and 200 mm. Or
- Open graded asphalt subbases having layer thicknesses between 80 mm and 100 mm. Or
- No fines concrete: Lay the pipe on a bed of no fines concrete to the line and level, as documented. Where using pipes in concrete, the pipes will need pegging and tied down to prevent floating when the concrete is liquid and newly poured.

Suitability for subbases: If the subbase requires pavement drains, make sure that the proposed type of pavement drain has adequate crushing strength to cope with compaction equipment in the following locations:

- Pervious crushed rock subbase depth: 200 mm minimum.
- Open graded asphalt subbase depth: 100 mm minimum.

Outlet length: Install an unslotted outlet pipe from the outside edge of the free-draining subbase to an outlet structure in the embankment batter and seal the pipe joints in this length of pipe with suitable couplings or mastic.

Level and alignment: Lay the pipe to the documented line and level.

Joints: Minimise joints in the pipeline.

Pipe anchorage: Anchor the pipes by securing all pipes held to the layer under the free-draining subbase to prevent movement of the pipes during placement and compaction of the free-draining subbase.

Backfilling

Subbase: Spread subbase material, compact and trim, where appropriate, as follows:

- For crushed rock macadam subbase: To the **SPREADING and TRIMMING, COMPACTION AND CURING** in *1141 Flexible pavement base and subbase*.
- For open graded asphalt subbase: To *1144 Asphalt (Roadways)*.

Compaction: Place and compact the filter material in layers with a maximum compacted thickness of 300 mm. Tamp around and over the pipe to avoid damage or disturbance to the pipe.

No fines concrete: Backfill with no fines concrete, as documented.

3.5 EDGE DRAINS

Excavation

Trench dimensions: Trim the verge material to subgrade level and to the minimum width, as documented.

Discharge pipe: If the pipe is to discharge through the fill batter, excavate a suitable trench to the documented grade.

Strip filters: Do not use strip filters.

Laying of pipe

Pipe: If any part of a shoulder consists of material other than concrete, install slotted thick walled PVC-U pressure pipe.

Securely hold in place: Secure all pipes held against the vertical face of the rigid pavement.

Bedding and alignment: Lay the pipe on a prepared bed of filter material or no fines concrete to the documented line and level.

Joints: Minimise joints in the pipeline.

Backfilling

Soaking of filter material: Mechanical compaction of this filter material is not required. After placement of the filter material, soak with water and add additional filter material, if required.

Material: Backfill filter material to **FILTER MATERIAL** in the *1171 Subsurface drainage* worksection or no fines concrete to **NO FINES CONCRETE**, in the *1171 Subsurface drainage* worksection and as required for verges.

Compaction: Relative compaction of not less than 95% (Standard compaction).

3.6 OUTLETS STRUCTURES

General

Requirements: Conform to *1171 Subsurface drainage*.

Intra-pavement drain discharge: If discharge must be constructed, extend each pipe using a 60° bend. Unslotted pipe to discharge through the fill batter and construct an outlet structure on the discharge end, as documented.

Edge drain: If discharge must be constructed, install unslotted pipe with mastic sealed joint from the outlet section of a pipe at the vertical face of the rigid pavement to an outlet in the embankment batter.

3.7 CLEAN-OUTS

General

Outlet: Preformed riser fitting or pipe not less than 100 mm diameter.

Intervals: Maximum 120 m.

4 ANNEXURE A

Duplicate and customise these Schedules, adding and deleting rows and columns, as required. Delete schedules if not required.

To be completed by the specifier.

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 Laying of pipes	H – Superintendent and Principal Certifier	Compacted bedding, and placement of pipes	1 day before backfilling over pipes	Backfilling
SUBMISSIONS, Execution details Intra-pavement drains	H	Submit details of securing pipes for holding down subsoil drains using no fines concrete.	7 days before laying of pipe.	Laying of subsoil pipe under pavement
SUBMISSIONS, Execution details Edge drains	H	Submit details of securing geocomposite drains	7 days before laying of edge drain.	Laying of subsoil geocomposite edge drain

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
Backfilling	Pipe outlets: Relative compaction of fill material	1 contract	1 per type	AS 1289.5.4.1 (2007).
Backfilling of intrapavement drains with no fines concrete	Ability of no fines concrete to be porous under road	1 contract	1 per type	
	- Water absorption			AS 1141.6.1 (2000)
	- Permeability			RMS T376 (2016)

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
1173.1 Excavation	m ³ - Calculated from the width, depth and length of trench. - Width: As documented. - Depth and length: As documented.	All costs associated with the following: - Excavation for all types of material. - Replacement for over excavation for any reason. - Disposal of excavation material - The schedule quantity is a provisional quantity.
1173.2 Subsoil drain pipe	Lin. m - Length measured along the pipe including any slotted pipe required for outlets.	All costs associated with the following: - Laying and securing of the subsoil pipe, including connections, fittings and seamless tubular filter fabric where specified. - The schedule quantity is a provisional quantity.
Subsurface drainage		To 1171 <i>Subsurface drainage</i>
Flexible pavement		To 1141 <i>Flexible pavement base and subbase</i>
Asphaltic (Roadways)		To 1144 <i>Asphalt (Roadways)</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 1141		Methods for sampling and testing aggregates
AS 1141.6.1	2000	Particle density and water absorption of coarse aggregate - Weighing-in-water method
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
RMS T376	2016	Moulding of no fines concrete specimens

5 ANNEXURE M – CESSNOCK CITY COUNCIL SPECIFIC CLAUSES

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

0	15/01/2024	First Published
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