

COFFS HARBOUR CITY COUNCIL



**DEVELOPMENT SPECIFICATION
DESIGN**

1172 Subsoil and foundation drains

Version 1 01 January 2009

1172 SUBSOIL AND FOUNDATION DRAINS

1 SCOPE AND GENERAL

1.1 SCOPE

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

This worksection should be read in conjunction with 1171 *Subsurface drainage*.

1.2 TERMINOLOGY

Subsoil drains

The subsoil drains are intended for the drainage of ground water and/or the pavement in cuttings.

Foundation drains

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

1.3 QUALITY

Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are given in 0161 *Quality (Construction)*.

1.4 REFERENCED DOCUMENTS

The following documents referred to in this worksection shall be deemed as the latest edition of the Australian Standards, including amendments and supplements.

Worksections

0161 *Quality (Construction)*

1112 *Earthworks (Roadways)*

1171 *Subsurface drainage*

Standards

AS 1289 Methods of testing soils for engineering purposes

AS 1289.5.4.1 Soil compaction and density tests—Compaction control test—Dry density ratio, moisture variation and moisture ratio

1.5 LOCATION

Subsoil and foundation drains shall be constructed where and as shown on the Drawings or as directed by the Superintendent.

1.6 ORDER OF CONSTRUCTION

Subsoil drains

Subsoil drains shall comply with the following:

- Timing of work—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.
- Excessive groundwater—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.

Foundation drains

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

2 CONSTRUCTION

2.1 SUBSOIL DRAINS

Excavation

Excavation shall comply with the following:

- Associated worksection—Excavation shall be undertaken in accordance with the requirement of 1171 *Subsurface drainage*.
- Grade—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.
- Over-excavation—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.
- Two stage construction—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.

Laying of pipe

Pipe laying shall comply with the following:

- Bedding—A bed of filter material 50 mm in compacted thickness and shall be laid to the specified line and grade.
This action constitutes a HOLD POINT.
The Superintendent's approval of the compacted bedding is required prior to the release of the hold point.
- Filter material—The type of filter material shall be as shown on the Drawings or as directed by the Superintendent.
- Location, grade and pipe—The 100 mm diameter corrugated slotted plastic piping, or the corrugated flat plastic piping, complying with 1171 *Subsurface drainage*, shall be laid on the compacted bed to the specified line and level. The pipe shall not deviate from the specified line by more than 100 mm at any point.
- Joints and capping—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.

Backfilling

Backfilling shall comply with the following:

- Filter material—The trench shall be backfilled with filter material to the level specified.
The type of filter material shall be as shown on the Drawings or as directed by the Superintendent.
The filter material shall be placed and compacted in layers with a maximum compacted thickness of 300 mm. Tamping around and over the pipe shall be done in such a manner as to avoid damage or disturbance to the pipe.
- Compaction of 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.
- Select 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 1112 *Earthworks (Roadways)*, compacted for its full depth to a relative compaction of not less than 100% (Standard compaction) as determined by AS 1289.5.4.1.

- Geotextile—Where shown on the Drawings or as directed by the Superintendent, a geotextile conforming with the requirements of 1171 *Subsurface drainage*, shall be provided at the interface between the filter material and adjoining materials. Laps of 500 mm shall be provided at joints in the fabric.

Outlets

Outlets are to be provided as shown on the Drawings or at maximum intervals of 150 m. 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 Drawings shall be constructed at the discharge end.

Cleanouts

Cleanouts shall be provided at the commencement of each run of subsoil drain line and at intervals of approximately 60 m or as shown on the Drawings. Details of the required cleanout construction are shown on the Drawings. The standard CI caps as shown on the Drawings shall be supplied by the Contractor.

2.2 FOUNDATION DRAINS

Excavation

Excavation shall be undertaken in accordance with 1171 *Subsurface drainage*, and **Subsoil drains**.

Laying of pipe

Pipe laying shall comply with the following:

- Bedding—A bed of filter material 50 mm in compacted thickness and shall be laid to the required line and grade.
This action constitutes a HOLD POINT.
The Superintendent's approval of the compacted bedding is required prior to the release of the hold point.
- Filter material—The type of filter material shall be as shown on the Drawings or as directed by the Superintendent.
- Pipe—The 100 mm diameter corrugated slotted plastic piping, or the corrugated flat plastic piping, complying with 1171 *Subsurface drainage*, shall be laid on the compacted bed.
- Jointing of pipe—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.

Backfilling

Backfilling shall comply with the following:

- Filter material—The trench shall be backfilled with filter material in accordance with the provisions of **Subsoil drains**.
- Earth backfill—The upper section of the trench, above the level specified for filter material backfill, shall be backfilled with suitable earth free draining 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.
- Geotextile— Where shown on the Drawings or as directed by the Superintendent, a geotextile, conforming with the requirements of 1171 *Subsurface drainage*, shall be provided at the interface between the filter material and adjoining materials.

Laps of 500 mm shall be provided at joints in the geotextile.

Outlets

An outlet structure in accordance with the detail shown on the Drawings and 1171 *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.

3 LIMITS AND TOLERANCES

The limits and tolerances applicable to this worksection are summarised in Table 3.1.

Table 3.1. Summary of limits and tolerances

Activity	Limits/Tolerances	Worksection Clause Reference
Excavation		
- Trench Grade	≥0.5%	Subsoil drains
- Compaction	>95% (Standard compaction)	Subsoil drains
Laying of pipe		
Alignment	Deviation <100 mm from specified line at any point	Subsoil drains
Subsoil drain backfill		
- Layer thickness	300 mm max	Subsoil drains
- Compaction (Relative) Filter and Backfill material	100% (Standard compaction)	Subsoil drains
Outlet spacing	150 m max	Subsoil drains
Cleanout spacing	60 m approx	Subsoil drains
Foundation drain backfill		
- Layer thickness	300 mm max	Subsoil drains
- Compaction (Relative) Filter material Backfill material	100% (Standard compaction) >95% (Standard compaction)	Subsoil drains Foundation drains

4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

Payment shall be made for all the activities associated with completing the work detailed under this worksection on a schedule of rates basis in accordance with Pay Items 1172.1 to 1172.6 inclusive.

A lump sum price for any of these items shall not be accepted.

If any item, for which a quantity of work is listed in the Schedule of Rates, has not been priced by the Contractor, it shall be understood that due allowance has been made in the prices of other items for the cost of the activity which has not been priced.

Filter material and outlet structures are measured and paid in accordance with 1171 *Subsurface drainage*.

Backfill material (other than filter material) is measured and paid in accordance with this worksection and not 1112 *Earthworks (Roadways)*.

4.2 PAY ITEMS

1172.1 Excavation for subsoil and foundation drains

The unit of measurement shall be the cubic metre measured as bank volume of excavation.

The volume of excavation shall be determined by multiplying the width, depth and length of the trench.

The width of trench shall be as shown on the Drawings or as directed by the Superintendent.

The depth and length of excavation shall be based on the Superintendent's instructions and shall be determined at the time of excavation.

The sides of the trench shall be taken as vertical.

The schedule rate shall cover all types of material and separate rates shall not be included for earth or rock. The rate is deemed to include:

setting out and associated survey work;

replacement for overexcavation for any reason;

control of stormwater run-off, temporary drainage and erosion and sedimentation control.

The disposal of material from drain excavation shall be included in the schedule rate for excavation.
The schedule quantity is a provisional quantity.

1172.2 Subsoil drain pipe—100 mm dia slotted corrugated plastic pipe

The unit of measurement shall be the linear metre measured along the length of the pipe.
The schedule rate shall cover the supply and laying of the subsoil pipe.
The rate shall include connections, markers, fittings and seamless tubular filter fabric where specified.
The schedule quantity is a provisional quantity.

1172.3 Subsoil drain pipe—corrugated flat plastic pipe

The unit of measurement shall be the linear metre measured along the length of the pipe.
The schedule rate shall cover the supply and laying of the subsoil pipe.
The rate shall include connections, markers, fittings and seamless tubular filter fabric where specified.
The schedule quantity is a provisional quantity.

1172.4 Supply, placement and compaction of backfill material (other than filter material) for subsoil and foundation drains

The unit of measurement shall be the cubic metre of compacted backfill material.
The volume of backfill material shall be determined by multiplying the width, depth and length of backfill material in the trench.
The width of the trench shall be as shown on the Drawings or as directed by the Superintendent.
The depth and length of backfill material in the trench shall be based on the Superintendent's instructions and shall be determined on site.

The sides of the trench shall be taken as vertical.
The schedule of quantity is a provisional quantity.

1172.5 Supply and placement of geotextile

The unit of measurement shall be the square metre of area covered by geotextile as measured on site.
The schedule rate shall cover the supply placing and securing of the geotextile material.
No additional payment shall be made for additional geotextile used in lap joints.
The schedule quantity is a provisional quantity.

1172.6 Cleanout structures

The unit of measurement shall be 'each' cleanout structure constructed in accordance with the Drawings.
The schedule rate shall cover the supply and installation of standard cast iron lids and the recording of cleanout locations in accordance with 1171 *Subsurface drainage*.
The schedule quantity is a provisional quantity.