



WESTERN AUSTRALIA SPECIFICATION

231

SUBSOIL AND FOUNDATION DRAINS

Amendment Record for this Specification Part

This Specification is Council's edition of the AUS-SPEC generic specification part and includes Council's primary amendments.

Details are provided below outlining the clauses amended from the Council edition of this AUS-SPEC Specification Part. The clause numbering and context of each clause are preserved. New clauses are added towards the rear of the specification part as special requirements clauses. Project specific additional script is shown in the specification as italic font.

The amendment code indicated below is 'A' for additional script 'M' for modification to script and 'O' for omission of script. An additional code 'P' is included when the amendment is project specific.

Amendment Sequence No.	Key Topic addressed in amendment	Clause No.	Amendment Code	Author Initials	Amendment Date
<i>EXAMPLE 1</i>	<i>Provision for acceptance of nonconformance with deduction in Payment</i>	<i>XYZ.00</i>	<i>AP</i>	<i>KP</i>	<i>2/6/97</i>

SPECIFICATION 231 - SUBSOIL AND FOUNDATION DRAINS

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SPECIFICATION 231 : SUBSOIL AND FOUNDATION DRAINS

GENERAL

231.01 SCOPE

1. The work to be executed under this Specification covers the excavation, bedding, installation and backfilling of subsoil and foundation drains.
2. Subsoil and foundation drains shall be constructed where and as shown on the Drawings or as directed by the Superintendent. ***Location***
3. This Specification should be read in conjunction with the Specification for SUBSURFACE DRAINAGE - GENERAL. ***Associated Specification***
4. Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in the Specification Part for Quality Requirements. ***Quality***

231.02 TERMINOLOGY

1. The subsoil drains are intended for the drainage of ground water and/or the pavement in cuttings. ***Subsoil Drains***
2. Foundation drains are required for the drainage of seepage, springs and wet areas within and adjacent to the foundations. ***Foundation Drains***

231.03 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. ***Documents
Standards
Test Methods***

(a) Council Specifications

- | | | |
|-----|---|-------------------------------|
| 213 | - | Earthworks |
| 230 | - | Subsurface Drainage - General |

(b) Australian Standards

- | | | |
|---------------|---|---|
| AS 1289.5.4.1 | - | Compaction control test - Dry density ratio, moisture variation and moisture ratio. |
|---------------|---|---|

231.04 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***

SUBSOIL AND FOUNDATION DRAINS

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

231.05 SUBSOIL DRAINS

(a) Excavation

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

Associated Specification

2. 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

3. 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

4. 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

(b) Laying of Pipe

1. 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.

HP

2. The type of filter material shall be as shown on the Drawings or as directed by the Superintendent.

Filter Material

3. The 100mm diameter corrugated slotted plastic piping, or the corrugated flat plastic piping, complying with the Specification for SUBSURFACE DRAINAGE - GENERAL, 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 100mm at any point. **Bedding**

4. 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. **Joints and Capping**

(c) Backfilling

1. 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 300mm. Tamping around and over the pipe shall be done in such a manner as to avoid damage or disturbance to the pipe. **Filter Material**

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. **Compaction of Filter Material**

3. 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 the Specification for 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. **Select Material**

4. Where shown on the Drawings or as directed by the Superintendent, a geotextile conforming with the requirements of the Specification for 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. Outlets are to be provided as shown on the Drawings or at maximum intervals of 150m. 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. **Pipes and Structures**

(e) Cleanouts

1. Cleanouts shall be provided at the commencement of each run of subsoil drain line and at intervals of approximately 60m or as shown on the Drawings. **Location**

2. Details of the required cleanout construction are shown on the Drawings. **Details**

231.06 FOUNDATION DRAINS

(a) Excavation

1. Excavation shall be undertaken in accordance with the requirements of the Specification for SUBSURFACE DRAINAGE - GENERAL and Clause 231.05 of this Specification. **Associated Specification**

SUBSOIL AND FOUNDATION DRAINS

(b) Laying of Pipe

1. 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.

HP

2. The type of filter material shall be as shown on the Drawings or as directed by the Superintendent.

Filter Material

3. The 100mm diameter corrugated slotted plastic piping, or the corrugated flat plastic piping, complying with the Specification for SUBSURFACE DRAINAGE - GENERAL, shall be laid on the compacted bed.

Bedding

4. 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 231.05(c).

Filter Material

2. 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 per cent (Standard compaction) as determined by AS 1289.5.4.1

Earth Backfill

3. Where shown on the Drawings or as directed by the Superintendent, a geotextile, conforming with the requirements of the Specification for 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 geotextile.

Geotextile

(d) Outlets

1. An outlet structure in accordance with the detail shown on the Drawings and the Specification for 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

SPECIAL REQUIREMENTS

231.07 RESERVED

LIMITS AND TOLERANCES

231.08 SUMMARY OF LIMITS AND TOLERANCES

1. The limits and tolerances applicable to the various clauses in this Specification are summarised in Table 231.1 below.

Item	Activity	Limits/Tolerances	Spec Clause
1.	Excavation		
	(a) Trench Grade	≥0.5%	231.05(a)
	(b) Compaction	>95% (Standard compaction)	231.05(a)
2.	Laying of Pipe		
	Alignment	Deviation <100mm from specified line at any point	231.05(b)
3.	Subsoil Drain Backfill		
	(a) Layer thickness	300mm max	231.05(c)
	(b) Compaction (Relative) Filter and Backfill material	100% (Standard compaction)	231.05(c)
4.	Outlet Spacing	150m max	231.05(d)
5.	Cleanout Spacing	60m approx	231.05(e)
6.	Foundation Drain Backfill		
	(a) Layer thickness	300mm max	231.05(c)
	(b) Compaction (Relative) Filter material	100% (Standard compaction)	231.05(c)
	Backfill material	>95% (Standard compaction)	231.06(c)

Table 231.1 - Summary of Limits and Tolerances

MEASUREMENT AND PAYMENT

231.09 PAY ITEMS

1. Payment shall be made for all the activities associated with completing the work detailed under this Specification on a schedule of rates basis in accordance with Pay Items 231(a) to 231(f) inclusive.
2. A lump sum price for any of these items shall not be accepted.
3. 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.
4. Filter material and outlet structures are measured and paid in accordance with the Specification for SUBSURFACE DRAINAGE - GENERAL.
5. Backfill material (other than filter material) is measured and paid in accordance with this Specification and not in the Specification for EARTHWORKS.

Pay Item 231(a) EXCAVATION FOR SUBSOIL AND FOUNDATION DRAINS

1. The unit of measurement shall be the cubic metre measured as bank volume of excavation.
2. 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.
3. 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.
4. The disposal of material from drain excavation shall be included in the schedule rate for excavation.
5. The schedule quantity is a provisional quantity.

Pay Item 231 (b) SUBSOIL DRAIN PIPE — 100MM DIA SLOTTED CORRUGATED PLASTIC PIPE.

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

Pay Item 231(c) SUBSOIL DRAIN PIPE - CORRUGATED FLAT PLASTIC PIPE

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

4. The schedule quantity is a provisional quantity.

Pay Item 231(d) SUPPLY, PLACEMENT AND COMPACTION OF BACKFILL MATERIAL (OTHER THAN FILTER MATERIAL) FOR SUBSOIL AND FOUNDATION DRAINS.

1. The unit of measurement shall be the cubic metre of compacted backfill material.
2. 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.
3. The schedule of quantity is a provisional quantity.

Pay Item 231(e) SUPPLY AND PLACEMENT OF GEOTEXTILE

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

Pay Item 231(f) CLEANOUT STRUCTURES

1. The unit of measurement shall be "each" cleanout structure constructed in accordance with the Drawings.
2. The schedule rate shall cover the supply and installation of standard cast iron lids and the recording of cleanout locations in accordance with the requirements of the Specification for SUBSURFACE DRAINAGE - GENERAL.
3. The schedule quantity is a provisional quantity.