

SPECIFICATION FOR PIPE SUBSOIL DRAIN CONSTRUCTION

1. SCOPE

Pipe subsoil drains shall be constructed in accordance with this specification and in conformity with the lines, grades and cross-sections shown on the drawings. The work shall include: the construction of trenches; the supplying and laying of perforated pipes of the specified type and size; the jointing of the pipes; the supplying and compacting of approved backfilling materials; the construction of connecting and outlet drains; the supply of all materials, labour, plant, tools and transport required for the proper completion of the contract.

2. MATERIALS

2.1 Pipe Types

The perforated pipes shall conform to the requirements for the class, type of joints, diameter and length shown on the drawings and as defined in the job specification, and prior to perforation shall be one of the following types:

- 2.1.1 Ceramic pipes complying with NZS 1823:1967, "Ceramic (Earthenware) Sewer Pipes for Use with Flexible Joints".
- 2.1.2 Unreinforced concrete pipes complying with the requirements specified for Class C pipes in NZS 3107:1978, "Precast Concrete Drainage and Pressure Pipes".
- 2.1.3 Reinforced concrete pipes complying with the requirements specified for Class S (standard reinforced) or stronger pipes in NZS 3107:1978, "Precast Concrete Drainage and Pressure Pipes".
- 2.1.4 Corrugated steel pipes complying with AS 1761-1979 "Helical Lock-Seam Corrugated Steel Pipes".
- 2.1.5 Nestable corrugated steel pipes complying with AS 2041-1977, "Corrugated Steel Pipes, Pipe-Arches and Arches".

2.1.6 Plain wall PVC pipes complying with AS/NZS 1260:1999 "PVC pipes and fittings for drain, waste and vent applications", Class SN4 or SN6.

2.1.7 High density polyethylene pipes complying with the requirements specified for drain pipes in NZS 7604:1981, "High Density Polyethylene Drain and Sewer Pipe and Fittings"

The perforations shall be circular 6.5 mm (+ 1.5 mm) in diameter, arranged as shown in Appendix 1` of this specification.

2.1.8 High density Polyethylene smooth bore perforated Corrugated Plastic pipe which shall, when tested in accordance with Appendix H of AS:2439, Part 1-1981 "Perforated Drainage Pipe and Associated Fittings", have a pipe stiffness of not less than 500 at 5% deflection, and 400 at 10% deflection.

$$\text{Pipe stiffness} = \frac{F(\text{kN})}{y(\text{m}) \times \text{Measured specimen length (m)}}$$

This pipe shall also comply with clause 10.5 elongation requirement of AS2439, Part 1 - 1981.

Pipe that complies with the above requirements shall be permanently identifiable by either of the following methods

- at least one clearly visible continuous longitudinal red line on the outside of the pipe.
- or, in legible lettering on both sides at approximately 1 metre intervals as detailed below.

Brand Name

TNZ F/2 Class 500

2.2 Joints

The manufacturers' recommended jointing system shall be used.

When rubber rings are used in flexible joints they shall comply with BS 2494:1986 "Materials for Elastomeric Joint Rings for Pipework and Pipelines", and shall be of a type approved for use with the particular joint.

2.3 Filter Material

Unless otherwise specified the filter material shall be as follows:

Filter material shall be clean, durable stone having a crushing resistance of not less than 100 kN when tested in accordance with NZS 3111:1986 Section 14 or a mixture of such material with clean hard sand.

The filter material when tested in accordance with NZS 4402 Part 2:1986, shall comply with the following gradings:

TEST SIEVE APERTURE PERCENTAGE PASSING

26.5 mm	100
13.2 mm	85 - 100
9.5 mm	80 - 95
4.75 mm	65 - 85
2.36 mm	50 - 70
1.18 mm	35 - 55
600 μm	18 - 40
300 μm	3 - 25
150 μm	8 max
75 μm	0

3. EXCAVATION

Trenches shall be cut in such a manner as will ensure that the pipes will be laid true to the depths, grades and lines shown on the drawings. The width of the trench shall not exceed the specified dimensions.

Unless otherwise specified trenches shall have:

- (i) a gradient of not less than 1 in 100;
- (ii) vertical sides from the trench bottom to a minimum of 300 mm above the top of the pipe; and
- (iii) a minimum depth that will ensure that, when the pipes are laid, the invert level shall be not less than 1 metre below finished subgrade level.
- (iv) a minimum depth of cover over buried flexible pipes of: 750mm for unsealed roads/embankment conditions/construction equipment; 600mm for sealed roads and 450mm for areas not in roadways. These requirements are as per AS / NZS 2566:1998 "Flexible Buried Pipelines – Structural Design.

Excavation material shall be stacked at least the excavation depth away from the edge of the excavation and the size of the spoil bank shall be limited to avoid any danger to stability of the trench or adjacent buried services.

Surplus excavated material shall be disposed of as directed by the Engineer.

4. BEDDING

Unless specified otherwise the pipe shall be evenly bedded on a continuous cushion of the filter material specified in section 2.3. The thickness of the cushion under the pipe shall be not less than 75 mm.

For plastic and steel pipes the filter shall be shaped to provide support to the invert of the pipe over the lower 60 degree segment of its circumference.

For all pipes the filter shall be excavated so as to ensure that no length of pipe is supported on a socket, eg. a chase is excavated in the bedding to prevent the socket from bearing on the filter. The filter material shall be placed and compacted in layers around the pipe until 150 mm above the top of the pipe. The thickness of layers shall not exceed 75 mm for pipes of 250 mm and smaller diameter, and shall not exceed 150 mm for pipes of greater diameters. The material at the pipe haunches shall be adequately compacted prior to placing material over the pipe.

5. LAYING AND JOINING PIPES

Each pipe shall be individually set true to line and level.

All types of joints must be assembled according to the manufacture's instructions.

Solvent weld joints may be used for PVC pipes.

Couplers to connect corrugated plastic pipes shall have gripping lugs to engage the external corrugations.

Pipe jointing shall be carried out in such a manner that the finished joints present a smooth invert surface between pipes.

The spigot and the inside of the socket of pipes shall be clean before jointing.

When rubber rings are used for flexible joints in concrete and ceramic pipes they shall be free of dust, grease or dirt. The rubber rings shall be mounted evenly on the extreme end of the spigot, and the pipe lined up truly concentric with the pipes already laid. The spigot

shall then be forced into the socket leaving a gap between the socket shoulders and the spigot of between 5 and 10 mm, care being taken to maintain the pipes concentric. The rubber ring shall be equidistant from the end of the socket all round and at least 20 mm from the back of the socket chamfer when the joint is completed.

6. BACKFILLING

The trench shall be backfilled in accordance with the cross-sections shown on the drawings.

Unless otherwise specified the trench shall be backfilled as follows:

The backfill shall be filter material as detailed in section 2.3 of this specification. The backfill material shall be placed in layers not exceeding 150 mm loose depth and shall be positively compacted to provide support of not less than that of the adjacent material.

Heavy construction equipment and rollers shall not be operated over or near the subsoil drain until backfilling of the trench has been completed.

7. OUTLETS

Outlets from subsoil drains shall be constructed to discharge clear of embankments, and there shall be sufficient slope to prevent silting.

8. MAINTENANCE

The contractor shall ensure at all times that subsoil drainage installations are protected from inadvertent, or deliberate, use for temporary surface drainage.

The contractor shall maintain the subsoil drains and outlets until the end of the maintenance period. He shall make good any subsidence of the subsoil drain by ascertaining the cause and taking appropriate action to repair the damage and to prevent further subsidence.

9. BASIS OF PAYMENT

All miscellaneous items, board, supervision, contingencies, conveyance of plant, and incidental work, plus general overhead, and administration are incorporated in the unit rates listed in the schedule.

Payment will be made on the total number of metres of subsoil drains installed in accordance with the plans and specification, at the various depths as detailed in the schedule. The unit rate in each case shall be in full compensation for the supply of all materials, labour and plant, necessary to construct the drains as specified.

APPENDIX 1

**PERFORATIONS IN SUBSOIL DRAIN PIPES
(Except for Corrugated High Density Polythene)**

76 mm centres

