

## **SECTION FOUR**

### **DRAINAGE**

#### **4.01 GENERAL**

This Section specifies the construction of all underground pipe drains, conduits and appurtenant works including also subsoil house and open earth drains in accordance with the accompanying plans.

#### **4.02 MATERIALS**

Materials must confirm to the following Australian Standard:

AS 4058-1992 Precast Concrete Pipes (Pressure and Non-Pressure)

Concrete for all works within this Section are to comply with Section Five "Concrete" of this Specification.

All pipes must be spigot and faucet rubber ring jointed pipes.

Butt and interlocking jointed pipes must not be used unless specifically approved by the Superintendent.

All pipes within the boundaries of the road reserve are to be Class '2' quality.

Pipes manufactured from other materials may be used with the specific approval of the Superintendent with the exception that drains under kerb and channel and/or road pavements must be reinforced concrete pipes as specified above.

#### **4.03 DAMAGE TO PIPES**

Any pipe which becomes chipped at the ends or damaged in any way will be liable to be condemned. Condemned pipes must immediately be removed from the site of the works at the Contractor's expense.

#### **4.04 CLEARING AND GRUBBING**

Drainage works areas are to be cleared and grubbed in accordance with Section Two "Clearing and Grubbing".

#### **4.05 EXCAVATION**

The excavation for all drains, drainage pits and other appurtenant structures are to be taken out to the exact lines, levels, gradings, cross-sections and details shown on the plans or as directed by the Superintendent.

Unless otherwise approved by the Superintendent trenches will only be opened sufficiently in advance of laying pipes to enable work to proceed without delay.

Each trench is to be of sufficient width to provide a clearance on each side of the pipe equal to one-sixth internal diameter of pipe but not less than 100mm.

The clearance in the case of spigot and faucet joints and also bandage and collar joints is to be increased at the pipe joints to at least 200mm on each side. In all cases for whatever type of joint or connection required, sufficient clearance must be left to properly join or connect the pipes. Trenches are to be deepened under faucets and at external flush joints and for anchor blocks where required.

Should the trench bottom be of unstable material the Contractor must excavate and replace such material with approved sand or fine crushed rock.

Where pipe drains are adjacent to other constructions the Contractor is to take special care to prevent trenches being taken out wider than necessary to enable the drain to be laid.

#### **4.06 TIMBERING TRENCHES**

The Contractor will be responsible for properly timbering and shoring of pipe trenches and will be fully responsible for any damage caused through the sides of the trenches collapsing during construction work.

#### **4.07 LAYING OF PIPES**

The Contractor is to lay and joint accurately all pipe lines shown on the plan, true to line level and gradient and must be particularly careful to lay all pipes with the top as indicated by the manufacturer in its correct position. All pipes must be laid on a 75mm bed of approved clean bedding sand or other approved bedding material.

##### **i. Spigot and Faucet Rubber Ring Jointed Pipes**

Laying is to commence at the downstream end with the pipes being laid with faucets pointing upstream. The rubber ring must be clean and dry and not twisted when placed on the spigot step.

Each spigot is to enter the full depth of the faucet of the adjacent pipe and is to be concentric therein.

##### **ii. Butt and Interlocking Jointed Pipes**

##### **(Used only with specific approval of the Superintendent)**

Care must be taken to see that all the inverts of each pipe and culvert fit accurately with one another. The joints in all pipes must be neatly rendered internally, or externally (depending on size) with a 1:3 cement sand mortar finished flush with the wall of the pipe.

Butt joints must have cement mortar bandage joints reinforced with wire netting. No protrusion or depression of the mortar joint inside the pipe or culvert will be tolerated.

#### **4.08 INSPECTION**

All pipe lines and joints must be inspected and approved by the Superintendent before any backfilling is placed in position.

#### **4.09 BACKFILLING**

After the pipes have been laid jointed and inspected as specified, the trenches are to be backfilled with fine crushed rock or approved bedding sand to a height of not less than 150mm above the pipe or culvert crown. The material used to complete the backfilling must be the best available from that excavated from the trench, excluding all rock.

All backfilling is to be carried out in layers not exceeding 150mm and compacted throughout to a dry density of not less than 95% Maximum Standard dry density; 150mm compacted depth topsoil or loam must be laid on top as a final layer.

#### **4.10 TRENCHES UNDER KERB AND CHANNEL AND/OR ROAD PAVEMENTS**

Where any stormwater drain is laid in such a position as it will be underneath any proposed or existing kerbing and/or channelling or, where the line of drain crosses any roadway, the whole of the trench is to be backfilled to sub-grade level with fine crushed rock.

Backfilling is to be carried out in layers not exceeding 150mm in depth and compacted throughout to a dry density of not less than 95% Standard Maximum dry density.

#### **4.11 TRENCHES ACROSS OR ALONG FOOTPATHS**

Where any stormwater drain is laid in such a position as it will be under any proposed or existing footpath, the whole of the trench must be backfilled in accordance with Clause 4.09 except that in the case of excavations in concrete, bituminous or gravel type footpaths, the top 75mm of the excavation must be reinstated with similar paving material to that used in the surrounding footpath.

The Contractor must maintain such backfilling in trenches to the specific levels in a safe trafficable condition for the full term of the Contract.

#### **4.12 DRAINAGE DURING PROGRESS OF THE WORKS**

The Contractor is to make proper provision and take all necessary precautions for the diversion of flood and drainage waters and the discharging of same during the progress of the works.

#### **4.13 HOUSE DRAINS**

The Contractor must connect all stormwater drains into the underground drainage or kerb and channel where there is no underground drainage, in accordance with Standard Drawing No LSC209.

Pipes must be 90mm diameter UPVC stormwater drainage pipes with spigot and socket solvent welded joints, laid in a straight line and on an even slope from the property line to the kerb and channel or underground drain on a 50mm compacted depth sand bedding.

All joints are to be welded with solvent cement.

Where house drains are connected into an underground drain its location is to be marked by a 75mm high “D” cut into the surface of the concrete kerb adjacent to each inlet.

All existing house drains must be regraded to conform to the new levels, any modifications to such drains being deemed to include all necessary adjustments to existing pits and drains inside the properties to effectively deliver the drainage to the street drainage system.

#### **4.14 SUBSOIL DRAINS**

Subsoil drains are to be laid where shown on the plans, or where directed by the Superintendent. They are to consist of 75mm diameter slotted PVC pipes, laid to a depth of not less than 700mm below kerb level as shown on the drawings and below the surface of the clay subsoil. The subsoil drain must be below the level of any service conduit.

Subsoil drains shall be firmly bedded, true to line and grade, on the solid bottom of a trench shaped to receive the pipes trimmed to the dimensions shown.

The pipes are to be covered as shown on the standard plan with clean 20mm screenings, and covered with a strip of approved building paper or polythene sheet for the full length and width of the trench.

A 150mm compacted depth topsoil is then to be used to backfill the trench to the required level.

Trenches and pipes must be inspected by the Superintendent before the screenings are placed. All subsoil drains must be connected to stormwater drain pits.

Under no circumstances are any extraneous pipes to be connected to subsoil drains.