

1 – GEOTECHNICAL INVESTIGATION

- Sewer trenches are usually deep, and so they often intersect groundwater that will need to be controlled before and/or during excavation and pipe laying.
- Sewer pipes are usually embedded in screenings, and screenings cannot be placed directly on or against sand or soft clay in the walls or floor of the trench – screenings need to be separated from these materials by a layer of geotextile.
- In order to plan for (or avoid) either or both of these complications, it necessary to carry out a geotechnical investigation to determine the ground conditions along the proposed route of the sewer.
- Arrange for a geotechnical investigation to be done ideally before sewer detail design, but certainly before the commencement of construction.
- Plan the geotechnical investigation to determine the depth to groundwater and the nature of the soils to at least 1 m below proposed trench floor level.
- Test pits are usually simpler and give better information than trial holes. In some areas a visual inspection by an experienced person might suffice.

2 – GROUNDWATER CONTROL

- Control all groundwater inflow and remove all free water from the trench floor before placing any bedding material.
- Where a trench is making water slowly, a geotextile-wrapped gravel drain on the trench floor may be sufficient. If so, over-excavate the trench floor by 100 mm, place geotextile on the floor and up the sides, fill to a depth of 100 mm with screenings, wrap the geotextile over the screenings, and drain to a pump sump in the trench. Drainage to the sump may be assisted by including an agricultural drainage pipe in the screenings (Figure 2 (a)).
- Where the stability of a trench is likely to be compromised by groundwater inflow, or where the inflow is expected (or found) to be too great for a gravel drain, wellpoint dewatering may be required. Design the wellpoint dewatering system to lower the groundwater to below the floor of the trench.
- Operate dewatering system(s) until such time as there is no danger of flotation of the newly laid pipes AND the trench has been backfilled to not less than 150 mm above normal groundwater level.

3 – TRENCH FLOOR PREPARATION

- The design trench floor level limits are 80 mm minimum to 150 mm maximum below the bottom of the pipe.
- Make good any over-excavation by increasing the thickness of the bedding screenings, not by backfilling with other materials.
- If the trench floor is wholly in rock (a) it may be left irregular and (b) the bedding may be placed directly on it.
- If the trench floor is in firm, stiff or hard clay soil, trim it smooth, remove all loose material, and place the bedding screenings directly on it.
- If the trench floor is in soft clay soil or sand, place a layer of geotextile across the floor and up the walls to top of embedment level (Figure 2 (b)).
- If the trench floor wholly or partially consists of very soft clay, old fill, refuse, OR has irregular outcrops of rock in it, OR has been disturbed by groundwater inflow, then seek specialist geotechnical advice to ensure zero post-installation total and/or differential settlement.
- If a sewer is to be laid in or below new fill, seek specialist geotechnical advice for the design of the fill. Design the fill to ensure zero post-installation settlement of the sewer. Lay the sewer in a trench dug into the fill after the fill has been brought up to not less than 500 mm above the top of the sewer.

4 – BEDDING PLACEMENT

- Simply place the bedding screenings on the prepared trench floor (see 3) and rake to grade – additional compaction is not necessary.

5 – PIPE INSTALLATION

- Excavate pockets in the bedding to clear the pipe sockets.
- Home the pipe and ensure that the pipe is supported uniformly along its barrel by attempting to pass a hand under the pipe.
- If voids are present, remove the pipe and regrade the bedding. Alternatively hand-pack additional screenings under the pipe.

6 – SIDE SUPPORT AND OVERLAY PLACEMENT AND COMPACTION

- Remove or raise shoring before placing any side support or overlay screenings.
- Place and compact the side-support and overlay screenings using a method that ensures the reduction of the internal vertical diameter of the pipe is not more than 3% at the end of installation (ie after the trench has been backfilled to the surface). *Note that carefully bringing up the screenings uniformly on either side of the pipe in one smooth operation will normally achieve this without the need for additional mechanical compaction.*
- The minimum finished thickness of the overlay is 300 mm.
- Where sand is to be used as trench fill above the overlay, place a layer of geotextile over the screenings and 150 mm min up the trench walls (Fig 2 (c)).

7 – MATERIALS

- Screenings: Screenings to Transport SA standard specification SA10-7, or alternatively 10 mm OR 14 mm nominal single-size aggregate as per Table 1 of AS 2758.1 - 1998.
- Geotextile: medium-weight, non-woven, needle-punched filter fabric.

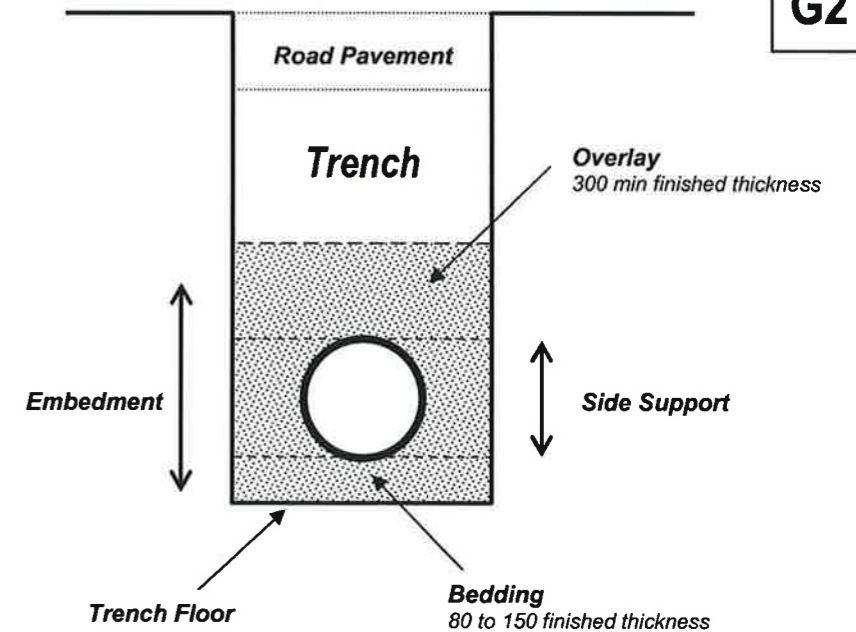


Figure 1: TERMINOLOGY

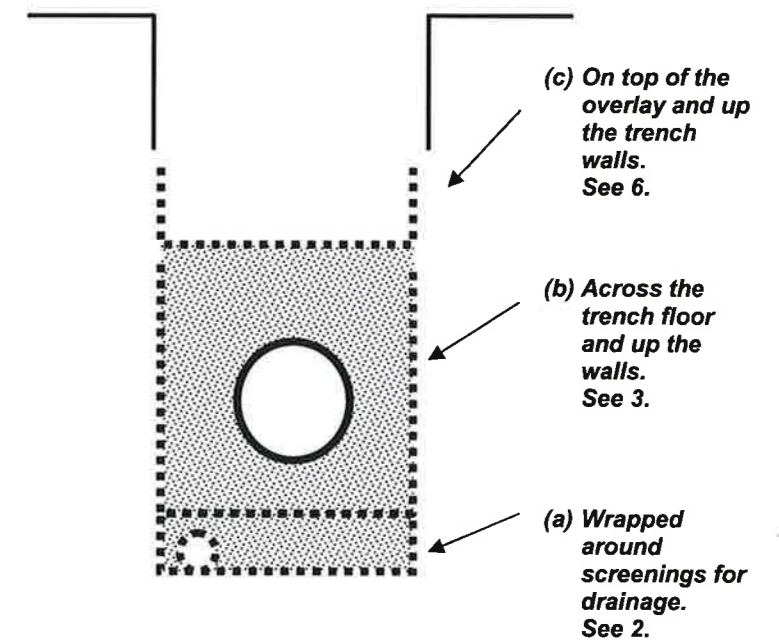


Figure 2: POSSIBLE GEOTEXTILE LOCATIONS

THIS DRAWING SUPERSEDES DRG 02-0156-01

Chg	A	Amendment – 1. Overlay now 300 mm minimum in all locations. 2. Materials note amended. 3. Title amended to include single-size aggregate.	Des	EC	Amendment Authorization <i>[Signature]</i> for Gen. Man. E&P 19/07/10 ENGINEERING & PROJECTS	SOUTH AUSTRALIAN WATER CORPORATION 	SEWER CONSTRUCTION MANUAL PAGE G2 TRENCH EXCAVATION & EMBEDMENT OF SEWERS USING 10-7 mm SCREENINGS OR ALTERNATIVELY 10 mm OR 14 mm AGGREGATE	Not to Scale EWS 4168/92 2000 02-0156-01A
Drm	WG		Drm	EC				
Ckd			Exm	EC				
Unit Ldr			Unit Ldr					
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