TNZ F/6 NOTES: 2003

NOTES TO THE SPECIFICATION FOR GEOTEXTILE WRAPPED AGGREGATE SUBSOIL DRAIN CONSTRUCTION

These notes are for the guidance of supervising officers and must not be included in the Contract Documents.

1. SCOPE

The TNZ F/7 specification referred to in the TNZ F/6 is only applicable for uni-directional flow and are not appropriate for reversing flow conditions. In reversing flow conditions the upstream filter cake is broken down with a consequent effect on filtering ability.

2. GEOTEXTILE WRAPPED AGGREGATE DRAINS

In drainage applications where the controlled extraction of water from soil is being undertaken, filters are constructed to prevent in-situ soil from being washed into drains. Such washed-in soils cause clogging of the drains and potential surface instability of land adjacent to the drains.

Filtration is the primary function of the geotextile in this application (TNZ F/6), as it is in most drainage applications.

Aggregate drains are sometimes referred to as 'French drains'. These drains usually clog up eventually. In this context the subsoil drains of TNZ F/6 become geotextile wrapped French drains, ie, anticlog French drains.

Compared with the conventional subsoil drains of TNZ F/2 the geotextile functionally replaces the filter material and the drainage aggregate replaces the perforated pipe. However, in some cases pipes may be included to increase capacity or to form outlets or the like.

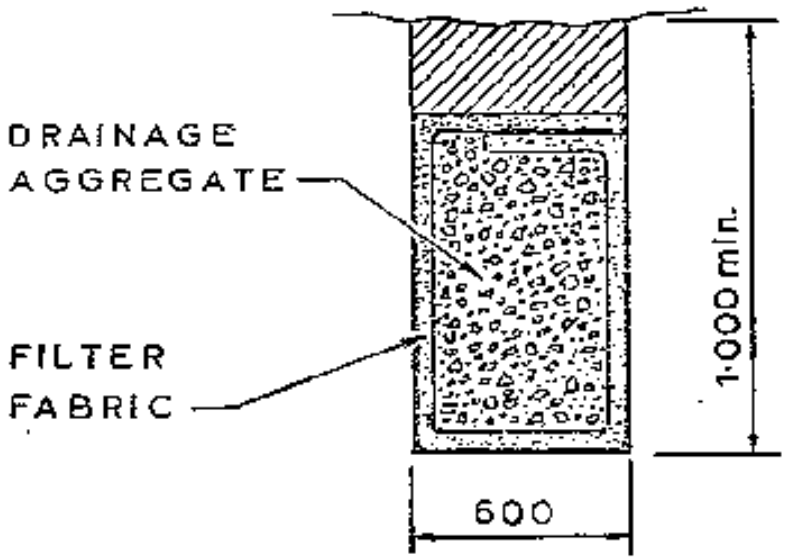
Geotextile wrapped aggregate drains (without pipes) can deform significantly without their function being greatly impaired, pipe subsoil drains cannot. Hence in applications involving possible differential settlement geotextile wrapped aggregate drains should be used in preference to pipe subsoil drains. As there are no pipes to lay and the filtration characteristics are factory quality controlled these drains are not so greatly dependent on placement techniques.

3. DRAINAGE AGGREGATE

TNZ F/6 specifies an ideal drainage aggregate. However, in many cases satisfactory alternatives or waste materials that are substantially cheaper will be available, eg, grade 4 sealing chips, chip sweepings etc. If such lower grade drainage materials are used then their probable lower water carrying capacity must be considered.

The larger the stones and the more uniform the grading of the drainage aggregate then the higher its water carrying capacity (ie, higher its permeability).

The following table gives a guide to the water carrying capacity of aggregate drains.



Cross-section 1 m x .6 m (drainage aggregate)

Gradient 1:100

Stone Size	Permeability	Capacity	
(mm)	**(m/s)**	**(m^3/s)**	**(litre/s)**
19-25	.42	.0024	2.4
10-13	.11	.0006	.06
6-10	.02	.0001	.01

Note: Capacity is directly proportional to both cross-section area and gradient. So three times the above cross-section area would give three times the above capacity, twice as steep a gradient would give twice the capacity etc (refer Darcy's Law).

4. PIPE TYPES

When perforated pipes are placed within the drainage aggregate then the following criteria must be satisfied to avoid drainage aggregate being washed into the pipes:

D_{85} drainage aggregate > perforation diameter

5. LAYING

The system will not operate as designed if the geotextile is installed carelessly so that it becomes torn or severely damaged or if adjacent sheets are not adequately overlapped. The standard splice lengths should be increased if large ground movements are anticipated.

6. BACKFILLING

For the geotextile to function as designed it must be in intimate contact with the soil. Compaction of the drainage aggregate is necessary to ensure this.