3 FILLING

3.1 GENERAL

3.1.1 Scope

1 This Part specifies materials for filling purposes.

2 Related parts and Section are as follows:

This Section

Part 2..... Excavation

Section 6 Roadworks

3.1.2 References

1 The following Standards are referred to in this Part:

BS 812.....Testing Aggregates

BS 1377 .....Methods of test for soil for civil engineering purposes

3.2 EARTHWORKS MATERIALS

3.2.1 Top Soil

1 Top soil is to be fertile, friable soil obtained from well drained arable land and to be free draining, non-toxic and capable of sustaining healthy plant growth.

3.2.2 Suitable Material

1 Suitable material for earthworks shall be approved soil with a liquid limit not exceeding 35% and a plasticity index not exceeding 10%. The material passing the 0.075 mm sieve shall not exceed 20% and the organic matter content shall not exceed 2% (as determined by BS 1377 – Part 3).

2 Where excavated rock is to be used as fill material elsewhere on the site, the Contractor is responsible for ensuring that the excavated rock meets the requirement of the Specification for fill material.

3 The Contractor is responsible for mixing the excavated rock with suitable fill material imported and/or excavated from within the site should it be necessary in order to produce a suitable fill material that complies with the requirements of the Specification and he should allow in his rates and programme for carrying out the work.

4 Sweet soil and any excavated materials which are considered re-usable by the Engineer, shall be preserved and protected by the Contractor, until they are removed by the Owner or until the expiration of the Contract.

5 No excavated suitable material is to be removed from the Site without the Engineer's written permission. Should the Contractor be permitted to remove suitable material from the site to suit his operational requirements, then he is to make good any consequent deficit or filling arising therefrom at his own expense.

6 Recycled materials (native or processed) shall be considered as suitable materials given that they meet the specs mentioned in 3.2.2.

3.2.3 Unsuitable Material

1 Unsuitable materials include:

(a) rock particle exceeding 75mm in size

(b) organic material (as defined in BS 1377 Part 3) containing greater than 2% stumps and other perishable material

(c) material susceptible to spontaneous combustion

(d) soils of a liquid limit exceeding 35% and/or a plasticity index exceeding 10%.

(e) material containing more than 5% of water soluble salts by weight of dry soil (individually, water soluble chloride exceeding 1% or water soluble sulphate exceeding 1.5%) or more than 10% of acid-soluble salts (individually, acid soluble chloride exceeding 2% or acid soluble sulphate exceeding 3.0%) as determined by BS 1377: part 3

(f) any other material which the Engineer may deem to be unsuitable for earthworks

3.2.4 Utilisation of Excavation Materials

1 All excavated material determined as suitable by the Engineer, is to be utilised as backfill. The surplus material shall be disposed of as specified in Part 2 of this Section.

3.3 MAIN PLANT FOR EARTHWORKS CONSTRUCTION

3.3.1 General

1 The Contractor is to employ only plant which is suited to the soils to be handled. He should not at any time use plant which damages or reduces the natural strength of the soil either in its in-situ state or during handling and placing or in its final compacted state. Unsuitable or faulty plant shall be removed from the work site and borrow pits at the order of the Engineer.

3.4 BACKFILLING

3.4.1 General

1 Excavation is only be backfilled after the permanent works therein have been approved and after the removal of any building debris or deleterious material from the excavations.

2 Selected excavated material will normally be used or backfilling in the manner described in Clause 3.5 of this Part. Where the excavated material is not considered suitable, selected material form an approved source is to be used.

3 The backfill will be brought to a suitable level above grade to provide for anticipated settlement and unless indicated otherwise, is to be sloped away from the structure.

4 The bottom of all excavations are to be probed and any poor bearing area shall be reported to the Engineer who will direct remedial work. Soft spots and other unsound materials are to dealt with as specified in Part 2 of this Section.

5 In circumstances where backfill has to be deposited below standing water, only rock, as specified in Section 6, Roadworks, is to be used.

3.5 COMPACTING IMPORTED OR SELECTED EXCAVATED FILL MATERIAL

3.5.1 General

1 Fill to be compacted by a suitable plate type vibrator, pedestrian operated vibrator roller, small tandem roller or other approved compaction plant.

2 The material is to be placed in layers within the effective range of compaction of the plant provided that the maximum loose (uncompacted) thickness of each layer dose not exceed 200 mm.

3 The material is to be watered and mixed as necessary to ensure that prior to compaction the moisture content of the whole layer is ± 3% of the optimum moisture content. Compaction of each layer is to continue until a density of a least 95% of the maximum dry density has been achieved.

4 The dry density/moisture content relationship will be determined by the heavy compaction test (4.5% rammer method) of BS 1377.

5 All fill material used in earthworks shall be compacted as per related Specification by plant approved by the Engineer for that purpose. If required by the Engineer the Contractor shall carry out compaction trials on the material supplemented by laboratory testing to determine the correct plant and number of passes required to achieve the specified requirements.

6 Potable water shall be used for compaction of all fill material within the area of excavation.

7 The Contractor shall carry out moisture content determinations at frequent intervals or when there is a change in the material on the soils undergoing compaction so as to ensure that the moisture content of the soil is within the optimum range for the field compaction determined from compaction trials.

8 All adjustment of moisture content shall be carried out in such a way that the specified moisture content remains uniform through out compaction.

9 No completed fill layer shall be covered by the next layer until it has been tested, inspected and approved by the Engineer.

10 The finished surface of earthworks for paved surfaces (other than public roads) shall be shaped and rolled and then tested for accuracy so that maximum local irregularities in the finished profiles lie within the tolerance of ± 20mm for formation, as well as ± 10mm and ± 5mm respectively for longitudinal and transverse profiles of finished surfaces, when tested by a straight edge or level instrument. The frequency of local irregularities shall be at the discretion of the Engineer.

11 Where fill material is to be deposited in areas where the existing ground is sloping, the Contractor shall excavate benches so that fill material is deposited onto a horizontal surface. The levels of the benching terraces shall match the layers of the fill material that are deposited in the adjacent areas.

3.5.2 Water

1 The water to be mixed with the soil / fill materials to achieve the desired moisture content in the filling / earthworks operations shall be potable.

3.6 FILL BELOW GROUND SLABS

3.6.1 General

1 The installation of cable ducts for service entries and service pipework is to be completed before placing of the fill to receive the ground slab.

2 The compacted fill or hardcore is to be shaped and trimmed to the required levels and dimensions and blinded with sand.

3.7 FILLING

3.7.1 Concrete Blinding

1 Immediately on completion of excavations for concrete structures a blinding layer of concrete Grade OPC 25 not less than 75mm thick shall be placed to prevent deterioration of the formation and to provide a clean working surface for the structure.

END OF PART