4 SOIL SAMPLING

4.1 GENERAL

4.1.1 Scope

1 Taking of samples of soil, groundwater, gas and contaminants. Sample handling, transportation, storage, retention and disposal.

2 Related Sections and Parts are as follows:

This Section

Part 1, ...General
Part 2, ...Boreholes
Part 3, ...Pits and Trenches.

4.1.2 References

1 The following documents are referred to in this Part:

ASTM D420 ..... Site Characterization for Engineering, Design, and Construction Purposes

ASTM D2488 ..... Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)

BS 5930 ..... Code of practice for ground investigations

EN 1997-2..... Eurocode 7 - Geotechnical design - Part 2: Ground investigation and testing

BSI –DD 175..... Code of practice for the identification of potentially contaminated land and its investigation. (BS 10175 Investigation of potentially contaminated sites. Code of practice - Code of practice)

ICE et al, Soil Investigation Steering Group (SISG) Publication, *Soil investigation in construction, Part 4, Guidelines for the safe investigation by drilling of landfills and contaminated land,* Thomas Telford, (1993).

4.2 SAMPLING GENERALLY

4.2.1 Sampling and Testing Frequency

1 The frequency of sampling and in-situ testing is dependent on the ground conditions. In the absence of designated requirements the intervals observed shall be as follows:

(a) in boreholes

(i) first open tube sample (generally in clay soils) or standard penetration test (SPT) (generally in granular soils) at 0.5 m depth, the next at 1.0 m depth, thereafter at 1 m intervals to 5 m depth then at 1.5 m intervals.

(ii) small disturbed samples shall be taken from the topsoil, at each change in soil

(iii) type or consistency and midway between successive open tube samples or SPT's.

(iv) Bulk disturbed samples shall be taken of each soil type.

(b) in pits and trenches

(i) Small disturbed samples shall be taken of the topsoil, at each change in soil type or consistency and between successive bulk disturbed samples.

(ii) Bulk disturbed samples shall be taken at 1 m depth intervals, with at least one large bulk disturbed sample of each soil type.

4.2.2 Recording depths of samples

1 The depths below ground level at which samples are taken shall be recorded. For open tube and piston samples the depth to the top and bottom of the sample, and the length of sample obtained shall be given. For bulk samples the limits of the sampled zone shall be recorded.

4.2.3 Description of samples

1 All samples shall be examined and described by a geotechnical person meeting the requirements of Part 1, Clause 1.3.1, Paragraph 5 Item (c) in accordance with BS 5930. Samples of suspected contaminated ground and leachate shall be described by an environmental or geotechnical person meeting the requirements of Part 1, Clause 1.5, Paragraph 5 Item (c) in accordance with DD 175. Descriptions shall include colour and smell with reference to specific inclusions.

4.2.4 Labelling, Protection and Transportation of Samples

1 Samples shall be clearly labelled in accordance with BS 5930. Samples of fill, groundwater, leachate or contaminated ground suspected to be toxic or hazardous shall be tagged with a red label.

2 Samples shall be protected from direct heat and sunlight.

3 Samples shall be transported to the Contractor's premises. Where required by the Engineer, selected samples shall be delivered to the designated address.

4.2.5 Retention and Disposal of Samples

1 Samples shall be kept for the designated period after submission of the approved final report. This period shall not exceed three months, unless specifically designated otherwise. The Contractor shall ultimately dispose of all samples other than those delivered to the designated address.

4.3 SOIL SAMPLES

4.3.1 Small Disturbed Samples

1 Small disturbed samples shall weigh not less than 0.5 kg. They shall be placed immediately in airtight containers, which they should sensibly fill.

4.3.2 Bulk Disturbed Samples

1 Bulk disturbed samples shall be representative of the zone from which they have been taken.

2 Normal bulk disturbed samples shall weigh not less than 10 kg.

3 Large bulk disturbed samples shall weigh not less than 30 kg.

4.3.3 Open Tube and Piston Samples

1 Open tube and piston samples shall be taken using the sampling equipment and procedures as described in BS 5930. The diameter shall be 100 mm unless otherwise designated.

2 Before an open tube or piston sample is taken, the bottom of the hole shall be carefully cleared of disturb materials and where a casing is being used the sample shall be taken below the bottom of the casing. Following a break in the work exceeding one hour, the borehole shall be advanced by 250 mm before open tube or piston sampling is resumed.

3 Where an attempt to take an open tube or piston sample is unsuccessful the hole shall be cleaned out for the full depth to which the sampling tube has penetrated and the recovered soil saved as a bulk disturbed sample. A fresh attempt shall then be made from the level of the base of the unsuccessful attempt. Should this second attempt also prove unsuccessful the Contractor shall agree with the Engineer as to alternative means of sampling.

4 The samples shall be sealed immediately to preserve their natural moisture content and in such a manner as to prevent the sealant from entering any voids in the sample.

5 Soil from the cutting shoe of an open tube shall be retained as an additional small disturbed sample.

4.3.4 Standard Penetration Test Samples

1 When a standard penetration test (SPT) is made, the sample from the split barrel sampler shall be retained as a small disturbed sample.

4.4 GROUNDWATER SAMPLES

1 Groundwater samples shall be taken from each exploratory hole where groundwater is encountered. Where more than one groundwater level is found, each one shall be sampled separately. Where water has been previously added, the hole shall be bailed out before sampling so that only groundwater is present. The sample volume shall be not less than 0.25 l.

4.5 SAMPLES OF SUSPECTED CONTAMINATED GROUND, GROUNDWATER AND LEACHATE FOR CHEMICAL ANALYSIS

1 Samples of suspected contaminated ground, groundwater and leachate shall be taken in accordance with DD 175 and the SISG publication under the supervision of an environmental or geotechnical person meeting the requirements of Part 1, Clause 1.5, Paragraph 5 Item (c).

2 The size and type of sample and container, method of sampling and time limitations for carrying out specific analyses shall be commensurate with the range of analyses to be carried out or as designated.

4.6 GAS SAMPLING

1 Samples of gas for chromatographic analysis shall be obtained from exploratory holes or standpipes in accordance with DD 175 and the SISG publication. The sampling method shall relate to the volume of gas available and the type of laboratory analysis. The sampler receptacle shall be airtight and may include lockable syringes, Teflon-lined bags or gas bombs.

4.7 SPECIAL SAMPLING

1 The Engineer may require special sampling. This work will normally require supervision on site by a geotechnical person and shall be carried out in accordance with BS 5930 or as designated.

END OF PART