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2 EXCAVATION

2.1 GENERAL

2.1.1 Scope

- 1 This Section specifies the requirements for the excavation for structures, culverts, headwalls, catch basins, manholes, inlets, retaining walls and the like. The work includes all necessary clearing and grubbing and the disposal of all material resulting from such excavation. The work also includes the provision, and subsequent removal, of all necessary bailing, drainage, pumping, sheeting, strutting, coffer dam construction and crib construction.
- 2 Rates for excavation shall include for excavation in any material. Excavation in any material shall include common excavation, side shoring, support systems, excavation in artificial hard material and shall be inclusive of all encountered impediments, including roots, boulders etc. Blasting will not be permitted without the written approval of the Engineer.
- 3 Related Sections and Parts are as follows:

Section 1	General
Section 6	Roadworks

2.1.2 References

- 1 The following standards are referred to in this Part;
BS 1377Method of test for soils for civil engineering purposes

2.2 EXCAVATION FOR STRUCTURES

2.2.1 Excavation Support

- 1 Prior to Commencing any structural excavation work which is 1.5 m or greater in depth, the Contractor shall design an excavation support system.
- 2 Details of the excavation support system shall be submitted to the Engineer for review and approval at least one week before any excavation work commences. Details of the excavation support system shall be complete with, but not limited to, the following:
 - (a) drawings of the structural support members showing materials, sizes and spacing,
 - (b) calculations showing the maximum theoretical deflection of the support member.
- 3 The system is to be designed so that no members extend through surfaces exposed in the finished construction, and no shoring or bracing is placed under permanent structures.
- 4 The Contractor shall submit to the engineer calculations of lateral earth pressure for the full excavation depths, surcharge loads of any description, equipment loads, forces at various stages of support during excavation, the maximum design loads to be carried by various members of the support system and strut pre-load forces.
- 5 If the structure support system proposed includes tieback anchors, the Contractor's submitted details shall include drawings that show the profile of the soil in which each anchor is to be installed. If the tieback anchors penetrate other adjacent properties then the appropriate approvals from the owner of the adjacent properties should be obtained. If tieback anchors penetrate the Right of Way for a roadway or any adjacent government property then removable anchors can be used after obtaining the appropriate approvals from the government entity that owns the adjacent property.

- 6 Tieback anchors that project beyond the vertical limits of the Site boundary on to adjoining property shall only be permitted if permission to do so is given by the owner of the property in writing. Copies of such written permission shall be submitted to the along with excavation support system proposals.

2.2.2 Removal of Water

- 1 At locations where the excavation extends below the groundwater table, a dewatering system is to be provided which will lower ambient groundwater levels. The resulting groundwater level shall be at a depth which is sufficiently below the excavation level so as to allow the safe and proper execution of the work. The resulting foundation level shall be a stable, dry sub-grade which is suitable for the execution of subsequent operations.
- 2 The Contractor is to design the dewatering methods and settling basins so that no critical amounts of soil, sand or silt are removed during either the dewatering operations.
- 3 Complete working drawings showing the type of dewatering and groundwater control system proposed shall be submitted to the Engineer for his review. The Contractor's submittal shall include drawings that show the arrangement, location and depths of the proposed dewatering system. A complete description of the equipment and materials to be used and the procedures to be followed to be given, together with details of required standby equipment and standby power supply. The Contractor shall also indicate his proposed location(s) for the discharge of extracted groundwater.
- 4 The dewatering system design should also include the details of measures required to prevent damage due to settlement of roads, pavements, utilities, sewers, buildings and other structures outside the excavation but within the area affected by the dewatering.

2.2.3 Approvals

- 1 The designs of the structure excavation support system and the dewatering systems specified above is to be prepared by and signed by a qualified engineer experienced in this type of design work. Approval of the designs and shop drawings will not relieve the Contractor of the adequacy and performance of these temporary works.

2.2.4 Inspection

- 1 In addition to the provisions of Part 13 of Section 1, the Contractor shall also undertake the following described in the following Clauses unless otherwise instructed by the Engineer.
- 2 Following a detailed inspection of all adjacent structures, the Contractor shall prepare a report on the pre-construction condition of all structures that may be affected during construction of the Works. The report will include photographs, drawings and sketches with levels and dimensions fully illustrating the structure's condition. In particular, it shall note any existing damage or structural inadequacy. Deficiencies and damage are to be suitably marked on the structure in a way that it is not permanently defaced.
- 3 Three (3) copies of the Report shall be submitted for the approval of the Engineer. Once approved, five (5) additional copies shall be supplied to the Engineer.
- 4 The Contractor shall carry out a survey of levels of undisturbed ground before commencing any excavations.
- 5 When the excavation has been carried down to formation level the Contractor shall advise the Engineer's Representative that the excavation is ready for inspection and the Engineer's Representative shall, without reasonable delay, inspect the excavation unless he considers it unnecessary.

2.2.5 Unsound Materials

- 1 Any loose, improperly compacted, soft or other unsuitable material which is encountered below or adjacent to structural foundation levels shall be completely removed, backfilled with a suitable material and compacted to 95% of the maximum dry density as determined by BS 1377 Part 4. Backfilling shall be done in layers with an unconsolidated thickness not exceeding 200 mm up to the foundation level. The limits of such work shall be as directed by the Engineer. Alternatively, the Engineer may instruct that removed material be replaced with Class C25 concrete.

2.2.6 Over-Excavation

- 1 Any over excavation is to be backfilled with Class C25 concrete at the Contractors expense.

2.2.7 Finishing to Excavation

- 1 All rock or other hard foundation material is to be cleaned of all loose material. All seams or crevices are to be cleaned and grouted. All loose and disintegrated rock and thin strata is to be removed.
- 2 When the structure is to rest on material other than rock, excavation to final grade should not be made until just before the structure is to be placed/constructed and special care is to be taken not to disturb the excavated surface. The surface required shall be rolled and compacted to 95% of the maximum dry density.

2.2.8 Storage of Excavated Material

- 1 Excavated material is not to be stored or deposited in such a way as to endanger structures or cause an obstruction of any kind.

2.3 MATERIALS

2.3.1 Excavated Material

- 1 All excavated material will be the property of the Owner and no material shall be removed, transported and disposed of without the prior written approval of the Engineer.

2.3.2 Common Excavation

- 1 Common excavation consists of the excavation and satisfactory disposal of all soils, certain strata and rock boulders less than one (1) cubic metre in volume. Strata which are altered and weathered and are in place, but which are not firm enough, or in the opinion of the Engineer are not rigid enough to have all the characteristics of rock excavation is to be classified as common excavation.

2.3.3 Rock Excavation

- 1 Rock excavation consists of the excavation and satisfactory disposal of all unaltered and unweathered firm and rigid igneous, metamorphic and sedimentary solid rock that in the opinion of the Engineer can only be excavated by the use of pneumatic hammers or other such similar apparatus.

2.3.4 Blasting

- 1 Blasting will not be permitted without prior approval. (Refer to Section 6: Roadworks).

2.4 DISPOSAL OF SURPLUS MATERIAL

2.4.1 General

- 1 All materials arising from site clearance or excavation which are surplus, suitable or unsuitable for use in the Works will become the property of the Owner and will not be disposed of by the Contractor either off the Site to an approved tip without written approval from the Engineer. If directed, or otherwise agreed by the Engineer, the Contractor may dispose of surplus material on the Site in an approved manner as directed by the Engineer.

END OF PART

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