

# AXIS CONSULTANTS

## STANDARD CIVIL ENGINEERING SPECIFICATION

ISSUED : 15-09-2012

EARTHWORK GRADING & BANKING

REV. - 0

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### 1.0 SCOPE

This specification and the method of measurements described thereon are applicable for earth work involved in filling site over the entire area/most of the area to raise the general grade level to the desired elevation.

### 2.0 APPLICABLE CODES

**Note:** Wherever reference is made to IS Codes, on any page of this Technical Specification (including annexure), applicable year of publication of IS Code is as stated below.

All work shall be carried out strictly in accordance with the Technical Specifications, unless otherwise approved by the Engineer-in-Charge in writing. The Indian Standard Codes applicable to this section shall include but not limited to the following.

IS 1200 (Part 1) -1992	: Methods of measurement of building and civil engineering works: Part 1 Earthwork.
IS 2720 (Part 2) -1973	: Methods of test for soils: Part 2 Determination of water content
IS 2720 (Part 4) -1985	: Methods of test for soils: Part 4 Grain size analysis
IS 2720 (Part 5) -1985	: Methods of test for soils: Part 5 Determination of liquid and plastic limit.
IS 2720 (Part 7) -1980	: Methods of test for soils: Part 7 Determination of water content - dry density relation using light compaction
IS 2720 (Part 8) - 1983	: Methods of test for soils: Part 8 Determination of water content - dry density relation using heavy compaction.
IS 2720 (Part 15) - 1986	: Methods of test for soils: Part 15 Determination of consolidation properties.
IS 2720 (Part 28) -1974	: Methods of test for soils: Part 28 Determination of dry density of soil in place, by the sand replacement method.
IS 3764-1992	: Excavation work.- Code of Safety
IS 4701-1982	: Code of practice for earthwork on canals.

### 3.0 PRIORITY OF REQUIREMENTS

In case of any variation and discrepancy in condition between the special conditions, this specification and codes, order of priority shall be as under :-

- (1) Special conditions
- (2) This specification
- (3) Codes

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### **4.0 GENERAL**

- 4.1 CONTRACTOR shall furnish all tools, plants, instruments, qualified supervisory personnel, labour, materials, temporary works, consumables and everything necessary, whether or not such items are specifically stated herein for completion of the job in accordance with requirement of Specifications.
- 4.2 CONTRACTOR shall maintain adequate drainage facilities at site at all times during execution of work. Additional ditches, drains and such other temporary means to achieve this, shall be provided and maintained by CONTRACTOR at his own cost.
- 4.3 CONTRACTOR shall make all necessary, arrangement to locate borrow pits, getting local authorities approval, including Royalty payments and Labour Licenses.
- 4.4 CONTRACTOR shall make all necessary arrangements for bringing material. The source, borrow pits shall be subject to prior approval of Engineer-in-Charge. The approved borrow pits area shall be cleared of all bushes, roots of trees, plants, rubbish, etc. Topsoil containing salts, sulphates and other foreign material shall be removed. The material so removed shall be burnt or disposed off as directed by Engineer-in-Charge at CONTRACTOR's own cost.

### **5.0 MATERIAL FOR FILLING**

- 5.1 Only materials considered suitable by the Engineer-in-Charge shall be used for the construction and that considered unsuitable shall be disposed off, as directed by Engineer-in-Charge at his own cost and no claim for compensation shall be entertained.
- 5.2 The CONTRACTOR shall give the samples of earth proposed to be used for filling along with following characteristics to Engineer-in-Charge, prior to collection and use, for approval.
- (i) Mechanical analysis or grain size distribution as per IS 2720 Part 4.
  - (ii) Liquid limit as per IS 2720 Part 5.
  - (iii) Plastic limit as per IS 2720 Part 5.
  - (iv) Moisture density relationship as per IS 2720 Part 7
  - (v) Consolidation properties as per IS 2720 Part 15.
- 5.3 The material (soil) used for filling shall be free from boulders, lumps, tree roots, rubbish or any organic deleterious matter.
- 5.4 Materials (soil) having plasticity index less than 20 shall only be used for filling purposes.
- 5.5 Soil having laboratory maximum dry density of less than 1600 kg/m<sup>3</sup> shall not be used.
- 5.6 Care shall be taken to see that unsuitable waste material is disposed off in such a manner that there is no likelihood of getting mixed with the material proposed to be used for filling.
- 5.7 The work shall be so planned and executed that the best available material (soil) is reserved for the top portion of embankments.

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### **6.0 CLEARING AND STRIPPING**

6.1 The area including depressions, where filling or cutting is to be carried out, shall be cleared and stripped completely of bushes, roots, vegetation, shrubs, trees up to 30 cm girth, organic and other objectionable materials. All these shall be completely uprooted and virgin soil exposed and not merely scrapped at the surface. The roots of trees of girth up to 30 cm shall be removed to a minimum depth of 1M below existing ground level and holes, hollows filled up with selected approved available earth within all leads, lifts and compacted to obtain 90% of laboratory dry density of soil and levelled as directed by Engineer-in-Charge. All soft patches shall be worked out to remove soft soil and selected approved earth must be filled back and the areas compacted to obtain 90% of maximum laboratory dry density of soil as per IS 2720 Part 7. The depth of stripping shall generally be 150 mm.

6.2 All material thus cleared shall be stacked or disposed off as directed by Engineer-in-Charge.

#### **6.3 Payment**

No separate payment shall be made for clearing, stripping and disposal of materials obtained from clearing. This shall be considered as a part of cutting work (in areas of cutting) and filling work (in areas of filling) under the rates quoted for the respective items of

- (i) Earthwork in excavation/cutting and
- (ii) Earthwork in filling (For available earth and earth obtained from approved borrow pits) shall be inclusive of clearing and stripping with all operations as mentioned above in clause 5.

No separate payment shall be made for clearing, stripping and disposal of materials obtained from clearing of borrow areas for earth as directed by Engineer-in-Charge. This shall be considered a part of filling work (in areas of filling) and the rates quoted under the respective item.

### **7.0 EARTHWORK IN FILLING**

7.1 (i) After clearing, stripping and consolidation of areas as specified in clause 5, spot levels at intervals and pattern as decided by Engineer-in-Charge shall be taken jointly by the CONTRACTOR and Engineer-in-Charge. Filling shall commence only after the levels are signed by the CONTRACTOR as a token of his acceptance. Approved fill material shall be spread in uniform layers not exceeding 30 cm in loose depth.

(ii) In case total filling required in any area with earth, both from borrow pits and available approved excavated material from within plant area, then joint levels shall be taken before commencing filling with earth from borrow area.

(iii) However earth from borrow areas required for filling shall be used only after the available earth from excavation within demarcated areas has been utilized and clearance to this effect obtained from the Engineer-in-Charge.

(iv) The CONTRACTOR shall make his own approach and access roads from the borrow pits to the demarcated filling areas. The CONTRACTOR may make use of such short cuts as may be available to him, for movement of earth from borrow areas to the filling areas. The OWNER does not guarantee any passage way or right of way for the CONTRACTOR other than available at site. No claim shall also be admissible to the CONTRACTOR, on account of his having to take longer leads or routes for the

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movement, than envisaged by him, either due to non-availability of routes, or any other grounds whatsoever.

- 7.2 All clods, lumps etc. shall be broken before compaction.
- 7.3 Successive layers of filling shall not be placed, until the layer below has been thoroughly compacted to satisfy the requirements laid down in this specification.
- 7.4 Prior to rolling, the moisture content of material shall be brought to within +/-2% of the optimum moisture content as described in IS 2720 Part 7. The moisture content shall preferably be on the wet side for potentially expansive soil.
- 7.5 After adjusting the moisture content as described in clause 6.4, the layers shall be thoroughly compacted by means approved by Engineer-in-Charge, till the specified maximum laboratory dry density is obtained.
- 7.6 General fill shall be placed in layers not exceeding 300 mm thickness and shall be thoroughly compacted to achieve a compaction of at least 90 % of laboratory maximum dry density up to a depth of 600 mm below finished grade. Final fill of 600 mm thickness shall consist of preferably natural material in, as dug condition except that stones larger than 100 mm shall be removed. It shall be placed in layers not exceeding 150 mm thickness and compacted to achieve of atleast 95% of laboratory maximum dry density. Each layer shall be tested in field for density and accepted by Engineer-in-Charge, subject to achieving the required density before laying the next layer.
- 7.7 If the layer fails to meet the required density, it shall be reworked or the material shall be replaced and method of construction altered as directed by Engineer-in-Charge to obtain the required density.
- 7.8 The filling shall be finished in conformity with the alignment, levels, cross-section and dimensions as shown in the drawing.
- 7.9 Extra material shall be removed and disposed off as directed by the Engineer-in-Charge.
- 7.10 TOLERANCES

General site grading including cutting and filling in depressions shall be carried out to within tolerances of +/- 5 cm of final lines, grades and slopes.

#### 7.11 REMOVAL OF SURPLUS EARTH

Surplus earth and soil from excavation and general site grading shall be removed from the filling area to the area demarcated by the Engineer-in-Charge for such disposal.