

# AXIS CONSULTANTS

<b><u>STANDARD CIVIL ENGINEERING SPECIFICATION</u></b>		
<b>ISSUED : 15-09-2012</b>	<b>EARTHWORK OTHER THAN GRADING &amp; BANKING</b>	<b>REV. - 0</b>

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## 1.0 SCOPE

This specification covers the general requirements of earthwork i.e. excavation, back-filling, filling in plinths, disposal and stacking them properly as shown on the drawings and directed by Engineer-in-Charge including all operations covered within the intent and purpose of this specification.

## 2.0 APPLICABLE CODES

**Note:** Wherever reference is made to IS Codes, on any page of this Technical Specification (including annexures), 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 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 28) - 1974	:	Methods of test for soils : Part 28 Determination of dry density of soil in place, by the sand replacement method.
IS 2720 (Part 29) - 1975	:	Methods of test for soils : Part 29 Determination of Dry Density of Soils, in place by the core-cutter method.
IS 3764-1992	:	Excavation work.- Code of Safety

## 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 EXCAVATION**

- 4.1 CONTRACTOR shall carry out the survey of the site before excavation and set properly, all lines and establish levels for various works such as earthwork, in connection for foundations, plinth filling, roads, drains, cable trenches, pipelines etc.
- 4.2 Excavation shall include careful removal of all materials of whatever nature, whether dry or wet, necessary for the construction work, exactly in accordance with lines, levels, grades and curves shown on the plans or as directed by Engineer-in-Charge. It shall be taken to exact widths or levels of the lowest step of foundation and the sides shall be left plumb where the nature of the soil permits it. Bottom of the foundation pit shall be levelled both in longitudinally and transverse direction. It shall be free of loose unconsolidated material. Should any of the excavation be carried down to a level below the specified level, the CONTRACTOR shall fill such extra excavation with 1:2:4 nominal mix concrete at his own expense, well rammed in position until it is brought up to the proper level. Filling with excavated material shall not be permitted for this purpose. Before laying the foundation concrete, all bottoms of trenches shall be lightly watered and thoroughly rammed.
- 4.3 Any dewatering, shoring, strutting and timbering or cutting of extra width of trenches required for the work and safety of workmen and equipment shall be done by the CONTRACTOR. The CONTRACTOR shall be responsible for the design of the shoring, which shall be strong enough to resist side thrust and prevent slips/bows and damage to adjacent works and property. It shall be removed as directed after all the items of work, for which it is required are completed. Water from the dewatered areas shall be drained off in such a way that it does not cause any damage to any property or any nuisance to others.
- 4.4 Adequate protective measures shall be taken to see that the excavation does not affect or damage adjoining structures. The CONTRACTOR shall take all measures required for ensuring stability of the excavation and safety of property and people in the vicinity. The CONTRACTOR shall erect and maintain during progress of work, temporary fences around dangerous excavations at no extra cost.
- 4.5 Excavated material required for filling shall be stacked or dumped as indicated by the Engineer-in-Charge. Excavated material not required for filling and any surplus material from the stacks or dumps retained for filling, shall be removed and spread on the site within a distance of 200m as directed by the Engineer-in-Charge or carted away from the site as directed by Engineer-in-Charge. Dumping of this surplus material shall be in an orderly manner and according to the levels/grades as indicated by Engineer-in-Charge.
- 4.6 Excavation in ordinary soil means excavation in ordinary hard soil including stiff heavy clay, hard shale, or compact murum, or any material, which can be removed by the ordinary application of spades, shovels, picks and pick axes. This shall also include removal of isolated boulders each having a volume not more than 0.05 m<sup>3</sup>.
- 4.7 Excavation in soft rock includes limestone, sandstone, laterite, hard conglomerates, etc. or other rock which can be quarried or split with crowbars or wedges. This shall also include excavation of tarred pavements, masonry work and rock boulders each having a volume of not more than 0.25m<sup>3</sup>.

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- 4.8 Excavation in hard rock includes any rock bound in ledges or masses in its original form or cement concrete for which in the opinion of the Engineer-in-Charge, requires the use of compressed air, equipment, sledge hammer and blasting or non-explosive materials viz. Acconex manufactured by A.C.C. Ltd. Specifications and instructions for use shall be as per manufacturer.
- 4.9 In case of any difficulty concerning the interpretation of type of soil as mentioned above, the Engineer-in-Charge shall decide whether the excavation in a particular material is in ordinary soil, soft rock or hard rock and his decision in this matter shall be final and binding on the CONTRACTOR and without appeal.
- 4.10 If any selected fill material is required to be borrowed, CONTRACTOR shall make arrangements and procure such material from outside borrow pits. The material of source shall be subject to prior approval of Engineer-in-Charge. CONTRACTOR shall make necessary access roads to borrow areas and maintain the same, if such access roads do not exist, at no extra cost.

## **5.0 BACKFILLING**

Backfilling shall be done to the original ground level or the elevation shown on the plan or as directed by Engineer-in-Charge. For backfilling, the materials shall be placed in layers of 15 to 20 cms, moistened and well compacted, to achieve a good compaction of the backfilled material. Backfilling shall be done after the concrete or masonry in the foundation has fully set and it shall be done in such a manner, as not to cause undue thrust on any part of the structures. The final backfill surface shall be trimmed and levelled to proper profile as directed by Engineer-in-Charge or indicated on the drawings.

## **6.0 DISPOSAL**

Lead for the disposal of excavated material shall be as specified in the respective item of work. The distance from the site to the centerline of the area of disposal, measured by the shortest straight line on the plan will be taken as the lead, and not the actual route taken by the CONTRACTOR. CONTRACTOR shall make necessary access road to the dumping yard at no extra cost, if such access roads do not exist. The disposed earth should be spread in layers as directed by the Engineer-in-Charge.

## **7.0 FILLING**

### **7.1 Filling in plinth, apron and floor subgrade**

Plinth filling shall be carried out with approved material as described earlier, in layers not exceeding 15 cm, watered and compacted with mechanical compaction machines. Engineer-in-Charge may however permit manual compaction by hand tampers in case he is satisfied that mechanical compaction is not possible. When filling reaches the finished level, the surface shall be flooded with water, unless otherwise directed, for at least 24 hours, allowed to dry and then the surface again compacted as specified above to avoid settlements at later stage. The finished level of the filling shall be trimmed to the level specified.

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### 7.2 Earth Fill / Sand Fill

- 7.2.1 Whenever the fill material (earth or soil) is purchased, CONTRACTOR shall get the approval of Engineer-in-Charge. The CONTRACTOR shall arrange to determine the following properties of the soil and shall get the approval of Engineer-in-Charge.

Clay content	:	15 % to 20 %
Laboratory dry density	:	Not less than 1600 kg/m <sup>3</sup>
Plasticity Index	:	Not more than 20.

- 7.2.2 Sand used for the fill shall be free of all debris, vegetable matter, chemicals impurities and complying with the requirements of IS : 383.
- 7.2.3 The fill shall be compacted using a vibrating compactor of not less than 1.5 tonne. The fill shall be thoroughly compacted in layers as directed but not more than 300 mm thick. Adequate water shall be used for compaction and the density after compaction shall be not less than maximum dry density obtained in test of IS : 2720 part 8.

### 7.3 Gravel Fill

- 7.3.1 The fill shall be non plastic granular material, well graded, strong, with maximum particle size of 50 mm, with not more than 15 % passing a 4.75 mm IS sieve, free of all debris, vegetable matter and chemical impurities.
- 7.3.2 Fill shall be placed and compacted in a manner, specified in clause 7.2.3.

### 7.4 Filling for Tank Pad Foundation

- 7.4.1 Filling for tank pad foundation shall be done to the lines and levels shown on the DRAWINGS, including formation, trimming of slopes, shoulders etc. This will be done with selected and approved earth from the excavated soil or soft rock or with the materials as indicated in the drawings or as directed by the Engineer-in-Charge. Where sufficient suitable material is not available, Engineer-in-Charge may direct the CONTRACTOR to purchase from different sources.
- 7.4.2 The CONTRACTOR at his own expenses without extra charges shall make provisions for, pumping or bailing out rain water and / or sub-soil water accumulated in the foundation and removing any bottom slush.
- 7.4.3 Before placing the filling material on pad, any harmful foreign materials, including boulders shall be removed. The sub grade shall be dressed and compacted. The filling material shall be placed in layers of compacted thickness of 150 mm. Moisture content of the filling material shall be adjusted by adding water to achieve optimum moisture content, to achieve a good compaction.
- 7.4.4 The CONTRACTOR shall arrange to determine the following properties of soil, and shall get the approval of Engineer-in-Charge.

The soil shall confirm to the specification as specified in clause 7.2.1.

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- 7.4.5 Soil shall be placed in layers of 150 mm to 300 mm, compacted with rollers to achieve a compaction of 90 to 95 % of laboratory maximum dry density, as directed by Engineer-in-Charge.
- 7.4.6 Soft rock material shall be well graded with maximum particle size of 50 mm, with not more than 15 % passing a sieve of 4.75 mm, free of all debris, vegetable matter, etc.
- 7.4.7 Soft rock shall be placed in layers of 150 mm thickness and compacted to achieve 70 % of laboratory maximum dry density.
- 7.4.8 CONTRACTOR shall make cut out in the tank pad as per the drawings or as directed by the Engineer-in-Charge to receive pipes, drains and nozzle outlets of the tank, at no extra cost to the OWNER / TEIL. Excavation for the pad, stone ring wall, Bituminous surface protection of pad are excluded from this scope of work.