
SECTION-II

EARTH WORK

1.0 BIS codes

The relevant BIS codes for this work shall be –

- a) IS 1200 (Pt 1) Method of measurement of earth work
- b) IS 1200 (Pt-27) Method of measurement of earth work (by Mechanical Appliances)
- c) IS 4081 Safety code for Blasting and related drilling operation
- d) IS 4988 (Part IV) Excavators
- e) IS 12138 Earth moving Equipment

2.1 CLASSIFICATION OF SOIL/ROCK FOR EARTHWORK

For the purpose of this Contract, Earthwork shall include all types of Soil/Dry Fissured Rock (DFR)/Wet Fissured Rock (WFR) /Hard Rock/Boulders etc. and no separate classification for any purpose including measurement for payment shall be done by the Employer. In addition to this, there shall be no distinction for the method of excavation adopted by the Contractor and also the location or muck dumping location for the excavated material. The responsibility for any lead and lift for the excavation and muck dumping shall lie solely with the Contractor and his rates quoted shall be inclusive of Soil/Rock/Boulder etc at any location and for dumping the same to suitable areas as may be identified by the Contractor without any consideration to any lead or lift involved therein. Identification and selection of dumping area shall also be within the scope of Contractor and his quoted rates shall be deemed to be inclusive of the same.

2.2 ANTIQUITIES AND USEFUL MATERIALS

2.2.1 Any finds of archaeological interest such as relics of antiquity, coins, fossils or other articles of value shall be delivered to the Engineer-in-Charge and shall be the property of the Government.

2.2.2 Any material obtained from the excavation which in the opinion of the Engineer-in-Charge is useful shall be stacked separately in regular stacks as directed by the Engineer-in-Charge and shall be the property of the Employer.

2.3 PROTECTIONS

2.3.1 Excavation where directed by the Engineer-in-Charge shall be securely barricaded and provided with proper caution signs, conspicuously displayed during the day and properly illuminated with red lights and/or written using fluorescent reflective paint as directed by engineer in charge during the night to avoid accident.

2.3.2 The Contractor shall take adequate protective measures to see that the excavation operations do not damage the adjoining structures or dislocate the services. Water

supply pipes, sluice valve chambers, sewerage pipes, manholes, drainage pipes and chambers, tower foundations, communication cables, power supply cables etc. met within the course of excavation shall be properly supported and adequately protected, so that these services remain functional. However, if any service is damaged during excavation the same shall be restored in reasonable time at the cost of the Contractor.

2.3.3 Excavation shall not be carried out below the foundation level of the adjacent structure until underpinning, shoring etc. is done as per the directions of the Engineer-in-Charge payment for which shall be deemed to be included in the quoted rates.

2.3.4 Any damages done by the contractor to any existing work shall be made good by him at his own cost. Existing drains pipes, culverts, over head wires, water supply lines and similar services encountered during the course of execution shall be protected against damage by the contractor. The contractor shall not store material or otherwise occupy any part of the site in manner likely to hinder the operations of such services.

3.0 SITE CLEARANCE

3.1 Before the earth work is started, the area coming under cutting and filling shall be cleared of shrubs, rank vegetation, grass, brushwood, trees and saplings etc. and rubbish removed and disposed at appropriate location at Contractor's cost. The roots of trees and saplings shall be removed to a depth of 60cm below ground level and the holes or hollows filled up with the earth, rammed and leveled.

3.2 The trees of girth above 30 cm measured at a height of one metre above ground shall be cut only after permission of the Engineer-in-Charge is obtained in writing. The roots of trees shall also be removed as specified in 2.4.1. Payment for cutting such trees and removing the roots shall be deemed to be included in the quoted rates.

3.3 Existing structures and services such as old buildings, culverts, fencing, water supply pipe lines, sewers, power cables, communication cables, drainage pipes etc. within or adjacent to the area if required to be diverted/removed, shall be diverted/dismantled as per directions of the Engineer-in-Charge and payment for such diversion/dismantling works shall be deemed to be included in the quoted rates.

3.4 In case of archaeological monuments within or adjacent to the area, the contractor shall provide necessary fencing all round such monuments as per the directions of the Engineer-in-Charge and protect the same properly during execution of works.

4.0 SETTING OUT AND MAKING PROFILES

4.1 A masonry pillar to serve as a bench mark will be erected at a suitable point in the area, which is visible from the largest area. This bench mark shall be connected with the standard bench mark as approved by the Engineer-in-Charge. Necessary profiles with strings stretched on pegs, bamboos or 'Burjis' shall be made to indicate the correct

formation levels before the work is started. The contractor shall supply labour and material for constructing bench mark, setting out and making profiles and connecting bench mark with the standard bench mark at his own cost. The pegs, bamboos or 'Burjis' and the bench mark shall be maintained by the contractor at his own cost during the excavation to check the profiles.

4.2 The ground levels shall be taken at 1 to 15 metres intervals (or as directed by the Engineer-in Charge) in uniformly sloping ground and at closer intervals where local mounds, pits or undulations are met with. The ground levels shall be recorded in field books and plotted on plans. The plans shall be drawn to a scale of 5 metres to one cm or any other suitable scale decided by the Engineer-in-Charge. North direction line and position of bench mark shall invariable be shown on the plans. These plans shall be signed by the contractor and the Engineer-in-Charge or their authorized representatives before the earth work is started. The cost of this activity shall be deemed to be included in the quoted rates.

5.0 BLASTING

5.1 No Blasting shall be allowed.

6.0 EXCAVATION IN ALL KINDS OF SOILS/ DFR / WFR /HARD ROCK / BOULDER

6.1 All excavation operations manually or by mechanical means shall include excavation and 'getting out' the excavated materials. In case of excavation for trenches, basements, water tanks etc. 'getting out' shall include throwing the excavated materials at a distance of at least one metre or half the depth of excavation, whichever is more, clear off the edge of excavation. In all other cases 'getting out' shall include depositing the excavated materials as specified. The subsequent disposal of the excavated material shall be either stated as a separate item or included with the items of excavation stating lead.

6.2 During the excavation the natural drainage of the area shall be maintained. Excavation shall be done from top to bottom. Undermining or undercutting shall not be done.

6.3 In firm soils, the sides of the trenches shall be kept vertical upto a depth of 2 metres from the bottom. For greater depths, the excavation profiles shall be widened by allowing steps of 50 cms on either side after every 2 metres from the bottom. Alternatively, the excavation can be done so as to give slope of 1:4 (1 horizontal : 4 vertical). Where the soil is soft, loose or slushy, the width of steps shall be suitably increased or sides sloped or the soil shored up as directed by the Engineer-in-Charge. It shall be the responsibility of the contractor to take complete instructions in writing from the Engineer-in-Charge regarding the stepping, sloping or shoring to be done for excavation deeper than 2 metres.

6.4 The excavation shall be done true to levels, slope, shape and pattern as instructed by the Engineer-in Charge.

6.5 In case excavation is done to a depth or width greater than that shown in the drawings or as required by the Engineer-in-Charge, the excess depth/width shall not be measured for payment purposes.

6.6 While carrying out the excavation for drain work care shall be taken to cut the side and bottom to the required shape, slope and gradient. The surface shall then be properly dressed.

6.7 In case the excavation is done wider than that shown on the drawings or as required by the Engineer-in-Charge, additional filling wherever required on the account shall be done by the contractor at his own cost.

6.8 The excavation shall be done manually or by mechanical means as directed by Engineer-in-charge considering feasibility, urgency of work, availability of labour /mechanical equipment and other factors involved. Contractor shall ensure every safety measures for the workers. Neither any deduction will be made nor any extra payment will be made on this account.

7.0 MEASUREMENTS

7.1 The length and breadth of excavation shall be measured with a steel tape correct to the nearest cm. The depth of cutting or height of filling shall be measured, correct to 10 cm, by recording levels. before the start of the work and after the completion of the work. The cubical contents shall be worked out to the nearest two places of decimal in cubic metres.

7.2 In case the ground is fairly uniform and where the site is not required to be levelled, the Engineer-in-Charge may permit the measurements of depth of cutting or height of filling with steel tape, correct to the nearest cm. In case of borrow pits, diagonal ridges, cross ridges or dead-men, the position of which shall be fixed by the Engineer-in-Charge, shall be left by the contractor to permit accurate measurements being taken with steel tape on the completion of the work Deduction of such ridges and dead men shall be made from the measurements unless the same are required to be removed later on and the earth so removed is utilized in the work. In the latter case nothing extra will be paid for their removal as subsequent operation.

7.3 Preparatory Works: Before starting the earth work, following steps should be taken :
(1) Original ground levels should be recorded in the Level Book in the presence of the contractor or his authorized representative, and should be signed by him and the Employer's representative who records the levels. All the local mounds and depressions should be indicated clearly in the drawing and the field Level Book before the

excavation work is started. (2) A suitable baseline should be fixed with permanent masonry pillars at distances not exceeding 10 metres to provide a permanent reference line for facilitating check work. The base line (s) should be entered in the Level Book with co-ordinates. These baselines should be maintained till the final payment for the work has been made. (3) While recording the levels, it should be ensured that the circuit is closed by taking final levels of the starting point or any other point, the R.L. of which was previously determined. (4) Plans showing initial levels, location of bench marks and reduced levels, should be prepared and signed by both the parties and attached to the agreement before commencement of the work.

8.0 RATES

8.1 Rates for Earthwork shall include the following: (a) Excavation at all lead and lift and depositing excavated material as specified. (b) Handing of antiquities and useful material as specified. (c) Protection as specified (d) Site clearance as specified (e) Surveying, Setting out and making profiles as specified (f) Forming (or leaving) dead – men or ‘Tell Tales’ in borrow pits and their removal after measurements. (g) Bailing out or pumping of rain water from excavations. (h) Muck dumping at all lead and lift (i) Mechanical / Chiselling operations for hard rock as specified.