**Section 8 Particular Specification.**

**1.Joint Measurement Team**:

All the measurement will be carried through Joint Measurement Team (JMT).Within 3(three) days of Signing of the Contract, the Project Director and the Contractor shall nominate their respective representative for the Joint Measurement Team for every reach/site/structure notify it to the Project Manager. The Project Manager shall constitute the Joint measurement team and notify it to the Project Director and the Contractor. It will be constitute following members. The highest ranked BWBD official included in the committee shall be the convener.

|  |  |  |
| --- | --- | --- |
| SL No | Designation |  |
| 1. | Concerned Sub-Divisional Engineer |  |
| 2. | Concerned SAE/SO. |  |
| 3. | Concerned Field Supervision Engineer. |  |
| 4. | Concerned Field Inspector. |  |
| 5. | Representative of the Contractor |  |
| 6. | Representative of the Project Director |  |

The followings shall be the job specification for this committee:

1. JMT will submit measurement of work executed by the contractor for every reach/site/structure in every 15 days to the Project Manager with copy to the Project Director and the Contractor. The Contractor shall use this measurement for preparation of his IPC.
2. In addition to preparing measurement JMT will ensure that every quality test mentioned in the specification has been done and results are acceptable. They will sign every test report done in this regard and submit it to the Project Manager with copy to the contractor and the Project Director.
3. JMT will submit monthly quality control report for every site/reach/structure. The form and content of the report is described in Annex-III. The contractor shall enclose copy of this report along with his monthly IPC.
4. After Completion of the work JMT will inspect the whole work and prepare a defect liability schedule and submit it to the Project Manager with copy to the project director.
5. All other duty and responsibilities mentioned in this specification.

**Dispute resolution in measurement:** If any measurement by JMT is not acceptable to the contractor or the Project Director then he will notify it to the Project Manager. Project Manager will appoint other person/team to re measure, which is acceptable to both the Project Director and the Contractor. After re-measurement he will decide the matter as per his power mentioned in GCC Clause 23.1.

**2. Work Programme and Site Meeting:**

Within 15 (Fifteen) days of signing the Contract, the Contractor shall submit to the Project Manager for the approval a complete and practicable construction programme (GCC Clause 42.1) showing the orderly performance of the Works. An indicative work programme is attached with this specification as Annex-I. Contractors work programme shall be based upon this. The Project Manager shall approve the work programe in consultation with the Project Director.

**3. Site /Progress Meetings:**

The site meeting will be held on every 15 days. The Convener of the JMT will preside over the meeting. The Contractor must attend meeting to review the progress of the work. Among other things the meeting report shall include the followings:

1. physical progress for the preceding 15 days and estimated progress for next 15 days;
2. completion schedules (target and actual) based on the approved Construction Programme;
3. a tabulation of construction equipment, listing the major items and pieces of equipment which were utilized for performance of the Works during the last 15 days;
4. a tabulation of employees, showing the supervisory staff and the numbers of several classes of laborers employed by the Contractor in the previous 15 days ;

The Report format for this site meeting is included as Annex-II with this specification.

Progress Meeting: Progress Meeting will be held on every month presided by the Project Manager. The Contractor must attend meeting to review the progress of the work.

**4. Type A Protection Work:**

**4.1. Construction Procedure of Embankment:**

1. Embankments designated on the Drawings to be mechanically compacted shall be demarcated to the lines and grades shown on the Drawings. Initially on fixing the center line alignment of embankment with GPS by the surveyor the bed width of embankment to be measured from design drawing and dug bailing, stripping or ploughing the base of embankment and borrow pit area, removing roots and stumps of trees if any are to be done.
2. The Contractor’s operations in the excavation of material designated for use in compacted embankments or compacted backfill shall be such as will result in an acceptable gradation of soil material, as specified.
3. The specified soil when available in borrow pit or collected from elsewhere shall have to be acceptable to the JMT. Contractor is to provide grain size distribution analysis certificate (Sieve and hydrometer ASTM D-422) of soil to be supplied by him from borrow pit or carried soil from elsewhere. The soil gradation shall have to be prior approved by the JMT and the Project Manager before placing on embankment body. Further laboratory compaction test certificate (With Modified proctor test ASTM D- 1557) of the soil to be used shall have to be supplied by the Contractor at the same time.
4. The specified soil shall be stockpiled nearby the designated location of embankment and moisture content of piled soil shall be checked by the JMT and the Project Manager.
5. If the moisture content is less than desired moisture content for desired compaction (85% of MDD with modified proctor test, ASTM D-1557), the moisture shall be supplemented by sprinkling and reworking the material at the site of compaction. If the moisture content is more than required moisture content for compaction, the material shall be dried by reworking, mixing with dry materials or other approved means.
6. The material to be compacted shall be deposited in horizontal layers not more than 300 mm thick and the distribution of materials shall be such that the compacted material will be homogeneous and free from lenses, pockets, streaks or other imperfections. The excavating and placing operations shall be such that the materials when compacted will be blended sufficiently to secure the best practicable degree of compaction, impermeability and stability. The compaction operation shall preferably be spread over reaches of around 500m.
7. Each layer of material shall be compacted uniformly by use of adequate and appropriate compaction equipment (Bulldozer/ Sheep Foot RolIer / Vibratory Compactor) approved by the JMT. Compaction shall be done in a longitudinal direction along the embankment and generally begin at the outer edges and progress towards the center in such a manner that each receives equal compaction effort.
8. The compacted soil in each layer shall be tested for specified dry density of about 85% of laboratory Maximum dry density (Modified proctor test ASTM D-1557) at optimum moisture content.
9. The JMT will take samples for each layer of soil being compacted and will perform tests required to determine that the compaction is meeting the requirements of these specifications. On satisfying the compaction requirement of each layer, next layer of soil to be dumped and compaction operation to be repeated. The JMT will decide the location of the Test and collect geo reference. All the test result shall be initialed by the all members of the JMT. The test results along with geo reference shall be duly recorded in the tabular form and certified by the Convener of JMT and this shall be submitted to Project Manager with monthly quality control report. The project Director upon recommendation of the Project Manager will approve the Report.
10. The in situ dry density of the compacted fill shall be determined by the sand replacement method described in ASTM D-1556 and frequency for sampling is stated in schedule of tests for this item of work.
11. A typical cross section showing construction of embankment layer by layer is shown later in this report (Annexure-III).
12. If the material being excavated from canal or other waterlogged areas for use as embankment and material is saturated, then it shall be initially stockpiled to drain the excess water before placing it for construction of embankment.
13. Location of borrow pits from the toe of embankment are shown in the sketch (Annexure-IV). Borrow pits should be kept at least 20m away from the toe of the embankment if earth is borrowed for the river side and 50 m away from the toe of the embankment if earth is borrowed from the country side and should not be made deeper than 2.5m from the ground level.
14. The contractor shall make continuous video of whole compaction work for each layer. No payment will be made for embankment construction without Video Document.

**Schedule of Test for Embankment Construction:**

Following Test shall be carried out at the frequencies shown in the Table to check the suitability of materials, moisture contents of the fill material and dry density of compacted fill as per specifications;

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| --- | --- | --- | --- |
| **Sl. No.** | **Name of Test** | **Frequency of Test** | **Test Method** |
| 1 | Atterberg's Limit  (Plastic Limit &  Liquid Limit) | 1. For each source of fill materials  2. One Sample for each 10,000 Cum of fill material  3. Change in the Characteristics of the material noticed on visual examination. | ASTM D 4318  or Equivalent |
| 2 | Grain Size Distribution | As stated above | ASTM D 422  or  Equivalent |
| 3 | Standard Proctor Test | 1. For each source of fill material;  2. As per direction of the Engineer. | ASSTO T 180 |
| 4 | Moisture Content | I .For each 5000 cum of fill material  2. As per direction of Engineer | ASTM D 4346 & ASTM D 4944  or V Equivalent |
| 5 | Dry Density V | 1. One Sample for each 1000 sqm of compacted surface in each layer  2. As per direction of Engineer | AAHSTO T191  or  Equivalent |
|  |  |  |  |

**Measurement:**

Embankment shall be measured in cubic meter based on pre-work and post-work survey. The pre-work and post work survey shall be carried by RTK GPS in presence of JMT.The convener of JMT shall collect raw data of RTK and submit it to the project manager with monthly quality control report. Printed copy of measurement of volume of work done from the survey shall be duly signed by the all member of the JMT.The Contractor will arrange RTK and Surveyor for all survey work and notify the project manager with date of surveying with copy to Project Director. The project manager shall notify the JMT to take measurement.

**Payment:**

Construction of embankment will be paid from BoQ item No:…….. of Bill No:02.The surveyor and RTK GPS will be paid from the day of work.