Section-8 Particular Specification

Embankment:

Construction Procedure:

The procedure for construction sequences and steps to be followed in construction of compacted embankment and responsibilities of contructor are given as follows.

* 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 dragging 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.
* 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. The available soil gradation in different hoar project is shown in the table above.
* The specified soil gradation in borrow pit or collected from elsewhere shall have be acceptable to the Consultant. 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 Consultant 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.
* The specified soil shall be stockpiled nearby the design location of embankment and moisture content of piled soil shall be checked by the Engineer.
* 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.
* The material to be compacted shall be deposited in horizontal layers not more than 230mm thick, and the distribution of materials shall be such that the compacted material will be homogeneous and free from lenses, pockets, streaks other imperfections. The excavating and placing operations shall be such theat 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 200m.
* When the material has been conditioned and placed as specified or directed, it shall be compacted with bull dozers of adequate weight and size or appropriate motorized vibratory compaction equipment as approved by the Engineer.
* 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. The optimum moisture content and maximum dry density of the available soil in Haor areas are given in table above.
* The Engineer 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 test result shall be duly recorded in the tabular form and certified by the Consultant’s Supervising engineer.
* The insitu dry density of the compacted fill shall be determined by the sand replacement method described in ASTM D-1556 or similar approved test at locations ordered by the engineer. The engineer will take samples of material being compacted and will perform tests required to determine the compaction is meeting the requirement of the specification.
* The contractor shall provide all necessary aid to the Engineer in obtaining representative samples for testing at no extra cost.
* On completion of layer by layer compaction up to design level, close turfing to be done on the slope and crest of embankment with 75mm thick durba or char kata sods of size of 200mm x 200mm. the sods to be watered regularly until it grows.
* A typical cross section showing construction of embankment layer by layer is shown later in this report .
* Compaction and turfing to be done integrally and work will be accepted when turfing grown .
* No adjustment in price shall be made on account of any operations of Contractor in wetting or drying the materials or on account of any delays occasioned thereby.
* 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.
* Location of borrow pits from the toe of embankment are shown in the sketch later in this report. Borrow pits should be kept at least 3m away from the toe of the embankment and should not be made deeper than 2.5 from the ground level.
* No burro pit will be allowed within 30m both river and country site from the Toe line of the Embankment
* Any ditch/pond within 30m from toe line of both side of Embankment shall be filled.
* Length of 30.00 m Model section shall be done as per design and specification after 500.00m subsequent interval.
* Video document shall be submitted for every sequence of works of an item. No bill will be made without video Document.
* Time-frame for construction of proposed Embankment has been mentioned in bar chart attached in this section.
* No part work of the Embankment shall be accepted by the authority. The work will be accepted only after completing of the Embankment to its full design section with specifications.
* Providing all equipments and accessories including site illumination etc, required for satisfactory execution of the works.
* Transportation, furnishing, installation, safe operation and maintaining of all equipments including operators, mechanic, supply of power ,fuel, lubricants, sprees, repairing and all other materials labors and temporary works at the end of the construction period under this contract.
* The contractor shall provide continuous supervision of works by persons competent to recognize adverse conditions as they develop and take immediate corrective measures. The supervisors engaged by the contractor, shall have thorough knowledge of the construction system, including the availability to suggest/made minor emergency repairs.
* The contractor shall be solely responsible for correctly assessing quality and the volume of fill materials required for the execution of the works. The land acquired by BWDB if available may be used as borrow area upon receipt of written permission from the engineer while such permission shall not entitle the contractor to cause any damage to government and public property adjacent to borrow area. The contractor shall remain bound and include in his rates under the contract to arrange/purchase private land to carry fill materials if required for satisfactory execution of the works
* The contractors shall plane and organize in such mode and manner that the work is completed in all respect within the time stipulated under these contracts and for such accomplishment the progress must be proportionate to the time limit.
* The contractor shall be responsible maintenance of the work including necessary repairing and mending all kinds of damages during the period from the date of issuance of “completion certificate” to the date of releasing the performance security as per direction of engineer in change.
* **Measurement and mode of payment:** Payment shall only be admissible on successful implementation of the items of schedule of works and on the basis of the engineer’s certification.
* Deduction of retention money etc, from the progressive bills will be made and released as per provision.
* No payment will be made if the contractor is failed to attain the compaction as per design and specifications.
* Tarffing bill will be made after well grown of Tarff. Twenty percent (20%) of payment beyond schedule retention money that has been mentioned in the ITT clause... will be retained till to grownup the Tarff as per design and specifications. If the contractor is failed to grownup the Tarff as per design and specifications within stipulated time, the retained money will be forfeited

.

**Methodology for re-excavation of Rivers and Khals manually or by mechanical equipment for HFM&LI Project.**

1. The Khals which are to be dredged and excavated should the demarcated to the lines shown on the drawing. The work should be done as per design and specification mentioned in the tender document. Initially Centerline alignment of khalsshould be fixed by the field office, Consultant and the contractor.

2. Pre-work and post work of the khal /river should by taken jointly by the field office, Consultant and the Contractor with the following equipment. a) DGPS, b)Total station, c) Level Machine.BWDB Task force will also monitor the measurement.

3. Spoils should be spreaded layer by layer keeping minimum 10m from the bank line of the khal. There should be some gaps between the spreadedspoil so that drainage facilities are not disturbed. No haphazard deposition of excavated earth will be allowed.

4. Bailing out of water should be done with low lift pump, shallow pump & mud pump. No excavation of earth will be allowed without bailing out of water.

5. Excavation of earth should be executed in dry bed condition.

6. No part work of the excavation/re-excavation of khal shall be accepted by the project authority. The excavation/re-excavation work will be accepted only after completion to its full design section.

7. The contractor should own or hire the following equipment's which will be used for re-excavation of khal/river (a) Long Boom Excavator (0.7m3)-1no for each 2-3km reach, (b) Dredger -18 inch (c)Low lift pump (2hp) (d) Shallow tube-well pump(2hp), (e) Mud pump (3cusec),

8. Every sequence of re-excavation work should be recorded by video for future record.

9. The cutting chart should be prepared by the contractor and it should be accepted by field office as well as consultant. The cutting chart should be available at site during inspection.

10. Excavation work shall be done from outfall (D/S) of the river/khal towards the off-take (U/S).

11. A smooth transition shall be provided between the excavated section of the river/khal and the existing section.

12.A smooth transition 1:50 shall be provided at point where design bed width or bed level changes.

13. BM/TBM pillar established by IWM (as mentioned in the drawing) should be used as reference for survey of this excavation work.

14. After completion of the work cross dams should be cleared for continuous channel flow.

15. As built drawing of the re-excavation work should be submitted by the contractor before submission of the final bill.

16. All instructions and specifications mentioned in the approved drawing should be followed strictly.

**17. Measurement and mode of payment:** Payment shall only be admissible on successful implementation of the items of schedule of works and on the basis of the engineer’s certification.

a) All measurement including pre**-**work/post-work and progress monitoring will be taken by jointly in presence of PE´s representative, Consultant and contractor/or his representative. Concerned sub-Divisional engineer and sectional officer will be the PE´s representative. BWDB Task force will also monitor the measurement.

b) Interim payment will be made depending on the progress monitoring and bill will be admissible after achievement of 15% progress

.

Regulator:

1. All instructions and specifications method in the approved drawing should be followed strictly.
2. Clearing Jungle/vegetation and preparing the site.
3. Construction of site inspection facilities.
4. Video document shall be submitted for every sequence of works of an item. No bill will be made without video Document.
5. Time-frame for construction of proposed Regulator has been mentioned in bar chart attached in this section.
6. No part work of the Regulator shall be accepted by the authority. The work will be accepted only after completing of the Embankment to its full design section with specifications.
7. Providing all equipments and accessories including site illumination etc, required for satisfactory execution of the works.
8. Transportation, furnishing, installation, safe operation and maintaining of all equipments including operators, mechanic, supply of power ,fuel, lubricants, sprees, repairing and all other materials labors and temporary works at the end of the construction period under this contract.
9. The contractor shall provide continuous supervision of works by persons competent to recognize adverse conditions as they develop and take immediate corrective measures. The supervisors engaged by the contractor, shall have thorough knowledge of the construction system, including the availability to suggest/made minor emergency repairs.
10. The contractor shall be solely responsible for correctly assessing quality and the volume of fill materials required for the execution of the works. The land acquired by BWDB if available may be used as borrow area upon receipt of written permission from the engineer while such permission shall not entitle the contractor to cause any damage to government and public property adjacent to borrow area. The contractor shall remain bound and include in his rates under the contract to arrange/purchase private land to carry fill materials if required for satisfactory execution of the works.
11. The contractors shall plane and organize in such mode and manner that the work is completed in all respect within the time stipulated under these contracts and for such accomplishment the progress must be proportionate to the time limit.
12. The contractor shall be responsible maintenance of the work including necessary repairing and mending all kinds of damages during the period from the date of issuance of “completion certificate” to the date of releasing the performance security as per direction of engineer in change.
13. Concrete of CC block shall have minimum 28 days cylinder strength of 15.00 N/mm2.
14. Auto feeding concrete Mixture Machine shall be used. No Mixture machine will be allowed smaller than 18litre capacity.
15. Sufficient curing arrangement shall be provided by the contractor. All steel Shutter/Forma shall have is in new condition. No wooden shutter will be allowed.
16. **Measurement and mode of payment:** Payment shall only be admissible on successful implementation of the items of schedule of works and on the basis of the engineer’s certification..

Khal:

1. All instructions and specifications method in the approved drawing should be followed strictly.
2. The method of Execution of Works:
3. Clearing Jungle/vegetation and preparing the site.
4. Construction of site inspection facilities at the site.
5. Dag bailing and profiling should be done as per design and specification
6. Bailing out of Water should be done as per schedule. No excavation of earth will be allowed without bailing out of water.
7. Excavation of earth should be executed in a dry bed condition.
8. Excavated earth should be deposited beyond 10.00 meter apart from the bank line of Khal/ Canal in layer by layer and in marginal dyke shape. No haphazard deposition of excavated earth will be allowed.
9. Length of 30.00 m Model section shall be done as per design and specification after 500.00m subsequent interval
10. Slope should be attained as per design and specifications.
11. Video document shall be submitted for every sequence of works of an item. No bill will be made without submission of video Document.

12. No part work of the Excavation of khal shall be accepted by the authority. The work will be accepted only after completing of the khal to its full design section with specifications.

1. Providing all equipments and accessories including site illumination etc, required for satisfactory execution of the works.
2. Transportation, furnishing, installation, safe operation and maintaining of all equipments including operators, mechanic, supply of power ,fuel, lubricants, sprees, repairing and all other materials labors and temporary works at the end of the construction period under this contract.
3. The contractors shall plane and organize in such mode and manner that the work is completed in all respect within the time stipulated under these contracts and for such accomplishment the progress must be proportionate to the time limit.
4. The contractor shall be responsible maintenance of the work including necessary repairing and mending all kinds of damages during the period from the date of issuance of “completion certificate” to the date of releasing the performance security as per direction of engineer in change.
5. **Measurement and mode of payment:** Payment shall only be admissible on successful implementation of the items of schedule of works and on the basis of the engineer’s certification.
6. All measurement including pre**-**work/post-work and progress monitoring will be taken by jointly in presence of PE´s representative, Consultant and contractor/or his representative. Concerned sub-Divisional engineer and sectional officer will be the PE´s representative
7. Deduction of retention money etc, from the progressive bills will be made and released as per provision.
8. No payment will be made if the contractor is failed to attain the compaction as per design and specifications

**Construction procedure:**

The procedure for construction sequences and steps to be followed in construction of compacted embankment are given as follows .

* 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 desing draqing and dug bai;ing, dtripping or ploughing the base of embankment and borroq pit area, removing roots and stumps of trees if any are to be done.
* 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. The available soil gradation in different hoar project is shown in the table above.
* The specified soil gradation in borrow pit or collected from elsewhere shall have be acceptable to the Consultant. 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 he Consultant 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.
* The specified soil shall be stockpiled nearby the design location of embankment and moisture content of piled soil shall be checked by the Engineer.
* 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.
* The material to be compacted shall be deposited in horizontal layers not more than 230mm thick, and the distribution of materials shall be such that the compacted material will be homogeneous and free from lenses, pockets, streaks other imperfections. The excavating and placing operations shall be such theat 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 200m.
* When the material has been conditioned and placed as specified or directed, it shall be compacted with bull dozers of adequate weight and size or appropriate motorized vibratory compaction equipment as approved by the Engineer.
* 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. The optimum moisture content and maximum dry density of the available soil in Haor areas are given in table above.
* The Engineer 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 test result shall be duly recorded in the tabular form and certified by the Consultant’s Supervising engineer.
* The insitu dry density of the compacted fill shall be determined by the sand replacement method described in ASTM D-1556 or similar approved test at locations ordered by the engineer. The engineer will take samples of material being compacted and will perform tests required to determine the compaction is meeting the requirement of the specification.
* The contractor shall provide all necessary aid to the Engineer in obtaining representative samples for testing at no extra cost.
* On completion of layer by layer compaction up to design level, close turfing to be done on the slope and crest of embankment with 75mm thick durba or char kata sods of size of 200mm x 200mm. the sods to be watered regularly until it grows.
* A typical cross section showing construction of embankment layer by layer is shown later in this report .
* Compaction and turfing to be done integrally and work will be accepted when turfing grown .
* No adjustment in price shall be made on account of any operations of Contractor in wetting or drying the materials or on account of any delays occasioned thereby.
* 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.
* Location of borrow pits from the toe of embankment are shown in the sketch later in this report. Borrow pits should be kept at least 3m away from the toe of the embankment and should not be made deeper than 2.5 from the ground level.

1. ll instructions and specifications method in the approved drawing should be followed strictly.
2. The method of Execution of Works:
3. Clearing Jungle/vegetation and preparing the site. Stripping/benching/ploughing should be done as per specification.
4. Construction of site inspection facilities.
5. Earth work should be done by nine inch layer by layer
6. Compaction shall be done up to 85% compaction in each layer.
7. Slope should be attained as per design and specifications.
8. No burro pit will be allowed within 30m both river and country site from the Toe line of the Embankment
9. Any ditch/pond within 30m from toe line of both side of Embankment shall be filled.
10. Length of 30.00 m Model section shall be done as per design and specification after 500.00m subsequent interval.
11. After completing of earthwork as per design sections closed Tarffing must be provided in the exposed portion of the embankment.
12. Video document shall be submitted for every sequence of works of an item. No bill will be made without video Document.
13. Time-frame for construction of proposed Embankment has been mentioned in bar chart attached in this section.
14. No part work of the Embankment shall be accepted by the authority. The work will be accepted only after completing of the Embankment to its full design section with specifications.
15. **Contractors responsibility:**
16. Providing all equipments and accessories including site illumination etc, required for satisfactory execution of the works.
17. Transportation, furnishing, installation, safe operation and maintaining of all equipments including operators, mechanic, supply of power ,fuel, lubricants, sprees, repairing and all other materials labors and temporary works at the end of the construction period under this contract.
18. The contractor shall provide continuous supervision of works by persons competent to recognize adverse conditions as they develop and take immediate corrective measures. The supervisors engaged by the contractor, shall have thorough knowledge of the construction system, including the availability to suggest/made minor emergency repairs.
19. The contractor shall be solely responsible for correctly assessing quality and the volume of fill materials required for the execution of the works. The land acquired by BWDB if available may be used as borrow area upon receipt of written permission from the engineer while such permission shall not entitle the contractor to cause any damage to government and public property adjacent to borrow area. The contractor shall remain bound and include in his rates under the contract to arrange/purchase private land to carry fill materials if required for satisfactory execution of the works
20. The contractors shall plane and organize in such mode and manner that the work is completed in all respect within the time stipulated under these contracts and for such accomplishment the progress must be proportionate to the time limit.
21. The contractor shall be responsible maintenance of the work including necessary repairing and mending all kinds of damages during the period from the date of issuance of “completion certificate” to the date of releasing the performance security as per direction of engineer in change.
22. **Measurement and mode of payment:** Payment shall only be admissible on successful implementation of the items of schedule of works and on the basis of the engineer’s certification..
23. Deduction of retention money etc, from the progressive bills will be made and released as per provision.
24. No payment will be made if the contractor is failed to attain the compaction as per design and specifications
25. Tarffing bill will be made after well grown of Tarff. Twenty percent (20%) of payment beyond schedule retention money that has been mentioned in the ITT clause... will be retained till to grownup the Tarff as per design and specifications. If the contractor is failed to grownup the Tarff as per design and specifications within stipulated time, the retained money will be forfeited.
26. Concrete of CC block shall have minimum 28 days cylinder strength of 15.00 N/mm2.
27. Auto feeding concrete Mixture Machine shall be used. No Mixture machine will be allowed smaller than 18litre capacity.
28. Sufficient curing arrangement shall be provided by the contractor. All steel Shutter/Forma shall have is in new condition.