

## **SPECIAL CONDITIONS FOR EARTHWORK IN CESS REPAIR**

### **1. GENERAL**

- A. Earthwork is to be executed strictly in accordance with “Comprehensive Guidelines and Specifications for Railway Formation” Specification No. RDSO/2020/GE: IRS-0004 with up-to-date amendments/correction slips as applicable.
- B. Standard sections for Earth work in formation, cutting blanketing for single line, double line, etc. are given in the Indian Railways Permanent way Manual June 2020 with up to date amendments/ correction slips as applicable, these are widely available.
- C. Where these conditions and specifications are in conflict with or repugnant to the Eastern Railway Standard Specifications and/or other books mentioned as Book of Reference in these tender documents, the clause of these Special Conditions and Specifications shall prevail.
- D. Before the work is started, the whole area between the toes of the bank or top of cutting, shall be properly cleared by the contractor of all Trees, Roots, Heavy grass and all obstructions. No extra payment will be made for such work. All trees of girth (parameter) more than 12 inch at 1 meter above the bottom shall be the property of the Railway and the Contractor shall, after uprooting, deposit the same with Railway. Before cutting trees, necessary permission required from the forest department or any other appropriate authority if required, shall be taken, by the contractor on the basis of Railway’s recommendatory letter.
- E. Where an embankment is being extended in width, the slope shall be benched as per RDSO/2020/GE: IRS-0004 specification and the cost for the same shall be included in the through rate and shall not be payable separately.
- F. Before commencing the work, dug belling as specified in specifications shall be done.

### **2. PAYMENT**

- A. SPECIAL CONDITIONS FOR PAYMENT OF ON ACCOUNT BILLS
  - i. Only 85% payment based on measured quantity shall be done after completion of work and compaction of final layer
  - ii. The balance 15% payment will be released after consolidation after one complete monsoon and necessary repair of erosion/cuts etc. by the contractor.
- B. Except of otherwise specified regarding secured advance, all payment shall be made on finished cross sectional quantities, cross sectional areas at various points shall be worked out and the arithmetic mean of the areas, at any two such continuous points multiplied by the horizontal distance between these two points measured along the centerline of the alignment shall be taken as the quantity of earthwork between the two points on which the payment shall be made. The contractor shall have no claim for the quantities over and above the payments on account of subsidence, base settlement, wastage or guttering due to rain, wind, etc. All bridges and other gaps shall be deducted in full from the quantity of the earthwork.
- C. SETTLEMENT ALLOWANCE: Where the embankment is compacted to specified dry density mentioned hereunder, no allowance for settlement of the bank shall be made, where the bank has not been formed by dumping earth, light tamping, and/or passing a monsoon over it, necessary allowances for settlement as specified in the specifications shall be made.
- D. All payments shall be made in accordance with items given in the “Schedule of Items” only. Any arrangements/works required to be done to achieve the work defined in various Items of the “Schedule of Items” shall be done at contractor’s cost without any extra payment and the Contractor should include such expenses in the rates quoted against the said items.
- E. While making embankment, earth shall not be dumped in any standing water at the location where embankment has to be constructed. If there is any standing water, the same shall be drained or pumped out completely before any earth is dumped in this area. In case of draining out or pumping out water, no extra payment will be made to the contractors and quoted rates for earthwork shall cover all such charges.
- F. The spoils from cuttings shall normally be utilised for earthwork in embankment. Where the cutting spoil has been used for making embankment, payments shall not be made for both cuttings as well as embankments. Only one payment, i.e., for cutting shall be allowed. However, lead over free lead (100 M) will be paid separately as provided in the schedule of the work. Surplus, unsuitable spoils shall be dumped in neat stacks on Railway land or disposed of as directed by Engineer at site for which no extra payment will be made.
- G. Stone excavated from cuttings, which may be considered useful for use as building stone, for pitching or for breaking into ballast or chips shall be stacked separately by the contractor as directed by the Engineer at site. This stone will be property of the Railway and may be issued as Railway materials to the contractors as pitching etc. in accordance with relevant Item of L&M Schedule.

- H. If any service roads etc. are to be built, the contractor shall build the same at his own cost, including ramps for transporting earth to make embankment, all the service roads are to be maintained by the contractor at his own cost. No separate payment for such works shall be made.
- I. JPO regarding procedure for undertaking digging work, in the vicinity of signalling, Electrical and Telecommunication cable based on, Telecom Circular No.9/2023 will be followed, in case damage is caused to OFC/Quad Cable/Signaling Cable during execution of the work, the contractor is liable to pay penalty for cable damage as specified in the JPO.

### **3. COMPACTION**

- A. Soil to be used shall be tested in a railway laboratory or at any reputed Govt. University/Institute or at any Govt. Test Laboratory/ Govt. Approved Laboratory as per the discretion/direction of Engineer-In-Charge or his representative for Maximum Dry Density (MDD) and related Moisture Content (OMC) by Modified Proctor Test.
- B. The measurement of compaction is to be done by number of passes of roller to each layer of earthwork. Only after satisfying with the degree of compaction achieved in terms of number of passes, next layer of earthwork should be permitted.
- C. Before work is commenced, the contractor is advised to conduct, field compaction trials for his own guidance so that compaction is efficiently and economically achieved. RDSO Specifications have given the suitable, type of roller and the same may be taken as guidance.
- D. Water, if required, for adding to the earth shall be arranged free of cost by the Contractor himself.
- E. The compaction of soil is essentially required for obtaining a uniform soil mass of desired density and known soil properties.

### **4. METHOD OF COMPACTION OF EARTHWORK IN CESS REPAIR**

- A. Small Vibratory Rollers of minimum 1T capacity shall be used for compaction of each layer as per RDSO guidelines. Near the cess level, working of small vibratory roller may be difficult due to running of train and safety issues. In such situation, plate compactor may be used for layer compaction as mentioned in RDSO specification also.
- B. Slope Vibratory Roller/Compactor of 10-20T capacity shall be used for compaction of slope.
- C. Proper Cross Slope should be provided to allow for efficient drainage.
- D. After site clearance all pockets and depressions left in the soil, if any, shall be made good and compacted.
- E. Proper Degree of Compaction on slope, cess, etc is to be to be ensured to obtain the maximum density achievable uniformly maintaining proper cess and embankment profiles.
- F. The number of passes of the roller and the optimum thickness of each layer will be fixed after carrying out field trials with the roller proposed to be used from time to time from location to location. The main criteria are being to obtain the maximum density achievable uniformly.
- G. If the soil is dry, water shall be sprinkled either in the borrow pit or over the spread layer, as convenient in order to obtain a workable moisture content before rolling is commenced. Where the natural moisture content of borrow pit is high, compaction in higher moisture contents can be allowed by the permission of Engineer-in-charge.
- H. Each layer shall be compacted to the specific density over its entire width commencing from the two sides, before another layer is started
- I. While compacting it shall be ensured that there is minimum overlap of 150mm between each run of the rollers.
- J. In parts to embankment which are inaccessible to the specified rolling equipment, e.g. around and in contact with culverts, abutments or in proximity to structure where rolling equipment will either not be possible to operate, or not permitted to operate, compaction shall be accomplished by hand tamping followed with plate vibrators or suitable mechanical means.
- K. Supplementary site-specific instructions wherever considered necessary, shall be issued by the Engineer-in-Charge or his representative.

### **5. MINIMUM EQUIPMENT TO BE DEPLOYED FOR EXECUTION OF EARTHWORK IN CESS REPAIR**

- 1. Compactors/Rollers
  - a. Slope Vibratory Roller/Compactor – 1 Nos.
  - b. Vibrating Plate Compactors – 4 Nos.
  - c. Small Width Vibratory Roller for Compaction of Earthwork and narrow width areas – 1 Nos.

- d. Single/Double Drum Vibratory Rollers – 2 Nos.
2. Backhoe - 2 Nos.
3. Excavator - 1 Nos.
4. Dumpers – As per Site Requirements.

Any other equipment as considered necessary based on prevailing site conditions are to be deployed at the discretion/direction of the Engineer-In-Charge or his representative.

## **6. INSPECTION REGISTER & RECORDS**

The Contractor shall maintain accurate records, plans and charts showing the dates and progress of all main activities and the same shall be produced as and when asked/demanded by Engineer-in-charge or his representative. Records of tests made shall be handed over to the Engineer's representative after carrying out the tests. The following registers will be maintained at site by the Contractor –

i) Site Order Register, (ii) Logbook of Events, (iii) Inspection Register, (iv) Quality Control Register, (v) Programme and Progress Register, etc, and all these registers shall be signed by the representative of the Engineer and the contractor/s.

Any other register considered necessary by the Engineer, shall also be maintained at site duly signed by the Railway and Contractors representative. The registers, Proforma, charts etc. will be property of the Railway.

## **7. SAMPLING & TESTING – PROVIDING SITE LABORATORY FACILITIES**

Contractor shall establish a laboratory at suitable location near to the site at his cost with necessary facilities for performing routine soil tests such Gradation Analysis-Sieve and Hydrometer, Atterberg's Limits - Liquid Limit & plastic Limit, Optimum Moisture Content (OMC), Maximum Dry Density (MDD) and Relative Density, Placement moisture content & in-situ Density, CBR test, etc. as to the satisfaction of the Engineer-in-Charge. The laboratory shall have minimum equipment listed below, All machines and equipment should have valid calibration certificate.

S NO	DESCRIPTION OF EQUIPMENT	REFERENCE OF I.S.CODE (latest version to be used)	UNIT
1	IS set of sieves with base & top lid 20mm, 19mm, 10mm, 4.75mm, 2mm 600mic, 425mic, 212 mic, 75mic,.	IS-460	sets
2	Hand operated sieve shaker for above sieves.		1 no.
3	<b>BALANCE</b> i) Pan balance/Electronic weighing machine- kg capacity (with 1.0 gm Least Count)		1 no.
	ii)Electronic balance- 500 gm capacity (with 0.1 gm Least Count)		1 no.
	iii)Electronic weighing machine		2 sets
4	200 grm (LC-0.01g)		5 sets
	Field density apparatus complete.	2720-1974 part-XXVIII	2 sets
5	Sand replacement	2720-1975 part-XXIX	
	Core cutter with dolly	2720 part-8-1983	1 set
6	Heavy Compaction Test apparatus full unit	2720 part-16-1987	2 set
7	Laboratory California Bearing Ratio (CBR)		1 no.
	Test Apparatus & It's required accessories	2386 part-4	
8	Abrasion Test Apparatus	IS 2720 Part-5-1985	1 no.
9	Liquid Limit Apparatus hand operated with counter & grooving tools.	IS 2720 Part-6-1972	3 no.
10	Shrinking limit apparatus		4 no.
11	Stainless steel spatula-25cm long		6 no.
12	Porcelain bowl for LL – 15 cm dia		

13	Aluminium dish with lid- 5cm dia.	2 no.
	Wash bottle – 1 lit. capacity	2 no.
14	500 ml Capacity	3 no.
15	Glass Plate 10mm thick 50X50 cm	3 no.
16	Ground glass 5mm thick 50X50 cm	10 no.
	Enameled trays 45X30cm	10 no.
	20X20cm	10 no.
	&	
	Enameled plates 6inch dia	3 no.
	8 inch dia	2 no.
17	10 inch dia	3 no.
18	Frying pans	3 no.
19	Stove Janata	1 no.
20	Straight edge 300mm long	2 no.
21	Sample Tube (Size Dia-150mm, Length-450mm)	5 no.

S NO	DESCRIPTION OF EQUIPMENT	REFERENCE OF I.S.CODE (latest version to be used)	UNIT
22	Grain size analyser of fines a) Hydrometer b) Thermometer 0 to 50 c) Glass cylinder 1000cc capacity with 60mm dia. d) Nomogram chart e) Stop Watch	IS-2720 Part-4-1985	2 no.
			2 no.
			5 no.
			1 no.
			1 no.
22	Desiccators as IS - 6128		2 no.
23	Gallon of 10 litter capacity for distilled water		3 no.
24	Wooden mortar and pestle.		1 no.
25	Specific gravity test apparatus.	IS-2720 Part-14-1983	2 no.
26	Density bottle-50 ml capacity		2 no.
27	Glass cylinder 100 cc capacity (for Free Swell index test)		1 no.
28	Oven-thermostatically controlled to maintain a temperature 105-110		
29	Relative Density test Apparatus	IS-2720 Part-14-1983	1 no.
30	Standard Penetration Test (SPT) Apparatus	IS_2131-1981 (Reaffirmed-1997)	1 no.
31	<b>Note</b> -Preparation of dry soil samples for various test	Follow IS-2720 Relevant Parts	
32	<b>Consumable Item</b>		
33	Service brush		
34	Wire brush		
35	Sodium carbonate		
36	Sodium Hexa Meta Phosphate		
37	Kerosene		
38	Mercury		
39	<b>Additional Equipment</b>		
	Hand auger 150mm dia with extension rod		
	Sampling tube 100mm dia. And 450mm length		

