



DAMODAR VALLEY CORPORATION

**NOTICE INVITING TENDER NO: 50/OT/DVC-MTPS/Civil/
PH-I/PKG-(I)/2013 Dated 10.10.2013**

Tender document for Earthwork in formation, Construction of bridges, blanketing and all allied works etc. in connection with construction of double line of existing single rail track between Raniganj and waiting bay line of Mejia Thermal Power Station (MTPS) of DVC at Mejia, Dist - Bankura, West Bengal.

PART – 1

TECHNICAL BID

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- Section-5: Technical Specifications**
- Section-6: Drawings**

Issued to (Name of Tenderer): _____

Address of tenderer: _____

Signature of officer issuing the documents _____

Designation _____

Date of Issue _____



(A Govt. of India Enterprise)
Regional Project Office, KOLKATA
56 C R Avenue, 2nd floor, Kolkata – 700 012
e.mail : pokolkata@rites.com
Phone No: (033) 22367118/7146/7162/7143(Fax)



RITES LTD
(A Govt. of India Enterprise)
REGIONAL PROJECT OFFICE, 56, C.R. Ave. (2nd fl), Kolkata-12
Phone No. 033-2236 7118/46/62 FAX-033 2236 7143

NOTICE INVITING TENDER

NIT No. 50/OT/DVC-MTPS/Civil/PH-I/PKG-(I)/2013 Dated 10.10.2013.

Group General Manager, RITES Ltd, Kolkata for & on behalf of Damodar Valley Corporation (DVC) invites sealed tenders from contractors who fulfill Qualifying Criteria stipulated in Tender Documents for the following work.

Name of work: Earthwork in formation, construction of bridges, blanketing and allied works etc. in connection with construction of double line of existing single rail track between Raniganj and waiting bay line of MTPS at Mejia, Dist. Bankura, W.B. **Estimated Cost:** Rs.36.40 Crore (Approx), EMD: Rs.36.40 Lakh, **Completion period:** 18 (Eighteen) months. **Sale of Tender Documents:** 11.10.2013 to 04.11.2013. **Last date of Submission of Tender:** 06.11.2013 up to 14.00 Hrs. Complete Tender Documents including Qualifying criteria can be purchased from the above address at a cost of Rs.10,000/- or downloaded from website:(www.rites.com). Amendment/corrigendum, if any, would be hosted on the websites only.



PART - 1

TECHNICAL BID



Section – 1

NOTICE INVITING TENDER & INSTRUCTIONS TO TENDERERS



SECTION 1

NOTICE INVITING TENDER AND INSTRUCTIONS TO TENDERERS

1.0 GENERAL

1.1 Tender Notice

Tenders are invited in **Two Packet system** by RITES Ltd., a Public Sector Enterprise under the Ministry of Railways, acting for and on behalf of Damodar Valley Corporation (DVC), (Employer) as an Agent/Power of Attorney Holder, from working contractors (including contractors who have executed works within the last **seven years** reckoned from the scheduled date of opening of tender) for the work of “Earthwork in formation, Construction of bridges, blanketing and all allied works etc. in connection with construction of double line of existing single rail track between Raniganj and waiting bay line of Mejia Thermal Power Station (MTPS) of DVC at Mejia, Dist - Bankura, West Bengal.”

(Note: Throughout these bidding documents, the terms ‘bid’ and ‘tender’ and their derivatives are synonymous).

1.2 Estimated Cost of Work

The work is estimated to cost Rs.36.40 Crores (Rupees thirty six crores and forty lakh). This Estimate, however, is given merely as a rough guide.

1.3 Time for Completion

The time allowed for completion will be 18 (eighteen) months from the date of start which is defined in Schedule F under Clause 5.1a of Clauses of Contract.

1.4 **Brief Scope of Work** Earth work in formation, blanketing, construction of major/minor bridges etc.

1.5 Availability of Site

The site for the work shall be made available in parts,

2.0 QUALIFICATION CRITERIA TO BE SATISFIED

2.1 Annual Financial Turnover

The bidder should have achieved a minimum average annual turnover (MAT) of **Rs. 36.40 Crores.**

Notes:

- Average annual turnover is to be determined taking into consideration turnover of best 3 financial years out of last 5 financial years. Other income shall not be considered for arriving at annual turnover.
- However, in case where audited results for the preceding financial year are not available, certification of financial statements from a practicing Chartered Accountant shall also be considered acceptable.

- A tolerance limit @ 5% (Five Percent) on the quantum of QR may be provided to take care of margins shortfall.

2.2 Work Experience

a) Similar Works Experience

The Bidder should have satisfactorily completed in his **own capacity** at least one similar work of minimum value of **Rs. 29.12 Crores** OR at least two similar works each of minimum value of **Rs. 18.2 Crores** OR at least three similar works each of minimum value of **Rs. 14.56 Crores** during the last 7 (seven) years ending last day of month previous to the one in which the offer has been invited. Works completed prior to the cut off date shall not be considered.

Similar Works

Similar Works shall mean the work of construction of earthwork in formation, bridges in Railway work carried out in India.

Notes :

- Only such works shall be considered where the executed/completed portion of Work Order/AMC/RC, payment receipt documents with reference to Work order No. and date of execution certificate with executed value and referred order No. be also considered as a proof of execution, even if the work has not been completed in totality (subject to furnishing proof of executed value of the work in the form of certified copies of RA bills).
- A tolerance limit @ 5% (Five Percent) on the quantum of QR may be provided to take care of margins shortfall.

2.3 Working Capital

Working Capital should be considered for the last financial year. Net Working Capital or access to Credit Facilities of the bidder should be more than **Rs. 6.07 Crores**.

Note:

A tolerance limit @ 5% (Five Percent) on the quantum of QR may be provided to take care of margins shortfall.

2.4 Net Worth

Net Worth of the bidder as on the last day of the preceding financial year shall not be less than 100% of the paid up share capital.

Net Worth means the sum total of the paid up share capital and free reserves. Free reserve means all reserves credited out of the profits and share premium account but does not include reserves credited out of the revaluation of the assets, write back of depreciation provision and amalgamation. Further any debit balance of Profit and

Loss Account and miscellaneous expenses to the extent not adjusted or written off, if any, shall be reduced from reserves and surplus.

- 2.5 A Certificate issued by the Auditor substantiating Net Worth of the Bidder should be submitted along with the bid.

Joint Venture

- 2.6 The Qualification Criteria to be satisfied will depend on the category of works, whether Normal or Large. Normal Works are those costing upto Rs.30 Crores each and Large Works are those costing more than Rs.30 Crores. The work for which the Tender is being invited falls under the category of ~~*Normal~~ / *Large.
(* Strike out whichever is not applicable)
- 2.7 The Qualification Criteria to be satisfied will also depend on whether the Work falls in Normal area or Difficult area. Difficult area includes North East States, Jammu & Kashmir, Jharkhand, Chattisgarh and Andaman & Nicobar Islands. Normal area covers all areas other than Difficult area. The work for which this Tender has been invited falls under **Normal area**.
- 2.8 In this Tender Joint Venture is **allowed**.

In case Joint Venture is allowed the following will apply:

- a) If JV is successful in the Bid, the Contract will be awarded in the name of JV. The JV Agreement should be executed within 15 days of receipt of Letter of Acceptance and the JV Agreement duly registered in accordance with law so as to be legally valid and binding on the members. The JV shall also open a Bank account in the name of JV and all payments due to the JV shall be credited by the Employer to that account only. To facilitate statutory deductions such as towards Income Tax, VAT etc. made from the amounts due to the JV being credited to the concerned Government Departments, the JV shall arrange to obtain in the name of JV, PAN/TIN etc as required.
- b) Bid submitted by a Joint Venture of two or more firms as Partners/Members shall be accompanied by the following documents:
- i) A copy of Joint Venture MOU/Agreement duly notarized so as to be legally valid and binding on all the Partners/Members and incorporating the following provisions (Suggested format at **Annexure III**):
- The Bid and, in case of a successful Bid, the Agreement shall be signed so as to be legally binding on all Partners/Members.
 - One of the Partners/Members shall be nominated as being in charge and this authorization shall be evidenced by submitting Power of Attorney signed by legally authorized signatories of all the Partners/Members.
 - The Partner-in-charge/Lead Member shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners/members of the Joint Venture and the entire execution of the Contract, shall be done exclusively with the Partner in charge.

- All the partners of the Joint Venture shall be liable jointly and severally for the execution of the Contract in accordance with the Contract terms and a statement to this effect shall be included in the authorization through a Power of Attorney in favour of the Partner-in-charge/Lead Member as well as in the Bid and in the Agreement (in case of a successful bid).
 - Indication of the precise responsibility of all Partners/Members of the Joint Venture in respect of planning, design, construction equipment, key personnel, work execution and financing of the Project duly indicating the percentage in financing of JV by each Partner.
 - In the case of Large Works, the maximum number of Partners can be only three and the Partner-in-Charge/Lead Member shall have more than 50% participation in financing of the JV and each of the other Members minimum 20% participation in financing of JV. In case of 'Normal Works', the Partner-in-Charge/Lead Partner shall be responsible for 100% financing of the J.V.
 - All partners/members of the JV shall comply with the provisions in the Integrity Pact and any violation of the Pact by any partner/member shall be construed as a violation by the JV.
- ii) Power of Attorney in favour of the Partner-in-charge/Lead Member on the lines mentioned in item "a" above. (Suggested format at **Annexure V**).
- 2.9 The documents to be furnished by the Bidder to prove that he is satisfying the Qualification Criteria laid down should all be in the Bidder's name, except in cases where though the name has changed, the owners continued to remain the same and in cases of amalgamation of entities.

In case JV is permitted the following provisions will apply:

(a) Annual Financial Turnover:

Large Works

For each Partner, the Minimum Average Annual Turnover (MAT) determined on the basis of turnover of best 3(three) financial years out of last 5(five) financial years will be considered. This should not be less than the figure arrived at by multiplying the minimum Annual Turnover stipulated for the Bidder in Qualification Criterion multiplied by the percentage of Financial participation by that partner in the JV. Each partner should satisfy this requirement and thus automatically JV will satisfy the criterion of Minimum Average Annual Turnover.

Normal Works

The Partner-in-charge/Lead Member shall singly meet this criterion.

(b) Work Experience:

Large Works

All the partners shall jointly meet this criterion.



Normal Works

The Partner-in-charge/Lead Member shall singly meet this criterion.

(c) Working Capital:

Large Works

For each Partner, the figure as indicated against the Net Working Capital, should be not less than the minimum Working Capital stipulated for the Bidder in the Qualification Criterion multiplied by percentage of Financial participation by that Partner in the JV.

Normal Works

The Partner-in-charge/Lead Member shall singly meet this criterion.

(d) Net Worth:

Large Works

All the partners shall meet individually this criterion.

Normal Works

The Partner-in-charge/Lead Member shall singly meet this criterion.

3.0 FORMAT AND CHECK LIST FOR SUBMISSION OF INFORMATION ON QUALIFICATION CRITERIA

3.1 Other than Joint Ventures

The Tenderer shall furnish a Letter of Transmittal as given in **Annexure II A** enclosing the documents mentioned therein/listed in para 1(a) of **Annexure IA**.

3.2 Joint Ventures (For Large Works)

The Partner in charge / Lead member shall furnish a Letter of Transmittal as given in **Annexure II B (L)** enclosing the documents mentioned therein/listed in para 1(b) of **Annexure I A**.

3.3 Joint ventures (For Normal Works)

The Partner in charge / Lead Member shall furnish a Letter of Transmittal as given in **Annexure II B (N)** enclosing the documents mentioned therein/listed in para 1(c) of **Annexure I A**.

(Note:- Tender document approving authority to delete Sub Para 3.2 or 3.3 or both as applicable.)

4.0 CONTENTS OF TENDER DOCUMENT

4.1 Each set of Tender or Bidding Document will comprise the Documents listed below and addenda issued in accordance with para 7 :

PART – 1 :- Technical Bid Packet

(Read with Correction Slip Nos.1 to _____)

- Section 1 Notice Inviting Tender and Instructions to Tenderers.
- Section 2 Tender and Contract Form.
- Section 3 Special Conditions.
- Section 4 Schedules A to F
- Section 5 Technical Specifications
- Section 6 Drawings

PART – 2 :- Financial Bid Packet

Schedule of Quantities (Bill of Quantities)

PART – 3:- General Conditions of Contract

(read with correction Slip Nos. 1 to _____)

- Section 7 Conditions of Contract
- Section 8 Clauses of Contract
- Section 9 RITES Safety Code
- Section 10 RITES Model Rules for protection of Health and Sanitary arrangements for Workers
- Section 11 RITES Contractor's Labour Regulations

4.2 General Conditions of Contract (Compilation of Sections 7 to 11) with upto date correction slips is also available in RITES website www.rites.com

5.0 ISSUE OF TENDER DOCUMENT

5.1 A complete set of Tender Document (Technical and Financial Bid) described in Para 4.1 above can be seen in the office of the **Group General Manager (Projects), RITES Ltd, Regional Project Office, 56, C.R. Avenue, 2nd floor, Kolkata 700012** between hours of 11.00 AM and 4.00 PM every day except on Saturdays, Sundays and Public Holidays.

5.2 One set of Tender Document may be purchased from the office of **Group General Manager (Projects), RITES Ltd, Regional Project Office, 56, C.R. Avenue, 2nd floor, Kolkata 700012** from **11.10.2013** to **04.11.2013** for a non refundable fee per set of **Rs.10,000/- (Rupees ten thousand only)** in the form of Demand Draft/ Pay Order/ Banker's cheque drawn on any Scheduled Bank payable at Kolkata in favour of RITES Ltd., Kolkata on submission of an application. Tender document may be issued free of cost to such applicants as are exempted from payment of cost of tender document as a matter of Government Policy.

5.3 Tender Documents including drawings can also be downloaded from RITES Website (www.rites.com) and in such a case, the Tenderer shall deposit the cost of tender documents (unless he is exempted from such payment as a matter of Government Policy) along with submission of tender, failing which his tender shall not be opened. The cost of tender documents shall be deposited in the form of a separate Banker's cheque / Demand Draft / Pay Order and enclosed in the envelope containing the Earnest Money Deposit. In case the Tenderer is exempted from such payment, the onus of proving such exemption shall rest with the tenderer and proof of the same

shall be placed in the envelope meant for Earnest Money. The amendments / clarifications to the Tender documents will also be available on the above website.

5.4 Tender Documents downloaded from RITES website shall be considered valid for participating in the tender process. During the scrutiny of downloaded tender document, if any modification / correction etc. is noticed as compared to the original documents posted on the website, the bid submitted by such a Tenderer is liable to be rejected. In case the bid of a Tenderer who has downloaded the document from website is accepted the contract shall be executed in the original / manual tender document issued by the concerned RITES officer.

5.5 Clarifications on Tender Documents

A prospective Tenderer requiring any clarification on the Tender Document may notify **Sri T.K. Biswas, Sr Dy.GM (C)** (The official nominated for this purpose) in writing or by telefax/ or by E-mail at the following Postal Address/ Fax No./E-mail address: **Group General Manager (Project),RITES Ltd, Regional Project Office, 56,C.R.Avenue, 2nd floor, Kolkata 700012, Fax no: 033-22367143/E- mail no: pokolkata@rites.com**

In cases where Pre-Bid Meeting is not proposed to be held, request for clarifications including request for Extension of Time for submission of Bid, if any, must be received not later than 10 (ten) days prior to the deadline for submission of tenders. Details of such questions raised and clarifications furnished will be uploaded in RITES website without identifying the names of the Bidders who had raised the questions. Any modification of the Tender Document arising out of such clarifications will also be uploaded on RITES website only.

In cases where Pre-Bid Meeting is proposed to be held, provisions in para 6.0 below may be referred to.

6.0 PRE-BID MEETING: Applicable

6.1 The Tenderer or his official representative is invited to attend a pre-bid meeting which will take place at the Office of **Group General Manager (Projects),RITES Ltd, Regional Project Office, 56,C.R.Avenue, 2nd floor, Kolkata 700012 on 28.10.2013 at 15.00 Hrs.**

6.2 The Tenderers are required to submit any question on issues relating to the tender, in writing or by telefax or by E-mail so as to reach **Sri T.K. Biswas, Sr Dy. GM (C) , RITES Ltd, Regional Project Office (2nd floor) Kolkata -700012. Fax no: 033/22367143/2225-5637, E-mail:pokolkata@rites.com** (the official nominated for this purpose) not later than 3 (three) days before the date fixed for the meeting.

6.3 The purpose of the meeting will be to clarify the issues raised and to answer supplementary questions on such issues.

6.4 Minutes of the meeting including the text of the questions raised (without identifying the source of enquiry) and the responses given will be uploaded on RITES website. Any modifications of the Tender Document which may become necessary as a result

of the Pre-bid Meeting shall be made exclusively through the issue of an Addendum / Corrigendum and not through the Minutes of the Pre-Bid Meeting. The Minutes of the Meeting as described above and the Addendum / Corrigendum, if any, will be uploaded on RITES website only.

- 6.5 Non-attendance at the Pre-bid Meeting will not be a cause for disqualification of a tenderer.

7.0 AMENDMENT OF TENDER DOCUMENT

- 7.1 Before the deadline for submission of tenders, the Tender Document may be modified by RITES Ltd. by issue of addenda/corrigendum. Issue of addenda / corrigenda will however be stopped 7 days prior to the deadline for submission of tenders as finally stipulated.

- 7.2 Addendum/corrigendum, if any, will be hosted on website only and shall become a part of the tender document. All Tenderers are advised to see the website for addendum/ corrigendum to the tender document which may be uploaded upto 7 days prior to the deadline for submission of Tender as finally stipulated.

- 7.3 To give prospective Tenderers reasonable time in which to take the addenda/ corrigenda into account in preparing their tenders, extension of the deadline for submission of tenders may be given as considered necessary by RITES.

8.0 TENDER VALIDITY

- 8.1 The Tender shall be valid for a period of 90 days from the due date for submission of Tender or any extended date as indicated in sub para below.

- 8.2 In exceptional circumstances, during the process of evaluation of tenders and prior to the expiry of the original time limit for Tender Validity, the Employer may request that the Tenderers may extend the period of validity for a specified additional period. The request and the tenderer's response shall be made in writing. A Tenderer may refuse the request without forfeiting his Earnest Money. A Tenderer agreeing to the request will not be permitted to modify his Financial Bid to a higher amount but will be required to extend the validity of the Earnest Money for the period of the extension.

9.0 EARNEST MONEY

- 9.1 The Tender should be accompanied by Earnest Money of Rs.36.40 lakh (Rupees thirty six lakh and forty thousand only) in any of the forms given below:-

Banker's Cheque / Pay Order/ Demand Draft payable at Kolkata, drawn in favour of RITES Ltd.

- 9.2 Any Tender not accompanied by Earnest Money in an acceptable form shall be rejected by the Employer as non-responsive unless the tenderer is exempted from payment of Earnest Money as a matter of Government Policy. The onus of proving such exemption shall rest with the Tenderer and such proof shall be placed in the envelope meant for Earnest Money.

9.3 Refund of Earnest Money

a) Two Packet System

The Earnest Money of the Tenderers whose Technical Bid is found not acceptable will be returned without interest soon after scrutiny of Technical Bid has been completed by the Employer subject to provisions of Para 9.4 (b). The Earnest Money of the Tenderers whose Technical Bid is found acceptable but Financial Bid is rejected will be returned without interest within 28 days of the end of Tender Validity Period subject to provisions of Para 9.4 (b).

b) Single Packet System

After evaluation of the Financial Bids, the Earnest Money of unsuccessful Tenderers will be returned without interest within 28 days of the end of Tender Validity Period subject to provisions of Para 9.4 (b).

c) The Earnest Money shall be refunded only through Electronic Fund Transfer. The tenderer shall submit RTGS/NEFT Mandate Form as per proforma given in Annexure IX, duly filled in.

d) In case of both Two Packet and Single Packet System, the Earnest Money of the successful Tenderer, without any interest, will be adjusted as a part of the Security Deposit payable in terms of provisions in the General Conditions of Contract (Clause 1A of Clauses of Contract).

9.4 The Earnest Money is liable to be forfeited

- a) if after bid opening, but before expiry of bid validity or issue of Letter of Acceptance, whichever is earlier, any Tenderer
 - i) withdraws his tender or
 - ii) makes any modification in the terms and conditions of the tender which are not acceptable to the Employer.
- b) in case any statement/information/document furnished by the Tenderer is found to be incorrect or false.
- c) in the case of a successful Tenderer, if the Tenderer
 - i) fails to furnish the Performance Guarantee within the period specified under Clause 1 of “Clauses of Contract”. or
 - ii) fails to commence the work without valid reasons within the period as specified in Schedule F after the date of issue of Letter of Acceptance or from the first date of handing over of the site, whichever is later.



In case of forfeiture of E.M. as prescribed hereinabove, the Tenderer shall not be allowed to participate in the retendering process of the work.

10.0 ALTERNATIVE PROPOSALS BY THE TENDERERS

The Tenderers shall submit offers which comply strictly with the requirements of the Tender Document as amended from time to time as indicated in Para 7.0 above. Alternatives or any modifications shall render the Tender invalid.

11.0 SUBMISSION OF TENDER

11.1 Two Packet System and Single Packet System

(a) Two Packet System : Applicable

The tenderer shall submit the Tender in original in two packets as under:-

PACKET A:- TECHNICAL BID

Envelope 1

Earnest Money alongwith Mandate Form as per Annexure-IX duly filled in & Cost of Tender Document if the bid is submitted on the document downloaded from RITES website, unless exempted from both payments as a matter of Government Policy. If exempted, the document, the documents substantiating such exemption must be placed in this envelope.

Envelope 2

“Authority to Sign”, „Integrity Pact’ (when applicable) and Qualification Information along with all enclosures / documents as per Letter of Transmittal/ Checklist given in **Annexure II A/IIB(L)/IIB(N)**. As regards “Authority to Sign” Para 11.2 below may be referred to. As regards „Integrity Pact’, para 11.7 below may be referred to.

Technical Bid (Part 1 and Part 3) (Refer Para 4.1) including signature on Tender Form (Section 2) duly witnessed after filling up blanks therein.

Each page of the above documents including all Drawings should bear the dated initials of the Tenderer along with the seal of the Company, in token of confirmation of having understood the Contents.

PACKET B:- FINANCIAL BID

Envelope 3 Schedule/Bill of Quantities.

Each page of the Financial Bid (Part 2 – Refer Para 4.1) should be signed by the Tenderer along with the seal of the company. In the last page of Financial Bid, at the end, the Tenderer should sign in full with the name of the Company, Seal of the Company and Date.

All rates and amounts, whether in figures and words, must be written in indelible ink. Each Correction, Cutting, Addition and overwriting should be initialed by the Tenderer.

The rates must be quoted in decimal coinage. Amounts must be quoted in full rupees by ignoring fifty paise and less and considering more than fifty paise as rupee one. If the same item figures in more than one section/part of Schedule of Quantities, the Tenderer should quote the same rate for that item in all sections/parts. If different rates are quoted for the same item, the least of the different rates quoted only shall be considered for evaluation of that item in all sections/parts of the Schedule of Quantities.

Instructions contained in subsequent Para 17.6 (a) on “Item rate tender” and 17.6 (b) on “Percentage rate tender” may be carefully studied and complied with.

- b) **Single Packet System** : Both Technical Bid (including signature on Tender Form in Section 2 duly witnessed) and Financial Bid Documents will be submitted in one Packet. Precautions as described above for Two Packet System shall be observed by the tenderers.

11.2 Authority to Sign

- a) If the applicant is an individual, he should sign above his full type written name and current address.
- b) If the applicant is a proprietary firm, the Proprietor should sign above his full type written name and the full name of his firm with its current address.
- c) If the applicant is a firm in partnership, the Documents should be signed by all the partners of the firm above their full type written names and current addresses. Alternatively the Documents should be signed by the person holding Power of Attorney for the firm in the Format at **Annexure IV**.
- d) If the applicant is a limited Company, or a Corporation, the Documents shall be signed by a duly authorized person holding Power of Attorney for signing the Documents in the Format at **Annexure IV**.
- e) If the applicant is a Joint Venture, the Documents shall be signed by the Lead Member holding Power of Attorney for signing the Document in the Format at **Annexure V**. The signatory on behalf of such Lead Partner shall be the one holding the Power of Attorney in the Format at **Annexure IV**.

11.3 Items to be kept in mind while furnishing details

While filling in Qualification Information documents and the Financial Bid, following should be kept in mind:

- i) There shall be no additions or alterations except those to comply with the instructions issued by the Employer or as necessary to correct errors, if any, made by the Tenderers.
- ii) Conditional Offer/ Tender will be rejected. Unconditional rebate/ discounts in the Financial offer will however be accepted.

- iii) The Employer reserves the right to accept or reject any conditional rebate/discounts. While evaluating the Bid Price, the conditional rebates/discounts which are in excess of the requirements of the bidding documents or otherwise result in accrual of unsolicited benefits to the Employer, shall not be taken into account.

11.4 Sealing and Marking of Tenders

11.4.1 Two Packet System : Applicable

(a) PACKET A – TECHNICAL BID

Envelopes 1 & 2 as described in Para 11.1 (a) above should be sealed separately superscribing “Technical Bid” with Envelope Number, Name of the work and Name of the tenderer. In addition, the following should also be superscribed on the respective envelopes.

- | | |
|------------|---|
| Envelope 1 | i) Earnest Money alongwith Mandate Form as per Annexure – IX.
ii) Cost of Tender Document if the Bid is submitted on the document downloaded from RITES website.
iii) If the Bidder is exempted from payment of Earnest Money and Cost of Tender Document, he should superscribe “Documents Substantiating Exemption from Payment of Earnest Money and Cost of Tender Documents’. |
| Envelope 2 | i) Authority to Sign, „Integrity Pact’ (when applicable as per para 11.7 below) and Qualification Information/ documents as per checklist in Annexure IIA / IIB(L)/ II B (N) .
ii) Technical Bid including Drawings |

Both the envelopes should be put in a packet which should be sealed. The following should be superscribed on the packet:

- i) Packet A – Technical Bid
- ii) Name of the Work
- iii) Name of the Tenderer

(b) PACKET B – FINANCIAL BID

Envelope 3 – Financial Bid should be put in Packet B which should be sealed. The following should be superscribed on the packet.

- i) Packet B - Financial Bid
- ii) Name of the work
- iii) Name of the tenderer

- (c) Both packets A and B should be put inside an outer envelope and sealed. This envelope should be superscribed with the following details:

- i) Tender for (Name of work)
- ii) Tender number
- iii) Date and time of opening of Tender
- iv) From (Name of Tenderer)
- v) Addressed to ---- (RITES Officer inviting the Tender)

11.4.2 Single Packet System

Two envelopes of Technical Bid and one of Financial Bid shall be made out as stipulated in Para 11.4.1 (a) and (b) above with the Name of the work and Name of the Tenderer superscribed on each of the envelopes. All the three envelopes shall be put in a Single Packet which shall be superscribed in the same manner as given in Para 11.4.1 (c) above.

11.4.3 If the envelopes and packets are not superscribed and sealed as indicated in Paras 11.4.1/ 11.4.2 above, the Employer will assume no responsibility for the misplacement or premature opening of the Tender.

11.5 Deadline for submission of Tender

11.5.1 Tenders must be received by the Employer at the following address not later than **14.00 Hrs. on 06.11.2013**. In the event of the specified date for the submission of the Tender being declared a holiday due to Strike/Bandh or on any account by the Employer, the Tenders will be received up to the appointed time on the next working day.

Address for submission of Tender: Office of **Group General Manager (Projects)**, **RITES Ltd, Regional Project Office, 56,C.R.Avenue, 2nd floor, Kolkata 700012**

11.5.2 The Employer may extend the deadline for submission of Tenders by issuing an amendment in writing in accordance with Para 7.3 in which case all rights and obligations of the Employer and the Tenderer previously subject to the original deadline will be subject to new deadline.

11.6 Late Tender / Delayed Tender

Any Tender received by the Employer after the specified date and time of receipt of Tender will be returned unopened to the Tenderer.

11.7 Integrity Pact

- (i) The Bidder/Contractor is required to enter into an Integrity Pact with the Employer, in the Format at **Annexure VIII**. The Integrity Pact enclosed as **Annexure VIII** will be signed by RITES for and on behalf of Employer as its Agent/Power of Attorney Holder at the time of execution of Agreement with the successful Bidder. While submitting the Bid, the Integrity Pact shall be signed by the duly authorized signatory of the Bidder/Lead Member of JV. In case of failure to submit the Integrity Pact duly signed and witnessed, along with the Bid, the Bid is likely to be rejected.

- (ii) In case of any contradiction between the Terms and Conditions of the Bid Document and the Integrity Pact, the former will prevail.

Provided always that provision of this para 11.7 – Integrity Pact, shall be applicable only when so provided in para 11.7A below which will also stipulate the name and address of the Independent External Monitor as well as the Name, designation and address of the official nominated by the Employer to act as the Liaison Officer between the Independent External Monitor and the Engineer-in-Charge as well as the Contractor.

11.7A Whether para 11.7 (Integrity Pact) shall be applicable YES

If Yes, Name and Address of the Independent External Monitor (In case value of contract is Rs.10 crores or more)

**Sri B.S. Minhas,
A-29, Bhairon Marg,
Hanuman Nagar,
Jaipur – 302 021.**

Name, Designation and Address of RITES' Liaison Officer

**Sri Y.K. Sharma,
Group General Manager/Airport,
RITES Ltd., Gurgaon.**

11.8 Modification and Withdrawal of Bids

11.8.1 Tenderers may modify or withdraw their bids by giving notice in writing before the deadline prescribed in para 11.5 for submission of Bids.

11.8.2 Each modification or withdrawal notice shall be prepared, sealed, marked and delivered in accordance with paras 11.1, 11.2 and 11.4 with the outer envelopes additionally marked „Modification' or „Withdrawal' as appropriate.

The envelopes for modifications on „Technical Bid' and „Financial Bid' shall be submitted in separate sealed envelopes and marked as „Modifications of Technical Bid' or „Modifications of Financial Bid' as the case may be.

11.8.3 No bid may be modified after the deadline for submission of Bids except as indicated below. If a Bidder makes a suo moto offer of rebate / discount in his Financial Bid after the deadline for submission of Bids, such offer will not be considered for Financial evaluation of Tenders. But if the Tenderer is successful in the Bid based on his original offer without considering the suo moto offer, the rebate / discount offered will be taken into account for incorporation in the Contract Agreement.

11.8.4 Withdrawal or modification of a Bid, subject to provisions in Para 11.8.3 above, after the deadline for submission of Bids shall result in forfeiture of the Earnest Money.

12.0 TENDER OPENING, EVALUATION AND CLARIFICATIONS OF APPLICATIONS

12.1 The Employer will open all the Tenders received (except those received late or delayed) as described in para 12.2/12.3 below, in the presence of the Tenderers or their representatives who choose to attend at **14.30 Hrs. on 06.11.2013** in the office of **Group General Manager (Project), RITES Ltd, Regional Project Office, 56,C.R.Avenue, 2nd floor, Kolkata 700012**. In the event of the specified date of the opening being declared a holiday by the Employer, the Tenders will be opened at the appointed time and location on the next working day.

12.2 Two Packet System : Applicable

- (a) (i) The PACKET A will be opened and Envelope 1 containing Earnest Money and Cost of Tender Document (where Bid is submitted in the document downloaded from RITES website) of all the Tenderers will be opened first and checked. If the Earnest Money furnished is not for the stipulated amount or is not in an acceptable form (unless exempted) and where applicable, the cost of Tender Document has not been enclosed for the correct amount and in an acceptable form (unless exempted), the Envelope 2 of PACKET A (TECHNICAL BID) and PACKET B will be returned to the Tenderer concerned unopened at the time of opening of the Tender itself. The Envelopes 2 of PACKET A (TECHNICAL BID) of other Tenderers who have furnished Earnest Money of correct amount in acceptable form (unless exempted) and where applicable the cost of Tender Document for the correct amount and in an acceptable form (unless exempted) will then be opened. The Tenderer's name, the presence of Earnest Money and Authority to sign and such other details as the Employer may consider appropriate will be announced by the Employer at the time of opening of Packet A. PACKET B (FINANCIAL BID) of the Tenderers whose Technical Bids have been accepted for evaluation will be checked to see if the seals are intact. All such PACKETS B will be put in an envelope and sealed. The Employer's official opening the Tender will sign on this envelope and will also take the signatures of preferably atleast two Tenderers or their representatives present. This envelope will be kept in safe custody by the Employer.
- (b) The Employer will scrutinise the Technical Bids accepted for evaluation to determine whether each Tenderer
- (i) has submitted 'Authority to sign' as per para 11.2 above and Integrity Pact (where applicable) duly signed and witnessed as per para 11.7 above;
- (ii) meets the Qualification Criteria stipulated in Para 2.0; and
- (iii) conforms to all terms, conditions and specifications of the Tender Document without any modifications or conditions.
- (c) If required, the Employer may ask any such Tenderer for clarifications on his Technical Bid. The request for clarification and the response from the Tenderer will be in writing. If a Tenderer does not submit the clarification/document requested, by the date and time set in the Employer's request for clarification, the bid of such Tenderer is likely to be rejected. Tenderers whose Technical Bids are not found acceptable will be advised of the same and their Earnest Money and PACKET B

(FINANCIAL BID) will be returned unopened. Tenderers whose Technical Bids are found acceptable will be advised accordingly and will also be intimated in writing of the time and date and place where and when the PACKET B (Financial Bid) will be opened.

- (d) At the appointed place, time and date, in the presence of the Tenderers or their representatives who choose to be present, the Employer will open the envelopes containing the PACKET B (FINANCIAL BID). The Tenderer's name, the tender amount quoted and such other details as the Employer may consider appropriate will be announced by the Employer.

12.3 Single Packet System

- (a) Envelope 1 of all the Tenders will be opened first and checked. If the Earnest Money furnished is not for the stipulated amount or is not in an acceptable form (unless exempted) and where applicable the Cost of Tender Document has not been furnished for the correct amount and in an acceptable form (unless exempted), the remaining envelopes will be returned to the tenderer concerned unopened at the time of opening of the Tender itself. The Envelopes no. 2 of Technical Bid and no. 3 of Financial Bid of other Tenderers who have furnished Earnest Money and where applicable the Cost of Tender Document, in acceptable form (unless exempted) will then be opened. The Tenderer's name, the presence of Earnest Money, the Authority to Sign the Tender, amount quoted and such other details as the Employer may consider appropriate will be announced by the Employer.

13.0 INSPECTION OF SITE BY THE TENDERERS

Tenderers are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their Tenders, as to the nature of the ground and sub-soil (as far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their Tender. A Tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed. The Tenderer shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity, access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a Tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant etc. will be issued to him by the Employer and local conditions and other factors having a bearing on the execution of the work.

14.0 EMPLOYER'S RIGHT ON ACCEPTANCE OF ANY TENDER

- (i) If required, the Employer may ask any Tenderer the breakdown of unit rates. If the Tenderer does not submit the clarification by the date and time set in the Employers request for clarification, such Tender is likely to be rejected.

- (ii) The competent authority on behalf of the Employer does not bind himself to accept the lowest or any other Tender and reserves to himself the authority to reject any or all the Tenders received without the assignment of any reason. All Tenders in which any of the prescribed conditions is not fulfilled or any condition is put forth by the Tenderer shall be summarily rejected.

15.0 CANVASSING PROHIBITED

Canvassing whether directly or indirectly, in connection with tenders is strictly prohibited and the tenders submitted by the Contractors who resort to canvassing will be liable to rejection.

16.0 EMPLOYER'S RIGHT TO ACCEPT WHOLE OR PART OF THE TENDER

The competent authority on behalf of the Employer reserves to himself the right of accepting the whole or any part of the tender and the Tenderer shall be bound to perform the same at the rates quoted.

17.0 MISCELLANEOUS RULES AND DIRECTIONS

- 17.1 The Tenderer shall not be permitted to tender for works if his near relative is posted as Associated Finance Officer between the grades of AGM(F) and J.M (F) in the concerned SBU Unit of RITES or as an officer in any capacity between the grades of GGM/GM and Engineer (both inclusive) of the concerned SBU of the Employer. He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any Gazetted officer in the organization of the Employer. Any breach of this condition by the Tenderer would render his Tender to be rejected.

No Engineer of Gazetted rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Organisation of the Employer is allowed to work as a contractor for a period of one year after his retirement from the Employer's service without the previous permission of the Employer in writing. The contract is liable to be cancelled if either the Contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Employer as aforesaid before submission of the tender or engagement in the Contractor's service.

- 17.2 If required by the Employer, the Tenderers shall sign a declaration under the officials Secret Act 1923, for maintaining secrecy of the tender documents drawings or other records connected with the work given to them. The unsuccessful Tenderers shall return all the drawings given to them.
- 17.3 Use of correcting fluid anywhere in tender document is not permitted. Such tender is liable for rejection.
- 17.4 a) In the case of Item Rate Tenders, only rates quoted shall be considered. Any tender containing percentage below/above the rates quoted is liable to be rejected. Rates quoted by the Tenderer in item rate tender in figures and words shall be accurately filled in so that there is no discrepancy in the rates written in figures and words. However, if a discrepancy is found, the rates which correspond with the amount worked out by the Tenderer shall unless otherwise proved be taken as correct. If the

amount of an item is not worked out by the Tenderer or it does not correspond with the rates written either in figures or in words then the rates quoted by the Tenderer in words shall be taken as correct. Where the rates quoted by the Tenderer in figures and in words tally but the amount is not worked out correctly, the rates quoted by the Tenderer will, unless otherwise provided, be taken as correct and not the amount. In the event that no rate has been quoted for any item(s), leaving space both in figure (s) or word(s) and the amount blank, it will be presumed that the Tenderer has included the cost of this/ these item (s) in other items and rate for such item (s) will be considered as zero and work will be required to be executed accordingly.

- b) In case of percentage Rate Tender only percentage quoted shall be considered. Any tender containing item rates is liable to be rejected. Percentage quoted by the Tenderer in percentage rate tender shall be accurately filled in figures and words so that there is no discrepancy. If, for any Schedule in Financial Bid, the total amount has been indicated by the Tenderer and if discrepancy is noticed in the percentages quoted in words and figures, then the percentage which corresponds with the total amount, shall, unless otherwise proved be taken as correct. If the total amount is not worked out or if worked out, it does not correspond with the percentages written either in figures or in words, then the percentage quoted by Tenderer in words shall be taken as correct. When the percentages quoted by the Tenderer in figures and in words tally but the total amount is not worked out correctly, the percentage quoted by the Tenderes shall be taken as correct, unless proved otherwise and the total amount worked out accordingly.

17.5 In the case of any Item rate tender where unit rate of any item/items appears unrealistic, such tender will be considered as unbalanced and in case the Tenderer is unable to provide satisfactory explanation, such a tender is liable to be disqualified and rejected.

17.6 (a) In Item rate Tender, all rates shall be quoted on the tender form. The amount for each item should be worked out and requisite totals given. Special care should be taken to write the rates in figures as well as in words and the amount in figures only, in such a way that interpolation is not possible. The total amount in each Schedule should be written both in figures and in words. In case of figures, the word 'Rs.' should be written before the figure of rupees and word 'P' after the decimal figures, e.g. Rs.2.15 P and in case of words, the word, 'Rupees' should precede and the word 'Paise' should be written at the end. Unless the rate is in whole rupees and followed by the word 'only' it should invariably be up to two decimal places. While quoting the rate in schedule of quantities, the word 'only' should be written closely following the amount and it should not be written in the next line.

(b) In Percentage Rate Tender, the Tenderer shall quote percentage below / above (in figures as well as in words) at which he will be willing to execute the work. He shall also work out the total amount of his offer and the same should be written in figures as well as in words in such a way that no interpolation is possible. In case of figures, the word "Rs" should be written before the figure rupees and word 'P' after the decimal figures (eg.) Rs.2.15 P and in case of words the word "Rupees" should precede and the word "Paisa" should be written at the end.

- 17.7 Sales-tax/VAT (except Service Tax), purchase tax, turnover tax or any other tax/ Cess on material, labour and Works in respect of this Contract shall be payable by the Contractor and the Employer will not entertain any claim whatsoever in respect of the same. However, in respect of Service Tax, same shall be paid by the Contractor to the concerned department on demand and it will be reimbursed to him by the Engineer-in-Charge after satisfying that it has been actually and genuinely paid by the Contractor.
- 17.8 Each Bidder shall submit only one Bid either as an individual or as a Proprietor in a Proprietary firm or as a Partner in a Partnership firm or as a Director of a limited Company/Corporation or as a Partner in a Joint Venture. Any Bidder who has submitted a Bid for a work, shall not be a witness for any other Bidder for the same work. Failure to observe the above stipulations would render all such Tenders submitted as a Bidder and / or as a witness, liable to summary rejection.
- 17.9 The Contractor shall be fully responsible for all matters arising out of the Performance of the Contract and shall, at his own expense, comply with all laws/ acts/ enactments/ orders/ regulations/ obligations whatsoever of the Government of India, State Government, Local Body and any Statutory Authority.

18.0 SIGNING OF CONTRACT AGREEMENT

- 18.1 The Tenderer whose tender has been accepted will be notified of the award by the Employer by issue of a 'Letter of Acceptance' ,,prior to expiration of the Bid Validity period, in the form at **Annexure VI**.

The Letter of Acceptance will be sent to the Contractor in two copies one of which he should return promptly, duly signed and stamped. The Letter of Acceptance will be a binding Contract between the Employer and the Contractor till the formal Contract Agreement is executed.

- 18.2 Within the period as specified in Clause 1 of 'Clause of Contract', of the date of issue of Letter of Acceptance, the successful Tenderer shall deliver to the Employer, Performance Guarantee and Additional Performance Guarantee (where applicable) in the format prescribed.
- 18.3 The Tenderer whose Tender is accepted shall be required to submit at his cost stamp papers of appropriate value as per the provisions of Indian Stamp Act within 15 days of the date of issue of Letter of Acceptance.
- 18.4 At the same time the Employer notifies the successful Tenderer that his Tender has been accepted, the Employer will direct him to attend the Employer's office within 28 days of issue of Letter of Acceptance for signing the Agreement in the proforma at **Annexure VII**. The Agreement will however be signed only after the Contractor furnishes Performance Guarantee and Additional Performance Guarantee (where applicable) and hence, where justified, the period of 28 days stipulated above will be extended suitably.

QUALIFYING CRITERIA FOR WORKS CONTRACTS**1. Annual Financial Turnover**

The bidder should have achieved a minimum average annual turnover (MAT) of **Rs. 36.40 Crores**.

Notes:

- Average annual turnover is to be determined taking into consideration turnover of best 3 financial years out of last 5 financial years. Other income shall not be considered for arriving at annual turnover.
- However, in case where audited results for the preceding financial year are not available, certification of financial statements from a practicing Chartered Accountant shall also be considered acceptable.
- A tolerance limit @ 5% (Five Percent) on the quantum of QR may be provided to take care of marginal shortfall.

2. WORK EXPERIENCE**a) Similar Works Experience**

The Bidder should have satisfactorily completed in his **own capacity** at least one similar work of minimum value of **Rs. 29.12 Crores** OR at least two similar works each of minimum value of **Rs. 18.2 Crores** OR at least three similar works each of minimum value of **Rs. 14.56 Crores** during the last 7 (seven) years ending last day of month previous to the one in which the offer has been invited. Works completed prior to the cut off date shall not be considered.

Similar Works

Similar Works shall mean the work of construction of earthwork in formation, bridges in Railway work carried out in India.

Notes :

- Only such works shall be considered where the executed/completed portion of Work Order/AMC/RC, payment receipt documents with reference to Work order No. and date of execution certificate with executed value and referred order No. be also considered as a proof of execution, even if the work has not been completed in totality (subject to furnishing proof of executed value of the work in the form of certified copies of RA bills).
- A tolerance limit @ 5% (Five Percent) on the quantum of QR may be provided to take care of marginal shortfall.

3. POSITION OF WORKING CAPITAL:

Working Capital should be considered for the last financial year. Net Working Capital or access to Credit Facilities of the bidder should be more than **Rs. 6.07 Crores**.

Note:

A tolerance limit @ 5% (Five Percent) on the quantum of QR may be provided to take care of marginl shortfall.

4. NET WORTH:

Net Worth of the bidder as on the last day of the preceding financial year shall not be less than 100% of the paid up share capital.

Net Worth means the sum total of the paid up share capital and free reserves. Free reserve means all reserves credited out of the profits and share premium account but does not include reserves credited out of the revaluation of the assets, write back of depreciation provision and amalgamation. Further any debit balance of Profit and Loss Account and miscellaneous expenses to the extent not adjusted or written off, if any, shall be reduced from reserves and surplus.

5. DECLARATION BY THE BIDDER

Even though the Bidders may meet the above qualifying criteria, they are subject to be disqualified if they have

- a) Made misleading or false representation in the forms, statements and attachments in proof of the qualification requirements. In such a case, besides Tenderer's liability to action under para 9.4 of Instructions to Tenderers, the Tenderer is liable to face the penalty of banning of business dealings with him by RITES.
- b) Records of poor performance such as abandoning the work, not properly completing the contract, inordinate delays in completion, litigation history or financial failures etc.
- c) Their business banned or suspended by any Central/State Government Department/ Public Undertaking or Enterprise of Central/State Government and such ban is in force.
- d) Not submitted all the supporting documents or not furnished the relevant details as per the prescribed format.

A declaration to the above effect in the form of affidavit on stamp paper of Rs. 10/- duly attested by Notary/Magistrate should be submitted as per format given in **Proforma 3** enclosed.



Proforma-1

**LIST OF SIMILAR WORKS SATISFYING QUALIFICATION CRITERION
COMPLETED DURING THE LAST 7 YEARS**

S. No.	Client's Name and Address	Name of the Work & Location	Scope of work carried out by the Bidder	Agreement / Letter of Award No. and date	Contract Value		Date of start	Date of Completion		Reasons for delay in completion if any	Ref. of document (with page no.) in support of meeting Qualification Criterion
					Awarded	Actual on completion		As per LOA/ Agreement	Actual		

SEAL AND SIGNATURE OF THE BIDDER

Note :

1. In support of having completed above works, attach self attested copies of the completion certificate or executed/completed portion of work order, even if the work has not been completed in totality (subject to furnishing proof of executed value of the work in the form of certified copies of RA bills) from the owner/client or Executing Agency / Consultant appointed by owner / Client indicating the name of work, the description of work done by the Bidder, date of start, date of completion (contractual & actual) and contract value as awarded and as executed by the Bidder . “Contract Value” shall mean gross value of the completed work including cost of materials supplied by the owner/client but excluding those supplied free of cost, as the case may be.
2. Such Credential certificates issued by Organizations, the work executed under whom, shall only be accepted for assessing the eligibility of a Tenderer.

3. Information must be furnished for works carried out by the Bidder in his own name or proportionate share as member of a Joint Venture. In the latter case details of contract value including extent of financial participation by partners in that work should be furnished.
4. Use a separate sheet for each partner in case of a Joint Venture.
5. Only similar works executed/completed portion of work order, even if the work has not been completed in totality (subject to furnishing proof of executed value of the work in the form of certified copies of RA bills) during the last 7 years ending last day of month previous to the one the offer has been invited, which meet the Qualification Criterion need be included in this list.



Proforma 2

**SOLVENCY CERTIFICATE FROM A NATIONALISED
OR A SCHEDULED BANK**

This is to certify that to the best of our knowledge and information, M/s _____, having their registered office at _____, a customer of our Bank, is a reputed company with a good financial standing and can be treated as solvent to the extent of Rs. _____. This certificate is issued without any guarantee or risk and responsibility on the Bank or any of its officers.

Signature with date
Senior Bank Manager (Name of Officer issuing the
Certificate)
Name, address & Seal of the Bank/ Branch

Note:

Banker's Certificate should be on letter head of the Bank.



Proforma 3

DECLARATION BY THE BIDDER

(Affidavit on Non-Judicial Stamp Paper of Rs.10/- duly attested by Notary / Magistrate)

This is to certify that We, M/s. _____, in submission of this offer confirm that:-

- i) We have not made any misleading or false representation in the forms, statements and attachments in proof of the qualification requirements;
- ii) We do not have records of poor performance such as abandoning the work, not properly completing the contract, inordinate delays in completion, litigation history or financial failures etc.
- iii) No Central / State Government Department/ Public Sector Undertaking or Enterprise of Central / State Government has banned/suspended business dealings with us as on date.
- iv) We have submitted all the supporting documents and furnished the relevant details as per prescribed format.
- v) List of Similar Works satisfying Qualification Criterion indicated in Proforma 1 does not include any work which has been carried out by us through a Subcontractor on a back to back basis.
- vi) The information and documents submitted with the Tender and those to be submitted subsequently by way of clarifications / making good deficient documents are correct and we are fully responsible for the correctness of the information and documents submitted by us.
- vii) We understand that in case any statement/information/document furnished by us or to be furnished by us in connection with this offer, is found to be incorrect or false, our EMD in full will be forfeited and business dealings will be banned.

SEAL, SIGNATURE & NAME OF THE BIDDER

signing this document



ANNEXURE I A

CHECK LIST OF DOCUMENTS TO BE SUBMITTED

1. a) BY BIDDERS OTHER THAN JOINT VENTURES

i) **Annual Financial Turnover**

- Annual financial turnover for each of the last 5 Financial Years in tabular form.
- Self attested copies of Auditor's Report along with the Balance Sheet and Profit and Loss Statement for the relevant Financial Years in which the minimum criterion is met (Refer Notes under Para 1 of **Annexure I**).

ii) **Work Experience**

- Similar Work Experience : **Proforma 1 of Annexure I** with details of 1, 2 or 3 works as the case may be, which satisfy requisite qualification criterion with self attested copies of supporting document (Refer Para 2a of **Annexure I**).

iii) **Working Capital**

Documents substantiating Net Working Capital or Access to Credit Facilities as indicated in QR.

iv) **Net Worth**

Documents substantiating Net Worth as indicated in QR.

Declaration by Bidder

Proforma 3 (Refer Para 5 of Annexure I)

- vi) **Integrity Pact** (where applicable): duly signed and witnessed in the format at **Annexure VIII** (Refer para 11.7 of NIT & Instructions to Tenderers)

b) BY JOINT VENTURE PARTNERS FOR "LARGE WORKS" :

(1) By Partner-in-Charge/Lead Member

- i) JV MOU/Agreement (Refer Para 2.4 of NIT & Instructions to Tenderers)
- ii) Power of Attorney (Refer Para 2.4 of NIT & Instructions to Tenderers)
- iii) Annual Turnover : As in a(i) above
- iv) Work Experience

- Similar Work Experience : As in (a) (ii) above
- v) Working Capital: As in (a) (iii) above.
 - vi) Net Worth: As in (a) (iv) above.
 - vii) Declaration by Bidder: As in (a) (v) above.
 - viii) Integrity Pact: duly signed and witnessed, as in (a) (vi) above.

(2) By Partners other than Partner-in-Charge/Lead Member

- i) Annual Turnover: As in (a) (i) above)
- ii) Work Experience
 - Similar Work Experience : As in (a) (ii) above
 - Construction Experience in Key activities/specialised components: As in (a) (ii) above.
- iii) Working Capital: As in (a) (iii) above .
- iv) Net Worth: As in (a) (iv) above.
- v) Declaration by Bidder: As in (a) (v) above.

c) **BY JOINT VENTURE PARTNERS FOR “NORMAL WORKS”: Not Applicable**

(1) By Partner-in-Charge/Lead Member

- i) JV MOU/Agreement (Refer Para 2.4 of NIT & Instructions to Tenderers)
- ii) Power of Attorney (Refer Para 2.4 of NIT & Instructions to Tenderers)
- iii) Annual Turnover: As in a(i) above – to meet 100 % of requirement as per criterion
- iv) Work Experience

Similar Work Experience : As in (a) (ii) above – to meet 100% of requirement as per criterion
- v) Working Capital: As per (a) (iii) above – To the extent of 100% financial participation
- vi) Net Worth: As in (a) (iv) above.
- vii) Declaration by Bidder: As in (a) (v) above.
- vi) Integrity Pact: duly signed and witnessed, as in (a) (vi) above.

(2) By Partners other than Partner-in-Charge/Lead Member

- i) Work Experience: Construction experience in Key Activities/ Specialised Components As in (a) (ii) above.
- ii) Declaration by Bidder: As in (a) (v) above.



ANNEXURE II A

QUALIFICATION INFORMATION/CHECKLIST OF DOCUMENTS --LETTER OF TRANSMITTAL BY OTHER THAN JOINT VENTURES (on letter head of the Applicant)

From _____ To RITES Ltd. _____
(Authority Inviting
Tender)
Sir,

Sub: Submission of Qualification information /documents as per Checklist.

1. I/We hereby submit the following documents in support of my/our satisfying the Qualification Criteria laid down for the work:-
 - a) Self attested copy of a certificate, confirming that the applicant is a working contractor or has executed any work within the last seven years reckoned from the date of opening of Tender, issued by a Government Organization/Semi Government Organization of Central or State Government; or by Public Sector Undertaking/Autonomous Body of Central or State government; or by a Public Ltd. Company listed in Stock Exchange in India or Abroad.
 - b) Annual Financial Turnover
 - (i) Annual financial turnover for each of the last 5 Financial Years in a tabular form.
 - (ii) Self attested copy of Auditor's Report along with the Balance Sheet and Profit and Loss Statement and Schedules for the relevant Financial Year in which the minimum criterion is met, with calculations in support of the same.
 - c) Work Experience
 - i) Similar Work Experience :- In **Proforma 1** with details of 1 / 2 / 3 works as applicable and self attested copies of supporting documents as mentioned therein.
 - ii) Construction experience in key activities / specialised components: Tabular Statement giving contract wise quantities executed in last 7 years with documentary proof.
 - d) Working Capital
 - e) Net Worth
2. In addition the following supporting documents are also enclosed.
 - a) Self attested copy of Partnership Deed/Memorandum and Articles of Association of the Firm.
 - b) Self attested copies of PAN/TAN issued by the Income Tax Department.
 - c) Declaration – **Proforma 3**



- d) Self attested copy of Sales Tax, Works Contract Tax, Service Tax Registration Certificate (as applicable).
 - e) Self attested copy of Registration under Labour Laws, like PF, ESI etc.
 - f) Self attested copy of ISO 9000 Certificate (if any)
 - g) Integrity Pact (where applicable): duly signed and witnessed.
3. I authorize you to approach any Bank, Individual, Employer, Firm or Corporation, whether mentioned in the enclosed documents or not, to verify our competence and general reputation.
4. I also enclose written Power of Attorney of the signatory of the Tender on behalf of the Tenderer.

Yours faithfully,

Encl: As in Paras 1, 2 & 4

Signature of Applicant
with Name _____
Date with seal



ANNEXURE II B (L)

**QUALIFICATION INFORMATION /CHECKLIST OF DOCUMENTS
– LETTER OF TRANSMITTAL BY JOINT VENTURE**

(FOR LARGE WORKS COSTING OVER Rs.30 CRORES)
(To be signed by the Lead Member on his Letter Head)

From

To

RITES Ltd. _____

(AUTHORITY INVITING TENDER)

Sir,

Subject: Submission of Qualification Information/ documents as per Checklist.

1. As the Lead Member of the Joint Venture, I/We hereby submit the following documents in support of our JV:
 - a) Self certified copy of the Joint Venture Agreement/Memorandum of Understanding.
 - b) Power of Attorney in my/our favour as the Lead Member executed by the authorized representatives of all the members.
 - c) Self attested copy of Sales Tax, Works Contract Tax, Service Registration Certificate (as applicable).
 - d) Self attested copy of Registration under Labour Laws, like PF, ESI etc.
 - e) Self attested copy of ISO 9000 Certificate (if any)
 - f) Integrity Pact (where applicable) – Duly signed and witnessed.
- 2) I/We also enclose the following documents pertaining to each of the Partners including Lead Partner duly signed by the Authorized representative of each Partner/Member of J.V.
 - i) **Qualification Criteria**
 - a) Self attested copy of a certificate, confirming that the applicant is a working contractor or has executed any work within the last seven years ending last day of month previous to the one in which Tender being invited, issued by Railways, CPWD, MES, DOT, RITES, State PWD or any other Central/State Government Undertaking, Municipal Body, Autonomous Body of Central or State Government or Public Limited Company listed on NSE/BSE.
 - b) Annual Turnover
 - Annual financial turnover for each of the last 5 Financial Years in tabular form.



- Self attested copy of Auditor's Report along with the Balance Sheet and Profit and Loss Statement and Schedules for the relevant Financial Years in which the minimum criterion is met, with calculations in support of the same.

c) Work Experience

- Similar Works Experience :- In **Proforma 1** with details of 1 / 2 / 3 works as applicable and self attested copies of supporting documents as mentioned therein.
- Construction experience in key activities / specialised components:-
Tabular Statement giving contract wise quantities executed in last 5 years with documentary proof.

d) Working Capital – documentary evidence in support of the same.

e) Net Worth - documentary evidence in support of the same.

(ii) **Other Supporting Documents**

- a) Self attested copy of Partnership Deed/Memorandum and Articles of Association of the Firm.
 - b) Self attested copy of PAN/TAN issued by Income Tax Department.
 - c) Declaration – **Proforma 3**
- 3) I/We authorize you to approach any Bank, Individual, Employer, Firm or Corporation, whether mentioned in the enclosed documents or not, to verify the competence and general reputation of each Member of our JV.
- 4) I also enclose written Power of Attorney of the signatory of the Tender on behalf of the Tenderer.

Encl: As in Paras 1, 2 & 4

Yours faithfully,

Signature of Applicant
with Name
Date and Seal



ANNEXURE II B (N)

**QUALIFICATION INFORMATION /CHECKLIST OF DOCUMENTS
- LETTER OF TRANSMITTAL BY JOINT VENTURE**

(FOR NORMAL WORKS COSTING BETWEEN Rs.1 CRORE and Rs.30 CRORES)

(To be signed by the Lead Member in his Letter Head)

From

To

RITES Ltd. _____
(AUTHORITY INVITING TENDER)

Sir,

Subject: Submission of Qualification Information/ documents as per Checklist.

As the Lead Member of the Joint Venture, I/We hereby submit the following documents in support of our JV:

Details pertaining to JV

- a) Self certified copy of the Joint Venture Agreement / Memorandum of Understanding.
- b) Power of Attorney in my/our favour as the Lead Member executed by the authorized representatives of all the members.
- c) Self attested copy of a certificate, confirming that each Member of JV is a working contractor or has executed any work within the last seven years ending last day of month previous to the one in which Tender being invited, issued by Railways, CPWD, MES, DOT, RITES, State PWD or any other Central/State Government Undertaking, Municipal Body, Autonomous Body of Central or State Government or Public Limited Company listed on NSE/BSE.
- d) Self attested copy of Sales Tax, Works Contract Tax, Service Registration Certificate (as applicable).
- e) Self attested copy of Registration under Labour Laws, like PF, ESI etc.
- f) Self attested copy of ISO 9000 Certificate (if any)
- g) Integrity Pact (where applicable) duly signed and witnessed.

Details pertaining to Lead Member

(i) Qualification Criteria

- a) Annual Turnover
 - Annual financial turnover for each of the last 5 Financial Years in a tabular form.
 - Self attested copy of Auditor's Report along with the Balance Sheet and Profit and Loss Statement and Schedules for the relevant Financial Year in which the minimum criterion is met, with calculations in support of the same.



b) Work Experience

- Similar Works Experience: - In **Proforma 1** with details of 1 / 2 / 3 works as applicable and self attested copies of supporting documents as mentioned therein.
- Construction experience in key activities/ specialised components:-
Tabular Statement giving contract wise quantities executed in last 7 years with documentary proof.

c) Working Capital – documentary evidence in support of the same.

d) Net Worth - documentary evidence in support of the same.

ii) **Other supporting documents**

a) Declaration – **Proforma 3**

b) Self attested copy of PAN/TAN issued by the Income Tax Department.

2) I/We also enclose the following documents pertaining to each of the other Partners of J.V. duly signed by the Authorized representative of each Partner/Member of J.V.

i) **Qualification Criteria**

- Work experience
- Construction experience in key activities/ specialised components:-
As per para i (b) above as for Lead Member.

ii) **Other Supporting Documents**

Self attested copy of Partnership Deed/ Memorandum and Articles of Association of the firm.

3) I/We authorize you to approach any Bank, Individual, Employer, Firm or Corporation whether mentioned in the enclosed documents or not, to verify the competence and general reputation of each Member of our JV.

4) I also enclose written Power of Attorney of the signatory of the Tender on behalf of the Tenderer.

Yours faithfully,

Encl: As in Paras 1, 2 & 4

Signature of Applicant
with Name
Date and Seal



ANNEXURE III

**DRAFT MEMORANDUM OF UNDERSTANDING
EXECUTED BY MEMBERS OF THE CONSORTIUM / JOINT VENTURE
(On each firm's Letter Head)**

From

To

RITES Ltd

Dear Sir,

Re: RITES Tender Notice No. _____ dated _____ for _____ (Name of Work)

We wish to conform that our company / firm (delete as appropriate) has formed a Consortium with _____ (insert names of all other members of the group) for purposes associated with your Tender No. _____

(Members who are not the Lead Member of the Consortium should add the following paragraph) *

* The Consortium is led by _____ (insert name of the Lead Member) whom we hereby authorize to act as leader on our behalf for the purposes of submission of Bid for _____ (name of work) and to incur liabilities and receive instructions for and on behalf of any and all the partners of the Joint Venture/Members of the Consortium. For this purpose we have executed a Power of Attorney in favour of _____ (name of the Lead Member)

(Member who is the Lead Member of the Consortium should add the following paragraph)**

** In this Consortium we act as Lead Member and for the purposes of bidding for the work, represent the Consortium.

Till the award of work, the Lead Partner shall furnish Bid bond and all other bonds/guarantees to the Employer on behalf of the Joint Venture, which shall be legally binding on all the partners of the Joint Venture.

In the event of our Consortium being awarded the contract we agree to be jointly with _____ (insert names of all other members of the Consortium) and severally liable to RITES, its successors and assigns for all obligations, liabilities, duties and responsibilities arising from or imposed by the contract subsequently entered into between RITES and our Consortium.



The precise responsibility of the Lead Member and other Members of the Consortium in respect of planning, design, construction equipment, key personnel, work execution and financing of the Work including Percentage of financial participation by each Member will be as indicated in the **Annexure**. These shall not be varied/ modified subsequently without your prior approval.

We further agree that entire execution of the contract shall be carried out exclusively through the Lead Member.

In case our Bid is successful, the Joint Venture Agreement incorporating the above provisions will be executed within 15 days of receipt of Letter of Acceptance from you and shall be registered at the place where the Agreement will be signed, so as to be legally valid and binding on all Members of the Consortium.

We agree that the Joint Venture Agreement shall be valid during the entire currency of the Contract including the period of extension if any, and the maintenance period after the work is completed.

We further confirm that we shall open a Bank Account in the name of JV and all payments due to the JV shall be made by you by crediting to that Account. To facilitate statutory deductions such as towards Income Tax and VAT made from the amounts due to us against our bills, being credited to the concerned Government departments, we shall obtain PAN/TIN number etc. as required and advise you the details before claiming our first on-account bill.

We affirm that the Integrity Pact with the Employer in the format at Annexure VIII (if applicable) shall be signed by the Lead Member duly witnessed, on behalf of the Joint Venture/Consortium. All Members including the Lead Member shall comply with the provision in the Integrity Pact and any violation of the Integrity Pact by any Member shall be construed as violation by the Joint Venture/Consortium.

Encl: Annexure.

Yours faithfully,

Signature _____

(Name of Signatory) _____

(Capacity of signatory) _____

Seal

Witness 1

Name

Address

Occupation

Witness 2

Name

Address

Occupation

Note :

1. To be executed by each Member of the Consortium individually.



ANNEXURE IV

FORMAT FOR POWER OF ATTORNEY TO AUTHORISED SIGNATORY

POWER OF ATTORNEY

(To be executed on non-judicial stamp paper of the appropriate value in accordance with relevant Stamp Act. The stamp paper to be in the name of the firm/ company who is issuing the Power of Attorney).

We, M/s. _____ (name of the firm/company with address of the registered office) hereby constitute, appoint and authorise Mr./Ms. _____ (Name and residential address) who is presently employed with us and holding the position of _____ and whose signature is given below as our Attorney to do in our name and our behalf all or any of the acts, deeds or things necessary or incidental to our bid for the work _____ (name of work), including signing and submission of application / proposal, participating in the meetings, responding to queries, submission of information / documents and generally to represent us in all the dealings with RITES or any other Government Agency or any person, in connection with the works until culmination of the process of bidding, till the Contract Agreement is entered into with RITES and thereafter till the expiry of the Contract Agreement.

We hereby agree to ratify all acts, deeds and things lawfully done by our said Attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid Attorney shall always be deemed to have been done by us.

(Add in the case of a Consortium/Joint Venture)

Our firm is a Member/Lead Member of the Consortium of _____, _____ and _____.

Dated this the _____ day of _____ 20

(Signature and name of authorized signatory being given Power of Attorney)

(Signature and name in block letters of *All the partners of the firm, * Authorized Signatory for the Company)

(* *Strike out whichever is not applicable*)

Seal of firm/ Company

Witness 1:

Name:

Address:

Occupation:

Witness 2:

Name:

Address:

Occupation:

Notes:

- In case the Firm / Company is a Member of a Consortium/ JV, the authorized signatory has to be the one employed by the Lead Member.



- The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.



ANNEXURE V

FORMAT FOR POWER OF ATTORNEY TO LEAD MEMBER OF CONSORTIUM / JOINT VENTURE

(To be executed on non-judicial stamp paper of the appropriate value in accordance with relevant Stamp Act. The stamp paper to be in the name of the company who is issuing the Power of Attorney)

Whereas _____ RITES Ltd. has invited bids for _____ (Name of work) for and on behalf of _____ as an Agent /Power of Attorney Holder.

Whereas, the Members of the Consortium comprising of M/s._____, M/s._____, M/s._____ and M/s._____ (the respective names and addresses of the registered offices to be given) are interested in bidding for the work and implementing the same in accordance with the terms and conditions contained in the bid documents.

Whereas, it is necessary for the members of the Consortium to designate one of them as the Lead Member with all necessary power and authority to do, for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Consortium’s bid for the work.

NOW THIS POWER OF ATTORNEY WITNESSETH THAT

We, M/s._____, M/s _____ and M/s_____ hereby designate M/s. _____ being one of the members of the Consortium, as the Lead Member of the Consortium, to do on behalf of the Consortium, all or any of the acts, deeds or things necessary or incidental to the Consortium’s bid for the work, including submission of application proposal, participating in meetings, responding to queries, submission of information/documents and generally to represent the Consortium in all its dealings with RITES or any other Government Agency or any person, in connection with the work until culmination of the process of bidding till the contract agreement is entered into with RITES and thereafter till the expiry of the contract agreement.

We hereby agree to ratify all acts, deeds and things lawfully done by our said Attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid Attorney shall and shall always be deemed to have been done by us/Consortium.

Dated this the _____ day of _____ 20

(Signature and Name in Block letters of *All the Partners of the firm / * Authorised Signatory for the Company)

(* *Strike out whichever is not applicable*)
Seal of firm / Company

Witness 1
Name:
Address:
Occupation:

Witness 2
Name:
Address:
Occupation:



Notes:

- To be executed by all the members individually, in case of a Consortium.
- The mode of execution of the Power of Attorney should be in accordance with the procedure, if any laid down by the applicable law and the charter documents of the executant (s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.



ANNEXURE VI

**(FORM OF LETTER OF ACCEPTANCE)
(By REGD POST / ACK.DUE)**

(On the letter head of RITES)

NO. : RITES/

Dated :

To

_____ aggregate

(Name & Address of the Contractor)

Dear Sirs,

Sub: TENDER No. _____ FOR THE WORK OF _____

Ref: Your Tender dated _____ and letters dated _____

and this office letter Nos. _____ dated _____ in reply to the same.

This is to notify you that your Tender for the work under reference has been accepted by the Competent Authority of RITES LIMITED for a total Contract Price of Rs. _____ (Rupees _____ only) in its capacity as an Agent /Power of Attorney Holder acting for and on behalf of _____ (the Employer).

Pursuant to Clause 1 of the Contract, you are required to furnish irrevocable Performance Guarantee for an amount equivalent to 5% (Five percent) of the Contract Price and an Additional Performance Guarantee for an amount of Rs. ----- (if applicable). The Guarantee Bonds aggregating for an amount of Rs. _____ are required to be submitted within ___ days of issue of this Letter of Acceptance.

The time of _____ months allowed for execution of the work will be reckoned from the date of start as defined in Schedule F or from the first day of the handing over of the site, whichever is later, in accordance with phasing, if any, indicated in tender document.

You are requested to contact _____ (complete designation and address of the Project Coordinator) for carrying out the contract.

You are also requested to attend this office within Twenty Eight days from the date of issue of this letter for execution of the formal agreement. It may be noted that no payment shall be made for any work carried out by you till the Agreement is executed and till such time the Performance Guarantee and Additional Performance Guarantee (where applicable) has/have been submitted by you.

This Letter of Acceptance is being sent to you in duplicate and you are requested to return without delay one copy of the letter duly signed and stamped, as a token of your acknowledgement.



Kindly note that this Letter of Acceptance thereof shall constitute a binding Contract between us pending execution of formal Agreement.

Your letters as well as this office letters referred to above shall form part of the Contract.

Yours faithfully,

RITES LIMITED

Agent / Power of Attorney Holder

For and on behalf of _____ (The Employer)

Copy to :

1. _____ (The Employer) for information.
(To be included on the Original sent to the Contractor)
2. Project Coordinator (Complete designation and address)
3. Associated Finance (Not in original)



ANNEXURE VII

FORM OF AGREEMENT

(ON NON JUDICIAL STAMP PAPER OF APPROPRIATE VALUE)

Agreement No. _____ dated _____

THIS AGREEMENT is made on _____ day of _____ Two thousand _____ between RITES Ltd. a Government of India Enterprise and a Company registered under Companies Act, 1956 having its registered office at SCOPE Minar, Laxmi Nagar, Delhi - 110092 and its Corporate Office at RITES BHAWAN, Plot No.1, Sector 29, Gurgaon (Haryana) representing through _____, RITES LIMITED acting for and on behalf of and as an Agent /Power of Attorney Holder of _____ hereinafter called the Employer (which expression shall, wherever the context so demands or requires, include their successors in office and assigns) on one part and M/s. _____ hereinafter called the Contractor (which expression shall wherever the context so demands or requires, include his/ their successors and assigns) of the other part.

WHEREAS the Employer is desirous that certain works should be executed viz. _____ (brief description of the work) and has by Letter of Acceptance dated _____ accepted a tender submitted by the Contractor for the execution, completion, remedying of any defects therein and maintenance of such works at a total Contract Price of Rs. _____ (Rupees _____ only)

NOW THIS AGREEMENT WITNESSETH as follows:-

1. In this Agreement words and expressions shall have the same meaning as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents in conjunction with addenda/ corrigenda to Tender Documents shall be deemed to form and be read and construed as part of this agreement viz.

The Letter of Acceptance dated _____.

Priced Schedule (Bill) of Quantities

Notice Inviting Tender and Instructions to Tenderers.

RITES Tender and Contract Form

Special Conditions

Schedules A to F.

Technical Specifications

Drawings

Amendments to Tender Documents (List enclosed)

General Conditions of Contract (read with Correction Slip Nos. 1 to --) comprising of

- (i) Conditions of Contract
- (ii) Clauses of Contract
- (iii) RITES Safety Code
- (iv) RITES - Model Rules for the protection of Health and Sanitary arrangements for Workers
- (v) RITES – Contractor's Labour Regulations.



3. In consideration of the payment to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute, complete, remedy defects therein and maintain the works in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay to the Contractor in consideration of the execution, completion, remedying of any defects therein and maintenance of the works, the contract price or such other sum as may become payable under the provisions of the contract at the time and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused their respective common seals to be hereinto affixed (or have herewith set their respective hands and seals) the day and year first above written.

SIGNED, SEALED AND DELIVERED BY

<p>_____</p> <p>In the capacity of _____</p> <p>On behalf of M/s. _____</p> <p>(The Contractor)</p> <p>In the presence of</p> <p>Witnesses (Signature, Name & Designation)</p> <p>1.</p> <p>2.</p>	<p>_____</p> <p>representing RITES LIMITED</p> <p>In the capacity of Agent / Power of Attorney Holder</p> <p>For and on behalf of _____</p> <p>(The Employer)</p> <p>In the presence of</p> <p>Witnesses (Signature, Name & Designation)</p> <p>1.</p> <p>2.</p>
---	---



ANNEXURE VIII



INTEGRITY PACT

Between

RITES LTD. acting for and on behalf of and as an Agent / Power of Attorney Holder of
_____ hereinafter called the "Employer" AND

_____ hereinafter referred to as "The Bidder/Contractor"

Preamble

The Employer intends to award, under laid down organizational procedures, contract/s for _____. The Employer values full compliance with all relevant laws and regulations, and economic use of resources, and of fairness and transparency in his relations with the Bidder/s and/or contractor/s.

In order to achieve these goals, the Employer will appoint an Independent External Monitor (IEM) who will monitor the Tender process and execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Employer

- (1) The Employer commits himself to take all measures necessary to prevent corruption and to observe the following principles:-
 1. No employee of the Employer, personally or through family members, will in connection with the tender or for the execution of the contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
 2. The Employer will, during the tender process, treat all Bidders with equity and reason. The Employer will in particular, before and during the tender process, provide to all Bidders the same information and will not provide to any Bidder confidential/additional information through which the Bidder could obtain an advantage in relation to the tender process or the contract execution.
 3. The Employer will exclude from the process all known prejudiced persons.
- (2) If the Employer obtains information on the conduct of any of his employees which is a criminal offence under the IPC (Indian Penal Code) /PC (Prevention of Corruption) Act, or if there be a substantive suspicion in this regard, the Employer will inform its Chief Vigilance Officer and in addition can initiate disciplinary action.

Section 2 – Commitments of the Bidder/Contractor

- (1) The Bidder/Contractor commits himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

1. The Bidder/Contractor will not directly or through any other person or firm, offer, promise or give to any of the Employer's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
 2. The Bidder/Contractor will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions, to restrict competitiveness or to introduce cartelization in the bidding process.
 3. The Bidder/Contractor will not commit any offence under the relevant IPC/PC Act; further the Bidder/ Contractor will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Employer as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
 4. The Bidder/Contractor will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- (2) The Bidder/ Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3-Disqualification from tender process and exclusion from future contracts

If the Bidder/Contractor, before award or during execution has committed a transgression through a violation of Section 2 above, or in any other form such as to put his reliability or credibility in question, the Employer is entitled to disqualify the Bidder/Contractor from the tender process or take action as per the procedure mentioned in the "Guideline on banning of business dealing" annexed and marked as **Annexure "A"**.

Section 4- Compensation for Damages

- (1) If the Employer has disqualified in terms of the provisions in Section 3, the Bidder/Contractor from the tender process prior to the award of contract, the Employer is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.
- (2) If the Employer has terminated the contract during execution in terms of the provisions under Section 3, the Employer shall be entitled to demand and recover from the Contractor the damages equivalent to Earnest Money Deposit, Security Deposits already recovered and Performance Guarantee, which shall be absolutely at the disposal of the Employer.

Section -5 Previous transgression

- (1) The Bidder/ Contractor declares that no previous transgression occurred in the last 3 years with any other Company in any country conforming to the Anti-Corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- (2) If the Bidder/Contractor makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as per the procedure mentioned in "Guideline on banning of business dealing".

Section -6 Equal treatment of all Bidders/Contractors/Sub-Contractors

- (1) The Bidder/Contractor undertakes to demand from all partners/sub-contractors (if permitted under the conditions/ clauses of the contract) a commitment to act in conformity with this Integrity Pact and to submit it to the Employer before signing the contract.
- (2) The Bidder/ Contractor confirms that any violation by any of his partners/sub-contractors to act in conformity with the provisions of this Integrity Pact can be construed as a violation by the Bidder/Contractor himself, leading to possible Termination of Contract in terms of Section 4.
- (3) The Employer will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section 7- Criminal charges against violating Bidders/Contractors/Sub-Contractors

If the Employer obtains knowledge of conduct of a Bidder, Contractor or Partners/Sub-Contractor, or of an employee or a representative or an associate of a Bidder, Contractor or Sub-Contractor, which constitutes corruption, or if the Employer has substantive suspicion in this regard, the Employer will inform the same to its Chief Vigilance Officer.

Section -8 Independent External Monitor/Monitors

- (1) The Employer shall appoint competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- (2) The Monitor is not subject to instructions by the representatives of the parties and will perform his functions neutrally and independently. He will report to the MD/RITES Ltd.
- (3) The Bidder/Contractor accepts that the Monitor has the right of access without restriction to all Project documentation of the Employer including that provided by the Contractor. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Partners/Sub-Contractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder/Contractor/Partners/Sub-Contractor with confidentiality.

- (4) The Employer will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Employer and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
- (5) As soon as the Monitor notices or has reason to believe that violation of the agreement by the Employer or the Bidder/ Contractor, has taken place, he will request the Party concerned to discontinue or take corrective action , or to take any other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner or refrain from action or tolerate action.
- (6) The Monitor will submit a written report to the MD/RITES Ltd. within 8-10 weeks from the date of reference or intimation to him by the Employer and should the occasion arise, submit proposal for correcting problematic situations.
- (7) If the Monitor has reported to the MD/RITES Ltd. of a substantiated suspicion of an offence under relevant IPC/PC Act, and the MD/RITES Ltd. has not, within reasonable time, taken visible action to proceed against such offender or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner.
- (8) The word Monitor would include both singular and plural.

Section – 9 Pact Duration

This pact begins when both parties have legally signed it. It expires for the Contractor when his Security Deposit is released on completion of the Maintenance Period and for all other Tenderers six months after the Contract has been awarded.

If any claim is made/lodged during this time the same shall be binding and continue to be valid despite the lapse of this pact specified above, unless it is discharged/determined by MD/RITES Ltd.

Section 10 Other Provisions

- (1) This agreement is subject to Indian Law. Place of performance and jurisdiction shall be as stated in the Contract Agreement.
- (2) Changes and supplements as well as termination notices need to be made in writing.
- (3) If the Contractor is a partnership or a consortium, this agreement must be signed by the Partner in charge/ Lead Member nominated as being incharge and who holds the Power of Attorney signed by legally authorised signatories of all the partners/Members. The Memorandum of Understanding /Joint Venture Agreement will incorporate a provision to the effect that all Members of the Consortium will comply with the provisions in the Integrity Pact to be signed by the Lead Member on behalf of the Consortium. Any violation of Section 2 above by any of the



Partners/Members will be construed as a violation by the consortium leading to possible Termination of Contract in terms of Section 3

- (4) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

RITES Ltd.
Agent / Power of Attorney Holder

(Office Seal)

(Office Seal)

Place:.....

Date:.....

Witness 1:

(Name & Address) -----

Witness 2

(Name & Address) -----



ANNEXURE IX

Mandate Form

To
RITES Ltd.,

Dear Sir,

Authorization for payments through Electronic Fund Transfer System (RTGS/NEFT)

We hereby authorized RITES Ltd. To make all our payments, including refund of Earnest Money, through Electronic Fund Transfer System (RTGS/NEFT). The details for facilitating the payments are given below:-

(TO BE FILLED IN CAPITAL LETTERS)

1	NAME OF THE BENEFICIARY	
2	ADDRESS WITH PIN CODE	
3	(A) TELEPHONE NO WITH STD CODE	
	(B) MOBILE NO.	
4	BANK PARTICULARS	
A	BANK NAME	
B	BANK TELEPHONE WITH STD CODE	
C	BRANCH ADDRESS WITH PIN CODE	
D	BANK FAX NO WITH STD CODE	
E	11 CHARACTER IFSC CODE OF THE BANK (EITHER ENCLOSE A CANCELLED CHEQUE OR OBTAIN BANK CERTIFICATE AS APPENDED)	
F	BANK ACCOUNT NUMBER AS APPEARING ON THE CHEQUE BOOK	
G	BANK ACCOUNT TYPE (TICK ONE)	SAVINGS/ CURRENT/ LOAN/ CASH CREDIT/ OTHERS
H	IF OTHERS, SPECIFY	
5	PERMANENT ACCOUNT NUMBER (PAN)	
6	E-MAIL ADDRESS	

I/We hereby declare that the particulars given above are correct and complete. If the transaction is delayed or credit is not effected at all for reasons of incomplete or incorrect information. I/We would not hold RITES Ltd. responsible. Bank charges for such transfer will be borne by us.



Date _____

SIGNATURE

AUTHORISED SIGNATORY

Name _____

BANK CERTIFICATION

It is certified that above mentioned beneficiary hold bank account No. _____ with our branch and the Bank particulars mentioned above are correct.

Date _____

SIGNATURE

AUTHORISED SIGNATORY

Name _____

OFFICIAL STAMP

Guidelines on Banning of Business Dealings

1. Introduction

- 1.1 RITES, being a Public Sector Enterprise and „State’, within the meaning of Article 12 of Constitution of India, has to ensure preservation of rights enshrined in Chapter III of the Constitution. RITES has also to safeguard its commercial interests. It is not in the interest of RITES to deal with Agencies who commit deception, fraud or other misconduct in the execution of contracts awarded / orders issued to them. In order to ensure compliance with the constitutional mandate, it is incumbent on RITES to observe principles of natural justice before banning the business dealings with any Agency.
- 1.2 Since banning of business dealings involves civil consequences for an Agency concerned, it is incumbent that adequate opportunity of hearing is provided and the explanation, if tendered, is considered before passing any order in this regard keeping in view the facts and circumstances of the case.

2. Scope

- 2.1 The procedure of (i) Suspension and (ii) Banning of Business Dealing with Agencies, has been laid down in these guidelines.
- 2.2 It is clarified that these guidelines do not deal with the decision of the Management not to entertain any particular Agency due to its poor / inadequate performance or for any other reason.
- 2.3 The banning shall be with prospective effect, i.e., future business dealings.

3. Definitions

In these Guidelines, unless the context otherwise requires:

- i) ‘Bidder / Contractor / Supplier’ in the context of these guidelines is indicated as „Agency’.
- ii) „Competent Authority’ and „Appellate Authority’ shall mean the following:
- a) The Director shall be the „Competent Authority’ for the purpose of these guidelines. CMD, RITES shall be the „Appellate Authority’ in respect of such cases.
- b) CMD, RITES shall have overall power to take suo-moto action on any information available or received by him and pass such order(s) as he may think appropriate, including modifying the order(s) passed by any authority under these guidelines.
- iii) „Investigating Department’ shall mean any Department, Division or Unit investigating into the conduct of the Agency and shall include the Vigilance Department, Central Bureau of Investigation, the State Police or any other department set up by the Central or State Government having powers to investigate.

4. Initiation of Banning / Suspension:

Action for banning / suspension business dealings with any Agency should be initiated by the department/ unit having business dealings with them after noticing the irregularities or misconduct on their part.

5. Suspension of Business Dealings

- 5.1 If the conduct of any Agency dealing with RITES is under investigation by any department, the Competent Authority may consider whether the allegations under investigation are of a serious nature and whether pending investigation, it would be advisable to continue business dealing with the Agency. If the Competent Authority, after consideration of the matter including the recommendation of the Investigating Department/Unit, if any, decides that it would not be in the interest to continue business dealings pending investigation, it may suspend business dealings with the Agency. The order to this effect may indicate a brief of the charges under investigation. The order of such suspension would operate for a period not more than six months and may be communicated to the Agency as also to the Investigating Department.

The Investigating Department/Unit may ensure that their investigation is completed and whole process of final order is over within such period.

- 5.2 As far as possible, the existing contract(s) with the Agency may be continued unless the Competent Authority, having regard to the circumstances of the case, decides otherwise.
- 5.3 If the Agency concerned asks for detailed reasons of suspension, the Agency may be informed that its conduct is under investigation. It is not necessary to enter into correspondence or argument with the Agency at this stage.
- 5.4 It is not necessary to give any show-cause notice or personal hearing to the Agency before issuing the order of suspension. However, if investigations are not complete in six months time, the Competent Authority may extend the period of suspension by another three months, during which period the investigations must be completed.

6. Grounds on which Banning of Business Dealings can be initiated

- 6.1 If the security consideration, including questions of loyalty of the Agency to the State, so warrants;
- 6.2 If the Director / Owner of the Agency, proprietor or partner of the firm, is convicted by a Court of Law for offences involving moral turpitude in relation to its business dealings with the Government or any other public sector enterprises or RITES, during the last five years;
- 6.3 If there is strong justification for believing that the Directors, Proprietors, Partners, owner of the Agency have been guilty of malpractices such as bribery, corruption, fraud, substitution of tenders, interpolations, etc;

- 6.4 If the Agency employs a public servant dismissed / removed or employs a person convicted for an offence involving corruption or abetment of such offence;
- 6.5 If business dealings with the Agency have been banned by the Govt. or any other public sector enterprise;
- 6.6 If the Agency has resorted to Corrupt, fraudulent practices including misrepresentation of facts;
- 6.7 If the Agency uses intimidation / threatening or brings undue outside pressure on the Company (RITES) or its official in acceptance / performances of the job under the contract;
- 6.8 If the Agency indulges in repeated and / or deliberate use of delay tactics in complying with contractual stipulations;
- 6.9 Based on the findings of the investigation report of CBI / Police against the Agency for malafide / unlawful acts or improper conduct on his part in matters relating to the Company (RITES) or even otherwise;
- 6.10 Established litigant nature of the Agency to derive undue benefit;
- 6.11 Continued poor performance of the Agency in several contracts;

(Note: The examples given above are only illustrative and not exhaustive. The Competent Authority may decide to ban business dealing for any good and sufficient reason).

7. Banning of Business Dealings

- 7.1 A decision to ban business dealings with any Agency shall apply throughout the Company.
- 7.2 If the Competent Authority is prima-facie of view that action for banning business dealings with the Agency is called for, a show-cause notice may be issued to the Agency as per paragraph 8.1 and an enquiry held accordingly.

8. Show-cause Notice

- 8.1 In case where the Competent Authority decides that action against an Agency is called for, a show-cause notice has to be issued to the Agency. Statement containing the imputation of misconduct or mis-behaviour may be appended to the show-cause notice and the Agency should be asked to submit within 30 days a written statement in its defence. If no reply is received, the decision may be taken ex-parte.
- 8.2 If the Agency requests for inspection of any relevant document in possession of RITES, necessary facility for inspection of documents may be provided.
- 8.3 After considering the reply of the Agency and other circumstances and facts of the case, a final decision for Company-wide banning shall be taken by the Competent

Authority. The Competent Authority may consider and pass an appropriate speaking order:

- a) For exonerating the Agency if the charges are not established;
- b) For banning the business dealing with the Agency.

8.4 The decision should be communicated to the Agency concerned along with a reasoned order. If it decided to ban business dealings, the period for which the ban would be operative may be mentioned.

9. Appeal against the Decision of the Competent Authority

9.1 The Agency may file an appeal against the order of the Competent Authority banning business dealing, etc. The appeal shall lie to Appellate Authority. Such an appeal shall be preferred within one month from the date of receipt of the order banning business dealing, etc.

9.2 Appellate Authority would consider the appeal and pass appropriate order which shall be communicated to the Agency as well as the Competent Authority.

10. Review of the Decision by the Competent Authority

Any petition / application filed by the Agency concerning the review of the banning order passed originally by Competent Authority under the existing guidelines either before or after filing of appeal before the Appellate Authority or after disposal of appeal by the Appellate Authority, the review petition can be decided by the Competent Authority upon disclosure of new facts /circumstances or subsequent development necessitating such review.

11. Circulation of the names of Agencies with whom Business Dealings have been banned.

11.1 Depending upon the gravity of misconduct established, the Competent Authority of RITES may circulate the names of Agency with whom business dealings have been banned, to the Ministry of Railways and PSUs of Railways, for such action as they deem appropriate.

11.2 If Ministry of Railways or a Public Sector Undertaking of Railways request for more information about the Agency with whom business dealings have been banned a copy of the report of Inquiring Authority together with a copy of the order of the Competent Authority/ Appellate Authority may be supplied.

12. Restoration

12.1 The validity of the banning order shall be for a specific time & on expiry of the same, the banning order shall be considered as "withdrawn".

12.2 In case any agency applies for restoration of business prior to the expiry of the ban order, depending upon merits of each case, the Competent Authority which had passed the original banning orders may consider revocation of order of suspension of business/lifting the ban on business dealings at an appropriate time. Copies of the restoration orders shall be sent to all those offices where copies of Ban Orders had been sent.



Section – 2

TENDER AND CONTRACT FORM



SECTION 2

TENDER AND CONTRACT FORM FOR WORKS

To

Tender Accepting Authority/RITES
[Refer Schedule F (Conditions of Contract)]
Name, Designation / Address

Sub: TENDER FOR THE WORK OF _____

(TENDER No. _____ ISSUED BY _____)
TENDER

1. I/We have read and examined the Notice Inviting Tender and Instructions to Tenderers, Special Conditions, Schedules A to F, Technical Specifications, Drawings, Schedule / Bill of Quantities and General Conditions of Contract as well as other documents and rules referred to in GCC and all the details contained in the Tender Document for the work.
2. I/We hereby tender for the execution and completion of the work and remedy any defects therein, specified in the Schedule of Quantities within the time specified in Schedule "F", and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in Notice Inviting Tender and Instructions to Tenderers and in Clause 11 of the Clauses of Contract and with such materials as are provided for, by, and in respects in accordance with, such conditions so far as applicable.
3. We agree that our tender shall remain valid for a period of 90 days from the due date for submission of bid or extended date as stipulated and not to make any modifications in its terms and conditions.
4. A sum of Rs. _____ (Rupees _____ only) is hereby forwarded in the form of Banker's cheque/Pay Order /Demand Draft issued in favour of RITES Ltd., payable at _____ as the Earnest Money. Mandate Form authorizing RITES Ltd. To make all payments through RTGS/NEFT as per Annexure-IX duly filled in, is enclosed.
5. If I/We withdraw my/our tender during the period of tender validity or before issue of Letter of Acceptance which ever is earlier or make modifications in the Terms and Conditions of the Tender which are not acceptable to the Employer, then the Employer shall, without prejudice to any other right or remedy, be at liberty to forfeit entire Earnest Money absolutely.
6. If I/We fail to furnish the prescribed Performance Guarantee and Additional Performance Guarantee (if applicable) within prescribed period, I/We agree that the said Employer shall, without prejudice to any other right or remedy, be at liberty to forfeit the said Earnest Money absolutely.
7. If, I/We fail to commence the work within the specified period, I/We agree that the Employer shall, without prejudice to any other right or remedy available in law, be at

- liberty to forfeit the Earnest Money and Performance Guarantee and Additional Performance Guarantee (if applicable) absolutely.
8. Further, I/We hereby agree that in case of forfeiture of Earnest Money or both Earnest Money & Performance Guarantee and Additional Performance Guarantee (if applicable) as aforesaid in paras 5 to 7, I/We shall be debarred from participation in re-tendering process of the work.
 9. On issue of Letter of Acceptance by the Employer, I/We agree that the said Earnest Money shall be retained by the Employer towards Security Deposit, to execute all the works referred to in the Tender document upon the Terms and Conditions contained or referred to therein and to carry out such deviations as may be ordered, upto maximum of the percentage mentioned in Schedule F at rates as stipulated in relevant Clauses of contract and those in excess of that limit at the rates to be determined in accordance with the provisions contained in Clauses 12.2 and 12.3 of the tender form.
 10. I/We hereby agree that I/ We shall sign the Formal Agreement with the Employer within 28 days from the date of issue of Letter of Acceptance. In case of any delay, I/We agree that we shall not submit any Bill for Payment till the Contract Agreement is signed.
 11. I/We hereby declare that I/We shall treat the tender documents, drawings and other records connected with the work as secret/confidential documents and shall not communicate information derived there from to any person other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the Employer/State.
 12. I/We hereby declare that I/We have not laid down any condition/deviation to any content of Technical Bid and/or Financial Bid. I/We agree that in case any condition is found to be quoted by us in the Technical and/or Financial Bid, my/our Tender may be rejected.
 13. I/We understand that the Employer is not bound to accept the lowest or any tender he may receive. I/We also understand that the Employer reserves the right to accept the whole or any part of the tender and I/We shall be bound to perform the same at the rates quoted.
 14. Until a formal agreement is prepared and executed, this bid together with our written acceptance thereof shall constitute a binding contract between us and RITES.
 15. I am/We are signing this Tender offer in my / our capacity as one/those authorized to sign on behalf of my/our company/as one holding the Power of Attorney issued in my favour as Lead Member by the Members of the Joint Venture.

Signature of Authorized Person/s
Date
Name/s & Title of Signatory
Name of Tenderer
Postal Address
Seal

Witness
Signature
Name
Postal Address
Occupation

Section - 3

SPECIAL CONDITIONS



SECTION 3

SPECIAL CONDITIONS

Special Conditions relating to existing Clauses of Contract:

- 1.1 The Contractor has to work along with other agencies in and around the area allotted for his works. He should execute all his works in complete co-ordination and co-operation with all such agencies and provide access to other agencies so that at no time either his work or the work of other agencies is stopped or delayed. In case of any dispute in this regard, the decision of Engineer-in-charge or his representative will be final and binding on the Contractor. No claim for idle labour, plant and machinery under any circumstances will be entertained by the DVC/RITES.
- 1.2 For work close to railway line, road telephone line, power line (both underground and overhead) and structures, all precautions should be taken for ensuring that during the execution of the work no damage is caused to such assets and also no obstruction is caused to the movement of trains/road traffic.
- 1.3 **APPROACH ROAD:** - Contractor will provide approach road/roads for movement of materials as per direction of Engineer-in-charge. Contractor will also maintain these approach roads in safe and fit condition at his own cost. He will however have no authority to prevent use of such roads by DVC/RITES and other bonafide contractors working at site. DVC/RITES will, however, have the authority to disallow any movement on the road, which in their opinion is not in the interest of work. If the contractor fails to provide service road to the satisfaction of the Engineer-in-charge it will be provided by the Engineer-in-charge at Contractor's cost. However in case any such road is not required for the purpose of the work, nothing shall be deducted from contractor's payments on this account.
- 1.4 The contractor is required to execute the work in stretches/areas which are made available to him and which may or may not be in continuous stretches. Decision of Engineer-in-charge shall be final in this regard and binding on the contractor. Contractor shall have no claim if the stretches /areas are not available for the construction /repair at the same time. Extra time where requested by the Contractor on this account shall be considered by the Engineer-in-charge on case to case basis.
- 1.5 The contractor shall provide a detailed schedule of work along with material and labour deployment on monthly basis and revise or update the same every month.
- 1.6 The contractor shall procure all the materials well in advance so that there is sufficient time for testing of the materials and clearance of the same before using in the works. Testing of the materials i.e. concrete cubes/reinforcement steel/moorum/earth/stone dust/cement/aggregate/ballast and any other materials shall be carried out in Govt Engineering College, National Test House, RITES Laboratory at Liluah, or any other approved laboratories as directed by Engineer In charge and as per the frequency mentioned in relevant IS Code. Cost of testing of materials shall be borne by the contractor.

- 1.7 The concreting work shall be done with proper and assured system of curing in duly identified areas with date of concreting marked in paint. In hot weather the contractor shall take relevant care to cover the work with wet gunny bags/ Hessian cloth or use continuous sprinkling of water on surface so as to keep the surface wet.
- 1.8 The contractor shall, after completion of work, clear the site of all debris and left over materials, at his own expense to the entire satisfaction of Engineer In charge.
- 1.9 Contractor should be registered with the concerned department of Employees Provident Fund Organisation (EPFO). **No payment shall be released to the contractor until and unless the contractor submits the registration certificate and upto date deposit receipt of provident fund due to be deposited by him.**
- 1.10 At the time of submission of RA/Final bill a certificate shall be submitted by the contractor regarding upto date clearance of payment to his/their sub contractors, vendors, suppliers, labour contractor etc. if any.
- 1.11 Contractor shall submit to RITES/DVC the entry challan of incoming materials like cement, steel structural and reinforcement etc. for verification of Stores and record.
- 1.12 Contractor should maintain the daily cement consumption register. Engineer - in - charge or his representative may check the registers and the challans at any time.
- 1.13 **NIGHT WORK:-** The contractor would be required to carry out the work even at night, without conferring any right on the contractor for claiming for extra payment for introducing night working. The decision of the Engineer-in-charge in this regard will be final and binding on the contractor. Contractor shall make his own arrangement for sufficient illumination at site. Nothing extra will be paid for doing works at night.
- 1.14 **FIRST AID:-**The contractor shall maintain in a readily accessible place first aid appliance including an adequate supply of sterilized dressing and sterilized cotton wool. The appliances shall be placed under the charge of responsible person who shall be readily available during working hours.
- 1.15 The contractor shall also provide, fix & be responsible for the maintenance of all stakes, templates profiles, levels marks, points etc. and must take all necessary precautions to prevent these being removed altered or disturbed and will be held responsible for the consequences of such removal, alteration or disturbances should the same take place and for their efficient reinstatement.
- 1.16 **HANDING OVER OF SITE :-**
 - 1.16.1 Efforts will be made by the Employer to hand over the site to the Contractor free of encumbrance. However, in case of any delay in handing over of the site to the Contractor, the Employer shall only consider suitable extension of time for the execution of the work. It should be clearly understood that the Employer shall not consider any other compensation whatsoever viz. towards idleness of contractor's labour equipment etc.

- 1.16.2 The Employer reserves the right to hand over the site in parts progressively to the Contractor. The Contractor will be required to do the work on such released-fronts in parts without any reservation whatsoever.
- 1.16.3 The access roads near, to the work site may not be available at the time of Mobilisation by the Contractor. The Contractor shall plan his work within the plant area as per available roads at site. All drainage of works area and all other weather truckable/haulage roads as required by the Contractor shall be constructed and maintained during the construction period by the Contractor at his own cost.
- 1.17 The Contractor has to made temporary diversion of course of water during execution of any work conveniently free of cost.
- 1.18 The Contractor will bear all the charges for testing of materials.
- 1.19 Contractor will have to arrange water supply and electricity connection at his own expenses.
2. The tenderer shall hold the offer open till such date as may be specified in the tender. It is understood that the tender documents have been sold/issued to the tenderer and the tenderer is being permitted to tender in consideration of the stipulations on his part that after submitting his tender, he will not resale from his offer or modify the terms and conditions thereof, in a manner not acceptable to RITES.
3. If a tenderer expires after the submission of his tender or after the acceptance of his tender, RITES shall deem such tender as cancelled. If a partner of a firm expires after the submission of their tender or after the acceptance of their tender, RITES shall deem such tender as cancelled unless the firm retains its character.
4. When the tender is submitted by the tenderer(s), it will be understood that the tenderer(s) has/have gone through carefully in detail all the instructions, conditions, General and Special conditions of contract all General and Special instructions/ specifications for execution of the work and that the tenderer(s) has/have got himself/ themselves clarified on all points and doubts and interpretations by the proper authority of RITES Ltd.
5. Contractor's store houses, yards etc. for stocking materials issued by RITES shall be located in the site premises only at locations approved by Engineer-in-charge.
6. If there is any conflict between description given in schedule of quantity and conditions mentioned in the special conditions, the schedule of quantity shall prevail .
7. Before commencing the work, joint inventory of existing materials in the track is to be taken by the representatives of RITES/DVC and the contractor and entered in the inventory register and jointly signed.
8. Adequate protection should be made while moving on public Roads or adjacent and across railway tracks. The rates quoted shall include cost of such items. Similarly the excess materials supplied free by the Employer shall be returned to the nominated

stores of the Clients/RITES. No separate payments will be made extra for these items except where otherwise mentioned. The contractor shall include such expenses for items while quoting his rates for the "SCHEDULE OF QUANTITIES".

9. It should be clearly understood that it is entirely the contractor's responsibility and liability to find, procure and use the required tools and plants and accessories at his own cost for efficient and methodical execution of the work. RITES shall have the right to check the sufficiency or quality of the Contractor's tools from time to time and the Contractor shall carry out all reasonable instructions of RITES in this respect.
10. In the event of any accident at the workspot, or while transporting materials, if it is established by the enquiry by RITES representative/Clients' representatives or Railway/local Civil authority that the accident occurred wholly or partly due to any act tantamount to negligence on part of the contractor, he shall render himself liable for all damages and also legal proceedings.
11. In case the released P.Way materials are left over at site, the contractor has to employ security/chowkidars day and night at his own cost till the P.Way materials are handed over to the Engineer-in-Charge of work at his nominated depot. Till they are returned/handed over at the nominated depot, the released materials will continue to remain in the custody of the contractor.
12. Shifting of labour camp from place to place as the work advances will be at the cost of the contractor.
13. The contractor will co-operate with the Engineer-in-Charge in maintaining various registers, charts and records etc. in connection with the works.
14. The following registers will be maintained by the RITES representative at the cost of contractor who should sign the registers so maintained by RITES in token of his acceptance of the entries made therein.
 - a. Register of joint inventory.
 - b. Register of materials issued.
 - c. Register of site order.
 - d. Register of materials laid in track.
 - e. Register of materials received back from contractor.
 - f. Register of miscellaneous items, etc.
 - g. Other relevant registers.
15. A separate register should also be maintained by the contractor for the deployment of contract labour at site. The registers should be made available to Employer/RITES personnel, as and when required.
16. While stacking P. Way materials (new or second hand or released) on cess/side, care should be exercised to ensure that those stacks do not infringe the Railway's moving dimensions.

17. Time shall be regarded as the essence of the contract and failure on the part of contractor to complete the work by the date stipulated in the agreement and work order will entitle RITES Administration to recover liquidated damages/penalty.
18. RITES Administration reserve the right to alter the detailed plan and sections and to carry out minor alteration in the plans resulting in corresponding increase or decrease in the quantity of works without being liable to pay enhanced rates for the work or to allow extra time for completion of the work.
19. No new facilities such as roads, level crossing etc, other than those already in existence will be made available to the contractor.
20. The Schedule of items of work to be carried out, provided in the SCHEDULE OF QUANTITIES” gives only brief description of each of the items. Execution of these items will be governed by the **Technical specifications. For detailed specifications reference may be made to Section 5 “Technical Specifications” in general and in particular to the various Guidelines and Specifications listed in Para 1.0 “Preamble to Technical Specification” of Section 5.** RITES' representative at site will be fully empowered to provide guidance in the matter of execution of the works and his instructions will be final and binding in this regard.
21. In case any workman is found incompetent or otherwise undesirable by the RITES' representative at site, he should not be allowed to work under the Contractor. In this matter, the opinion of the Engineer-in-Charge will be final and binding on the contractor. Any violation of this requirement by the Contractor shall be treated as fundamental breach of contract entitling RITES to rescind the contract by giving 7 days notice.
22. Particulars of work done during each day, with location where the work is done, will have to be recorded in a register by the Contractor's site in charge and the register will be kept available for inspection/scrutiny by RITES' representative. A site order book will also have to be maintained where instructions regarding work to be carried out will be recorded by RITES' representative at site.
23. RITES's representative shall have the right at all times to supervise the contractor's work and instruct the contractor and the contractor shall execute the work as per the instructions without any lapse of time. For this purpose the Contractor shall maintain a Site Order Book. Failure to comply with RITES' representative's instructions shall be deemed to be a fundamental breach of contract on the part of the Contractor entitling RITES to rescind the Contract at the Contractor's risk and cost after serving a notice of 7 days.
24. On-account payments to Contractor shall be made periodically based on the quantity and item of work executed at the rates accepted under this contract, and upon a certificate by the RITES' representative that work has been done to proper specification and to the satisfaction of its representative.
25. The Contractor will make all arrangements for getting passes/authorities for his men including making necessary application with photos for each labourer deployed for this work and will bear all costs, if any. Housing accommodation and watering

arrangements for contractor's labour will have to be arranged by the contractor.

26. The Contractor will bear all medical expenses and make immediate arrangement for medical attention to his labourer, if injured on duty. He will provide "Medical Aid" Box at site of work at his cost.
27. **DVC will only for supply items provide 'C' form and 'Way Bill' to the contractor for availing of sales tax rebate wherever applicable.** In case, DVC fails to provide 'C' form and way bill, additional sales tax as paid by the contractor on account of non issue of 'C' form, will be reimbursed to the contractor on production of full proof of payment of sales tax by the contractor.
28. The rates quoted shall be inclusive of all taxes (except Service tax) such as sales tax (against issue of 'C' form against supply items), excise duty, entry tax, toll tax, turnover tax on works contract, octroi, royalty, VAT, Labour Welfare Cess and any other tax, levy, cess etc as applicable. However, sales tax/ VAT on works contract if paid by DVC/RITES directly the same amount shall be recovered from contractor's on account bill and no exemption claims on this account shall be entertained by DVC/RITES. Inspection charges and the charges for loading, transportation, unloading and stacking of materials at store should not be quoted separately. The quoted rates should remain firm till completion of the entire work.
29. **On completion of the work, the contractor should submit Royalty Clearance Certificate if available or should apply for Clearance Certificate from the concerned State Government under intimation to RITES Engineer-in-Charge. In case the contractor is not able to furnish Royalty Payment Certificate, an Indemnity Bond indemnifying the Employer against any legal action by the State Government for non-payment of Royalty should be submitted by the Contractor before releasing Security Deposit.**
30. The tender is being invited on behalf of "Mejia Thermal Power Station (MTPS)" under M/s. Damodar Valley Corporation(DVC), payment will be made to the Contractor within 10(ten) days from the date of receipt of fund from M/s. DVC.
31. Tenderers may please note-
 - i. Should also be noted that the Employer is the Principal Employer for this work.
 - ii. In case of any dispute between RITES Ltd. and contractor, RITES Ltd. being merely an agent, client should be made first respondent and should be liable for all monetary losses.
 - iii. RITES Ltd. is only agent/consultant acting on behalf of the client/employer and in case of arbitration the client shall be the first respondent.
32. No payment will be made unless copy of the current & valid S.T.C.C. or exemption certificate is submitted prior to or along with the bills.
33. **STORES TO BE SUPPLIED BY THE CONTRACTOR**
 - (i) The quoted rates should also be inclusive of Inspection Charges and charges for loading, transportation, unloading and stacking at site store near/within the

premises of MTPS siding as per the direction of Engineer-in-Charge of RITES Ltd. at MTPS Site, Dist-Bankura, West Bengal. The quoted rates shall remain firm during the currency of the Contract.

- (ii) Actual quantity delivered at site will be considered for the purpose of effecting payment.
 - (iii) Consignee: - Additional Controller of stores/MTPS/DVC or his authorised representative at MTPS, Dist.-Bankura, West Bengal.
 - (iv) RITES Ltd on behalf of Damodar Valley Corporation (DVC) under. "Mejia Thermal Power Station" reserves the right to undertake any test, if required, before acceptance of the materials on contractor's cost.
 - (v) Any materials and accessories, found to be damaged at the time of receipt will not be accepted and shall have to be replaced by good ones free of cost after being duly inspected.
34. **Period of Maintenance/Defect Liability period:** As per clause 17 of clauses of contract in GCC applicable to this work, the period of maintenance/defect liability period for this work shall be 12 (twelve) months from the date of issue of final completion certificate or till the final bill has been passed whichever ever is later.
35. After handing over of the existing section to the contractor, the same section will be maintained and guarded by the contractor, till all the works are completed in all respect and handed over back to the Engineer-in-charge.
36. Completion Drawings:
- a) Completion drawings for the works executed, shall be prepared by the contractor at his own cost.
 - b) Completion drawing will be prepared on tracing paper.
 - c) Contractor will supply of drawing, 5 copies of completion drawing along with original tracing & soft copy with the final bill.

Additional Special Condition of Contract

1. “When L-1 offer is less than 90% of the justified cost/ market rate analysis cost the Bid should be treated as unbalanced. The workability of the rates should be assessed and commented upon by the Tender Committee in its recommendation to the Tender Accepting Authority. For this purpose, the Tender Committee may advice L-1 Bidder to produce detailed price analysis for any or all items of Bill of Quantities to demonstrate the inherent consistency of those price with the construction methods and schedule proposed. This process of checking with L-1 bidder should be carried out expeditiously so as to complete it well within the bid validity period. If required, the bid validity period should be got extended. If an evaluation, the price analysis is not found to be satisfactory, the bidder should be asked to furnish Additional Performance Guarantee to the extent the total quoted cost is lower than 90% of justified cost/market rate analysis cost.”

Section - 4

SCHEDULES A TO F

SECTION 4
PROFORMA OF SCHEDULES

(Operative Schedules to be supplied separately to each intending Tenderer)

SCHEDULE „A’

Schedule of quantities (As per Bill of Quantities attached)

(BOQ to be attached with Financial Bid)

SCHEDULE „B’ –

Schedule of materials to be issued to the contractor. (Refer Clause 10 of Clauses of Contract)

S.No	Description of items	Quantity	Rates in Figures & words at which the material will be charged to the contractor	Place of Issue
1	2	3	4	5

- Not Applicable -

SCHEDULE ‘C’ –

Tools and plants to be hired to the contractor. (Refer clause 34 of Clauses of Contract).

S.No	Description	Hire charges per day	Place of Issue
1	2	3	4

- Not Applicable -

SCHEDULE „D’

Extra schedule for specific requirements/documents for the work, if any.

- Not Applicable -

SCHEDULE ‘E’ –

Schedule of components of Cement, Steel, other materials, POL, Labour etc .for price escalation. (Refer Clause 10CC of Clauses of Contract).

(To be worked out and filled by NIT approving authority. The

Components and their percentages may be modified depending on the nature of work)

CLAUSE 10 CC : Applicable

Component of Cement (Xc)

expressed as percent of total value of work 20%

Component of steel (X5)

expressed as percent of total value of work 25%

Component of other materials (XM) (except cement & steel)

expressed as per cent of total value of work 25%

Component of labour (Y)

expressed as percent of total value of work 25%

Component of P.O.L (Z)

expressed as percent of total value of work 5%

Total 100 %

SCHEDULE „F”Reference to General Conditions of Contract

Name of Work: “Earthwork in formation, Construction of bridges, blanketing and all allied works etc. in connection with construction of double line of existing single rail track between Raniganj and waiting bay line of Mejia Thermal Power Station (MTPS) of DVC at Mejia, Dist - Bankurah, West Bengal.”

Estimated cost of work Rs. 36.40 Crores

Earnest money : Rs. 36.40 Lakh

Performance Guarantee (Ref. Clause 1) 5% of Tendered value.

Security Deposit: (Refer clause 1A) 5% of Tendered value

Notice Inviting Tender and Instruction to Tenderers

Officer inviting tender :

Group General Manager (P),
RITES Ltd, 2nd Floor,
56 C. R. Avenue, Kolkata- 700 012**CONDITIONS OF CONTRACT**

Definitions

2 (iv) Employer Damodar Valley Corporation

2(v) Engineer-in-Charge **Group General Manager (Projects), RITES Ltd,
Kolkata Project Office or his authorized representative**
(Authority competent to execute Contract

2(vii) Accepting Authority	Agreement as per Item 7.2 of SOP) Director Project, RITES (Authority competent to accept Tenders as per Item 3.1/3.2/ 3.3 of SOP as applicable)
2(ix) Percentage on cost of materials and labour to cover all overheads and profits.	15%
2(x) Standard Schedule of Rates	USSR/E.R'2011 (to be modified as per requirement and as applicable)
2(xiii) Date of commencement of work first	15 days from the date of issue of LOA or the date of handing over of site whichever is later
9 (a) (ii) General Conditions of Contract	RITES General Conditions of Contract July 2011 Edition as modified & corrected upto C.S.No. 4 dated 16.07.2013.

CLAUSES OF CONTRACT

Clause 1

1 (i) Time allowed for submission of
P.G. from the date of issue of
Letter of Acceptance subject
to maximum of 15 days 15 days.

Maximum allowable extension
beyond the period provided in
(i) above subject to a maximum of
7 days 7 days.

Clause 2

Authority for fixing compensation under
Clause 2 Director Projects
(Authority competent to accept Tender)

Clause 2A

Whether Clause 2A shall be applicable NO

Clause 5

5.1 (a) Time allowed for execution of work
Date of start 18 months from the date of start
15 days from the date of issue of
Letter of Acceptance or the first date
of handing over of site whichever is
later

5.1 (b) TABLE OF MILESTONE(S) : Not applicable

S.No	Description of Milestone (Physical)	Time allowed in days (from date of start)	Amount to be withheld in case of non achievement of milestone
1			
2			
3			
4			

Clause 5 A Shifting of stipulated date of completion

Competent authority

Accepting Authority as
Specified in Clause 2(vii) of
Conditions of Contract above.

Clause 6 A Whether Clause 6 or 6A applicable

6

Clause 7

Gross work to be done together with net
payment/adjustment of advances for
material collected, if any, since the last such
payment for being eligible to interim payment

Rs 100 Lakh

Clause 10A

i) Whether Material Testing Laboratory is to
be provided at site.

YES

ii) If "YES" list of equipments to be provided

a) As per RDSO specification,
b) As per IS Codes

Clause 10 B

Whether Clause 10 B(ii) to (v) applicable

NO

Clause 10 CC

Whether Clause 10CC applicable

YES

Clause 11



Specifications to be followed for execution

For Earth work as per RDSO specifications & Civil work as per IS & Bridge Code.

Technical Specifications under Section No. 5.
Clause 12

Clause 12.2 Deviation Limit beyond which
12.3 & 12.5 Clauses 12.2,12.3 & 12.5 shall
apply

- i) For Non-foundation items.
 - Plus 25%
 - Minus No limit
- ii) For Foundation Items
 - Plus 100%
 - Minus No limit

Note: For Earthwork, individual classification quantity can vary to any extent but overall Deviation Limits will be as above.

12.5 Definition of Foundation item if other than that described in Clause 12.5

(If not applicable write accordingly)
Director Projects/RITES

Clause 16 Competent Authority for deciding reduced rates

(Authority Competent to accept Tender)

Clause 18 List of mandatory machinery, tools & plants to be deployed by the Contractor at site:-

- 1. _____ 2. _____ 3. _____
- 4. _____ 5. _____ 6. _____

Clause 25

25 (i) Appellate Authority

- CMD/RITES
(The Authority immediately above Engineer-in-charge to whom the Engineer-in-charge report)

Appointing Authority
appoint

- _____
(The Authority competent to
Arbitrator as per Item 9.2 of
SOP)

Clause 36 (i) & (iii)

Minimum Qualifications & Experience required and Discipline to which should belong

Designation	Minimum Qualification	Minimum working experience	Discipline to which should belong	Number
Principal Technical	Graduate in	5 year	Civil	1

Representative	Engineering			
Deputy Technical Representative	Graduate in Engineering/ Diploma in Engineering	2 years/ 5years	Civil	1

36 (iv) Recovery for non-deployment of Principal Technical Representative and Deputy Technical Representative

Designation	Rate of Recovery per month (in Rs.) for non-deployment
Principal Technical Representative	50000/-
Deputy Technical Representative	
Engineer (Degree Holder)	30000/-
Engineer (Diploma Holder)	30000/-

Clause 42

- i)(a) Schedule/statement for determining theoretical quantity of cement & bitumen on the basis of Delhi Schedule of Rates printed by CPWD DSR 2012
- ii) Variations permissible on theoretical quantities
- a) Cement
- for works with estimated cost put to tender not more than Rs.5 lakhs 3% plus / minus
 - for works with estimated cost put to tender more than Rs.5 lakhs 2% plus / minus
- b) Bitumen for All Works 2.5% plus only & nil on minus side
- c) Steel Reinforcement and structural steel sections for each diameter, section and category 2% plus / minus
- d) All other materials Nil

RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION

Sl. No.	Description of Item	Rates in figures and words at which recovery shall be made from the Contractor	
		Excess beyond permissible variation	Less use beyond the permissible variation
1	Cement		
2	Steel reinforcement		

3	Structural Sections		
4	Bitumen issued free		
5	Bitumen issued at stipulated fixed price		

Clause 46

Clause 46.10

Details of temporary accommodation including number of rooms and their sizes as well as furniture to be made available by the Contractor

Not applicable
(If not applicable indicate accordingly)

Whether Clause 46.11.1A applicable

NO

Whether Clause 46.13A applicable

NO

Clause 46.17

City of Jurisdiction of Court

Kolkata High Court

Clause 47.2.1

Sum for which Third Party Insurance to be obtained.

Rs. **Five** Lakhs per occurrence with the number of occurrences limited to **four**.

Clause 55

Whether clause 55 shall be applicable.

NO

If yes, time allowed for completion of sample floor/unit.

_____ months from
Date of start of work

Section – 5

TECHNICAL SPECIFICATIONS

SECTION 5

TECHNICAL SPECIFICATIONS

1. EARTHWORK IN RAILWAY FORMATION

1.1 EARTHWORK - GENERAL

1.1.1 RDSO Guidelines: For survey, design and execution of earthwork in railway formations, RDSO has issued detailed guidelines as “Guidelines for Earthwork in Railway Projects – Guideline No. GE: G-1” in July 2003. These Guidelines including their subsequent amended/revised versions, if any, shall apply to execution of earthwork in railway formations. These guidelines or their amended/revised versions have subsequently been referred to in this chapter as „RDSO Guidelines’. In case of any conflict between provisions of this chapter and those of RDSO Guidelines, the latter shall prevail.

1.1.2 Site Clearance: - Before work is started, the whole area between the toes of banks or tops of cuttings plus 1m additional width on both sides shall be properly and effectively cleared by the contractor of all vegetation, small trees of girth upto 30 cm (measured at a height of 1m above ground level), roots, bushes, heavy grass etc; The Contractor shall also clear the site of all buildings, abandoned structures etc as directed by the Engineer, for which extra payment will be made. The Contractor shall arrange removal of rubbish and other excavated material excluding earth upto a distance of 100 metres outside the periphery of the area under site clearance. Top soil obtained from site clearance as well as top layer of borrow pits which is rich in organic content and suitable for plant growth, if directed by the Engineer, may be stored for covering slopes of embankment and cuttings after construction. High portions of the ground shall be cut down and hollow depressions, if any, filled up with suitable excavated soil duly compacted and the ground dressed and levelled. The work of this nature will be covered by the initial rate for earth work, unless stated to the contrary in the agreement.

1.1.2.1 Trees of girth over 30 cm, measured at a height of 1m above ground level, shall be considered as large trees. Cutting down of large trees shall be paid extra at the rate specified in the Schedule of Rates. The rate shall include lopping of branches, trimming, removal from and clearing of site when stumps are grubbed up in addition. Large trees shall not be cut without specific orders from the Engineer. As few trees shall be cut as is absolutely necessary for the execution of work. The roots of trees and saplings shall be removed to a depth of 60 cm below ground level or 30 cm below formation level or 15 cm below subgrade level, whichever is lower. All holes or hollows formed due to removal of roots shall be filled up with earth rammed and levelled. Trees, shrubs, poles, fences, signs, monuments, pipe lines, cable, etc adjacent to the area which are not required to be disturbed during site clearance shall be properly protected by the contractor at his own cost and nothing extra shall be payable.

1.1.2.2 Any trees cut down or building materials released from dismantling of structures shall be stacked by the contractor within a distance of 100 metres outside the periphery of the area under site clearance as per instructions of the Engineer. The contractor shall have no claim to the trees or other material removed during site clearance and the same shall be the property of the Railway.

1.1.3 DATA AND SETTING OUT :

(a) Initial Data

At the commencement of work, the Engineer In charge shall give to the contractor the following data/ guidance.

- (I) Concrete centre line pillars fixed on the alignment at intervals of 250m
- (ii) Pucca level bench marks fixed along the alignment, about 30 m away from the centre line at intervals of 500m. These bench marks shall have been connected by leveling to available GTS bench marks and the reduced level of each shall be communicated.
- (i) Longitudinal section of the proposed formation to scale 1:2500 horizontal and 1:500 vertical with the existing ground level and the proposed formation level marked at intervals of 50m along the alignment and with the location of each curve, bridge, culvert, and level crossing on the entire alignment indicated.
- (ii) Existing ground level would be jointly recorded by the Engineer-in-Charge or his representative and the contractor or his representative by taking cross section at an interval of 25m or as suitable so as to produce the general existing ground profile. The Contractor will have to sign the level book as a token of acceptance of the level and it will form the original record for payment.
- (iii) Ground levels recorded as above would be plotted to a natural scale 1:100 at a subsequent date and desired profile of bank/cutting would also be plotted on it. This will also be signed by contractor and would be the basis for the final payment of earth work to be done.
- (iv) The contractor shall be responsible for subsequent preservation of all the above mentioned pillars and drawings and shall pay for the cost of their replacement, if necessary.

(b) Setting out :

Before commencement of earth work, the Contractor shall demarcate with a furrow, at least 20 cm wide and 15 cm deep, at 50 cms from the the toes of slopes of banks and outside limits of tops of cuttings on both sides of centre line and the boundaries of the bottom and top of the borrow pits. The “ dag belling” is to be maintained and renewed when necessary, throughout the duration of earth work. The cost of this is included in the rate for earth work.

Concrete pillars of 30 cms square at 50 cms away from and on both sides of the toe of the bank / top of cutting at each cross section would be constructed and maintained by the contractor at his own cost as a part of the setting out works. These concrete

pillars should be embedded to a depth of 50 cms. No extra payment on this account is permissible. He will also provide and maintain and maintain templates, burjies, reference pillars etc and shall take all necessary precautions to prevent these being removed, altered or disturbed and will be responsible for the consequence of such removal, alteration or disturbance and for their efficient reinstatement. No extra payment will be made on this account.

(c) Profiles:

In accordance with cross sections supplied, the Contractor shall at his own expense provide all stakes, bamboos, strings, pegs and labour for setting out profiles at every 25m or as directed for correct execution of the work. This will include provision of side drains and catch water drains as necessary in cutting and / or as marked in the cross sections supplied to the Contractor. The top of formation shall invariably have cross slopes of 1:30.

1.1.4 Mechanised construction of Earthwork: Manual methods of construction can not achieve the desired quality of earthwork. Therefore in all projects, it is necessary to deploy mechanised equipments such as earthmovers, dozers, hydraulic excavators, motor graders, scrapers, dumpers, mobile water sprinklers, vibratory rollers, sheepfoot rollers etc. so that quality of work meets laid down standards.

1.1.5 Maintenance: Banks and cuttings are to be correctly dressed and finished in profile with slopes as specified in each case. Where gullies or water-cuts commence to form on the slopes of embankments or cuttings, the erosion is to be checked as early as practicable and made good with suitable material well rammed into place. Where a gully or water-cut has not been checked at its commencement, it may be advisable to cut it out or step it before filling it in, and to further protect the place by turfing, pitching or other means as may be ordered by the Engineer. Work, before being finally paid for, is to be checked by the Engineer as having been correctly brought up, or carried down, to the proper level and to be otherwise complete in all respects in accordance with the specifications.

1.1.5.1 As soon as the work has been satisfactorily completed, the Engineer shall issue a certificate of completion in respect of the work as specified in relevant Clause of the General Conditions of Contract. Unless otherwise specified in the Tender conditions, the contractor shall maintain the banks / cuttings, for a period of Twelve months from the date of completion of work as indicated in the certificate of completion. The contractor shall be responsible for the handing over of the banks/cuttings to the Railway in proper condition, and, where necessary, for their restoration to such condition, at the end of the maintenance period. Until then, the contractor is responsible for all losses due to subsidence, wastage or guttering due to rain, wind, wear, wash or from any other cause whatsoever, and he shall have no claim for any extra work or payment on this account.

1.1.6 Spoil from cutting to bank:- Up to the initial lead specified in the BOQ item, material from each end of every cutting – subject to its suitability for use in railway embankment- shall be led forward into the adjoining bank as a matter of course, and the rate to be paid for such material shall be the rate for cutting only. The Engineer shall specify in each case from what point in each cutting to what point in the

adjoining bank, spoil shall be led out, payment being made only for the excess lead over and above the initial lead included in the rate for cutting. The Engineer can modify these limits at any stage of the work and all such changes shall be binding on the contractor without any claim for any extra payment on this account. Dressing and compaction of the bank will, however, be paid for in addition.

1.1.7 Classification of soils:- The classification of soil/rock met with in executing the work, if not made by the Engineer, shall be made by the his representative authorized by him for this purpose subject to the approval and final decision of the Engineer,. The rates to be paid to the contractor in his bills shall be based on these classifications.

Earth work shall be classified under the following heads:-

1.1.7.1 All kinds of Soils:- Generally any strata such as sand, gravel, loam, clay, mud, black cotton, moorum, shingle, river or nallah bed boulders, soling of roads, paths etc. macadam surface of any description, lime concrete, mud concrete and their mixtures which for excavation yields to the application of picks, shovels, jumpers, scarifiers, ripper and other manual digging implements.

1.1.7.2 Ordinary Rock: Generally any rock which can be excavated by splitting with crowbars or picks and does not require blasting, wedging or similar means for excavation, such as lime stone, sand stone, hard laterite, hard conglomerate and unreinforced cement concrete below ground level. If required light blasting may be resorted to, for loosening the materials but this will not in any way entitle the material to be classified as „Hard rock’.

1.1.7.3 Hard Rock (Requiring Blasting):- Generally any rock or boulder for the excavation of which blasting is required Such as granite, quartzite, basalt, reinforced cement concrete below ground level and the like.

1.1.7.4 Hard Rock (Blasting Prohibited):- Hard rock requiring blasting as described under **sub para 1.1.7.3**, but where blasting is prohibited for any reason and excavation has to be carried out by chiselling, wedging or any other agreed method.

1.1.8 Measurements:- Cutting and banks are to be excavated and made up neatly to the lines shown in the cross section as per approved construction drawing. No payment will be made for excess work done outside these lines except when such work is so ordered in writing by the Engineer. However, in case of embankments, extra width constructed, as per Para 1.2.5.6, to ensure proper rolling and compaction which is subsequently cut and dressed to avoid loose earth on the slopes shall not be paid for.

1.1.8.1 Should the Engineer so desire, he may, at any stage of the work, order the Contractor to increase or reduce the slopes of any cutting or bank or alter the formation level, in which case the amount of work actually done will be paid for in accordance with the specifications and the Schedule of Rates.

1.1.8.2 Unless otherwise specified the rate for Earth work is inclusive of an initial lead and lift as specified in the BOQ...

- 1.1.8.3** Additional lead for the purpose of payment will be measured from the centre of gravity of excavation to the centre of gravity of the bank or spoil heap, and shall be measured along the shortest practicable route and not necessarily the route actually taken.
- 1.1.8.4** Where initial lift is specified, additional lift for the purpose of payment will be estimated by dividing the cross section of the bank or cutting into successive stages of 1.5m high or deep respectively from the natural ground level and only the quantity contained in each strip shall be paid for at the rate appertaining to its height or depth above or below the natural ground level, respectively. Lift from the borrow-pit to the ground level or from ground level to the spoil bank shall not be taken into account in any payment for lift unless the depth of the borrow-pit or the height of the spoil bank has been made in excess of 1.5m under instructions from the Engineer, and in such cases, only the portion of the borrow-pit below 1.5m depth or of the spoil bank above 1.5m height as measured from the natural ground level, shall be, measured separately for payment of lift on the same basis as for cuttings or banks respectively.
- 1.1.8.5** For the purpose of above para, the natural ground level shall be reckoned as that obtaining at the toe of the bank nearest to borrow pits or at toe of spoil bank nearest to the cutting as the case may be. No payment shall be made for any lift from the ground level at the borrow pit to that at the bank, or from the ground level at the cutting to that at the spoil bank, where such lift is inherent in the lead on account of natural ground slope and no obvious act of lifting is involved, in the opinion of the Engineer. Obvious lifts such as involved in crossing of existing pits or banks, which cannot be avoided, will be measured and taken into account for payment. In such cases, the additional lift thus measured shall be taken into account in fixing the successive stage of 1.5m, whether in the bank or in the cutting. In sidelong ground where borrow-pits or spoil banks, as the case may be, are made on both sides, any payment for lift shall be a matter of special agreement.
- 1.1.8.6** For purpose of payment, cuttings shall be assumed to be composed of such soil / rock only, as stand exposed on both or one side of the finished cuttings, depending upon whether the cutting is box type or one sided on a transversely sloping ground. The content of each type of soil/rock thus assigned to any cross section shall be determined as indicated below. It is to be noted that no portion of cutting will be payable for any such type of soil/rock as is not exhibited on the finished side slope, where the side slope exists.
- (a) For box type cutting:-** The centre line of the alignment will be marked vertically on the cross section and the content of each type of soil/rock will be determined by computing the area of the strip, formed by joining the points, which form the extremity of occurrence of the particular soil on the finished side slope of cutting, by straight horizontal lines terminating on the centre line. **Figure No.1.1** is illustrative of the manner in which payment is to be made.
- (b) For one sided cutting on a transversely sloping ground:-** Content of each type of soil/rock will be determined by computing the area of the strip, formed by joining the points, which form the extremity of occurrence of the particular soil on the finished side slope of the cutting, by straight lines to the zero point. **Figure No.1.2** is illustrative of the manner in which the payment for the cutting will be made.

(c) For widening of existing cuttings for one or more lines where the existing cutting slope disappears and a fresh slope stands:- Before undertaking widening of the cutting, pre-classification of the existing cutting slope (which will disappear) should be done after clearing and cleaning the surface and the strata met marked on the cross-section sheets. After completion of the work various strata as stand exposed on the new finished slope of the cutting shall again be marked on the cross-sections. Then the demarcation points of adjacent strata as determined by classification of the existing slope and the final slope should be joined as shown in **Figure No.1.3**.

The cross-sectional areas for different strata may be worked out and quantities payable

classification-wise assessed accordingly.

(d) For extension to the existing cutting where no fresh cutting slope is available after work:- Before execution of the work pre-classification of the existing cutting slope which will not be finally available, should be done and recorded in the initial cross-section. **Figure No.1.4** is illustrative of the manner in which the payment for the cutting is to be made for soil of different classifications.

1.1.8.7 Classification in the above manner shall be made only at such points where the cross sections giving the ground profile have been recorded. The classification as recorded in the above manner in case of cuttings shall be signed by the contractor in token of his acceptance. The classification as recorded by the Authorized representative of the Engineer in the above cases for cuttings is subject to confirmation by the Engineer, whose decision shall be final and binding on the contractor. Where there is disagreement between the Contractor and the Authorized representative of the Engineer on classification of soil, payment shall be effected “on account” as per lower classification as made by the Authorised representative of the Engineer. Payment for extra at the rate for higher classification shall be made after final decision by the Engineer on the admissibility of the Contractor’s claim for higher classification.

1.1.8.8 In computing the quantity of earth work in cuttings and side drains, no cognizance will be taken of the additional excavation, which may be necessitated during the progress of the work due to the presence of boulders or other material, and payment will only be made for the quantity as per cross sections required to be provided.

1.1.8.9 Where cutting spoil is utilised for making the bank, stones over 75mm size, which are not to be used in the bank, shall be stacked separately at a site to be indicated by the Engineer. To determine the quantity of cutting spoil led out for making the bank, the sectional quantity of the cutting shall be reduced by the volume of stones and boulders stacked outside, which will be arrived at by deducting 50% for voids from the stack measurements of these stones and boulders. The stacking of these stones and boulders, including initial lead and lift specified in the item, is covered by the initial rate of Earth work.

1.1.8.10 It must be clearly understood that the Contract rates are intended to cover the full cost of finished work as per approved drawings or as directed by the Engineer

with nothing extra payable for work carried out in excess of the requirements. Banks and cuttings are to be carefully dressed to formation with such slopes as may be specified in each case. The payment for the quantity of earth work in cutting / bank shall normally be made on cross sectional measurements. The existing ground / bank profile shall be taken and plotted by the Authorised representative of the Engineer in the presence of contractor or his authorized agent before commencement of the work. The profile of the bank or the cutting required to be provided shall also be plotted on the same sheets. The levels and cross sections shall be signed by both the Authorised representative of the Engineer and the contractor / his authorized agent. (The profiles of the bank or cutting as required to be provided are for the guidance of the contractor and not for the purpose of measurements).

The profiles of the finished and plotted bank/ cutting shall like-wise be taken in the presence of the contractor or his authorised agent and super-imposed on the original ground profile. These profiles are to be taken at locations as directed by the Engineer, at least at 25m intervals on straight and every 15m on Curves with radii sharper than 600m and at extra locations in special cases such as irregular or side long ground etc. The gross volume of earth work shall be calculated from the original and finished profile of the bank/ cutting.

As it may, at times, be difficult to measure by means of cross sections the quantity of rock excavated by blasting or chiselling, owing to its irregular configuration or intermixture with other materials, the quantity of rock may be measured after stacking the excavated rock spoil. The same procedure also applies to any other type of soil/rock, which requires to be measured separately from the material constituting the bulk of the spoil. In all such cases, the payable quantity of the stacked material is to be arrived at by making suitable deductions for voids from the measured cubical contents of the stacks as specified below:-

Type of soil stacked	Deduction
(a) Rock spoil of different sizes	30 per cent
(b) Sandy materials	7 ½ per cent
(c) Black cotton soil	20 per cent
(d) Other soils, including coal ashes	15 per cent

To facilitate measurement, all stacks to be measured shall be made rectangular in plan and of uniform height, on level ground or ground levelled for this purpose. The stacking of spoil shall be done in a compact manner to the satisfaction of the Engineer. The rates provided shall include all charges on account of such stacking as well as any lead or lift, as also the re-stacking of stacks or portions of stacks which the Engineer considers, in his sole discretion, as not properly stacked.

Where earthwork is required to be done from borrowpits for repairs to bank to make up cess, to fill raincuts etc, the payment for such earthwork will be effected on borrow pit measurements.

As far as possible spoils from cuttings fit for embankment shall be used to make up the bank. If however, this is found to be uneconomical due to excessive lead or lift, or if sufficient quantity of good earth fit for embankment is not available from the source of cut spoils contractor's earth approved by Engineer or earth from borrow pits in railway land as directed by Engineer shall be utilised. As far as possible each

stretch of bank should be made of earth from only one source so as to avoid mix up. If however, this is not possible due to exigencies of work, earth from one source should be utilised first and compaction done before earth from the next source is allowed to be dumped. Initial cross section of bank and cross section after compaction of earth from each of the sources should be taken. Based on the cross sectional areas, the gross quantity of earth work in embankment executed by utilising the earth from different sources shall be determined

Final measurements shall be taken only after the bank/ cutting has been completed to the required profile as directed by the Engineer irrespective of the period of completion and number of monsoons that may pass during execution.

1.1.8.11 Where, for any reason at the discretion of the Engineer, borrow-pit measurements are resorted to, all matams and roads and excess earth work, such as bulges in the slopes of the banks, shall be excluded from the measurements.

1.1.8.12 Nothing extra shall be paid for :-

- i) Excavation for insertion of planking and strutting.
- ii) Removing slips or falls in excavations
- ii) Bailing out water in excavations from rains, ordinary springs not requiring pumping etc.

(Note:- Pumping out water caused by powerful springs, tidal or river seepage, broken water mains or drains and the like, shall be paid separately if provided for in the Agreement)

- iii) Unauthorised battering or benching of excavations.
- iv) Forming steps in sides of deep excavations and their removal after measurements.
- v) Protective measures for protection against risk of accidents to the public due to open excavation.
- vi) Protective measures / precautions taken to avoid damage to existing Signal / Electrical / Telecom / other Miscellaneous Cables, Pipes, installations etc.

1.1.8.13 On account payment

1.1.8.13.1 Running on account payments will normally be made only for such length of banks as in the opinion of the Engineer-in-Charge have been finally executed in terms of the conditions of contract. On account payments may however be made at the discretion of the Engineer-in-Charge if uncompleted bank is high or there are other circumstances which may result in heavy investment on the part of the contractor, before he is able to complete a stretch of bank in all respect. Such on account payment will be made to the extent of only 90% of the total quantity of earthwork. Contractor shall submit **royalty clearance certificate along with Running Account bill**, if the agency fails to submit the royalty clearance certificate, the required amount will be deducted as per extant Govt. rule, from his bill and will be deposited with the concerned dept.

1.1.9 Dressing Surface:-

- 1.1.9.1** This specification is applicable to Surface dressing executed as a separate work for purposes other than earthwork for embankment or cutting. In case of earthwork for embankment or cutting, provisions of **Para 1.1.2** will apply and the surface dressing will be covered by the initial rate of earthwork unless stated to the contrary in the Agreement. This specification shall also be applicable only to earthwork involving soil.
- 1.1.9.2** The terms “Dressing Surface” shall be taken to mean the cutting down of high portion of a specified area of ground and using the excavated earth to fill up the hollows and the depressions. The maximum depth of excavation or filling shall be restricted to 15 cms.
- 1.1.9.3** The levels to which the ground is to be dressed shall be such that the quantity filled is nearly equal to the quantity cut and the finished surface is even and tidy with such slopes as may be necessary for proper drainage. Before the work is commenced the proposed levels shall be set up at regular intervals both for the cuts and for the fills, by suitable means as directed by the Engineer and these shall be got checked and approved by him.
- 1.1.9.4** Unless otherwise provided for in the Contract, the rates shall be inclusive of removal of rubbish upto a distance of 50m outside the periphery of the area cleared.

1.2 EARTHWORK IN EMBANKMENTS

- 1.2.1 Profiles:-** Profiles for banks shall be set out where every cross section has been taken. These profiles shall be set up atleast every 25m on the straight and every 15m on curves with radii shorter than 600m. Profiles shall also be set up at any additional places if ordered by the Engineer.
- 1.2.2 Formation Width:-** The formation widths are to be as shown in the drawings.
- 1.2.3 Side Slopes:-** The side slopes will ordinarily be as shown in the drawing, but the Engineer or his Authorised representative may, by order in writing, vary this slope to suit local conditions.
- 1.2.4 Selection of Earth:-** Fill material proposed to be used, either from railway land or from outside shall be assessed for its suitability at contractor’s expense, in accordance with RDSO Guidelines. The contractor shall get the prior approval of the Engineer for the quality of the fill material. Soil groups falling under the classifications GB, GW, GC, GM, GP, SB, SW and SC under IS Code 1498 are generally considered suitable.
- 1.2.5 Execution of Earthwork:**
- 1.2.5.1** The spreading of material in layers of desired thickness over the entire width of embankment should be done by mechanical means and finished by a motor grader. The motor grader blade shall have hydraulic control suitable for initial adjustment and maintain the same so as to achieve the slope and grade.
- 1.2.5.2** Thickness of layer is to be decided in accordance with RDSO Guidelines. However, as a good practice thickness of layer should be generally kept as 300mm for fill material and 250mm for blanket material in loose state before compaction.
- 1.2.5.3** Efforts, in accordance with RDSO Guidelines, should be made to keep moisture content level of the soil in the range of $OMC \pm 2\%$ at the time of compaction.

- 1.2.5.4** The rate of progress should be, as far as possible, uniform so that the work is completed to final level almost at the same time.
- 1.2.5.5** The rolling for compaction of fill material should commence from edges towards center with minimum overlap of 200mm between each run of the roller. In final pass, roller should simply move over the surface without vibration so that top surface is properly finished.
- 1.2.5.6** Extra bank width of 500mm on either side shall be rolled to ensure proper compaction at the edges. The extra soil would be cut and dressed to avoid any loose earth at the slopes. This should preferably be done with help of grade cutter. In case of widening of embankments the extra width to be rolled shall be 300mm instead of 500mm.
- 1.2.5.7** At the end of the working day, fill material should not be left uncompacted. Care should be taken during rolling to avoid ponding on formation.
- 1.2.5.8** During construction of formation, there may be rainfall to the extent that rain cuts may develop on the surface of formation due to erosion of soil. Care should be taken that these rain cuts are not allowed to develop wide and deep otherwise these locations will remain weak spots.
- 1.2.5.9** Top of the formation should be finished to cross slope as provided in contract drawings.
- 1.2.5.10** Once the top surface of the formation has been finished to proper slope and level, movement of material vehicle for transportation of ballast, sleepers etc. should be avoided since these movements will cause development of unevenness, ruts on the surface which will accumulate water and weaken the formation.
- 1.2.5.11** At locations where the water table is high and the fill soil is fine-grained, it may be desirable to provide a granular layer of about 30 cm thickness at the base, above subsoil across the full width of formation. This work will be carried out if directed by the Engineer for which extra rate will be paid.
- 1.2.5.12** At places where embankment material are not conducive to plant growth, top soil obtained from site clearance as well as top layer of borrowpits which is rich in organic content and suitable for plant growth, may be stored for covering slopes of embankment and cuttings after construction or other disturbed areas, where revegetation is required as far as practicable.
- 1.2.5.13** In conversion / doubling / rehabilitation projects, suitable benching of existing slope, in steps 30cm in height and 60cm deep, shall be cut in the existing bank before any new earth is placed, to form a bond between the new and old earth work.. It should be ensured that there is no humus material left on the benched slope. Care needs to be taken to avoid entry of rainwater into the formation from this weak junction, otherwise this would result in development of weak formation, slope failure, maintenance problem due to uneven settlement etc.
- 1.2.5.14** Similar benching is to be provided in side-long ground of which the slope at right angles to the alignment of the banks is 3 Horizontal to 1 vertical or steeper or if

ordered by the Engineer. The benching in side long ground will not be separately measured or paid for, but is deemed to be covered by the initial rate for earth work.

- 1.2.6 Embankment in Water-logged ground etc:-** When embankments are to be carried across water-logged or swampy ground or to be made in soil which requires special protective measures, it rests with the Contractor in all such cases to bring these facts to the notice of the Engineer concerned who will direct on the methods to be adopted and the rates to be paid, and will arrange for a special agreement for the same if necessary.
- 1.2.7 Borrow Pits:-** The Engineer concerned will direct from where material is to be obtained. As far as possible, Bank should be made of homogeneous material with no mix of rubble or boulders with soil. In case of land provided by the Employer, no excavation for borrow pits shall be made within 2m of the limits of the acquired land. Borrow pits shall not be dug close to level crossings, bridges or culverts, telegraph poles, electric poles, or close to inhabited areas, unless they can be properly drained to prevent water stagnating. Borrow pits within station limits shall be avoided as far as possible. The earth is to be excavated and thrown to such width, depth and height and in such places as may be from time to time decided.
- 1.2.7.1** During excavation, the contractor shall take particular care to avoid damage to drains, water mains, cables or other underground work. Should any damage be caused, the Engineer shall be notified immediately and the damage shall be made good at the contractor's expense.
- 1.2.7.2** Where Earthwork is to be carried out within Railway land and where borrowing of Earth from Railway land is agreed to by the Railway as confirmed in writing by the Engineer-in-charge, Borrow pits shall be excavated within the limits of railway land as directed by the Engineer. The pits must be rectangular or conform to the land boundaries. The sides of the pits next to the toe of the bank are to be sloped down at 2:1, and elsewhere at a slope of 1:1 unless otherwise directed by the Engineer. Any pits wrongly excavated shall be refilled by the contractor at his own cost, and in such a manner as the Engineer directs.
- 1.2.7.3** Borrow pits are not to be made of uneven depth but the whole area of each pit is to be neatly excavated to the same level. The outer or the most distant half of the borrowpits is to be excavated first, so that in the event of the pits being flooded by rain, there will still be ground available for work.
- 1.2.7.4** A berm 15m wide is to be left untouched initially at every 80m between edges of borrowpits, and is not to be encroached upon for any excavation except under the instructions of the Engineer. If it is necessary for drainage purposes to cut through the berm, the channel will be made on the side remote from the Bank.
- 1.2.7.5** In side long ground, the borrow pits are to be dug on the upper side of the bank, and are to be continuous to serve as catch water drains; and, if so ordered, the contractor shall get the earth for the bank exclusively from such pits till the catch water drain is complete to the required length, section and level as prescribed by the Engineer.

- 1.2.7.6** When doing repair work to banks it is absolutely essential that diagonal bunds be kept, when digging fresh borrow-pits in the old ones, as a precautionary measure for correct assessment of the work. Diagonal bunds are also to be kept in borrow-pits for new works where payments are to be made on borrow-pit measurements. When doing earthwork repairs, Authorised representative of the Engineer should bear this point in mind and refuse to measure up any pit in which a diagonal bund has not been kept. For repair works it would save a large amount of unnecessary detailed measurements if all pits were excavated to a uniform size as far as practicable.
- 1.2.8 Stream diversions:-** When it has been decided to divert a stream adjoining the bank, the excavation for this work is to be undertaken and completed before any borrow pit work is done at site and all earth from such diversion is to be put into the main bank, if so ordered. If earth excavated from the drain is led into the bank, payment will only be made for the quantity excavated including lead and lift if any and not for both cut and fill. In excavating for diversion of stream, care must be exercised by the Engineer that such diversion does not start a land slip.
- 1.2.9 Bank executed manually:-** All railway embankments shall be constructed only by mechanical means in accordance with RDSO Guidelines. Other embankments, when executed manually, shall be made in successive layers, of not more than 30cm uncompacted depth, over the whole width. The subsequent layer shall be started only when the previous layer has been completed for a length not less than 30m along the embankment. All large clods shall be broken up in the borrow pits or bank by labour specially detailed for this work. This shall be strictly ensured.
- 1.2.10 Backing to bridges:-** In carrying embankments over a bridge or a culvert intended to be covered by the work, the earth work shall be brought up evenly on both sides of the structure so that the pressure may be equalised. In filling in the approaches of a bridge, or the spandrels between small arches, the earth filling shall be raised simultaneously with the wing walls in the former case and with the face walls in the latter, in order that the filling may be well trodden down under the feet of the labourers; and in filling in foundations and backing to revetments, the earth work shall similarly be brought up level as the masonry proceeds. Filling for the backing of bridges or culverts will conform to specifications under **Para 1.6.3** or as ordered by the Engineer.
- 1.2.11 Dressing:-** After completion of earth work the slopes shall be neatly dressed to the correct profiles, and shall be made up where required during the maintenance period. The top should be neatly dressed off sloping at an inclination of 1 in 30 either side from the centre line unless otherwise specified in the drawings.
- 1.2.12 Turfing:-** Turfing of banks shall be done during the monsoon season, preferably after a heavy shower, when it can be ensured that the bank slopes will remain wet for a long time after planting the grass. Turfing shall be paid for separately. Turfing shall not be commenced without the prior written permission of the Engineer.
- 1.2.12.1** Before turfing is commenced, the side slopes are to be dressed to the specified section. This dressing is included in the initial rate for earth work, and should a contractor stop work before dressing the bank, he shall be debited with the estimated cost of the dressing to be done by another contractor or departmental labour, as

decided by the Engineer. Where the slope is already consolidated, it should be loosened for a depth of about 4 cms before the sods are laid.

1.2.12.2 Turfing shall consist of sods, not less than 10 cm thick and 20 cm square well beaten into the bank till they get a proper hold and form a level and compact mat. The contractor shall be responsible for watering where necessary to ensure that the turf grows properly; and in the event of it not doing so, he will returf such parts as have not grown, at his own cost. The turfing shall be measured and taken over only after the grass has rooted well and has formed a sufficiently dense growth over the earth slopes.

1.2.12.3 Turfing of side slopes of cuttings if ordered by the Engineer shall be carried out in a manner similar to Turfing of bank.

1.2.13 Sarkanda or similar type of planting on bank slopes:- Where Sarkanda is planted on bank slopes, the minimum distance centre to centre in rows shall be 75 cm in either direction. The plantation in adjacent rows will be staggered for proper coverage of the area. For other types of plantation, the local practice shall be followed as directed by the Engineer. Where directed to be done, this item will be paid for extra.

1.2.14 Erosion Control of Slopes on Banks by use of Geo-jute

Where stipulated, particularly in areas having high erosion problems, the slope may be protected by use of Geo-jute, an eco-friendly, bio degradable material made of jute yarn with a coarse open mesh structure. On degradation it helps in growth of vegetation. The Type of Geo-jute to be used 1, 2 or 3 will be as stipulated. The work of laying and maintaining Geo-jute should be carried out strictly in accordance with the provisions in RDSO's guidelines for Application of Jute Geo-textiles in Railway embankments and hill slopes issued under RDSO/2007/GE:G-008 read with all upto date amendments / revisions.

1.3 EARTH WORK IN CUTTINGS

1.3.1 Formation width:- The formation widths, exclusive of side drains, are to be as shown in the drawings. The top width of each side drain will ordinarily be 120 cm at formation level and depth 30 cm, unless shown otherwise in the drawing.

1.3.2 Side Slopes: The side slopes will ordinarily be 1:1, unless otherwise shown in the drawing or ordered by the Engineer.

1.3.3 Excavation:

1.3.3.1 When so ordered, the centre portion of gullet of the cutting shall be first taken out to the full width of formation to enable the Engineer to determine the slopes suitable to the full length of the particular cutting or to different lengths of it. When the gullet is cut out to its full depth in shallow cuttings, or to the depth of the first cut in deep cuttings, the side portions or triangular sections up to the slopes may be excavated. In deep cuttings, the second cut will not be started until the top portion is thus completed.

The necessity of excavating cuttings in this manner is evident as, in the event of heavy rain occurring with work partly completed, and the bottom of the excavation uneven and incapable of drainage, excessive delay might occur or excessive pumping might become necessary. The contractor is solely responsible for any such contingency and the railway will not be liable for any compensation.

1.3.3.2 All cuttings shall be taken down carefully to the precise level and section as delineated in the drawings or as ordered by the Engineer. In case the bottom of the cutting is taken down deeper than is necessary by over sight or neglect of the contractor, the hollow must be filled up to true depth with selected material and rammed, at his expense. Cuttings with the formation in rock will be excavated to 15 cm below the true formation and filled up to true level with cutting spoil to ensure that no lumps of solid rock project above formation level. The bottom sloping from centre towards side drains shall be as given in Sub **Para 1.3.3.3** below. Payment will, however be made for earth work in cutting up to the true formation level only.

1.3.3.3 In soft soil the excavation of cuttings shall, in the first instances be carried to about 15 cm short of the full depth, so much being left for dressing the bottom true to the formation. The side slopes shall be dressed true and straight and the bottom shall then be completed by sloping if from the centre line towards the side drains to a slope of 1 in 24 or any other slope as shown in the drawing.

1.3.4 Drainage of cuttings:

1.3.4.1 In excavating cuttings, special precautions are to be taken to ensure that the excavations drain themselves automatically. To ensure this, the central block of earth or gullet is to be excavated first. This will be done in such a manner that the bottom of the excavation shall, where possible, slope downwards from the centre of the cutting towards the ends. It will be made in such cuts or steps as may from time to time, be directed. Generally, in deep cuttings the first cut or step will approximately follow the surface of the ground, where this will secure the necessary slope for drainage, and will be excavated to such depth not exceeding 3m as may be ordered, with perpendicular sides leaving pathways for workmen along the sides of the cut parallel to the central line about every 15 m. In shallow cuttings, not exceeding 2m in the deepest part, the gullet may be cut out at once to formation level.

1.3.4.2 Side drains shall be provided, according to the cross section shown in the drawing, at the toe of the slope in all cuttings to ensue proper drainage. Excavation to the required cross section and longitudinal slope to form the side drain will be paid for at the same rates as the cutting.

1.3.5 Catch-water drains:- Where required, catch water drains cut to the section and profile prescribed, shall be constructed on the up hill side leaving a berm of one metre from the boundary of the railway land and shall be paid for at the same rates as for cutting. The cross sectional area of the catch water drain shall normally not exceed 0.75 sqm. The spoil from the catch water drain will be deposited to make a uniform slope from the edge of the cutting towards the drain. The material derived from the catch water drain will be used to the extent required to provide the slope and the surplus earth should be deposited in the spoil bank of the cuttings. Unless ordered to

the contrary by the Engineer, the Catch water drain must be excavated before the cutting is started.

1.3.6 Berms and spoil banks:- No spoil shall be deposited within a distance of 9m from the top edge of the slope of any cutting duly taking into account the location of the catch water drain, if any. While doing so, the Engineer may bear in mind the side on which the doubling may eventually be done.

1.3.6.1 The spoil heap shall be roughly but neatly dressed off to a slope of 1 ½ : 1, and shall form a continuous bund along the top of the cutting. In country where there is any cross fall, sufficient spoil shall be thrown on the up hill side of the cutting to supplement the catch water drain and assist in keeping drainage out. This work must be done first.

1.3.6.2 (a) All material excavated from cuttings suitable for pitching, ballast, masonry or any other purpose whatever, shall be the property of the Railway, and shall be stacked, as also disposed off, as directed by the Engineer, within the limits of lead specified for stacking of spoil. This is included in the rate for cutting.

(b) Any finds of archaeological interest such as relics of antiquity, coins, fossils or other articles of value shall be delivered to the Engineer and shall be the property of the Railways.

1.3.7 Springs or Inflow: Should springs or inflow of water appear in cuttings, or should they be flooded, the contractor must arrange for bailing, pumping or drainage of water, without obstruction to adjacent works. Payment for the same shall not be made unless otherwise provided for in the Agreement with the Contractor.

1.3.8 Protections:- Excavation, where directed by the Engineer, shall be securely fenced and provided with proper caution signs, conspicuously displayed during the day and properly illuminated with red lights during the night, to avoid accidents. 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 & chambers, 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. No extra payment will be made for taking such measures unless otherwise specifically provided for in the Contract.

Excavation shall not be carried out below the foundation level of adjacent buildings until underpinning, shoring etc. is done as per the directions of the Engineer for which payment shall be made separately.

1.3.9 Blasting:- If any blasting operations are necessary, they shall be carried out in accordance with the Explosives Act and the Rules as amended upto date. Explosives Rules 1983 should be strictly adhered to by the Contractor's staff as well as Railway employees engaged in blasting operations. For general guidance, the instructions contained in Chapter X of Indian Railways Works Manual may be referred to. The following specifications are supplementary to the above.

1.3.9.1 Where hard rock is met with and blasting operations are considered necessary, the contractor shall obtain the approval of the Engineer in writing for resorting to blasting operation.

Note: In ordinary rock, not requiring blasting, blasting operations shall not be generally adopted. However, the contractor may resort to blasting with the permission of the Engineer, but nothing extra shall be paid for such blasting operations.

The contractor shall obtain licence from the competent authority for undertaking blasting work as well as for containing and storing the explosive as per the Explosive Act, 1884 as amended upto date and the Explosive Rules, 1983. The contractor shall purchase the explosives fuses, detonators etc. only from a licenced dealer. Transportation and storage of explosive at site shall conform to the aforesaid Explosive Act and Explosive Rules. The contractor shall be responsible for the safe custody and proper accounting of the explosive materials. Fuses and detonators shall be stored separately and away from the explosives. The Engineer or his authorised representative shall have the right to check the contractor's store and account of explosives. The contractor shall provide necessary facilities for this.

The contractor shall be responsible for any damage arising out of accident to workmen public or property due to storage, transportation and use of explosive during blasting operation.

1.3.9.2 Blasting operations shall be carried out under the supervision of a responsible authorized agent of the contractor (referred subsequently as agent on duty), during specified hours as approved in writing by the Engineer. The agent shall be a licensed blaster. In case of blasting with dynamite or any other high explosive, the position of all the bore holes to be drilled shall be marked in circles with white paint. These shall be inspected by the Contractor's agent. Bore holes shall be of a size that the cartridge can easily pass down. After the drilling operation, the agent shall inspect the holes to ensure that drilling has been done only at the marked locations and no extra hole has been drilled. The agent shall then prepare the necessary charge separately for each bore hole. The bore holes shall be thoroughly cleaned before a cartridge is inserted. Only cylindrical wooden tamping rods shall be used for tamping. Metal rods or rods having pointed ends shall never be used for tamping. One cartridge shall be placed in the bore hole and gently pressed but not rammed down. Other cartridges shall then be added as may be required to makeup the necessary charge for the bore hole. The top most cartridge shall be connected to the detonator which shall in turn be connected to the safety fuses of required length. All fuses shall be cut to the length required before being inserted into the holes. Joints in fuses shall be avoided. Where joints are unavoidable, a semi-circular nitch shall be cut in one piece of fuse about 2 cm deep from the end and the end of other piece inserted into the nitch. The two pieces shall then be wrapped together with string. All joints exposed to dampness shall be wrapped with rubber tape.

The maximum of eight bore holes shall be loaded and fired at one occasion. The charges shall be fired successively and not simultaneously. Immediately before firing, warning shall be given and the agent shall see that all persons have retired to a place of safety. The safety fuses of the charged holes shall be ignited in the presence of the agent, who shall see that all the fuses are properly ignited.

Careful count shall be kept by the agent and others of each blast as it explodes. In case all the charged bore holes have exploded, the agent shall inspect the site soon after the blast but in case of misfire, the agent shall inspect the site after half an hour and mark red crosses (X) over the holes which have not exploded. During this interval of half an hour, nobody shall approach the misfired holes. No driller shall work near such bore until either of the following operations have been done by the agent for the misfired boreholes.

- (a) The contractor's agent shall very carefully (when the tamping is of damp clay) extract the tamping with a wooden scraper and withdraw the fuse, primer and detonator.
- (b) The holes shall be cleaned for 30 cm of tamping and its direction ascertained by placing a stick in the hole. Another hole shall then be drilled 15cm away and parallel to it. This hole shall be charged and fired. The misfired holes shall also explode along with the new one.

Before leaving the site of work, the agent of one shift shall inform the another agent relieving him for the next shift, of any case of misfire and each such location shall be jointly inspected and the action to be taken in the matter shall be explained to the relieving agent.

The Engineer shall also be informed by the agent of all cases of misfires, their causes and steps taken in that connection.

1.3.9.3 General Precautions:- For the safety of persons red flags shall be prominently displayed around the area where blasting operations are to be carried out. All the workers at site, except those who actually ignite the fuse, shall withdraw to a safe distance of atleast 150 metres from the blasting site. Audio warning by blowing whistle shall be given before igniting the fuse.

Blasting work shall be done under careful supervision of a licensed blaster and trained personnel shall be employed. Blasting shall not be done within 100 metres of an existing structure, unless specifically permitted by the Engineer in writing. In such cases, the Authorised representative of the Engineer must be present to ensure that special precautions as may be prescribed by the Engineer and those stipulated by the licensing authority are taken and that necessary warning is given to the inhabitants.

All procedures and safety precautions for the use of explosives drilling and loading of explosives before and after shot firing and disposal of explosives shall be taken by the contractor as detailed in IS 4081, Safety code for blasting and related drilling operation.

1.3.9.4 Precautions against misfire:- The safety fuse shall be cut in an oblique direction with a knife. All saw dust shall be cleared from inside of the detonator. This can be done by blowing down the detonator and tapping the open end. No tools shall be inserted into the detonator for this purpose.

If there is water present or if the bore hole is damp, the junction of the fuse and detonator shall be made water tight by means of tough grease or any other suitable material.

The detonator shall be inserted into the cartridge so that about one-third of the copper tube is left exposed outside the explosive. The safety fuse just above the detonator shall be securely tied in position in the cartridge. Water proof fuse only shall be used in the damp bore hole or when water is present in the bore hole.

If a misfire has been found to be due to defective fuse, detonator or dynamite, the entire consignment from which the fuse, detonator or dynamite was taken shall be got inspected by the Engineer or his authorised representative before resuming the blasting or returning the consignment.

1.4 EARTH WORK BY DEPARTMENTAL MATERIAL TRAINS - Deleted.

1.5 EXCAVATION OF FOUNDATIONS FOR BUILDINGS / TRENCHES FOR PIPELINES ETC. - Deleted

1.6 EARTH FILLING IN FOUNDATION TRENCHES AND PLINTH, UNDER FLOORS AND BEHIND ABUTMENTS ETC. - Deleted

1.7 SHORING OR TIMBERING FOR TRENCHES – Deleted.

1.8 PUDDLE – Deleted.

1.9 MECHANICAL COMPACTION OF EARTHWORK

Note: Based on RDSO's "Guidelines for Earthwork in Railway Projects" (July 2003 – Guideline No.GE:G-1 to which reference may be made for further details.)

1.9.1 Orders for compaction:- Depending upon the height of the embankment the type of the soil, time available for completing the embankment, the importance of the line and other relevant factors such as axle load, permitting higher speeds within a limited time etc, the Engineer shall decide whether Mechanical compaction is to be done for the full or part height of the embankment.

1.9.2 Advantages of Compaction:-

1.9.2.1 Compaction is the process of increasing the density of soil by mechanical means by packing the soil particles closer together with reduction of air voids and to obtain a homogeneous soil mass having improved soil properties. Compaction brings many desirable changes in the soil properties as follows:

- a) Helps soils to acquire increase in strength in both bearing resistance and shear strength.
- b) Reduces compressibility, thus minimising uneven settlement during services.
- c) Increased density and reduces permeability, thereby reducing susceptibility to change in moisture content.
- d) Reduction in erodability
- e) Results in homogeneous uniform soil mass of known properties.

- f) Reduction in frost susceptibility in cold regions.

1.9.3 Factors affecting Compaction in the filed:-

Compaction of a particular soil is affected by moisture content, compacting effort, type of roller etc as explained below:

- (a) **Compacting Effort:-** In modern construction projects, heavy compaction machinery are deployed to provide compaction energy. Types of machinery required are decided based on type of soil to be compacted. The method of compaction is primarily of four types viz kneading compaction, static compaction, dynamic or impact compaction and vibratory compaction. Different type of action is effective in different type of soils such as for cohesive soils, Sheeps foot rollers or pneumatic rollers provide the kneading action. Silty soil can be effectively compacted by Sheeps-foot roller / pneumatic roller or smooth wheel roller. For compacting sandy and gravelly soil, vibratory rollers are most effective. If granular soil has some fines both smooth wheeled and pneumatic rollers can be used.
- (b) **Moisture Control:** Proper control of moisture content in soil is necessary for achieving desired density. Maximum density with minimum compacting effort can be achieved by compaction of soil near its OMC (Optimum Moisture Content). If natural moisture content of the soil is less than the OMC, calculated amount of water should be added with sprinkler attached to water tanker and mixed with soil by motor grader for uniform moisture content. When soil is too wet it is required to be dried by aeration to reach upto OMC.
- (c) **Soil Type:** Type of soil has a great influence on its compaction characteristics. Normally, heavy clays, clays and silts offer higher resistance to compaction, whereas, sandy soils and coarse grained or gravelly soils are amenable for easy compaction. Coarse-grained soils yield higher densities in comparison to clay. A well-graded soil can be compacted to higher density.
- (d) **Thickness of Layer:** Suitable thickness of soil of each layer is necessary to achieve uniform compaction. Layer thickness depends upon type of soil involved and type of roller, its weight and contact pressure of its drums. Normally, 200-300mm layer thickness is optimum in the field for achieving homogeneous compaction.
- (e) **Number of Passes:** Density of soil will increase with the number of passes of roller but after optimum number of passes, further increase in density is insignificant for additional number of passes. For determination of optimum number of passes for given type or roller and optimum thickness of layer at a predetermined moisture content, a field trial for compaction is necessary which will be arranged by the Engineer for which the Contractor shall make all arrangements and bear the cost of test / tests as required.

1.9.4 Compaction procedure for Different soils

The embankments are constructed with locally available soil provided it fulfils the specified requirements. Procedure of compaction to be adopted will depend on the type of soil being used in construction. General guidelines to deal with compaction of various types of soils for attaining optimum dry density/ relative density at minimum effort, have been briefly given as under. The procedure to be adopted will be decided by the Engineer for strict adherence by the Contractor.

1.9.4.1 Compaction of Cohesion less gravely and Sandy soil

i) Sandy & gravely soils should be compacted with vibratory rollers. If fines are less in these types of soils, it can be compacted with minimum number of passes of vibratory rollers without strict control of moisture to achieve desired Relative Density. With higher percentage of fines, sandy and gravely soils need to be brought to OMC level to get effective compaction. Uniformly graded sand and gravel are difficult to be compacted. Top layer of sand and gravel remains loose in vibrating compaction. Therefore, in final pass the roller should move smoothly without vibration. Dry densities attained in field trials normally should be around MDD/ specified Relative Density as obtained from laboratory tests and should form the basis for specification and quality control.

ii) Poorly graded sand and gravel with $C_u < 2.0$, should not be used in earthwork for the banks to safeguard against liquefaction under moving loads or especially due to earthquake tremor. Generally, fine sand is prone to liquefaction. This aspect should be specifically examined to prevent possibility of any liquefaction.

1.9.4.2 Compaction of Silty- Clayey Soils

Silty soil is a fine-grained soil. These can be plastic or non-plastic depending upon the clay content in it. Silts and fine sands with high water content have a tendency to undergo liquefaction under vibrating rolling due to the pore water pressure generated by mechanical work. Silty soils can be compacted satisfactorily near about OMC either with smooth rollers or vibratory rollers. Vibratory roller will give high degree of compaction and higher lift. Compaction of silty clays will have to be handled in a manner similar to clays.

1.9.4.3 Compaction of Clays

i) Water content plays very important role in compaction of clays. Main objective of compacting predominantly clays is to achieve uniform mass of soil with no voids between the lumps of clays. If moisture content is too high, roller tends to sink into the soil and if too low the chunks would not yield to rolling by rollers. Appropriate water content i.e. OMC of the soil is in the range of about plastic limit plus two percent. Sheeps- foot rollers are most effective in breaking the clods and filling large spaces.

ii) Thickness of layer should not be more than depth of feet of roller plus 50mm. Pad foot vibratory roller with drum module weight of 7 tonne (total static weight of 11 tons) for a lift thickness of 30 cm is found quite effective for compaction of clays. For better results, initial rolling with static pad foot roller followed by 15 tons vibratory roller can be tried.

iii) In case of such soils, the MDD and OMC as determined in the Laboratory may not be very relevant and therefore achievable MDD and practicable moisture content at which such soils can be compacted should be determined by conducting field trials for which the Contractor shall make all arrangements and bear the cost of field trials as required.

1.9.5 Selection of Compacting Equipment:

The performance of roller is dependent mainly on type of soil used in construction. Guidelines on selection of compacting equipment are given in **Annexure 1.2**. Vibratory rollers which can be used in static as well as dynamic mode with plain and pad drum, are now being manufactured by reputed Indian Companies also. Salient features of some of models are given in **Annexure 1.3**. The Contractor should get the Engineer's approval for the type of equipment to be deployed for compaction.

1.9.6 General aspects of Mechanical Compaction

- a) The spreading of material in layers of desired thickness over the entire width of embankment should be done by mechanical means and finished by a motor grader. The motor grader blade shall have hydraulic control suitable for initial adjustment and maintain the same so as to achieve the slope and grade.
- b) Thickness of layer is decided based on field compaction trials. However, as a good practice thickness of layer should be generally kept as 300mm for fill material and 250mm for blanket material in loose state before compaction.
- c) If natural moisture content (NMC) of the soil is less than the OMC, calculated amount of water based on the difference between OMC and NMC and quantity of earthwork being done at a time, should be added with sprinkler attached to water tanker and mixed with soil by motor grader or by other means for obtaining uniform moisture content. When soil is too wet, it is required to be dried by aeration to reduce moisture content near to OMC. Efforts should be made to keep moisture content level of the soil in the range of $OMC \pm 2\%$ at the time of compaction.
- d) Fill shall be placed and compacted in layers of specified thickness. The rate of progress should be, as far as possible, uniform so that the work is completed to final level almost at the same time.
- e) The rolling for compaction of fill material should commence from edges towards center with minimum overlap of 200mm between each run of the roller. In final pass, roller should simply move over the surface without vibration so that top surface is properly finished.
- f) Extra bank width of 500mm on either side shall be rolled to ensure proper compaction at the edges. The extra soil would be cut and dressed to avoid any loose earth at the slopes. This should preferably be done with help of grade cutter.
- g) At the end of the working day, fill material should not be left uncompacted. Care should be taken during rolling to provide suitable slope on toe of the bank to facilitate quick shedding of water and avoid ponding on formation.
- h) During construction of formation, there may be rainfall to the extent that rain cuts may develop on the surface of formation due to erosion of soil. Care should be

taken that these rain cuts are not allowed to develop wide and deep otherwise these locations will remain weak spots.

- i) Top of the formation should be finished to cross slope of 1 in 30 from one end to other towards cess / drain in multiple lines and from center of formation to both sides in single line.
- j) Once the top surface of the formation has been finished to proper slope and level, movement of material vehicle for transportation of ballast, sleepers etc. should be avoided since these movements will cause development of unevenness, ruts on the surface which will accumulate water and weaken the formation.
- k) In conversion / doubling / rehabilitation projects, suitable benching of existing slope shall be done as provided for in the contract before new earthwork is taken up to provide proper bonding between old and new earthworks. It should be ensured that there is no humus material left on the benched slope. Care needs to be taken to avoid entry of rainwater into the formation from this weak junction, otherwise this would result in development of weak formation, slope failure, maintenance problem due to uneven settlement etc.
- l) At locations where the water table is high and the fill soil is fine-grained, it may be desirable to provide a granular layer of about 30 cm thickness at the base, above subsoil across the full width of formation. This work will be carried out if directed by the Engineer for which extra rate will be paid.

1.9.7 Quality Control of Compacted Earth / Blanket layer

1.9.7.1 Compacted Earth: Degree of compaction of each layer of compacted soil should be ascertained by measurement of dry density / Relative Density of soil at locations selected in specified pattern. The method of sampling, frequency of tests, method of tests to be conducted and acceptance criteria to be adopted are as under.

a) Method of Sampling:

- i) Various methods of selection of sample points for check of in-situ dry density are in vogue. The sampling adopted has to be such that effectiveness of proper compaction having been done for the entire area under consideration can be judged. For this, the Engineer will lay down in detail the method to be adopted in detail depending on site conditions and accordingly records of checks done are to be properly maintained. However, in absence of such procedure laid down, following method should be adopted.

Suggested Method of Sampling: For each layer, a minimum of one sample at a predetermined interval (in compliance with the requirement stated in next para) along the centreline of the alignment, would be taken in a staggered pattern so as to attain a minimum frequency of tests as given in sub para “b” below. For subsequent layer, the stagger should be such that the point of sampling does not fall vertically on the earlier sampling points of the layer immediately below. Additional sampling points can be taken, as considered necessary.

ii) In case of bank widening, sampling should be done at an interval of minimum 200 metres on widened side(s) of embankment.

b) Frequency of Tests:

Density check would be done for every layer of compacted fill / blanket material as per following minimum frequency:

i) At least one density check for every 200 sqm. for blanket layers and top one metre of sub-grade.

ii) At least one density check for every 500 sqm. for other than blanket and one metre of sub-grade.

In case of bridge approaches or special locations closer frequency may be adopted.

c) Method of In-situ Dry Density Measurements

Any of the following methods could be adopted as per the requirements at site. RDSO's guidance may be taken for adoption of other methods such as by use of Nuclear Moisture Density gauge and Compact Meter fitted on rollers.

Method of Measurement	Procedure of test	Parameters to be measured	Remarks
i) Sand Replacement Method	As per IS-2720 (Part 28) 1974	a) Insitu Dry Density b) Moisture content	May be adopted for all type of soils
ii) Core Cutter Method	As per IS-2720 (Part 29) 1975	-do-	In some of the coarse grained soils (with little fines) taking core cutter samples is difficult. In such cases, sand replacement method may be used for density measurement.

d) Acceptance Criteria:

i) Coarse grained soils which contains fines passing 75 micron IS Sieve, upto 5 percent should have the Density Index (Relative Density) a minimum of 70% as obtained in accordance with IS:2720 (Part-14)-1983.

ii) For other soils, field dry density should not be less than maximum attainable dry density obtained in field compaction trial. However, in field compaction trial, the maximum attainable dry density should not be less than 98% of MDD

values as obtained by Heavy Compaction Test (IS 2720 (part 8) – 1983) in the laboratory.

In case, there are difficulties in achieving 98% of the MDD values as obtained by Laboratory test, in the field trials, the same may be relaxed upto 95% of MDD with the specific approval of the Engineer, recording reasons of such relaxation.

- iii) During widening of bank in case of gauge conversion and rehabilitation of unstable formation, compaction of earthwork should be minimum 95% of MDD as obtained by Laboratory test as per Heavy Compaction Test (IS:2720 (part 8) – 1983) or 70% Relative Density for cohesionless soil (IS:2720 (Part 14)–1983).

1.9.7.2 Formation Level: Finished top of sub-grade level may have variation from design level by ± 25 mm and finished top of blanket layer may also be permitted to have variation from design level by plus 25mm. The ballast should be placed only on level formation without ruts or low pockets.

1.9.7.3 Cross Slope: Cross slope should be within 1 in 28 to 1 in 30.

1.9.7.4 Side Slopes: Side slope should in no case be steeper than designed side slope. Provision of berm width should not be less than the designed width.

1.9.7.5 Formation Width: Formation width should not be less than the specified width.

1.10 BLANKETING

Note: Based on RDSO's Specification No. GE.IRS.2 (Final) dated July 2005 on "Mechanically produced Blanketing Material for Railway formation including Guidelines for Laying" to which reference may be made for further details.

1.10.1 Scope:- Where the drawings provide for a Blanket of coarse and granular material of thickness as shown therein over the full width of formation, the contractor shall arrange for the supply of the materials at site, spreading over the formation earthwork and for consolidation as detailed below. The thickness of blanketing layer shall be fixed in light of the Guidelines dated July 2005 of RDSO referred to in the Note above.

1.10.2 Sample for Material:- The successful contractor should submit for approval by the Engineer samples of the Blanketing material in three wide mouth sealed glass jars of a quantity of 0.0035 Cum. each. The material to be used by the contractor for blanketing should strictly adhere to the quality of material as approved by the Engineer.

1.10.3 Specifications of Blanket Material

Blanket material produced in a plant should generally conform to following specifications:

- a) It should be coarse, granular and well graded.
- b) Skip graded material is not permitted.

- c) Non -plastic fines (particles of size less than 75 micron) are limited maximum to 12%, whereas plastic fines are limited maximum to 5%.
- d) The blanket material should have particle size distribution curve within one of the bands of enveloping curves shown in **Figure 1.5** or the percent passing of the material through each IS sieves should lie between the upper and lower limit of blanket material as given in the **Table 1.1**
- e) The material should be well graded with C_u & C_c as under:
 Uniformity coefficient, $C_u = D_{60}/D_{10} > 7$
 Coefficient of curvature, $C_c = \frac{D_{30}^2}{D_{60} \times D_{10}}$ between 1 and 3
- f) Particle size distribution must follow one of the gradation ranges tabulated below.

Table 1.1: Particle size distribution ranges for different grades of blanket material

S.No	IS Sieve size	Grade A	Grade B	Grade C
1.	40 mm	100	95-100	95-100
2.	20 mm	100	93-100	80-100
3.	10 mm	95-100	85-95	65-85
4.	4.75 mm	92-99	70-92	43-70
5.	2 mm	65-90	46-65	22-46
6.	600 micron	33-50	22-33	08-22
7.	425 micron	28-40	18-28	05-18
8.	212 micron	16-27	10-16	00-10
9.	75 micron	00-12	00-10	00-08

1.10.4 Selection of Blanket Material

Depending on the source of material, the blanket material can be categorized in the following categories:

- Natural material
- Machine manufactured material
 - Crushed material
 - Blended material

1.10.4.1 Proper survey of area close to projects needs to be carried out to identify suitable sources of blanket material required for the project. Aim of such source identification survey is to use naturally available material, or select alternatives of machine manufactured blanket material through crushing, blending or a combination, which is cheap and conforms to the specifications laid down.

1.10.4.2 The parent material of the blanket material so chosen should be chemically inactive and sturdy in normal working environment. Brickbats, factory slag, weak dissolvable stones like lime, shale, laterite etc. need not be selected as blanket material.

1.10.4.3 The choice of gradation as provided in 1.10.3 (f), above, may be exercised judiciously, based on the availability of material. It may be advisable to choose the grade A for finest subgrade soils (requiring 1.0m thick layer of blanket), and grade B or C for coarser subgrades (requiring less thickness of blanket).

1.10.5 Mechanical Production:-

The Blanket can be produced by adopting either crushing methodology or Blending Methodology as described in Paras 6.1 and 6.2 respectively of RDSO's Specification No.GE.IRS.2 (Final) dated July 2005 and to which reference can be made for any details. Crushing Methodology is resorted to in the event of non availability of natural source of blanket materials and involves crushing the rock / boulder to produce crushed blanket material. Blending methodology involves proper blending of two or more soils or in combination with soils crushed material like stone chips or quarry dust.

1.10.6 Quality Control on Blanket Material at Production site

1.10.6.1 The source of blanket material, detailed in para 1.10.4, needs to be identified based on tests & studies conducted and conformity of the material to the Specification as laid down in para 1.10.3.

1.10.6.2 It is desirable to have a check on quality of material at source/manufacturing point so that major deviation in quality of the material being sent to site does not exist. It would be in the interest of the supplier to have such tests conducted on his own to avoid any complication at a later stage.

1.10.6.3 The frequency of such test could be laid down by the engineer in-charge, if need be. In the absence of any other instructions, at least one test may be performed per day to check the particle size gradation at the point of loading into the trucks. However, the final acceptance of the blanket material should be at the site where it is laid, as per para 1.10.6.6.

1.10.6.4 The supplier/ Engineer may also lay down proforma for 'Incoming Material Register' to be maintained at manufacturing point for having a control on utilization of different grades of material, especially where blending is done using crushed as well as local material.

1.10.6.5 Test for Quality: Blanket material should be tested as per IS: 2720 (Part 4) of a minimum of one test per 500 cum. or part thereof to plot particle size distribution curve, so as to assess its suitability. It would be necessary to carry out wet analysis to assess actual percentage of fines. To expedite testing work, dry sieve analysis may be carried out if variation between results of dry and wet analysis are not significant and adequate margin exists with respect to acceptance criteria. However, in such cases also, wet analysis has to be carried out at frequent interval to verify the extent of variation. In any situation, acceptance

of blanket material would be based on wet analysis only. The sample for wet analysis should be prepared as per para 4.3 of IS: 2720 (Part 4).

1.10.6.6 Acceptance Criteria:

The material should generally conform to specification as given at para 1.10.3.

1.10.7 Transportation:

The blanket material should be transported wet after mixing water in order to achieve OMC, in tippers for direct unloading on formation.

1.10.8 Laying, Spreading and Compacting

1.10.8.1 The blanket material must be spread with a tractor mounted grader or a paver-finisher in layers of uniform thickness, before allowing compaction.

The blanketing should generally cover the entire width of formation from shoulder to shoulder. In case of sand or non-cohesive material it should be confined within a trench with berms of 60 to 75 cm width and sand drains across the cess to drain the track and the blanket. The cross drains should be with adequate slope at 5 to 10 cm below the bottom of the blanket and spaced 3 m apart. The thickness of the blanket shall be at least 30 cms but may be increased depending on local conditions.

1.10.8.2 Compaction to specified levels of RD or percentage of MDD (para **1.10.10.3**) will be carried out through a number of passes of vibratory rollers of 100-120 kN static weight or equivalent capacity. A combination of vibrating rolling initially and static finishing rolling may be established through trials. Speed of roller shall not exceed 5 km/hr.

1.10.8.3 Proper control of moisture is required to optimize the compaction effort. Optimum moisture content may be established through Modified Proctor Apparatus (IS:2720, part 8) and moisture may be added by sprinkling at the plant or at site as per the requirement.

1.10.8.4 Rolling is to be carried out in layers of not more than 300 mm each, following the same camber profile as provided in the subgrade layer and to be maintained upto the top layer.

1.10.8.5 No provision for uncompacted portion may be made on the edges of embankment. The sides may be hand rammed with a suitable rammer.

Note: The engineer should generally expect to get MDD above 2.1 gm/cc, and OMC in the range of 5-9%, as matter of guidance.

1.10.9 Quality Control Checks on Finished blanket work:

1.10.9.1 Degree of compaction of each layer of compacted blanket should be ascertained by measurement of dry density/Relative Density of soil at locations selected in specified pattern. The method of sampling, frequency of tests, method of tests to be conducted and acceptance criteria to be adopted are as under.

1.10.9.2 Method of Sampling:

(a) The sampling adopted has to be such that effectiveness of proper compaction having been done for the entire area under consideration can be judged. For this, the Engineer in-charge should lay down the method adopted in detail depending on site conditions and accordingly records of checks done are properly maintained. However, in absence of such procedure laid down, following method should be adopted:

(b) Suggested method of sampling: For each layer, a minimum of one sample at a predetermined interval (in compliance with the requirement stated in next para) along the centreline of the alignment would be taken. The checking points may be staggered to the extent possible.

(c) Frequency of Tests: Density check would be done for every layer of blanket material as per following minimum frequency :

At least one density check for every 200 sq.m of blanket layer. (say, every 18 to 30 m for single line, or doubling work and every 12 to 16 m for a double line construction.)

1.10.9.3 Method of in-situ dry density measurements:

Any of the following methods could be adopted as per the requirements at site.

Method of measurement	Procedure of test	Parameters to be measured	Remarks
i) Sand Replacement Method	As per IS-2720 (Part 28) 1974	a) Insitu Dry Density b) Moisture content	May be adopted for all type of material
ii) Core Cutter Method	As per IS-2720 (Part 29) 1975	-do-	In some of the coarse-grained soils (with little fines) taking core cutter samples is difficult. In such cases, sand replacement method may be used for density measurement.
iii) Nuclear Moisture Density Gauge	As issued by RDSO	a) Bulk density b) Moisture content c) Dry density d) Degree of compaction	May be used in consultation with RDSO
iv) Compactor meters fitted on roller (On roller continuous compaction control)	As issued by RDSO	As issued by RDSO	May be used in consultation with RDSO.

1.10.10 Acceptance Criteria:

1.10.10.1 The material should pass the st criteria laid under Para 1.10.6.6 above.

1.10.10.2 The blanket material, which contains fines passing 75 micron IS Sieve, upto 5 percent should have the Density Index (Relative Density) a minimum of 70% as obtained in accordance with IS: 2720 (Part 14) – 1983.

1.10.10.3 For other materials, field dry density should not be less than maximum attainable dry density obtained in field compaction trial. However, in field compaction trial, the maximum attainable dry density should not be less than 98% of MDD values as obtained by Heavy Compaction Test (IS: 2720 (part 8) – 1983) in the laboratory. In case, there are difficulties in achieving 98% of the MDD values as obtained by Laboratory test, in the field trials, the same may be relaxed upto 95% of MDD with the specific approval of Chief Engineer/construction, recording reasons of such relaxation.

1.10.10.4 During widening of bank in case of gauge conversion and rehabilitation of unstable formation, compaction of blanket layer should be minimum 95% of MDD as obtained by Laboratory test as per Heavy Compaction Test (IS: 2720 (part 8) – 1983) or 70% Relative Density for cohesionless soil (IS: 2720 (Part 14) – 1983).

1.10.11 Measurement:

1.10.11.1 Measurement of blanket material should be done on the basis of finished cross section after the material and workmanship have been accepted as per the above criteria. No deduction is to be made towards voids.

1.10.11.2 In very rare cases, where it is not possible to take blanket material on finished subgrade, measurement may be done on the basis of stack measurement with the permission of Chief Engineer in-charge. It may be necessary to frame different schedule items for different methods of measurement. There should be no occasion to change the method of measurement unless specifically provided for in the tender documents duly approved by competent authority.

1.10.11.3 Method of measurement in case of stack measurement may be the same as in case of ballast incorporated in "Specification for track ballast-1999".

1.10.11.4 It is advisable to tally the quantity and quality measured at site with the ' Incoming Materials Register' maintained at plant (para 1.10.6.4) as a means of double check.

2. TECHNICAL SPECIFICATIONS FOR CONCRETE WORKS

1.0 GENERAL

1.1 **General requirement**

The contractor shall furnish all labour, equipment and materials required for complete performance of the work in accordance with the drawings and as described herein.

1.2 **Reference Points and Bench Marks**

Permanent reference pillars established and fixed in the area shall not be removed or disturbed under any circumstances without the approval of the Engineer. The Engineer-in-Charge will locate initially the centre line of the bridges and set out the centre point. Contractor will provide all labour and materials required for this purpose. The contractor shall set out details of position/profile of individual foundations, piers, abutments etc. and be responsible for accuracy thereof. The contractor shall carefully maintain and protect all benchmarks and reference points and shall lay out all his work by accurate reference there to. The relevant level of structure at different part will be checked by Engineer-in-charge or his representative.

2.0 EXCAVATION

2.1 **Site Clearance**

The contractor shall remove all vegetation, trees, structures and any foreign material existing at the site of proposed work. The area shall be stripped to remove roots of grass/trees, and other organic materials which shall be burnt and/or removed to approved disposal areas or other locations as indicated by the Engineer-in-Charge. Cost of labour, tools, transport etc. required for this is deemed to be included in the overall rate.

2.2 **General Requirements**

The contractor shall furnish all labour, equipment and materials required for complete performance of the work in accordance with the approved drawings and as described herein.

2.3 **Drainage in the Vicinity of Excavations**

The contractor shall control the surface grade in the vicinity of all excavations so that the surface of the ground in vicinity is properly sloped or diked to prevent surface water from running into the excavated areas during the progress of the construction.

2.4 Excavations shall include the removal of all materials as per direction of the Engineer-in-Charge, as may be required to execute the work properly. Excavation shall be made with sufficient clearance to permit the placing, inspection and setting of forms and completion of all works for which the excavation is made.

2.5 Sides and bottoms of excavation shall be cut sharp and true. Undercutting shall not be permitted. Earth sides of excavation shall not be used in lieu of formwork for placement of concrete unless otherwise authorised in special cases, by the

Engineer-in-Charge where limitations of space for larger excavation necessitate such a decision.

- 2.6 When machines are used for excavation, the last 300 mm before reaching the required level shall be excavated by hand or by such equipment that will leave the soil at the required final level, in its natural condition.
- 2.7 The Bearing capacity of the soil at the bottom of excavation shall be determined by the Engineer-in-Charge, so as to decide on the depth of foundation.
- 2.8 The bottom of excavation shall be trimmed to the required levels and when carried below such levels by error shall be brought to level by filling with concrete 1:3:6 or as specified, at the contractor's cost.
- 2.9 If the contractor is directed by the Engineer-in-Charge to excavate to a lower level than that indicated on the drawings and covered by through rates, such additional excavation shall be paid for at the applicable unit rate.
- 2.10 The contractor shall be responsible for assumptions and conditions regarding the nature of materials to be excavated and the difficulty of making and maintaining the required excavations and performing the work required as shown on the drawing and in accordance with these specifications. Cofferdams, sheeting, shoring, bracing, draining, dewatering, etc. shall be arranged and installed as required and the cost thereof shall be included in the unit rate quoted for the item of excavation. The contractor shall be held responsible for any damage to any part of the work and property caused by collapse of sides of excavations. Material used for temporary works may be salvaged if it can be done without jeopardising safety of the work and structures and subject to approval of the Engineer-in-Charge. However, no extra claim shall be entertained for material not salvaged or any other damage to contractor's property as a result of the collapse. He shall not be entitled to any claim for additional payment for having to re-do the excavation as a result of the same.
- 2.11 All excavation for installation of underground facilities, such as piping, sewing, sewer lines, tunnels, ducts, drain lines etc. shall be open cuts.
- 2.12 Where excavation requires bracing, sheeting, or shoring etc. the contractor shall submit to the Engineer-in-Charge, drawings showing arrangements and details of proposed installations and shall not proceed until he has received approval from the Engineer-in-Charge.
- 2.13 For purposes of excavation of earthwork, the following definitions shall apply, when a through rate is not specified.
- a) **Ordinary Soil**
All kinds of soil except soil containing 50% or more of kankar, moorum and/or shingle and rock.
 - b) **Hard Soil**

Soil containing 50% or more of kankar, moorum and/or shingle and boulders upto 150 mm size, without binding material, shall be classified as hard soil, but the decision of the Engineer-in-Charge in the matter of classification of the soil shall be final and binding on the contractor.

2.14 **Measurement**

Measurement for payment will be based on volume calculations determined by the existing grade, (ground level) and the bottom elevation (level) of structure/lean concrete with lateral dimensions (vertical sides) 0.3 m outside concrete outline of lowest footing for depths upto 1 m below existing grade and 1 m outside concrete outline of lowest footing for depths more than 1 m below existing grade (ground level). (Concrete dimensions determined from drawings). The unit of measurement shall be cubic metre. Nothing extra would be payable for slope, shoring, strutting etc. irrespective of the fact that they are actually provided. Payment includes leading excavated soil to a spoil dump or for reuse in a location in the vicinity as directed by Engineer-in-Charge.

2.15 **Excavation in Rock- Hard, Soft or Decomposed**

2.15.1 For the purpose of classification of rock in excavation, the following definitions shall apply:

a) **Hard rock requiring blasting**

Any rock excavation for which blasting is required.

b) **Soft or Decomposed rock**

Lime stone, sand stone, laterite, hard conglomerate or other soft or disintegrated rock which can be quarried or split with crow bars or wedges.

2.15.2 **Excavation**

The specifications for excavation the Clause No.2.0 to 2.13 above shall apply to excavation work in rock also, except for the bottom of excavation, where depending on the type of rock, over-breaks upto a maximum depth of 0.3 m below the required level may be allowed by the Engineer-in-Charge at his discretion and paid accordingly. Concrete backfill in such over-breaks shall also be paid for. No payment shall, however, be allowed for backfilling, if such overbreaks are required to be brought to grade by filling with only soil including its proper compaction.

2.15.3 Blasting material required for excavation work included in this tender shall be arranged by the contractor at his cost, from any authorised dealer of such approved material. Necessary assistance for obtaining approval for procurement of the material will be given by the RITES/Employer. The contractor shall be fully responsible for entering into agreement with any authorised magazine contractor in respect of rates, regularity of supply etc. Contractor will also obtain necessary license for transporting, stocking and use of explosives and draft only suitable qualified and licensed personnel for handling the explosives.

2.15.4 **Blasting**

All rules under the Explosives Act or other local rules in force shall be fully observed. All blasting works shall be done in accordance with the stipulations contained in the Indian Standard Specification No. IS:4081. Blasting shall be done by employing qualified personnel and under careful supervision. Blasting shall only

be carried out at certain specified times as directed by the Engineer-in-Charge. Proper precautions for safety of persons and property shall be taken. Where blasting is to be carried out in the proximity of other structures, sand bags etc. shall be used on top of the blast holes to prevent the rock fragments, from causing damage to adjacent structures and other property. The unit rate for excavation involving blasting shall be inclusive of the cost of providing all necessary materials, labour and arranging for such precautions.

2.15.5 **Unexploded charge**

The number of blasts to be fired and the actual number of shots heard shall be compared and the person responsible shall satisfy himself by site examination that all blasts have exploded before any person working in the area is permitted to re-approach the work site. The withdrawal of the unexploded charge shall not be permitted under any circumstances. The unexploded charge shall be flooded with water and the hole marked in a distinguishable manner. Another hole shall be made at a distance of about 450 mm off the old hole and fired in the usual way. This process shall be continued till the original blast is exploded.

2.15.6 **Decomposed or Soft rock**

Excavation in "decomposed or soft rock" shall be carried out by blasting, by crow bars, by shovel and pick axes etc. or by both the methods. No extra shall be paid for the use of any particular method.

2.15.7 **Chiseling in Hard Rock :**

Where blasting is prohibited or not practicable, excavation shall be carried out by chiseling and payment shall be made at the same rate as provided for hard rock requiring blasting. The decision of the Engineer-in-Charge in this regard shall be final.

2.15.8 All excavated materials obtained from excavation shall remain client's property. The useful portion shall be separated from the useless ones and deposited in regular stacks at places indicated and as directed by the Engineer- in-Charge.

2.16 **Measurement**

- (i) As soon as level of rock is reached, the contractor shall intimate the Engineer-in-Charge, who shall record the level for calculating quantities of excavation in rock.
- (ii) When "hard rock" and "decomposed or soft rock" are mixed together, the entire quantity of excavation done below rock level shall be recorded from cross-section taken before commencement and after completion of rock excavation, payment lines being as provided in clauses 2.14 and 2.15.2. The hard rock excavated shall be stacked, measured and reduced by 30% to allow for bulking and voids to arrive at the quantity payable under "hard rock". The difference between the entire excavation below rock level (between the pay lines) and the quantity payable under "hard rock" shall be paid for as "decomposed or soft rock".
- (iii) In case, the quantity of "hard rock" alone as measured above is in excess of the theoretical total payable quantity of excavation below rock level, then payment under "hard rock" shall be restricted to the total theoretical payable quantity.

- (iv) All excavated material, rock or soil, obtained as a result of over-excavation and for which payment shall not be made, shall also be carried and disposed of as directed and stacked at places shown by the Engineer-in-Charge, at the cost of the contractor.
- (v) In the case of stray boulders which are classified as "hard rock", measurements of such outcrops shall be made on the basis of linear measurements of the outcrop made before excavation. Such measurements shall be signed by the contractor as token of acceptance before excavation is taken in hand.
- (vi) When the excavation in rock is paid for as a single item for all classes of rock, the measurement will be made based on cross-sectional area after recording rock level at commencement and finishing.

2.17 **Excavation below water Table**

- 2.17.1 Wherever water table is met with during the excavation. the Contractor shall immediately report the fact to the Engineer-in-Charge who shall arrange to record the exact level of the water table. The decision of the Engineer-in-Charge in the matter shall be final.
- 2.17.2 The Contractor shall dewater and maintain the water table below the bottom of the excavation level during excavation. concreting and back-filling.

2.18 **Methods of Measurements**

In the case of excavation in rock, payment for overbreaks upto a maximum depth of 0.3 m below the required level may be allowed by the Engineer-in-Charge at his discretion. No extra is payable for dewatering operation during execution of work.

3.0 **RUBBLE BACKING**

- 3.1 A backing of dry rubble walling will be provided behind abutments and wing walls for facilitating proper drainage. It shall be provided to dimensions in accordance with the drawings.
- 3.2 The materials used should be broken stone of quality approved by Engineer-in-Charge. The stones used will be of least dimension of 15 cm in any direction and not friable. Materials selected from out of excavated material may be permitted to be used by Engineer-in-Charge, in which case only labour rate is payable for the work. Otherwise, the cost will include supply of all materials, labour and tools.

4.0 **BACKFILL**

- 4.1 The contractor shall furnish all labour, equipment and materials required for complete performance of the work in accordance with the drawings and as described herein.
- 4.2 After completion of foundation footings, abutments and wing walls and other constructions below the elevation of the final grades and prior to backfilling,

all forms, temporary shoring, timber etc. shall be removed and the excavation cleaned of all trash, debris, and perishable materials. Backfilling shall begin only with the approval of the Engineer-in-Charge.

- 4.3 Backfilling shall be done with inorganic materials, obtained from the excavation or borrow pits, if suitable, and subject to the approval of the Engineer-in-Charge. Filling behind abutments and wing walls shall be done with sandy materials to be obtained from approved source.
- 4.4 Backfill shall not be dropped directly upon or against any structure in locations where there is danger of displacement or damage.
- 4.5 Backfill shall be placed in horizontal layers not exceeding 20 cm in thickness. Each layer shall be compacted under proper moisture content and with such equipment as may be required to obtain a density equal to or greater than 94% of maximum as determined by the relevant Indian Standards. Trucks or heavy equipment for depositing or compacting backfill shall not be used within 1.5 m of building walls, piers, or other facilities which may be damaged by their weight or operation. The methods of compaction shall be subject to the approval of the Engineer-in-Charge. Pushing of earth for backfilling shall not be adopted under any circumstances.
- 4.6 Backfill adjacent to pipes shall be hand placed, free of stones, concrete, etc. compacted uniformly on both sides of the pipe and where practicable, to a depth of 300 mm over the top of pipes. While tamping around piping, care shall be taken to avoid unequal pressures.
- 4.7 On completion of structures, the earth surrounding them shall be accurately finished to line and grade as shown on the drawings. Finished surface shall be free of irregularities and depressions and shall be within 50 mm of the specified level.

4.8 **Measurements**

Measurements shall be based on the volume by computed cross-sections.

5.0 **CONCRETE**

5.1 **Scope**

5.1.1 This section of the Specification covers the technical requirements for furnishing, forming, placing and finishing all concrete, plain and reinforced complete for all structures at all elevations, superstructures, tunnels, ducts and trenches and including encasement of steel section as shown on the drawings except as otherwise specified, and providing necessary recesses, weepholes etc.

5.1.2 All concrete works as indicated in the scope of this contract shall be carried out as per these specifications.

5.2 **General Requirements**

- 5.2.1 The contractor shall furnish all labour, material and equipment to form, place and finish all structural concrete and miscellaneous items complete, as indicated on the drawings and as described herein.
- 5.2.2 All materials, tests, mixing, placing, formwork, reinforcing and workmanship shall conform to the Indian Railway Standard Code of Practice for Plain and Reinforced Concrete for General Bridge Construction (Revised latest edition) (Concrete Bridge Code) and subsequent amendments and other relevant codes of the Bureau of Indian Standards and/or as shown on drawings and/or described herein, or quoted in the Concrete Bridge Code.
- 5.3 **Materials**
- 5.3.1 Cement shall conform to IRS Concrete Bridge Code of year 1997(incorporating A&C Slip No. 11, Year 2007) clause 4.1.
- 5.3.2 Concrete aggregates shall conform to "Specification for Coarse and Fine Aggregate from Natural Sources for Concrete" IS : 383 (Latest Edition).
- 5.3.3 Water used in mixing concrete shall be clean and free from injurious amounts of oils, acids, alkalies, organic materials, or other deleterious substances.
- 5.3.4 Reinforcement shall be Thermo Mechanically Treated (TMT) High Yield Strength Deformed (HYSD) bars of grade Fe 500 conforming to IS: 1786 (latest edition) from primary manufacturer. All reinforcement shall be clean and free from loose, mild scales, dust, loose rust and coats of paint, oil or other coatings, which may destroy or reduce bond.
- 5.3.5 Reinforcement accessories shall be furnished by the contractor. Binding wire shall be annealed from wire quality not less than No. 16 S.W. gauge (1.65 mm dia). Bar supports, chairs and bolsters (as approved by the Engineer- in-Charge) shall be sufficiently strong to support the steel properly
- 5.4 **Concrete Mix**
- The compression strength as measured by works test at 28 days, shall be as indicated on the drawings for the different areas and types of construction or as indicated in IRS-Concrete Bridge Code 1997.
- 5.4.1 Where controlled concrete is used, the minimum cement content will be as per IRS Concrete Bridge Code 1997.
- 5.4.2 Concrete grade upto M-20 will be Nominal Mix Concrete with proportions of materials as per Clause-9.3 and Table-9 of I.S. 456 : 2000. Concrete grade above M-20 will be as per mix design to be submitted by the contractor from the Govt. recognised laboratory as per direction of Engineer-in-charge conforming to Code IS-10262:1982(SP-23:1982, P-122). Trial mix will be carried out jointly by the Contractor and the Site Engineer of RITES and cement consumption thereon will be decided on the basis of Trial mix (minimum cement content 400 Kg/cum for RCC and 350 Kg/cum for PCC or as per trail mix whichever is higher). No extra payment will be made for this mix design or trial mix of any grade.
- 5.5 **Sampling and Testing in the Field**
- 5.5.1 Samples of concrete shall be taken at the direction of Engineer-in-Charge in the field in accordance with IS : 1199 "Methods of sampling and analysis of concrete".

- 5.5.2 These samples shall be tested for strength and consistency at testing laboratory set up at the Project site or at any other Government Laboratory, approved by the Engineer-in-Charge, in accordance with IS : 516. The moulds, labour and material for cubes shall be supplied by the contractor who shall also arrange to transport the cubes to laboratory at his cost. Actual cost of the testing shall be borne by the contractor.
- 5.5.3 The acceptance criteria for concrete shall be as given in subsequent paras. Only the slumps indicated in the approved design mix shall be adopted. However, larger slumps than those indicated in the approved design mix of concrete of a specified grade (strength) may be necessary to get a workable consistency for concrete in the case of beams, walls columns and other heavily reinforced members. No extra payment shall be made for extra cement that may have to be added in such cases to get the concrete of the same specified grade (strength) with larger slumps. The decision of Engineer-in-Charge regarding the degree of consistency or the amount of slump shall be final.
- 5.5.4 Samples shall be cured under laboratory conditions, except when in the opinion of the Engineer-in-Charge extreme weather condition may prevail at which time the Engineer-in-Charge may require curing under job conditions.
- 5.5.5 If the 'test strength' of the laboratory controlled cubes for any portion of the concrete work falls below the compressive strength specified, the Engineer-in-Charge shall have the right to order a change in the proportions or the water content for the remaining portion of the structure.
- 5.5.6 If the 'test strength' of the job cubes falls below the specified strength, the Engineer-in-Charge shall have the right to require provisions for temperature and moisture control during the period of curing as necessary to secure the required strength, and may require re-tests in accordance with "standard method of securing, preparing and testing specimens for hardened concrete for compressive and flexural strengths".
- 5.5.7 When the cubes tested reveal a strength lower than those specified, the acceptance criteria for such concrete shall be decided as stipulated in subsequent paras. The Engineer-in-Charge shall also reserve the right to reject whole or any part of the work. In case of acceptance of such works the standard deviations shall be worked out, and examined by the Engineer-in-Charge and if he is satisfied only then such works can be accepted at the accepted or at the reduced rate.
- 5.5.8 For the purposes of statistical analysis any cube result, which in the opinion of Engineer-in-Charge is due to improper sampling, moulding or testing shall be discarded and a dummy result shall be substituted. The value of dummy result shall be equivalent to the average value of the cubes from the same grade of concrete tested immediately before and after the discarded value.

5.6 **General Storage**

- 5.6.1 All materials shall be stored by the contractor in a manner affording convenient access for identification and inspection at all times. The storage facilities arrangements shall be subject to the approval of the Engineer-in-Charge.
- 5.6.2 Cement shall be stored by the contractor in silos or suitable weather-proof buildings with dry floors, to be provided by the contractor, in a manner to prevent deterioration.
- 5.6.3 Aggregate shall be stored by the contractor in areas floored with tightly laid wooden planks or other approved hard, smooth and clean surface, in a manner precluding intrusion of any foreign material. Aggregates of different classes shall be stored in separate piles sufficiently removed from each other to prevent the material at edges of the piles from getting intermixed.
- 5.6.4 Reinforcement shall be stored off the ground in a manner to prevent objectionable changes in original surface characteristics in separate piles or racks above grade.

5.7 **Mixing and Placing Concrete**

- 5.7.1 Concrete shall not be placed in any unit of the work until after the forms, bracing, reinforcing steel and other preparations for casting have been approved by the Engineer-in-Charge and approval given in writing to proceed with the casting. Concreting under severe cold conditions shall not be permitted.
- 5.7.2 No concrete shall be placed except in the presence of the Engineer-in-Charge or his authorised representative. Concrete which is not placed in accordance with the specifications or which is of inferior quality as determined by the Engineer-in-Charge shall be removed and replaced by the contractor at his cost.
- 5.7.3 It is imperative that all excavations prepared for concrete construction are maintained free of water until such concrete work is completed. The contractor shall make provisions and furnish equipment as required for such dewatering, subject to approval by the Engineer-in-Charge. Water used for flushing concrete placing equipment shall be discharged clear of the concrete and forms.
- 5.7.4 All concrete shall be mixed until there is a uniform distribution of materials, and shall be discharged completely before the mixer is recharged. Mixing shall be done in a mechanical mixer and the type and size shall be subject to the approval by the Engineer-in-Charge. The mixer shall be rotated at a speed recommended by the manufacturer and mixing shall be continued at least two minutes after all materials are in the drum. For batches larger than 0.75 cum, mixing time shall be increased at the rate of 15 seconds for each additional 0.75 cum or fraction thereof. All concrete shall be discharged within 3 minutes after the introduction of mixing water to the cement and aggregates unless a different time is specified by the Engineer-in-Charge.
- 5.7.5 Before beginning a run of concrete all hardened concrete and foreign materials shall be removed from the inner surfaces of mixing and conveying equipment.

The first batch of concrete through a cleaned mixer for use in the works shall contain 15% less coarse aggregates than normal in order to compensate for coating the interior of the mixer. All conveyance buggies and borrows shall be thoroughly cleaned at frequent intervals during the placing of concrete. Concrete shall be rapidly handled from the mixer to the place of final deposit and shall not be delivered by spout or troughs nor dumped into carriers with a free fall from the mixer of more than 1 m. Every possible precaution shall be taken to prevent separation or loss of the ingredients while transporting the concrete.

- 5.7.6 The placing of concrete shall be a continuous operation with no interruption in excess of 30 minutes between the placing of continuous portions of concrete. Concrete shall be deposited in such a manner as would prevent displacement of forms or reinforcement above the level of the fresh concrete, and the formation of seams or planes of weakness within the sections. Each layer shall be plastic where a new layer is placed upon it. Concrete shall be deposited as close to its final position as practicable in order to prevent segregation. After initial set of concrete the forms shall not be jarred and no strain or vibrating equipment shall be placed on the ends of projecting reinforcement. Chutes used to convey concrete shall be surfaced with metal or other material, and their slopes shall not be such as to cause segregation. Suitable spouts or baffles shall be provided to prevent segregation during discharge. Where concrete is placed manually by use of pans, the entire pan with the concrete shall be dropped to the surface where concrete is to be deposited instead of emptying the pan manually.
- 5.7.7 Concrete shall not ordinarily be placed under water. In unavoidable cases, such concreting shall be done only with the specific approval of procedure and application by the Engineer-in-Charge. Additional cement shall be added as necessary and shall be paid for only at issue rate.
- 5.7.8 To secure maximum density and eliminate formation of air pockets the concrete shall be thoroughly vibrated and worked around all reinforcement, embedded facilities and into corners of forms. Unless other methods are authorised by the Engineer-in-Charge, mechanical vibrators shall be used for the purpose, the type and operation of which is subject to the approval of the Engineer-in-Charge. The extent of vibration shall be through the entire depth of each new layer and several inches into the layer below. With vibration applied at the point of deposit and uniformly through out the freshly placed concrete, not farther apart than the radius over which the vibration shall be sufficient to accomplish thorough compaction and complete embedment of reinforcement. The tendency for large aggregate to gravitate to lower elevations due to vibration shall not relieve the contractor from his responsibility of obtaining a uniform density throughout the mass. Excess cement paste thus formed at the top of each layer shall be removed before the succeeding layer is deposited. Hand tamping shall not be permitted. Contractor shall provide proper equipment other similar areas where conventional methods would not be adequate. Immersion type vibrators shall be provided at the rate of at least one 65 mm unit per 4 cum per hour together with at least one stand-by vibrator of the appropriate size. Vibrators shall be inserted in the concrete at a sufficient

number of places so that their fields of influence overlap and shall not be used to work the concrete along the forms or screens. Vibrators shall be withdrawn in time to prevent the formation of voids. Over-vibration causing segregation, surface laitance, or leakage through the forms shall be avoided. Where electrically operated vibrators are used, diesel or petrol driven stand-by vibrators shall be available for carrying on uninterrupted vibration in case of power failure.

5.7.9 **The contractor shall establish/arrange for concrete batching plant of adequate capacity for speedy execution of the work and shall have adequate number of transit mixture/concrete pump etc for transportation & placement of concrete.**

5.8 **Construction Joints**

5.8.1 The location and details of construction joints not indicated on the drawings must be approved of by the Engineer-in-Charge before concrete is poured.

5.8.2 Construction joints in foundations shall not be provided without specific concurrence of the Engineer-in-Charge.

5.8.3 When the work has to be resumed on a surface which has hardened, such surface shall be roughened. It shall then be swept clean with wire brushes etc. thoroughly wetted, and covered with a 10 mm layer of neat cement slurry. This 10 mm layer of mortar shall be freshly mixed and placed immediately before the placing of the concrete.

5.8.4 Where the concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgment of particles of aggregate. The surface shall be thoroughly wetted for 24 hours beforehand and all free water removed. The surface shall then be coated with neat cement grout. The first layer of concrete to be placed on this surface shall not exceed 150 mm in thickness and shall be well-rammed against old work, particular attention being paid to corners and close spots.

5.8.5 The unit rate of concrete work shall include the cost of preparation of construction joints as mentioned above and no extra payment shall be admissible on this account.

5.9 **Inserts**

5.9.1 All anchors, anchor bolts, inserts, pipes, conduits, sleeves, brackets, frames, nosings, bolts, etc. and any other items that are required to be embedded in the concrete shall be placed in correct position before pouring. Extra care shall be taken during pouring operation to maintain their location. Blockouts and openings shall be kept as indicated in the drawings. These inserts shall be welded to the nearest reinforcement to keep them in position and all such weldings shall be deemed to be included in the unit rate quoted and no extra shall be payable on this account.

5.9.2 Provision will be made for insertion of holding down bolts on piers/bed-blocks in form of necessary holes by leaving a suitable insert before concreting and

removing the same after the concrete attains adequate strength. These holes will be filled with cement sand mortar after the girders are aligned and holding down bolt is inserted and fixed in position.

5.10 **Curing**

5.10.1 Unless otherwise specified, all concrete shall be moist, cured by keeping all exposed surfaces, edges and corners continuously moist for at least seven days after being placed by spraying, ponding or covering with waterproof paper or moisture retaining fabric.

5.10.2 Immediately after stripping of the forms, water shall be applied directly to the concrete surfaces, the wetting down operations shall be continuous within the curing time specified. As an alternative to continual wetting down of pier/abutment/girder faces, the use of a sprayed-on membrane may be substituted subject to approval by the Engineer-in-Charge.

5.11 **Method of Measurement**

Measurement shall be in cubic metres correct upto second place of decimal. Deductions shall be made for all block outs and openings but not for embedments, reinforcements, and weep holes.

6.0 **FORMWORK**

6.1 All details of formwork, placing, tying etc. shall be subject to the approval of the Engineer-in-Charge and the contractor when required shall submit drawings, showing details of form construction. The contractor shall be responsible for the adequacy of the formwork to withstand the pressure of freshly placed concrete or other loads imposed without failure, movement or deflection of the component parts. Forms shall be true to the shape, lines and dimensions of the concrete work as shown on the drawings.

6.2 For concrete surfaces that are exposed to view and for all other concrete surfaces that are to be finished smooth, the lining of forms shall be of smooth, non-absorbent lining material. The type and conditions of such lining for forms shall be subject to the approval of the Engineer-in-Charge. All edges of panels shall be square and straight in both directions, and all panels shall match perfectly in length, width and alignment as required.

6.3 All forms shall be sufficiently tight to prevent the loss of liquid from the concrete. All rubbish particularly chipping, shaving and saw dust shall be removed from the interior of the forms before the concrete is placed and the formwork in contact with concrete shall be cleaned and thoroughly wetted or treated with an approved composition to prevent absorption of water from adherence of form to the concrete. Such composition shall be kept out of contact with reinforcement and shall be non-staining and non-injurious to concrete.

6.4 Form lumber may be reused, provided it is true unwarped, thoroughly clean and without broken or damaged edges and equal in every respect to new

lumber. All reform lumber shall have the contact surfaces reoiled or recoated with an approved composition prior to usage.

- 6.5 Contractor shall keep an accurate record of the date on which the concrete is cast for each part of the work and the date on which the form work is removed.
- 6.6 Removal of forms from structural concrete shall be in accordance with the following requirements.
- 6.7 No supporting forms shall be removed suddenly in such a manner as to create shock-loading.
- 6.8 Form work for sides shall not be removed before 2 days.
- 6.9 Bottom forms shall not be removed before 28 days unless this period is reduced with specific concurrence of Engineer-in-Charge.

6.10 **Method of Measurement**

Measurement of form work where separately provided for and so included in the Schedule shall be based on contact area of concrete work from dimensions shown on the drawings. The unit of measurement shall be sq. metres correct to second place of decimal. Otherwise, the cost will be part of rate quoted for concrete works.

7.0 **BENDING AND PLACING REINFORCEMENT**

- 7.1 Contractor shall as per instruction of Engineer-in-Charge, fabricate and place reinforcement to shapes and dimensions as indicated or required to carry out intent of drawings and specifications.
- 7.2 The contractor shall prepare bar-bending Schedule on the basis of the drawings marked "released for construction" and submit the same for approval. No work shall be commenced without the approval of the Schedule.
- 7.3 Any adjustments in reinforcement to suit field conditions and construction joints other than shown on drawings shall be subject to the approval of the Engineer-in-Charge.
- 7.4 The contractor shall adhere strictly to requirements for concrete cover over steel reinforcement, protection of bars for bonding with future extensions, columns ties, splices, laps, spacer bars, temperature reinforcement, mesh reinforcement and other items in connection with proper placing.
- 7.5 Reinforcement shall be placed accurately, tied or welded securely at intersections and splices, and held in position with spacers or other approved supports during concrete placement. Tie wire ends shall be pointed away from surface. Where bars at laps are welded, the length of weld shall be minimum 8xd welded on both sides of the joint and shall be in accordance with the relevant Indian Standards. The contractor will not be entitled to any extra payment for welding the reinforcements.

- 7.6 Payment for steel reinforcement bars shall be on the basis of weight of bare steel irrespective of any coating applied in metric tonnes. The weight of the bar shall be derived from the sizes and corresponding unit weights given in hand book of BIS. Standard hook lengths, chairs, spacer bars and authorised laps only shall be included in the weight calculated. Binding wires shall not be weighed nor otherwise measured. Measurements for weight shall not include cutting allowance etc.
- 7.7 Bending of bars will normally be done 'cold'. Engineer-in-Charge's specific approval will be obtained for hot-bending of bars. Torsteel/Deformed bars will under no circumstances be hot-bent. No extra will be payable for hot-bending in lieu of cold bending.

8.0 TESTING OF GRADE MIX CONCRETE

For Grades M-20 and above Sampling, Strength Test and Acceptance Criteria shall be as stipulated in Para 8.7 of Concrete Bridge Code-197, extracts at **Annexure A**. Procedure for carrying out Cube Compressive Test is at **Annexure B**.

9.0 PIPE CULVERTS

9.1 General

- 9.1.1 The pipe used shall be in accordance with IS:458-56 "Concrete Pipes" and the type will generally be to class NP-4, unless otherwise specified in the drawing. They shall also be provided with collar unless otherwise specified or permitted by the Engineer-in-Charge.
- 9.1.2 The laying of pipes will be in accordance with IS:783 Code of Practice for laying of concrete pipes and guidelines in Section 2300 of Ministry of Shipping and Transport Specification for Road and Bridge works.

9.2 Materials and Handling

- 9.2.1 All materials used in the manufacture of pipes as well as laying in the pipe culverts shall conform to the general requirements contained in the IS Specification mentioned above and indicated in the foregoing sections.
- 8.2.2 Each consignment of the pipes shall be inspected, tested where considered necessary and approved by the Engineer-in-Charge before their incorporation in the works. If the pipes are not being cast in the vicinity of the works, suitable facilities shall be provided for the Engineer-in-Charge to inspect them during the process of manufacture and at the place of manufacture. Necessary test certificates for the material used shall be produced to the Engineer-in-Charge when demanded.

9.3 Excavation

- 9.3.1 The foundation bed for the pipes shall be excavated true to the levels and grades shown in the drawing or as directed by the Engineer-in-Charge. The pipes shall

be placed in shallow excavation made in natural ground, or in trenches cut in the previously made embankments. Where the height of fill exceeds 3 times the external diameter of the pipe before excavating for pipe laying, the embankment shall first be made

and properly consolidated upto a level of one pipe diameter above the proposed top of the pipe for length equal to 5 pipe diameters on either side of centre line, trenching being done thereafter. The sides of the trench shall be nearly vertical as possible, and the clearance between sides, and pipe shall not be less than 150 mm or more than 1/3rd the pipe diameter.

- 9.3.2 If soft, spongy or other type of unstable soil is met with during such excavation, the unsuitable material shall be removed to depth, width and length as directed by the Engineer-in-Charge and be back filled with approved granular soil which shall be thoroughly compacted and shaped to the specified level and shape.
- 9.3.3 Where bed-rock-boulder, hard clay, shale or other hard material is met with, the excavation shall be taken for at least 20 mm below the bottom level of the pipe and space filled with approved soil, free of stone, fragmented material etc. and compacted for providing adequate support unless concrete bedding is specified otherwise.
- 9.3.4 Generally pipes for railway culverts will be laid on concrete bedding unless otherwise specified in the drawing.

9.4 **Bedding for Pipe**

The concrete used for the bedding shall have mix which shall have a 28-day compressive strength of not less than 140 Kg/Sq.cm. Unless otherwise specified bedding shall have a minimum thickness of 1/4th of the normal diameter of the pipe and form a cradle extending for 1/4th of the diameter of the pipe above the lowest bedding level. Suitable recess will be provided in the bedding for resting the projection, collars, etc. for the pipe.

9.5 **Back Filling**

- 9.5.1 Trenches shall be back filled soon after the jointing material has hardened. Back filling shall be made of selected good soil free of stones, roots or other organic matter and the soil shall be approved by the Engineer-in-Charge. The back filling shall be done carefully with selected/approved material upto 30 cm above the top of pipe and entirely rammed and consolidated at optimum moisture content. It shall be laid in layers not exceeding 150 mm. Care should be taken particularly while consolidating the soil under the haunches of the pipe. Consolidation below and above haunches of the back fill shall be done by foot, light tampers or hand-operated mechanical equipment approved by Engineer-in-Charge.
- 9.5.2 Filling shall be done simultaneously on both sides of the pipe so that unequal pressures do not occur. No walking or working out the completed pipe shall be permitted till it is back-filled upto 30 cm over the pipe except for purpose of consolidation of fill.

9.5.3 In case of high embankment after filling the trench upto the top of the pipe, a loose fill of a depth equal to the external diameter of the pipe shall be placed over the pipe before further layers are added and compacted. This shall be done for the full width of the trench. Only further layers placed above this level, shall be compacted.

9.6 **Face Walls and Wing Walls**

Face walls, wing walls and aprons, etc. shall be constructed in accordance with the details shown in the drawing or as approved by the Engineer-in-Charge. No traffic shall be permitted over the pipe culvert unless the filling over the pipe is at least 60 cm.

9.7 **Measurements for Payment**

9.7.1 RCC pipe culverts shall be measured along their centre between the inlet and outlet ends in linear meters. Length for supply and laying includes supply of collars jointing material and all labour required for laying, aligning, jointing and curing joints.

9.7.2 Selected granular material and cement concrete for pipe bedding shall be measured as laid in cubic metres. Ancillary work like head walls, etc. shall be measured as provided under the respective sections.

9.8 **Rates**

9.8.1 The rate for the pipe shall include the cost of pipe and matching collars including loading, unloading hauling handling, storing, laying in position and jointing complete.

9.8.2 Ancillary work such as excavation including back filling, concrete and masonry shall be paid for separately, as provided under the respective clauses.

10.0 **PROTECTION WORKS**

10.1 **Pitching**

General

Pitching shall not be laid until the banks on which it is to be laid have become consolidated. Before slope pitching is commenced, unless a floor apron is also provided, a trench is to be dug at the toe of the bank, 50 cm deep, or to the depth shown on the drawings, and 15 cm layer of quarry chips or ballast must be laid in trench, on the bed of the pitching.

All earth surfaces that are to be pitched and subsequently exposed to the action of running water, must be covered with a rammed layer of gravel, moorum or quarry refuse to a depth of about 15 cm or as ordered by the Engineer In charge. This under layer prevents the finer material of the bank of being sucked out by the flowing water.

10.2 **Stone pitching and flooring**

The stones for stone pitching shall be set in the work as received from the quarry, and without any dressing except knocking off weak corners and edges with a mason's hammer. A small proportion of chips may be allowed to show in the face work. The face stones must in general weigh at least 30 Kg and not more than 60 Kg unless otherwise specified, and be well-bedded and hand set in the earth or dry stone backing, which must be brought up at the same time

as the hand set face work. If the backing is of earth, it shall be rammed in 30 cm layers. For bank protection, only rough stone pitching should be used for reasons of economy.

Stone pitching in continuous lengths will be divided suitably in panel by stone masonry walls 45 cm wide and equal to a depth of pitching with cement mortar 1 : 6 or otherwise specified in such a way that total enclosed area does not exceed 10 sq.m.

11.0 **FLOORING**

11.1 **Base**

The base shall consist of dry rammed moorum or dry rammed quarry refuse of 15 cm thickness as decided by the Engineer- in-Charge.

11.2 **Drop Walls & Curtain walls**

The drop walls both on the upstream and down stream shall be built in Cement concrete as specified in the Drawing. On the upstream side the foundation shall be taken to a depth of 90 cm below the bed level while on the down stream side it shall be taken to a sufficient depth and to effectively dissipate the hydraulic head due to high flood level and afflux thereby preventing seepage underneath the flooring towards the down stream side. Alternatively the depth of the drop walls and the length of the flooring should be as shown in the drawings so that the minimum flow is longer than the piping gradient line. The foundation for the drop wall shall also be laid in cement concrete and dimensions shall be in accordance with the drawings.

11.3 **Aprons**

11.3.1 Aprons are provided at the toes of Banks in continuation of the slope pitching for affording protection to the banks. These are provided to overcome the effects of scour that will be caused in the bed of the river at this location due to high velocities, whirls etc. Aprons are provided in such a manner that they can launch slope pitching below bed level and extending beyond scour level. Hence such aprons are provided in form of loose stones to a predetermined thickness and width.

11.3.2 A base consisting of smaller stones not exceeding 25 Kg in weight and not exceeding 20 cm in any direction shall be laid first over a layer of stones varying from 25 to 60 Kg in weight. The stones in the pitching shall be laid in such a way that the longest side is bedded vertically. Aprons shall be grouted by the cement mortar as specified in the drawing.

11.4 **Payment**

Measurement will be taken in Cubic meters for pitching and flooring where thickness is predetermined and specified uniformly in drawing.

12.0 **MISCELLANEOUS**

Stone masonry random rubble/coursed rubble/dry course rubble would be used in breast/retaining walls, drop and curtain walls, top, toe and intermediate walls of supporting panels in pitching and flooring in bridges as shown in the drawing and/or as directed by the Engineer-in-Charge.

12.1 **Weep Holes**

75/100 mm dia weep hole along with filter media at back would be provided in retaining walls at regular intervals as specified in the drawings/directed by the Engineer-in-Charge. Keeping these holes would be a part of the masonry work/concrete but no deduction would be made in the quantities for holes.

12.2 The following IS codes apply for the special works :-

- a) IS-2911 code of practice for construction of pile foundation (with bored piles)

13.0 The contractor shall submit royalty clearance certificate for the material used in RCC, PCC, boulder work etc with related R/A Bill. If the agency fails to do so, the required amount will be deducted as per extant Govt rule, from his bill and will be deposited with the concerned dept.

14.0 WATER BOUND MACADAM ROAD WORKS

14.1 General

The works shall be carried out in accordance with provisions in CPWD Specifications. Chapter 17 on Road Works.

14.2 Materials

14.2.1 Coarse Aggregates

Para 17.1.1 of CPWD Specifications may be referred to. The Physical requirements have been outlined in Table 17.1 and Grading requirements of size range 90mm to 45mm and 63mm to 45mm in Table 17.2.

14.2.2 Fine Aggregates

Para 17.1.2 of Specifications may be referred to.

14.3 Preparation of Sub-Grade

Para 17.6 may be referred to.

14.4 Sub Base

The Sub Base shall consist of Water Bound Macadam with Stone aggregate of size 90mm to 45mm. Para 17.7.2 of CPWD Specifications may be referred to. Base

The Base Course shall consist of Water Bound Macadam with Stone aggregate of size 63mm to 45mm. Para 17.8.1 of CPWD Specifications may be referred to.

14.5 Surface Course

100mm thick Surface course over Water Bound Macadam surface shall be provided as detailed in the relevant item in the BOQ.

ANNEXURE A

**GRADE MIX CONCRETE
WORKS TESTS ON CONCRETE SAMPLING, STRENGTH TESTING AND
ACCEPTANCE CRITERIA**

EXTRACTED FROM CONCRETE BRIDGE CODE (REVISED – 1997)

Note: Unless otherwise specified in the Contract the cost of tests including Materials, labour and testing charge in Laboratory will be borne by the contractor.

8.7. Sampling, Strength Tests and Acceptance Criteria

8.7.1. General:

Samples from fresh concrete shall be taken as per IS: 1199 and cubes shall be made, cured and tested at 28 days in accordance with IS: 516.

8.7.1.1. In order to get a relatively quick idea of the quality of concrete, optional tests on beams for modulus of rupture at 72 ± 2 hours or at 7 days, or compressive strength tests at 7 days may be carried out in addition to 28 days compressive strength tests. For this purpose, the values given in **Table 7** may be taken for general guidance in case of concrete made with ordinary Portland cement. In all cases, the 28 days compressive strength specified in **Table 2** shall alone be the criterion for acceptance or rejection of the concrete.

(Note:-Table 2 is on “Grading Concrete” in terms of which the specified characteristic compressive strength at 28 days in N/mm^2 is 20 in case of M-20, 25 in case of M-25 and so on).

TABLE 7

OPTIONAL TESTS REQUIREMENTS OF CONCRETE (Clause 8.7.1.1)

GRADE OF CONCRETE	COMPRESSIVE STRENGTH ON 15 CM CUBES (N/mm^2)	MODULUS OF RUPTURE BY BEAM TEST Min. (N/mm^2)	
		Min. at 7 days	At 72 + 2 h
(1)	(2)	(3)	(4)
M 20	13.5	1.7	2.4
M 25	17.0	1.9	2.7
M 30	20.0	2.1	3.0
M 35	23.5	2.3	3.2
M 40	27.0	2.5	3.4
M 45	30.0	2.7	3.6
M 50	33.5	2.9	3.8
M 55	37.0	3.1	4.0
M 60	40.0	3.3	4.2

8.7.2. Frequency of sampling

8.7.2.1. Sampling Procedure - A random sampling procedure shall be adopted to ensure that each concrete batch shall have a reasonable chance of being tested: that is, the sampling should be spread over the entire period of concreting and cover all mixing units.

8.7.2.2. Frequency - The minimum frequency of sampling of concrete of each grade shall be in accordance with the following:-

Quantity of concrete in the work m ³	Number of Samples
1-5	1
6-15	2
16-30	3
31-50	4
51 and above	4 plus one additional sample for each additional 50m ³ or part thereof.

NOTE - At least one sample comprising of 3 cubes shall be taken from each shift.

8.7.3. Test Specimen - Three test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for various purposes such as to determine the strength of concrete at 7 days or at the time of striking the form work, or to check the testing error. Additional cubes may also be required for testing cubes cured by accelerated methods as described in IS: 9013. The specimen shall be tested as described in IS: 516.

8.7.4. Test Strength of Samples – The test strength of the sample shall be the average of the strength of three specimens. The individual variation should not be more than ± 15 percent of the average. If more, the test results of the sample are invalid. When individual variation exceeds this limit, the procedure for the fabrication of specimen and calibration of the testing machine should be checked.

8.7.5 Standard Deviation

8.7.5.1. Standard Deviation Based on Test Results

(a) **Number of Test Results:** The total number of test results required to constitute an acceptable record for calculation of standard deviation shall not be less than 30. Attempts should be made to obtain 30 test results, as early as possible, when a mix is used for the first time.

(b) **Standard Deviation to be brought up to date**

The calculation of the standard deviation shall be brought up to date after every change of mix design and at least once a month.

8.7.5.2 Determination of Standard Deviations (Not given in this Annexure)

8.7.5.3 Assumed Standard Deviation – Where sufficient test results for a particular grade of concrete are not available, the value of standard deviation given in **Table 8** may be assumed.

TABLE 8
ASSUMED STANDARD DEVIATION (Clause 8.7.5.2)

GRADE OF CONCRETE	ASSUMED STANDARD DEVIATION N/mm ²
M 20	4.6
M 25	5.3
M 30	6.0
M 35	6.3
M 40	6.6
M 45	7.0
M 50	7.4
M 55	7.6
M 60	7.8

However, when adequate past records for a similar grade exist and justify to the designer a value of standard deviation different from that shown in **Table 8**, it shall be permissible to use that value.

8.7.6 Acceptance Criteria

8.7.6.1. Compressive Strength

When both the following conditions are met, the concrete complies with the specified compressive strength:

- (a) The mean strength determined from any group of four consecutive test results complies with the appropriate limits in column A of **Table.9.**; and
- (b) Any individual test result complies with the appropriate limits in column B of **Table.9.**

8.7.6.2. Flexural strength: when both the following conditions are met, the concrete complies with the specified flexural strength:

- (a) The mean strength determined from any group of four consecutive test results exceeds the specified characteristic strength by at least 0.3 N/mm².
- (b) The strength determined from any test result is not less than the specified characteristic strength less 0.3 N/mm².

TABLE 9 CHARACTERISTIC COMPRESSIVE STRENGTH COMPLIANCE REQUIREMENTS
(Clauses 8.7.6.1 & 8.7.6.2)

Specified grade	Group of test results	A	B
		The mean of the group of test results exceeds the specified characteristic compressive strength by at least	Any individual test result is not less than the specified characteristic compressive strength less
		N/mm ² .	N/mm ² .
M20 & above	Any consecutive 4 Tests	3	3

Special note for Table. 9

8.7.6.3 Quantity of Concrete Represented by Strength Test Results

The quantity of concrete represented by a group of 4 consecutive test results shall include the batches from which the first and last samples were taken together with all intervening batches.

For the individual test result requirements given in column B of **Table 9** or in item (b) of para 8.7.6.2. only the particular batch from which the sample was taken shall be at risk.

Where the mean rate of sampling is not specified the maximum quantity of concrete that four consecutive test results represent shall be limited to 60 m³.

8.7.6.4. If the concrete is deemed not to comply pursuant to para 8.7.6.2. the structural adequacy of the parts affected shall be investigated and any consequential action as needed shall be taken.

8.7.6.5. Concrete of each grade shall be assessed separately.

8.7.6.6. Concrete shall be assessed daily for compliance.

8.7.6.7. Concrete is liable to be rejected if it is porous or honey combed; its placing has been interrupted without providing a proper construction joint, the reinforcement has been displaced beyond the tolerances specified; or construction tolerances have not been met. However, the hardened concrete may be accepted after carrying out suitable remedial measures to the satisfaction of the Engineer.

STANDARD SPECIFICATION FOR WBM AND BITUMEN PREMIX ROADS

1.0 SCOPE

This specification covers the material and construction details for earthwork in filling for embankments, filling with sand/murram, WBM sub-base, WBM base course and shoulders for roads and flexible pavements.

2.0 REFERENCE CODES AND STANDARDS

2.1 B.I.S. Specifications.

IS: 2720 – Methods of Test of Soil.

2.2 Indian Road Congress Standards.

IRC: 19 – Standard Specification and Code of Practice for Water Bound Macadam

3.0 EARTH WORK IN FILLING

3.1 Material

Only material considered suitable by the Engineer-In-Charge shall be employed for the construction and that considered unsuitable shall be disposed off as directed by Engineer-In-Charge at his own cost and no claim for compensation will be entertained. The contractor shall give the samples of earth, he proposes to use for filling along with the following characteristics of the sample to Engineer-In-Charge prior to collection and use, for approval.

- i) Mechanical analysis or grain size analysis as per IS: 2720 Part IV.
- ii) Liquid limit as per IS: 2720 Part V.
- iii) Plastic Limit as per IS: 2720 Part V.
- iv) Moisture density relationship as per IS: 2720 Part-VIII.

The material (Soil) used for filling shall be free from boulders, lumps, tree roots, rubbish or any organic deleterious matter.

Material having standard proctor laboratory maximum dry density less than 1.8 gm/cc shall not be used. The soil shall have a Plasticity Index of 5-24 (medium Plastic) and not more than 20% Fines i.e., Clay.

Care shall be taken to see that unsuitable waste material is disposed off in such a manner that there is no likelihood of its getting mixed with the materials proposed to be used for filling.

The work shall be so planned and executed such that the best available material is reserved for the top portion of embankment.

3.2 Filling for Embankments and Shoulders

- 3.2.1 The area where filling is to be placed must be cleared of all loose material and virgin soil must be exposed. Such exposed surface must be consolidated properly to obtain 90% of maximum laboratory dry density of the soil. All soft patches must be worked out to remove the soft soil and selected approved earth must be filled back and compacted.
- 3.2.2 Payment for the removal of loose top soil as described in clause 3.2.1 above shall be included in the item for earth work in filling. No separate payment for consolidation of exposed ground surface will be made. The rate quoted for the earth fill shall be inclusive of the cost of clearing and stripping, consolidation including watering, testing etc. Of the exposed ground.
- 3.2.3 Approved fill material shall be spread in uniform layers not exceeding 20 cms in loose depth for embankment filling. Shoulder construction shall be so organized as to keep pace with the construction of different layers of the pavement, which may require fill thickness less than 20cm. All clods, lumps etc. shall be broken before compaction.
- 3.2.4 In general the murrum shall be spread uniformly over the entire width of embankment or shoulders as the case may be. For large embankments, the spreading of soil shall be as directed by the Engineer-In-Charge.
- 3.2.5 Successive layers of filling shall not be placed until the layer under construction has been thoroughly compacted to satisfy the requirements laid down in this specification.
- 3.2.6 Prior to rolling, the moisture content of material shall be brought to within plus or minus 2% of the optimum content as described in IS: 2720 –Part-VIII. The moisture content shall preferably be on the wet side for potentially expensive soils.
- 3.2.7 After adjusting the moisture content as described in Clause 3.2.6, the layers shall be thoroughly compacted by means of rollers till 95% of modified proctor density is obtained as per IS:2720 Part VIII.
- 3.2.8 Each layer shall be tested in field for density and accepted by Engineer-In-Charge subjected to achieving the required density before laying the next layer. A minimum of one test as per 500 M² areas for each layer shall be conducted.
- 3.2.9 All type of rollers that should be employed for compaction shall be as per direction of Engineer-In-Charge.
- 3.2.10 If the layer fails to meet the required density, it shall be reworked to the material shall be replaced and method of construction altered as directed by Engineer-In-Charge to obtain the required density.
- 3.2.11 The filling shall be finished in conformity with alignment, levels, cross-section and dimensions as shown in the drawings.
- 3.2.12 Extra material shall be removed and disposed off as by Engineer-In-Charge.
- 3.2.13 Tolerance

Embankment and shoulders for roads, units etc. shall be carried to within a tolerance of cm. from final lines but shall be to required roads and slopes.

3.3 Payment

3.4.1 Payment for filling shall be made on cubic meter of volume calculated on the basis of cross-section plotted from the level of the ground surface prepared as described in clause 3.2 above and from where filling is to be carried out and the levels reached after filling and due consolidation.

3.4.2 Rates of embankment shoulder or fill formation shall include cost of breaking clods, watering, consolidation, providing testing apparatus and testing the degree of consolidation, providing and operating, including POL and operator charges of necessary road rollers and other equipment, dressing and leveling of sides and top surfaces etc.

4.0 FILLING WITH SAND/MURRUM

4.1 Sand for filling shall preferably be the locally available sand, clean and free from any chemical or other impurities. Murrum for filling shall be clean and well graded. Sand/Murrum shall not contain any vegetation, organic, clayey or other material and shall be obtained from a source approved by Engineer-In-Charge.

4.2 Murrum/Sand shall be spread in layers not exceeding 20 cm in loose thickness over the areas. Each layer shall be uniform in density, quality of material and moisture content as per IS: 2720 Part VIII.

4.2.1 In case of pure sand, flooding with water is permissible.

4.3 Compaction of each layer shall be by mechanical means as per directions of Engineer-In-Charge. Only in accessible reaches shall be worked manually. Each layer shall be uniformly compacted to obtain 95% of modified proctor density of the material. If the material fails to achieve the required density, the layer shall be reworked with necessary alteration in compaction, so that the required compaction is obtained. A minimum of one test as per 500 M² areas for each layer shall be conducted.

4.4 Subsequently layers shall be placed only after the layer already laid has been compacted to the required density and approved by Engineer-In-Charge.

4.5 The finished surfaces must be dressed to required grade and slope. Excess material must be removed from compaction site, as directed by Engineer-In-Charge.

4.6 Payment

Payment for sand/murrum filling shall be made on the basis of volume of fill, after placement and compaction. The rate quoted shall include cost of sand/murrum, royalties, transportation, handling, compacting, watering, testing at various stages, dressing removal of surplus material and any other incidental to this.

5.0 WATER BOUND MACADAM SUB BASE/BASE COURSE

The sub-base course shall consist of one or more layers, each or 100 mm compacted thickness.

The base course shall consist of one or more layers, each of 75 mm compacted thickness.

5.1 Stone Aggregate for WBM

5.1.1 The coarse aggregate shall be hard, crushed or broken stone metal from quarries approved by Engineer-In-Charge, it shall be hard durable and free from flat elongated, Soft and disintegrated particles. It shall not have excess of dirt and other objectionable matter. The quality, size, and grading of the coarse aggregate shall be conforming to IRC 19: STD Spec and code of practice for WBM.

a) The grading of the coarse aggregate for the sub-base course shall be as follows:

Size Range	Sieve Designation(IS: 460)	% by weight Passing the sieve
90mm to 45mm Grade-1	125 MM	100
	90 MM	90 – 100
	63 MM	25 – 60
	45 MM	0 – 15
	22.4 MM	0 – 5

b) The grading of the coarse aggregate for the base course shall be as follow:

Size Range	Sieve Designation(IS: 460)	% by weight Passing the sieve
63mm to 45mm Grade-2	90 MM	100
	63 MM	90 – 100
	53 MM	25 – 75
	45 MM	0 – 15
	22.4 MM	0 – 5

5.1.2 a) Physical requirement of coarse aggregates for sub-base course shall be as below:

- i) Los Angles Abrasion Value-60% (Maximum)
- Or
- ii) Aggregate Impact Value -50% (Maximum)

b) Physical requirement of coarse aggregates for base course shall be as below:

- i) Los Angles Abrasion Value-50% (Maximum)
- Or
- Aggregate Impact Value- 40% (Maximum)
- ii) Flakiness index value -15% (Maximum)

Samples of test shall be representative of the material to be used and collected as per IS: 2430.

5.1.3 The aggregate shall be stacked at the road sided on firm, well drained ground in regular stacks, as directed by Engineer-In-Charge. The various grades shall be stacked separately and contamination by earth and other extraneous matter shall be prevented effectively.

5.2 Binding Material

5.2.1 The binding material shall be clean, dry free from leaves, organic matter any deleterious material.

5.2.2 It shall be obtained from quarries approved by Engineer-In-Charge.

5.3 Spreading Coarse Aggregates

5.3.1 The sub grade or sub-base to receive WBM coarse shall be prepared to the required grade and camber. Before starting with WBM construction, side shoulders shall be constructed in advance to a thickness corresponding to the compacted layer of the WBM coarse for lateral confinement of aggregate. After shoulders are ready, their inside edge shall be trimmed vertical to receive the aggregate. The practice of constructing WBM in a trench section excavated on the embankment/formation must be avoided.

5.3.2 The coarse aggregate shall be spread uniformly and evenly on the prepared base in required quantities from the stacks. The aggregate shall be spread to proper profiles by using templates across the road about 6m apart.

5.3.3 The surface of the aggregate spread shall be carefully, trued up and all high or low spots remedied by removing or adding aggregate as may be required. The surface shall be checked from time to time, during the spreading and rolling of the coarse aggregate to ensure a finished surface without variation greater than 12 mm, when a 3 meter long straight edge is laid parallel to centre line of the road.

5.3.4 The WBM layer shall be tested by depth blocks. No segregation on large or fine particle shall be allowed and the coarse aggregate as spread shall be of uniform gradation with no pocket of fine materials.

5.3.5 The coarse aggregate shall not be spread in lengths more than 3 days average work in advance of the rolling, spreading murrum and bonding of the preceding section.

5.4 Rolling Road Metal

5.4.1 Immediately following the spreading of the coarse aggregate, it shall be compacted to full width by rolling with either three wheeled power roller of 8 to 10 tone weight or equivalent vibratory roller true to the line and camber as shown in the drawing. The course shall not be rolled when the sub-grade is soft or yielding or the rolling causes a wave like motion in the base course or sub-grade. When rolling develops irregularities that exceed 12mm when tested with a 3 meter straight edge, the irregular, surface shall be loosened and then aggregate added to or remove from it as required and the area rolled until it gives uniform surface conforming to the desired cross-section and

grade. The surface shall also be checked transversely by template and any irregularities corrected as above. The use of murrum to make up depression shall not be permitted.

5.4.2 The rolling shall begin from edges with roller running forward and backward until the edges have been firmly compacted. The rolling shall then progress gradually from edges to the centre parallel to the centre line of the road lapping uniformly each proceeding rear wheel track by one half widths and shall continue until the entire area of the course has been rolled by the rear wheel. On the super elevated portion of road, the rolling shall commence from the lower edge and progress gradually towards the upper edge of the road.

5.4.3 Rolling shall be discontinued when aggregate are thoroughly keyed and creating of stone wheel of roller is no longer visible partially compacted with sufficient void space in them to permit application of screenings. Slight sprinkling of water may be done if required.

5.5 Screenings

5.5.1 Material

Screening to fill the voids in the coarse aggregate shall, as far as possible be the same material as the coarse aggregate. Where it is decided by the Engineer-In-Charge to use other materials, the same shall be predominantly non plastic materials such as Kankar nodules, gravel (other than river-born rounded aggregate) or murrum, provided that the liquid limit and plasticity index of such material is below 20 and 6 respectively, and the fraction passing 75 micron siever does not exceed 10 percent.

5.5.2 Grading requirements of screenings

Size of Screening	Siever Designation (IS:460)	Percent by weight passing the sieve
13.2mm	13.2mm	100
	11.2mm	95-100
	5.6mm	15-35
	180 micron	0-10

This grading however shall not be mandatory, in case either murrum or gravel is used as screenings.

5.6 Application of Screenings

5.6.1 After the coarse aggregate has been rolled as described in Clause 5.3, screenings shall be applied uniformly and gradually over the surface to completely fill the interstices. Dry rolling shall be continued while the screenings are being spread so that the jarring effect of the roll will cause them to settle into the voids of the coarse aggregates.

- 5.6.2 The screening shall not be dumped in piles on coarse aggregate but shall be spread uniformly in successive thin layers either by the spreading motion of hand shovels or by mechanic spreaders.
- 5.6.3 The screenings shall be applied at a uniform and slow rate (in three or more applications so as to ensure filling of all voids. Rolling and brooming shall continue with the spreading of the screenings. Either mechanical brooms or both may be used. In no case shall the screenings be applied so fast and thick as to form cakes or ridges on the surface making the filling of voids difficult or preventing the direct bearings of the roller on the coarse aggregates. The spreading, rolling and brooming of screenings shall be performed on sections which can be completed within one day's operation and shall continue until no more screening can be forced into the voids of the coarse aggregates. Damp and wet screening shall not be used under any circumstances.
- 5.6.4 The quantity of screenings used shall be such as to fill all voids in the water bound macadam courses.
- 5.7 Sprinkling and Grouting
- 5.7.1 After spreading the screenings, the surface shall be copiously sprinkled with water, swept and rolled. Hand brooms shall be used to sweep the wet screening into voids and to distribute them evenly. The sprinkling, sweeping and rolling shall be continued and additional screenings applied where necessary until the coarse aggregate are well compacted and grout of screenings and water form a wave ahead of wheels of the roller. Care shall be taken to see that the base of sub-grade does not get damaged due to the addition of the excessive quantity of water during the construction.
- 5.8 Binding Material
- 5.8.1 Binding material to prevent releveling of WBM shall consist of fine grained material possessing P.I. Value upto 6.
- 5.8.2 Application of binding material shall not be necessary where murrum or gravel is used as screenings.
- 5.8.3 Binding material shall be obtained from quarries/sources approved by the Engineer-In-Charge.
- 5.9 Application of Binding Material
- 5.9.1 After the application of screenings as described above the binding material shall be applied at a uniform and slow rate (in two or more successive thin layers) so as to ensure filling of all voids.

After each application of binding material, the surface shall be copiously sprinkled with water and the resulting slurry swept in with hand brooms/mechanical brooms or both so as to fill the voids properly. This shall be followed by rolling with 1 6-10 tonne roller during which water shall be applied to the wheels to wash down the binding material that may get stuck to them. The spreading, rolling and brooming of binding material shall be performed on section which can be completed within one

day's operation and shall continue until no more binding material can be forced into the voids of the coarse aggregates until the slurry of binding material and water forms a wave ahead of the wheels of moving roller. Damp and wet binding material shall not be used under any circumstances.

5.9.2 The quantity of binding used shall be such as to fill all voids in the water bound macadam.

5.9.3 Payment

Payment for laying WBM shall be made on square meter basis of each layer of WBM laid, measured after consolidation and finishing. Rate shall include supply of all materials, royalty, taxes, handling, transportation, stacking, spreading metal in layers, including screening, consolidation by power roller, binding with murrum or other approved binding material, cost of carrying the material from stack to work for all leads and lifts, providing and running roller etc. complete as per specification and satisfaction of Engineer-In-Charge

5.9.4 Subsequent layers of WBM

Before laying the subsequent layers of WBM, the surface shall be scarified and reshaped to the required camber and profile and all ruts, depressions pot holes etc. made good. The second layer shall be laid after the surface preparation is approved by Engineer-In-Charge.

The specification and mode of measurement for subsequent layers of WBM will be similar to that described before.

5.9.5 Payment

Payment for surface preparation, rectification of damaged portions of proceeding layers of water bound macadam and filling in ruts and depressions shall be made in M2 or M3 as per schedule of items. Payment for subsequent layer of WBM shall be made on M2 as per CI.5.9.3

6.0 CONSTRUCTION OF SHOULDERS OR BERMS

6.1 After the WBM course is laid and compacted, the existing surface at side berms or shoulders of the roadway must be scarified. Fresh quantity of approved earth must be spread in layers for building up of berms upto the required level and scope.

The earth must be consolidated by at least three passes of an 8-10 tonne road roller. The edges must be well consolidated by suitable means to prevent edge slips and the work properly trimmed and dressed.

7.0 BITUMEN PREMIX CARPET

7.1 Material

7.1.1 Coarse aggregate

The aggregate shall consist of crushed stone of Clean, hard, tough, durable rock of uniform quality and shall be clean, free from excess of dust, flat or elongated pieces,

soft or disintegrated stone, clay or other deleterious matter. The size of aggregate shall be as below:

Coarse aggregate	size	Quantity required per 100 m ² of premix bituminous carpet
1. For 35mm thick 1 st Layer.	25mm and downsize	5.5 m ³
2. For 15mm thick 2 nd Layer	12mm and downsize	2.0 m ³

The grading for the coarse aggregates mentioned above for premix carpet shall comply with respective IRC code.

Physical requirement of coarse aggregates for premix bituminous carpet shall be as below:

i) Los Angles Abrasion Value-40% (Maximum)

Or

Aggregate Impact Value- 35% (Maximum)

ii) Flakiness index value -30% (Maximum)

Samples of test shall be representative of the material to be used and collected as per IS: 2430.

7.1.2 Binder

The Binder shall be bitumen of penetration 80/100 conforming to IS: 73. The bitumen shall be collected on road side drums. Any drum leaking or damaged shall not be accepted.

Quantity of bitumen required per 100 m² premix carpet will be as given below:

Bitumen 80/100 grade	Quantity required per 100 m ² of premix carpet
1. for 35 mm thick 1 st layer	269 Kg.
2. for 15 mm thick 2 nd layer	110 Kg.

7.2. LAYING

7.2.1 Preparation of Road Surface

The existing surface shall be thoroughly cleaned of dust, loose materials caked mud and foreign matter with the help of wire brush, chisel, picks etc., before laying the tack course. The cleaning shall be carried out in such a manner as to expose the stone metal to a depth of 1 to 2mm without dislodging the interlocking of the metal. All dust and other material thus removed shall be carried away and dumped at suitable places as directed by the Engineer-in-charge.

7.2.2 If Pot holes or ruts are found on the existing road surface, these irregularities must be filled in with premix chippings and will rammed about a week before the carpet is laid.

7.3 Tack Coat

7.3.1 The bitumen shall be heated in asphalt boiler to 177° - 188° C and shall be spread uniformly at the rate of 1 kg/m² by the means of sprayers. The applied binder shall be evenly spread.

7.3.2 The tack coat shall be applied just ahead, keeping pace with laying of premix carpet.

7.4 Preparation of Premix

7.4.1 50 mm thick asphalt bituminous carpet should be laid in two layers of 35 mm and 15 mm thickness with following specifications.

Ist Layer (35 mm thick) – coarse aggregate 25 mm and downsize @ 5.5m³ and 80/100 grade bitumen @ 269 kg per 100 m² of premix carpet.

II nd Layer (15 mm thick) – coarse aggregate 12 mm and downsize @ 2.0 m³ and 80/100 grade bitumen @ 110 kg per 100 m² of premix carpet.

7.4.2 Mechanical Mixers shall be generally used for preparation of premix improvised hand mixing drums may be used if permitted by the Engineer-in-charge.

7.4.3 Stone chippings of specified size shall be thoroughly mixed dry in the Mixer at the rate indicated above. Binder heated at temperature suitable for the grade of bitumen is added to the mixer drum at the specified rate per 100m³ of surface and thoroughly mixed till the stone chips are completely coated with the Binder.

7.4.4 The premix shall be emptied on the wheel barrows or stretchers and carried to work site.

7.5 Spreading of Premix

Immediately after applying the tack coat, the premix shall be spread in two layers as mentioned above with rakes to the required thickness and distributed evenly by means of a drag spreader. The camber shall be checked by means of camber board and the unevenness shall be rectified.

7.6 Rolling

7.6.1 When the premix has been laid for a length of 15-20 meters, rolling shall be commenced with tandem rollers (8 to 10 tonnes). Rolling should commence from edges and proceed towards center longitudinally.

7.6.2 The wheels of roller shall be continuously moistened to prevent the premix adhering to the wheels and being picked up.

7.6.3 After the preliminary rolling and honey combing, high spot or depressions shall be rectified by adding or removing the premix as per requirements and the surface shall be rolled again to compaction. Camber shall be checked at every stage and any defects found shall be rectified. Excessive rolling shall be avoided.

7.7 Seal Coat

7.7.1 A liquid seal coat, having following specifications should be applied immediately after laying the carpet and rolled to achieve maximum compaction. seal coats are of two types,

1) Type A: liquid seal coat for high rain fall areas, comprising an application of layer of bituminous binder followed by a cover of stone chippings, and lightly rolled.

The quantities of ingredients are as given below

	Quantity required per 100 m ² of seal coat
1. Quantity of binder in terms of straight run bitumen 80/100 grade	98.0 kg
2. Stone chipping (6 mm size all passing through 10 mm sieve and retained on 2.36 mm sieve)	0.9 m ³

2) Type B: premix seal coat for low rain fall areas comprising of a thin premixed fine grit or coarse sand. The quantities of ingredients are as given below:

	Quantity required per 100 m ² of seal coat
1. Quantity of binder in terms of straight run bitumen 80/100 grade	68.0 kg
2. Stone chipping (passing through 1.7 mm sieve and retained on 1.18 mm sieve)	0.6 m ³

Notes:

The combined compacted thickness of asphalt carpet and seal coat shall be minimum 62mm.

The combined compacted thickness of two layers of asphalt carpet shall be minimum 50mm.

Technical Specification of Structural Steel

**INDIAN RAILWAY STANDARD SPECIFICATION
FOR FABRICATION AND ERECTION OF STEEL
GIRDER BRIDGES AND LOCOMOTIVE TURN-
TABLES (FABRICATION SPECIFICATION) SERIAL NO.
B1-2001**

**ADOPTED -1934 LAST REVISION - 2001 REPRINTED - 2008
(INCORPORATING A & C SLIP UPTO 4)
of Structural Steel**



QUALITY ASSURANCE PLAN



RITES Ltd An ISO 9001-2000 Company	Client Name		QUALITY ASSURANCE PLAN				Project		Earthwork in formation, Construction of bridges, blanketing and allied works etc. in connection with construction of double line of existing single rail track between Raniganj and waiting bay line of MTPS at Mejia, Dist. Bankura, W.B.	
	Damodar Valley Corporation		ITEM : Civil Work, Concrete Work, Structural Work.		QP NO. :		Package-I			
					REV. NO.:		Contract No			
			Earthwork in formation, Construction of bridges, blanketing and allied works etc. in connection with construction of double line of existing single rail track between Raniganj and waiting bay line of MTPS at Mejia, Dist. Bankura, W.B.		DATE:		Constructio n Agency			
PAGE:										
Sl. No	Activity and Operation		Characteristics / instruments	Class of check	Type of check	Quantu m Of check	Reference Documents	Acceptance Norms	Format of Record	Remarks/ Precautions
1	2		3	4	5	6	7	8	9	10
1.0	EARTH									
	1.1	Fill (Suitability of borrow material & blanketing material)								
	A	Borrow Material (soil)								
		1.1.1	Grain size analysis and soil classification	set of sieves, Hydrometer etc	B	Physical	Minimum one test in every 5000 cum or change of strata/soil wherever is earlier.	IS:2720 (Pt.IV) IS:1498 - 1970/ TS	SR/TR	The soil should be suitable type Check by RITES.



		1.1.2	Liquid & plastic limit	Mechanical liquid limit device, Grooving tools, Evaporating Disc, Spatula, Palette knives, Balance, Oven, Containers	B	Physical	Minimum one test in every 5000 cum or change of strata/soil wherever is earlier.	IS:2720 (Pt.V) /TS	SR/TR	Check by RITES.
		1.1.3	Modified proctor Test to determine optimum moisture content and max. dry density of fill	Procter needle apparatus	B	Physical	Minimum one test in every 5000 cum or change of strata/soil wherever is earlier.	IS 2720 (Pt.VIII)/TS	SR/TR	Check by RITES
	B		Blanketing Material							
		1.1.1	Soil classification, Grain size analysis and %fine, Cu, Cc	set of sieves, Hydrometer etc	B	Physical	Minimum one test in every 500 cum or part thereof	IS:2720 (Pt.IV) IS:1498 - 1970 and para 4.3.4.1 of technical specification	SR/TR	Check by RITES
		1.1.2	Liquid & plastic limit	Mechanical liquid limit device, Grooving tools, Evaporating Disc, Spatula, Palette knives, Balance, Oven, Containers	B	Physical	Minimum one test in every 500 cum or part thereof	IS:2720 (Pt.V)/TS	SR/TR	do
		1.1.3	Modified proctor Test to determine optimum moisture content and max. dry density of blanketing material	Procter needle apparatus	B	Physical	Minimum one test in every 500 cum or part thereof	IS 2720 (Pt.VIII)/TS	SR/TR	Check by RITES

Note: Random checks & lab analysis											
	1.2		Degree of compaction of fill and blanketing material								
	A		Borrow material (soil)								
		1.2.1	In situ Dry density	Core cutter or sand replacement apparatus	B	Physical	i) Min. one test in each compacted layer for every 200 sqm and top 1m of subgrade. ii) Min. one test in each compacted layer for every 500 sqm below top 1m of subgrade.	IS 2720 (Pt. XXVIII & XXIX) / TS	SR/TR	98 % of max dry density (modified proctor) for homogeneous embankment Check by RITES	
		1.2.2	Moisture content	Balance, Oven etc	B	Physical	one test for every sample taken as per 1.2.1	IS 2720 /TS (Pt II)	SR/TR	check by RITES	
	1.3		Stripping								
		1.3.1	Check for required level of stripped ground	as required	B	visual & measurement	100%	RITES Tech spec., drawings	SR/TR	check by RITES	
		1.3.2	In situ Dry density of Natural Ground (sub soil)	Core cutter or sand replacement apparatus	B	Physical	min. one test for every 500 sqm	IS 2720 (Pt. XXIX) / TS	SR/TR	Check by RITES.	
2.0			CONCRETING WORK								

	2.1	Coarse Aggregate for concrete and filters								
		2.1.1	Particle Size & Shape (Sieve analysis, flakiness index, elongation index including visual inspection.	Sieves (confirming to IS-460-1962) , balance, Oven, Thickness gauge, Length Gauge, Metal Scoop etc	B	Physical	one test per 100 cum/ change of source whichever is earlier	IS: 2386 Part-I, (for test procedure), IS:383 (for permissible value)/TS	SR/LB	Results should be as per request of design mix subjected to verification within the limits specified in relevant IS code Check by RITES.
		2.1.2	Deleterious materials & organic impurities	Balance, Sieve (confirming to IS-460-1962) etc.	B	Lab analysis & Physical	To be done twice per source. Once at the starting, another in the middle	IS: 2386 Part-II, (for test procedure), IS:383 (for permissible value)/TS	SR/LB/ Test Report	Experts opinion regarding suitability of the aggregates shall be obtained from any specialist institute, Results will be reported nearest to 0.1% for clay lumps Check by RITES
		2.1.3	Determination of specific gravity , water absorbtion, bulk density and voids	Balance, Sieve (confirming to IS-460-1962) etc.	B	Physical	Once in twelve weeks/ 500 cum or change of source whichever is earlier	IS: 2386 Part-III, (for test procedure), IS:383 (for permissible value)/TS	SR/LB/ Test Report	These tests shall be carried out while establishing design mix & results be intimated. RITES
		2.1.4	Determination of Crushing value, Determination of impact value	Standard Apparatus for these test shall be used	A	Physical	To be done twice per source. Once at the starting, another in the middle	IS: 2386 Part-IV, (for test procedure), IS:383 (for permissible value)/TS	SR/LB/ Test Report	These tests shall be carried out while establishing design mix & results be intimated.

										RITES to check
		2.1.5	Moisture content	Balance, Sieve (confirming to IS-460-1962) and Oven etc.	B	Physical	Once for each stack of 100 Cum or part thereof except during monsoon when this has to be done every day before start of concreting	IS:2386 Part-III IS : 456 IS : 383/TS	SR/LB	Accordingly water content of the concrete will be adjusted. These tests shall be carried out while establishing design mix & results be intimated. RITES to check
		2.1.6	Soundness	Reagents (sodium Sulphate or Magnesium Sulphate)	B	Chemical / Physical	To be done twice per source. Once at the starting, another in the middle.	IS: 2386 Part-V, (for test procedure), IS:383 (for permissible value)/TS	SR/LB/ Test Report	These tests shall be carried out while establishing design mix & results be intimated. RITES to check
	2.2		Fine aggregate							



		2.2.1	Bulkage, bulk density, surface moisture & water absorption	As per IS Code	B	Physical	Bulkage & surface moisture to be done everyday before starting the work. Bulk density & water absorption to be done once in twelve weeks/ 500 cum or change of source whichever is earlier	IS: 2386 (Part III), IS:383/ TS	SR/LB/ TR	Volume of sand and weight of water shall be adjusted as per bulk and moisture content RITES to check	
LEGEND:							DOC. NO.:		REV-		
Legend to be used: Class # : A = Critical, B=Major, C=Minor; SR,TR,MfrTC											
SR = Site Register , TR= Test Report , Mfr TC=Manufacturer's Test Certificate , duly correlated											
Construction Agency Stamp and Signature											
		This document shall be read in conjunction with RITES Tech. Specifications, BOQ & Drawings.						REVIEWED BY	APPROVED BY	Approval Seal	
		2.2.2	Mortar making properties	As per IS Code	B	Physical	Once per source & one for every change of source	IS: 2386 (Part VI), IS:383/ TS	SR/LB/ TR	should be as per requirement of design mix RITES to check	

	2.2.3	Silt, Clay content and organic impurities and deleterious materials	Balance, Sieve (confirming to IS-460-1962) etc.	B	Physical	To be done twice per source. Once at the starting, another in the middle	IS: 2386 Part-II, (for test procedure), IS:383 (for permissible value)/ TS	SR/LB/ Test Report	should be as per requirement of design mix RITES to check
	2.2.4	Sieve Analysis, particle shape & size	set of sieves	B	Physical	one test per 100 cum/ change of source whichever is earlier	IS: 2386 (Part-I), IS:383/ TS	SR/LB/ TR	Should be as per requirement of design mix subject to variation specified in relevant IS codes. RITES to check
	2.2.5	Soundness	Reagents (sodium Sulphate or Magnesium Sulphate)	B	Chemical / Physical	To be done twice per source. Once at the starting, another in the middle	IS: 2386 Part-V, (for test procedure), IS:383 (for permissible value)	SR/LB/ Test Report	These tests shall be carried out while establishing design mix & results be intimated. RITES to check
	2.3	Water							
	2.3.1	Tests for PH Value	PH meter/ PH paper (to be recorded at site)	B	Testing at lab	One per month for each source	IS:3025, IS:456	SR/LB/ TR	do
	2.4	CEMENT (review of manufacturers test certificate for each consignment brought at site with the information to RITES.							



	2.4.1	a) Ensure that cement is stored in weather tight covered storage on raised platform.		B	Visual	100% covered storage	Refer RITES tech Spec		SR/LB	RITES site engineer to check. Manufacturers test certificate to be submitted by the contractor
	2.4.2	Fineness	As required	B	Physical	One per 200 MT	IS: 4031/1489/269/455/TS		SR/LB	do
	2.4.3	Initial & Final Setting time	As required	B	Physical	do	IS:4031/T S		SR/LB	do
	2.4.4	Soundness	As required	B	Physical	do	IS:4031/T S		SR/LB	do
	2.4.5	Specific Gravity	As required	B	Physical	do	IS:4031/T S		SR/LB	do
	2.4.6	Compressive Strength	As required	B	Physical	do	IS:4031/T S		SR/LB	do
2.5		STAGING, SHUTTERING AND FORMS								



		2.5.1	Materials and accessories	As required	B	Visual	100%	IS 4014	SR	proper care should be taken in order to combat corrosion. Proper care should be taken while cleaning, moving and stacking the scaffolds. It should be ensured that they are free from warped, broken or damaged edges or uneven surface before putting them on works. Cleaning and oiling is to be done. to check for loose connections if any Check by RITES
		2.5.2	Plywood for concrete shuttering work	As required	B	Visual	100%	IS 4990:1993, IS 1734; (Part 1 -11)/TS		Relevant documents & recommended method of use & loading etc. to be checked by RITES

		2.5.3	Durability, Strength & Soundness of staging, joists, shuttering and scaffolding	As required	B	Visual	Once	As per technical specification, manufacturer's spec.and IS: 3696,4014, 4990	SR	To be checked by RITES before & after placement of concrete
		2.5.4	Connection between individual scaffolding units and safe slenderness ratio. Two independent safety measures against collapse	As required	B	Visual	Fortnightly	As per relevant IS Codes	SR	RITES site engineer to check
		2.5.5	Alignment/Shape	As required	B	Measurement	Each member & before each lift of shuttering or before next stage	As per approved drawings	SR/LB	length,breadth,depth,shape, level, plumb line to be checked. Diagonal bracings are to be checked.
		2.5.6	Check form's seam marks and water tightness	As required	B	Physical	Random	As per approved drawings	SR/LB	RITES site engineer to check
	2.6	2.6.1	Mix Design	As required	B	Physical	once for every change in mix materials source	IS: 516 & IS:456, IS:10262/RITES Tech. Spec.	Mix Design Report	Design mix is to be carried out at any approved lab.
		2.6.2	Trial mix (Cubes compressive strength)of the Mix Design	As required	A	Physical	Min. 3 Trial Mixes with admixtures (if any) and Without admixtures	IS: 516 & IS:456, IS:10262/ RITES Tech. Spec.	SR/LB/ Test Report	RITES will conduct the trial mixes Mixing shall be in RITES approved batching plant/ weigh batcher.

	2.6.3	Crushing strength of trial mix cubes	As required for 7 & 28 days strength test	A	Physical	As per IS 456	IS: 516 & IS:456, IS:10262/ RITES Tech. Spec.	SR/LB	witness by RITES	
	2.7	Concrete conveying, placing and Compaction								
	2.7.1	Mixing of concrete	mixing of concrete shall be done in a approved mixer/ weigh batcher/ batching plant such as to produce a homogenous mix	B	Physical	To be calibrated at the time of starting and as desired by Engineer-in - charge	Review of calibration chart/ Certificate , IS 456/ TS		time of mixing will be as given in Technical specification / IS 456 Min. time of mixing should be 2 minutes for mixer capacity 2 cum or less Min. time of mixing should be 3 minutes or as recommended by by the mixer manufacturer for mixer capacity above 2 cum	
	2.7.2	Handling and Conveying	Buckets , Chutes, belt conveyer etc	B	Physical	100%	as per Tech. Spcfn./con struction/e rection methodology/ IS 457	SR	Technical specification is to be followed.	
	2.7.3	Placement of concrete	Visual	B	Physical	100%	as per constructi on/erectio n methodology as per tech.specs	SR	no concrete shall be placed until the place of deposite has been thoroughly inspected and accepted, Check by RITES	

		2.7.4	Compacting	As required	B	Physical	100%	Check for segregation as per IS 456 & TS		SR	Bleeding or segregation etc. is to be avoided as far as possible. Accumulated water is to be removed and shall not be covered with concrete, or dry concrete Check by RITES
		2.7.5	Curing	As required minimum 7 days	B	Physical	100%	Check for period of curing as per IS 456 & TS		SR	Exposed concrete surface shall be protected against heating and drying for atleast 72 hrs after placement. Check by RITES
	2.8		Tests on Green Concrete								
		2.8.1	Workability :- Slump test	Standard apparatus for different method used for measuring workability, slump cone	B	Physical	One sample every 2 hrs. from every mixing plant/ IS 456	IS:456, IS 1199-1959 & RITES Tech. Spec.		SR/LB/TR	Slump test for medium & high workability RITES site engineer to check

		2.8.2	Crushing strength (works Tests cubes)	As required for 7 & 28 days	A	Physical	As per IS 456	IS:516, IS:456, RITES Tech. Spec.		SR/LB/ Test Report	RITES site engineer to do the test.
		2.8.3	Water cement ratio(Cement Content And Water Content)	As required	B	Physical	At random at the time of batching.	As per IS:1199 and approved design mix.		SR/LB	As per mix design RITES site engineer to check
		2.8.4	Check for cement content		B	Physical	At random at the time of batching.	As per IS:3026, IS: 456, approved design mix & technical specification.		SR/LB	do
		2.8.5	Admixtures for Concrete (if any)	As per IS : 9103	B	Testing	100%	IS:456, appd. Design mix & technical specification		Test Report	Admixture of appd. Brand and tested quality shall be used.Manufacturers TC required.RITES site engineer to check
		2.8.6	Visual examination of finished structure	As required	B	Visual	100%	As per Tech. Specification./Appd. Drg./IS-456		-do-	RITES to check



		2.8.7	Dimensions	do	B	Measurement	100%	As per Tech. Specification./Appd. Drg./IS-456		do	RITES to check
	2.9	TEST/CHECK ON RCC STRUCTURE IN HARDENED CONDITIONS:									
		2.9.1	Ultrasonic Pulse Velocity Test	for critical foundations	A	NDT	100%	IS: 13311 Part- I and Tech. Specification/ IS 456	Test Report		Shall be performed by qualified persons/institution with calibrated equipments in presence of RITES, if there is any doubt in crushing strength and on specific instruction
		2.9.2	Load Test , Core test & Rebound Hammer	As required	A	Test	As required by RITES Engineer.	As per Technical specification and IS:456-2000	Test Report		The test shall be carried out only in case of doubt regarding grade & quality of concrete.
3			Reinforcement Steel								

	3.1		Physical and Chemical Properties as per relevant IS codes	As required/ agreed	B	Review of TCs	In 100 MT or part thereof	IS 1786/ 456/ TS	MTC	From Prime manufacturers of reinforcement
	3.2		Tolerance	As required/agreed	C	Physical	At random	IS:1786	SR/LB	To be checked at site
	3.3		Freedom from defects	As required/ agreed	C	Visual	Random before and during placement	As per technical specifications & IS: 468	SR	Any of the bars selected for use shall be free from cracks, surface flaws, laminations and rough, jagged and imperfect edges. Steel issued should be free from excessive rust. To be stored diameter wise in such a place so as to permit easy approach for inspection & identification. It should be cleaned of excessive rust before use. R/f will be tied with annealed wire. Water accumulation &

										distortion of r/f are to be avoided. To be checked by RITES
	3.4		Placement	As required/ agreed	B	Visual	100%	As per approved drawings and approved Bar Bending schedule/ IS 456/ TS	SR/LB/ Pour card	RITES Engineer to check as per Bar Bending Schedule (BBS) and as per relevant codal provision
	3.5		Cutting tolerance	As required/ agreed	B	Physical Measurement	100%	Approved drawings & check list.	SR	Tolerance as per specifications
4.0			Grout							
	4.1		Grouting Pressure	Calibrated Pressure Gauge	B	Physical	At random	Approved Drawing	SR/LB	To be checked at site by RITES
	4.2		Composition of Grout	NIL	B	Verification of MTC	Each lot/Batch	As per Technical Specification	SR/LB	To be checked at site by RITES
	4.3		Compressive strength (7 & 28 days)	As required	A	Physical	6 cubes for every grout at the time of each grouting	As per Technical specification	SR/LB	To be checked at site by RITES
5.0			Expansion Joints (Test Certificate of Manufacturer & Inspection agency is to be reviewed before placement)							
	5.1		Check of type & location of installation and release for concreting	NIL	B	Visual	100%	As per Technical Specification	MTC	To be checked at site by RITES

6.0		Ballast	On supply of the first 100cum, the following tests shall be carried out. Further supply shall be accepted only after this ballast satisfies the specifications for these tests.							
6.1		Size and Gradation test	As per Technical Specification	B	Physical	one for each stack	As per Technical Specification/ IS 383 / IS 2386	SR/LB	To be checked at site by RITES Size of one sample should be 0.027cum for stack of volume less than 100 cum & 0.027cum for every 100 cum or part thereof for stack of volume more than 100 cum. This sample should be collected using a wooden box of internal dimensions 0.3m x 0.3m x 0.3m from different parts of the stack	
6.2		Abrasion value	As per Technical Specification	B	Physical	One test for every 2000 cum	do	SR/LB	RITES to check	
6.3		Impact value	As per Technical Specification	B	Physical	One test for every 2000 cum	do	SR/LB	RITES to check	
6.4		Water absorption	As per Technical Specification	B	Physical	One test for every 2000 cum	do	SR/LB	RITES to check	



	6.5		Stack measurement	As per Technical Specification	B	Physical	100%	As per Technical Specification	SR/LB	RITES to check
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7.0

**Brick Masonry,
Sheeting & allied
works**

7.1

Test on Bricks

		7.1.1	Soundness	As required	C	Physical	As per relevant IS Code/ One Sample for 10,000 Nos. or part thereof	IS: 1077, IS: 3495, IS:2691, Tech. Specification		SR/LB	
		7.1.2	Colour	-	C	Visual	One for each stack	do		do	
		7.1.3	Compressive strength	As required	B	Physical	As per relevant IS Code/ One Sample for 10,000 Nos. or part thereof	IS: 1077, IS: 3495 (part I), IS:2891, Tech. Specification		do	
		7.1.4	Water Absorption	As required	B	Physical	As per relevant IS Code/ One Sample for 10,000 Nos. or part thereof	IS: 1077, IS: 3496 (part I), IS:2891, Tech. Specification		do	
		7.1.5	Visual & Dimension	Visual & Measurement tape	B	Visual & Measurement	Random	IS: 1077 & tech. Spcfn.		do	

		7.1.6	Warpage	Straight edge & scale	B	Measurement	Per 10000 Nos.	IS: 1077		do	
	7.2		Sand (masonry work & road works)								
		7.2.1	Silt, Clay content and organic impurities	As per IS Code	B	Physical	Once per source & for on every change of source	IS: 2386 Part-II, IS:383 /TS		SR/LB/TR	
		7.2.2	Grading Of Sand	IS Sieves	B	Physical	once for 100 cum or part thereof or change of source whichever is earlier.	IS 2116/ IS 383/ TS			
		7.2.3	Determination of specific gravity and water absorption, & Bulk density	Balance, Sieve (confirming to IS-460-1962) etc.	B	Physical	do	IS: 2386 Part-III, (for test procedure), IS:383 (for permissible value)		SR/LB/Test Report	
	7.3		Masonry construction								
		7.3.1	Workmanship	---	B	Visual/Physical	All work	As per Spec And IS 2212 for brick works			
		7.3.2	Laying	Trovel, Square, Plumb bob etc	B	Physical	All work	As per Spec And Clause no 11.0 of IS 2212 for brick works			



		7.3.3	Verticality and Alignment of Plumb	Plumb bob	B	Physical	All work	IS 2212 and Tech Spec			
8.0											
9.0			BOUGHT OUT ITEMS - BOI								
	9.1		Bought out items to be procured form the manufacturers acceptable to RITES	As required / agreed	B	Verificati on of MTC / Testing/ review	100%	RITES tech spec. / BOQ. List of all BOI to be submitted for approval along with proposed vendors	Relevan t docume nts/ TC		
10.0			RCC PIPES as per IS:458 & T.S.								
	10.1		Tests at Manufacturer's Works (RITES approved)								
		10.1.1	Hydrostatic Test	As required / agreed	B	Physical	As per IS 458	Testing Procedure as per IS 458	IR/TC		
		10.1.2	Absorption Test	As required / agreed	B	Physical	As per IS 459	Testing Procedure as per IS 459	IR/TC		
		10.1.3	3 Edge Bearing Test	As required / agreed	B	Physical	As per IS 460	Testing Procedure as per IS 460	IR/TC		
		10.1.4	Straightness Test	As required / agreed	B	Physical	As per IS 461	Testing Procedure as per IS 461	IR/TC		
		10.1.5	Dimensional Check & Visual Inspn.	As required / agreed	B	Physical	As per IS 462	Testing Procedure as per IS 462	IR/TC		
		10.1.6	RCC wire check & spacing	As required / agreed	B	Measure ment	Random	TS/IS 458	IR/TC		



	10.2		Checks at site							
		10.2.1	Check for Laying and Jointing	As required / agreed	B	Visual	As per IS 783	As per IS 783 & RITES Tech. Spec	IR/TC	
11.0			Road Works							
	11.1		Control of Alignment, Level & Surface Regularity							
		11.1.1	Horizontal alignment	As reqd	B	Physical	100%	Section 900 of MORTH specification/ IRC,RITES Spec.	SR	
		11.1.2	Surface Levels	As reqd	B		on a grid of points placed at 6.25m longitudinally and 3.5m transversely	Table 900-1 of MORTH Spec./ IRC		
		11.1.3	Surface Regularity of Pavement Courses	As reqd	B		100%	Table 900-2 of MORTH Spec./ IRC		
	11.2	Test on bases and sub-bases (excluding bituminous bound bases) – Water Bound Macadam								
	A		Aggregates							

		11.2.1	Aggregate Impact value, abrasion value & water absorption	Aggregate Impact value Test Apparatus	A	Physical	One test per 200 cum of Test aggregate	Section 900 of MORTH specification, RITES Spec.	SR/TR	
		11.2.2	Grading	Set of IS Sieves	B	Physical	One test per 100 cum of aggregate	Section 900 of MORTH specification, RITES Spec.	SR/TR	
		11.2.3	Flakiness index and elongation index	Flakiness and elongation test gauges	B	Physical	One test per 200cum of aggregate	Section 900 of MORTH specification, RITES Spec.	SR/TR	
	B		Sand (see clause 7.2)							
	C	Test on earthwork for embankment, construction and cut formation of Road								
		11.2.1	Soil (Grain size analysis, LL, PL, PI, Modified Proctor, CBR value)		B		100%	Clause 903.2 of MORTH spec & IS 2720 Part 4, 5 8 , 16		
		11.2.2	Compaction Control		B		on each layer by taking at least one measurement of density for each 2500 sqm of compacted area or road length of 500m whichever is lower.	IS 2780 (part 28)		



		11.2.3	Atterberg Limits of binding material (moorum)-LL/PL/PI and grain size analysis	Atterberg limits determination	B	Physical	One test per 100 cum of binding material	Section 900 of MORTH specification, RITES Spec.	SR/TR	
12.0			TURFING							
	12.1		visual inspection of turf sods	as required	B	Visual	100%	-		

Note: For items & works which are left out, the checks shall be mutually agreed in line with CPWD/RITES/Rly norms.

<u>General Points:</u>									
1.0	Quality Control Manpower			A check	As per T.S.				
2.0	Quality Control Laboratory			A check	As per T.S.				
3.0	Construction Equipments			A check	As per T.S.				
4.0	Organisation Chart			B check	As per T.S./As per requirement / direction of EIC				



Section - 6

DRAWINGS

(Not enclosed)