

**MORMUGAO PORT TRUST
ENGINEERING (CIVIL) DEPARTMENT**

e-TENDER NOTICE No. CE/N-23/2018

e- TENDER No. CE/24/2018

FOR

“Extension of Railway Line No.8 at Mormugao Port, Goa.”

<https://eprocure.gov.in/eprocure/app>

Due at 1500 hrs on 30.07.2018.



An ISO 9001:2015 Certified
ISPS Code Compliant Port

MORMUGAO PORT TRUST
ENGINEERING CIVIL DEPARTMENT

e- PORTAL NOTICE INVITING ONLINE TENDER

e - TENDER NO: CE/24/2018

**“e – tender for “Extension of Railway Line No.8 at Mormugao Port,
Goa.”**

Closing Date: 30.07.2018 at 15.00 Hrs

Further details **<http://eprocure.gov.in/eprocure/app>**

CHIEF ENGINEER



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MORMUGAO PORT TRUST
ENGINEERING (CIVIL) DEPARTMENT
E-TENDER No. CE/24/2018

Name of the Work: “Extension of Railway Line No.8 at Mormugao Port, Goa.”

COVER NO. 1 (TECHNICAL BID)

1. Notice Inviting Online Tender
2. Instruction for online submission
3. Tender Notice
4. Form of Agreement.
5. Form of Bank Guarantee for Security Deposit.
6. Scope of Work
7. Additional Special Instructions.
8. Additional General Specifications.
9. Technical Specifications.
10. General conditions of Contract

(PRICE BID)

1. Schedule of Quantities & Rates

DOCUMENTS TO BE UPLOADED DURING SUBMISSION

1. UNDERTAKING BY THE TENDERER
2. Form of Tender.
3. Appendix – I.
4. Appendix – II.
5. Appendix – III.
6. Performa – 1
7. Performa – 2
8. Performa – 3
9. Performa – 4
10. Performa – 5
11. Performa – 6
12. PROFORMA OF PRE CONTRACT INTEGRITY PACT.
13. Check List for Submission of Tender
14. Vendor Registration Form



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MORMUGAO PORT TRUST
ENGINEERING (CIVIL) DEPARTMENT

1. NOTICE INVITING ONLINE TENDERS (NIOT)

Details about tender:

Tender inviting	CHIEF ENGINEER, MORMUGAO PORT TRUST	
e - Tender No.	CE/24/2018	
Name of Work	e – Tender for “Extension of Railway Line No.8 at Mormugao Port, Goa.”	
Estimated Cost	Rs.1,09,62,000/-	
Bidding Type	Open (e-tender mode only)	
Bid Call (Nos.)	One	
Tender Currency Type	Two Cover	
Tender Currency Settings	Indian Rupee (INR)	
Joint Venture	Not Allowed	
Tender Cost	Rs.5,000/-	Mode Of Payment: e-payment only
EMD Cost	Rs. 1,10,000/-	
Transaction fees (Charges based on the award value of the winning Bidder)	Nil	
Payment of Tender Fee & EMD	<p>The Tender fee and EMD shall be paid in e-payment mode only, before the due date and time of the tender. Mode of Payment towards Tender Cost, & Earnest Money Deposit (EMD) to be paid online through e-Payment mode via :</p> <p>i. National Electronic Fund Transfer (NEFT) / Real-Time Gross Settlement (RTGS). Tenderer requires download pre-printed Challan towards credit of</p>	

	<p>MPT available on e-tender website and make its payment through any of their Bank.</p> <p>ii. Internet Payment Gateway (Debit/ Credit Card of type VISA, MASTERCARD or RuPay.</p> <p>iii. Net Banking: Payment can be made through the Internet Banking of Any Bank.</p> <p>Note: Any Payments made through NEFT/RTGS will take 24 hours for its reconciliation. Hence the payments through NEFT/RTGS should be made at least TWO BANK WORKING DAYS in advance before any due date and upload the scanned copy of challans in the e-Tender website as a token of payment</p>
Security Deposit	<p>Two parts:</p> <p>(i) EMD to be converted into security deposit</p> <p>(ii) 10% retention money deducted from the running bills. and to retained till defect liability period.</p>
Contract Period	Three (3) months

<p>Qualifying Criteria :</p>	<p>PRE-QUALIFICATION CRITERIA / BIDDING CONDITION</p> <p>(A) Financial Criteria The average annual turnover during the last three years ending 31st March 2017 of the tenderer should be at least Rs. 32.89 lakhs.</p> <p>(B) Technical Criteria The firm shall have successfully completed the similar works during the last seven years ending 31st March 2018 either of the following:</p> <p>i) Three similar works each costing not less than Rs.43.85lakhs or ii) Two similar works each costing not less than Rs.54.81lakhs or iii) One similar works costing not less than Rs.87.70lakhs</p> <p>NOTE: “Similar Works” means the works INVOLVING RAILWAY WORKS, LIKE LAYING AND LINKING PERMANENT WAY MORE THAN 2KMS. IN LENGTH INCLUDING SUPPLY OF MATERIAL SUCH AS RAILS, PSC SLEEPER, BALLAST POINTS & CROSSINGS / TURNOUTS ETC.</p> <p>Note :The Tenderer shall upload following specific document for fulfilling the eligibility criteria as documentary proof for</p> <p>a) Financial Criteria- Profit & Loss account, Income tax Returns/ Audited statement of Accounts duly authenticated by Chartered Accountant.</p> <p>b) Technical criteria- Copy of work orders and completion certificate for the works carried out completed successfully on similar works stating clearly the commencement and completion dates of execution of work and completion cost of work.</p>
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Place of opening	Conference Room, Office of the Chief Engineer, Mormugao Port Trust, A.O. Bldg., Headland Sada, Goa - 403 804.
Last Date & Time for uploading Bids	30/07/2018 @1500 Hrs.
Bid Opening Date	Techno-commercial Bid (Cover-I) will be opened on 31/07/2018 @ 1530 Hrs. Date of opening of price bid shall be notified after scrutiny and evaluation of Techno-commercial Bid.
Bid Validity	120 days from the last date fixed for receiving the tender.
Online Documents required to be submitted by scanning& uploading.	a. Copy of documents viz. Work Order, Completion certificate, Financial Turnover, Auditor's report, Balance sheet, P/L account statement, etc. Financial Turnover Certificate as at Appendix-II. b. Entire Tender document.
Address for communication:	Chief Engineer, Office of Chief Engineer, Engineering (Civil) Dept., Mormugao Port Trust, A.O. Bldg, Headland Sada, Goa – 403804.
Contact Details	For Tender related queries --- Phone :0832 – 2594611 / 2594607; Email :dattakumar.ambe@mptgoa.com For Tendering help contact: E-Tender Help Desk, 3rd Floor, IT-HUB Opp. Govt. ITI, Altinho Panaji, Goa – 403001
Website	http://eprocure.gov.in/eprocure/app

Format and Signing of Bid

The Price Bid to be submitted on-line shall be signed digitally by a person or persons duly authorized to sign on behalf of the Bidders.

The Bid shall contain no alternations additions, except those to comply with instructions issued by the Employer.



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ENGINEERING (CIVIL) DEPARTMENT

2. INSTRUCTIONS FOR ONLINE BID SUBMISSION

Tender No. CE/24/2018

Name of the Work: Extension of Railway Line No.8 at Mormugao Port, Goa.

Bidders are instructed to follow below mentioned procedure to submit the bid online through the e-tender site.

1. Bidder should do the registration in the tender site using the 'Vendor Registration' link available on home page.
2. Then the Digital Signature of SIFY/TCS/nCode or any Certifying Authority is to be registered after logging into the site.
3. Bidder can use Document Library menu to upload technical documents in advance as required for various tenders and use them during bid submission. This will facilitate the bid submission process by reducing time.
4. Bidder may get the tenders published documents in Tender free view link in home page and download the required documents/tender schedules by free of cost for read only.
5. Bidder then login into the site using the secured log in by giving the user id/password chosen during registration and password of the DSC/e-token.
6. Only one DSC should be used for a bidder and should not be misused by others.
7. Bidder should read the tender schedules carefully and submit the documents as asked, otherwise, the bid will be rejected.

8. If there are any clarifications, this may be obtained using clarifications or during the pre-bid meeting. Bidder should take into account of the Addendum/Corrigendum's published before submitting the bids online.
9. Bidder must fill the bid documents to be submitted as indicated in the tender schedule and they should use the uploaded format in website.
10. Bidder should prepare the EMD and tender fee as specified in the tender in the NIOT.
However, e-payment of Tender Fee and EMD shall confirm the opening of the Technical Bid of the respective firms.
11. Bidder selects the tender which he is interested using Tender search option initially the tender will be available in vendor unapplied stage.
12. From vendor unapplied stage Bidder has to request the tender document by clicking on Request tender form level-1 icon.
13. After requested the tender, same will move to vendor In progress.
14. The bidder has to select 'Edit Attachment Level 1' icon under action menu of particular tender.
15. The Bidder has to enter the password of the DSC/e-token and the required bid documents have to be uploaded one by one as indicated.
16. The vendor has to quote the rates in provided excel sheet (BOQ) by filling the highlighted in blue color cells and should be updated. The BOQ document, if found modified by the bidder, his bid will be rejected.
17. The tendering system will give a successful bid updating message & then a bid summary will be shown with the bid No., date & time of submission of the bid with all other relevant details. The bidder has to submit the relevant files required as indicated in the cover content. In case of any irrelevant files, the bid will be rejected.
18. The bid summary has to be printed and kept as an acknowledgement as a token of the submission of the bid.
19. The bid summary will act as a proof of bid submission for a tender floated and will also act as an entry point to participate in the bid opening date.

20. For any clarifications with the Tender Inviting Authority (TIA), the bid number can be used as a reference.
21. Bidder should log into the site well in advance for bid submission so that he submits the bid in time (i.e.) on or before the bid submission time. If there is any delay, due to other issues, bidder only is responsible.
22. Each document to be uploaded online for the tenders should be less than 5 MB and BOQ and Technical bid should be less than 2 MB. If any document is more than 5 MB, it can be reduced by scanning at low resolution and the same can be uploaded.
23. The time settings fixed in the server side & displayed at the top of the tender site, will be valid for all actions of requesting, bid submission, bid opening etc., in the e-tender system. The bidder should follow this time during bid submission.
24. All the data being entered by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered will not be viewable by unauthorized persons during bid submission & not be viewable by any one until the time of bid opening.
25. The confidentiality of the bids is maintained since the secured Socket Layer 128 bit encryption technology is used. Data storage encryption of sensitive fields is done.
26. Any documents that are uploaded to the server are subjected to symmetric encryption using a generated symmetric key. Further this key is subjected to asymmetric encryption using buyer's public keys. Overall, the submitted tender documents become readable only after the tender opening by the authorized individual.
27. Tenderer is required to submit their tender through online in the form of Two cover system on or before due date of closing time. The tender received after the due date and time will not be entertained.
28. Tender Document can be submitted online only in the designated two cover system on the e-tender website <http://eprocure.gov.in/eprocure/app> on or before the due date and time. Tenderer should submit the tender as per specification indicated in BOQ and accordance with the Instructions to Tenderers, Tender

Information Sheet, General Conditions of Contract and Special Conditions of Contract, etc.

29. **Technical and Commercial bid (Cover-I)** : The tenderer shall upload in the e-portal website, in the form of scanned copy, documents required as per Pre Qualification Criteria, Test of Responsiveness and other Appendix (Form of Tender, Annual Financial turnover, Power of Attorney etc.) as specified in the Tender.
30. **Price Bid (BOQ) – (Cover-II)**: Price should be quoted in Online “BOQ”. Price should be quoted in a spread sheet file (.xls format) available in e-tender portal only. Any indication of ‘Quoted Price’ in the online technical bid documents shall be lead to rejection of the bid outright. For evaluation purpose, the uploaded offer documents will be treated as authentic and final. The price bid submitted through e-tender mode only will be taken up for the purpose for evaluation.

31. Other conditions:

- a. There are no significant inconsistencies between the proposal and the supporting documents.
- b. The Port Trust reserves the right to reject any tender which in its opinion is non-responsive and no request for alteration, modification, substitution or withdrawal shall be entertained by the Port Trust in respect of such Tenders.
- c. The Port Trust would have the right to seek clarification on Techno-commercial conditions wherever necessary.
- d. Since the tender involves selection based on pre-qualification criteria and technical specification, the Chief Engineer will examine and seek clarification if any and list out the firms, which are found technically suitable and Cover – II Price Bid of such tenders only will be opened and EMD will be returned to the disqualified tenderers.
- e. The date and time will be intimated to tenderers whose offers are found suitable and Cover – II of such tenderers will be opened on the specified time and date.



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MORMUGAO PORT TRUST
ENGINEERING (CIVIL) DEPARTMENT

TENDERNo. CE/24/2018

Name of Work: Extension of Railway Line No.8 at Mormugao Port, Goa.

3 - TENDER NOTICE

1. INVITATION

1.1 Mormugao Port Trust (MPT) invites *sealed tenders in original under two cover bidding procedure and to the MPT's designs, drawings, relevant I.S. codes and specifications contained and referred directly/indirectly in this tender document and on Item rate basis for the work of '**Extension of Railway Line No.8 at Mormugao Port, Goa.**'

* "Sealed" shall means sealed with wax or closed with gum, to the satisfaction of authority opening the tender.

1.2. **Eligibility Criteria for tendering will be as follows:**

(A) Financial Criteria :

- i) The average annual financial turnover during the last three years ending 31st March 2017 of the tenderer should be at least **Rs.32.89lakhs.**

Note: **The above information shall be submitted along with documentary proof i.e. Profit & Loss account, Income tax Returns/ Audited statement of Accounts duly authenticated by Chartered Accountant.**

(B) Technical Criteria

- (ii) The firm shall have experience of successfully completing the "similar works" during last seven years ending 31st March, 2018, in either of the following:

- (a) **Three similar works each costing not less than Rs.43.85lakhs.**

OR

(b) **Two similar works each costing not less than Rs.54.81lakhs.**

OR

(c) **One similar work costing not less than Rs.87.70lakhs.**

Note : (i) **“Similar Works”** means the works INVOLVING RAILWAY WORKS, LIKE LAYING AND LINKING PERMANENT WAY MORE THAN 2KMS. IN LENGTH INCLUDING SUPPLY OF MATERIAL SUCH AS RAILS, PSC SLEEPER, BALLAST POINTS & CROSSINGS / TURNOUTS ETC.

1.2.1 The Tenderer should have executed works in the Railways/ Public Sector Govt. Undertakings/ State Governments / Private Sector/ Port Authorities.

1.2.2 Mode of Selection of Contractor:

Tenderer shall have to satisfy minimum Financial and Technical eligibility Criteria mentioned in the tender at 1.2 above. Tenderers who satisfy criteria mentioned in 1.2 and 1.2.1 above will be qualified for opening of Cover No.2 (Price Bid). Lowest Price offer is the sole criteria for award of work among qualified tenderers. In Bill of Quantities, tenderer shall have to quote unit Price in words and figures as per details. In case of difference in value of unit rate in words and figures, the lowest rate will be considered.

1.2.3 The contractor shall submit the techniques and methodology for the construction in Proforma 2 in case of routine work and also considering block work.

1.2.4 The tenderer shall furnish relevant information in respect of their firm etc. to ascertain their financial and technical capabilities and work experience in Proformae 1 to 6, except Proforma 2.

1.2.5 Offers received from the tenderer with counter stipulation and conditions will be summarily rejected and such offers will not be evaluated and considered at all.

1.2.6 Unregistered contractors can submit the tender provided, the firm fulfils minimum eligibility criteria specified in the tender. Successful tenderer shall have to register with the Department in due course of time.

1.3 Scope of the work :

The proposed work broadly comprises of:

- a) Earth work in filling with ordinary soil/murram.

- b) Murrum Blanketing on the Railway formation with blanket material viz. murrum, quarry/ crusher grit, etc.
- c) Earthwork in cutting in formation and side & catch water drains, etc. In Ordinary/ Hard Soil and In Soft Rock (RNRB).
- d) Contractor shall survey the proposed site **jointly with department representative** and prepare the drawing based on the survey and peg marks shall be made at site as per the alignment proposed on drawing.
- e) Dismantling of plain tracks from existing railway line including sleepers, ballast and utilizing the same in laying and linking.
- f) Dismantling of turnouts in 1 in 8½ from existing railway line including sleepers, ballast and utilizing the same in laying and linking.
- g) Supplying, transporting and handling machine crushed stone ballast of 50mm size clean angular, hard and durable track ballast.
- h) Laying and linking Permanent way on straight /curve with 60 Kg rails on 60 kg PSC sleepers with elastic fastenings fish plated tracks.
- i) Assembling and Insertion of 1 in 8½ Turnouts 60 kg with curved switch and CMS crossing on Fan shaped PSC sleepers.
- j) Assembling & fixing of Spring Loaded hand operated Lever boxes to the Turnouts.
- k) Through packing of newly laid tracks 1st packing, IInd packing and Final packing on straight or curve with any sleeper density to a good and acceptable geometry to conform to specified alignment & level and other track parameters.
- l) Through packing of newly laid 1 in 8½ turnouts/points and crossing 1st packing, IInd packing and Final packing to bring them to a good and acceptable geometry to conform to specified line, and levels and parameters
- m) Fixing check rails with complete fittings on PSC sleepers at level crossings, curves, etc., as per the specification and drawings
- n) Erection of prefabricated Buffer stop.
- o) Supply of 1 in 8½ Turnouts (L.H. = 2) 60kg with curved switch and CMS crossing suitable to 60 kg on Fan shaped PSC sleepers including transportation and handling
- p) Providing Soling for storm water drain and paving area to the required thickness.
- q) Providing & fixing shuttering /formwork, concrete of (1:2:4) grade, for storm water/service trenches.
- r) Contractor shall have to submit '**As Made Drawing**' in soft and hard

form on completion of work.

The work is required to be carried out strictly as per relevant Indian Standard Specification; the Drawings and as described in Specifications and Schedule of Quantities and Rates contained in this tender document with approved quality of materials.

- 1.4 The estimated cost of the work is **Rs.1,09,62,000/-**. The estimated cost of work is furnished herewith for the guidance of the tenderer and they are advised to make their own estimate for the same.
The tenderers are required to offer their item rate for each and every item in figures as well as in words at the space provided in the Schedule of Quantities and Rates.
- 1.5 The tenderer will have to work in close co-ordination with the other contractors employed, if any.
- 1.6 The quantities provided in the tender are approximate and may vary. The tenderers are strongly advised to inspect the site of work and acquaint themselves with the site conditions and quantum of works involved etc. so that they are fully aware of the nature and scope of the works to be carried out before tendering. No claim will be entertained due to variations in the quantities.
- 1.7 **The tenderers will be prequalified based on the information furnished by them. The Second Cover of the only those qualified tenderers will be opened on the date which will be intimated to them.**

2. PROCEDURE FOR OBTAINING TENDER DOCUMENTS

2.1 The tender documents are available on <http://eprocure.gov.in/eprocure/app> web site during sale period for more details contact Telephone No.0832 2594628 during working hours from 9.30 hours to 12.00 hours & 14.00 hours to 15.00 hours on any working day upto the last day stipulated for the submission of tender documents, The interested firms may alternatively download the tender documents from the Mormugao Port Trust web site <http://eprocure.gov.in/eprocure/app>. The payment of Rs.5,000 /- (Rupees Fivethousand only) will have to be made online.

3. EARNEST MONEY TO BE DEPOSITED FOR THIS TENDER:

The Earnest Money to be deposited online in respect of this tender is **Rs.1,10,000/-**(Rupees One Lakh Tenthousand only) Scheduled Bank within the jurisdiction of State of Goa payable at Vasco - Da - Gama.

4. **RELEASE OF SITE:**

The site is available and will be released to the contractor after the work is awarded. Contractor shall commence the work immediately. Contractor shall survey the proposed site and prepare the drawing based on the survey and peg marks shall be made at site as per the alignment proposed on drawing. It shall be the responsibility of the contractor not to cause any hindrance to the existing rail traffic and shall not obstruct the daily routine works in the vicinity. The dust, dirt and debris resulted at the site shall be controlled properly and removed daily. The complaints received in this respect will be viewed seriously and the cost of resulted damages, if any will be recovered without any reference. The Tenderer should take all these aspect into account while quoting the tender and to complete the work within stipulated completion period.

5. **TIME FOR COMPLETION OF THE WORK:**

The total completion period for the work is **Three(3) months** including monsoon from the date of receipt of acceptance letter. The contractors are required to plan their construction activities accordingly without causing any hindrances to the railway traffic and also routine railway movements and other activities of MPT contractor operating / working in the area.

Time is essence of the contract. If the tenderer stipulates a completion period longer than the one stipulated above, the same is liable for rejection.

See Clause No.40 of the General Conditions of contract.

7. **LIQUIDATED DAMAGES:**

Liquidated damages for delay in completion of the works are ½ percent (0.5%) of the Contract Price of work for delay of each week or part of a week subject to a maximum ceiling of 5 percent of the Contract Price. However, if the work is delayed by more than 25% of the contracted completion period, the contract is liable to be terminated and the balance works are liable to be got completed by Mormugao Port Trust through some other agency at the risk and cost of the defaulting Contractor.

8. **PROGRAMME OF WORKS:**

Every tenderer must prepare and submit with his tender a detailed CPM network based programme and bar chart and list of control milestones for the execution of the work, keeping in mind the site conditions and the possible hindrances due to monsoon, existing rail traffic, etc. duly signed and dated in accordance with Clause 15 of General Conditions of Contract & the Instructions for Preparation and Submission of Tenders. The bar chart and list of control milestones will form part of the tender. Wherever necessary work shall be taken up on traffic block condition with prior permission in writing to the Chief Engineer, in such circumstances all the items required for the traffic block condition shall be procured and stacked at site.

9. **MAINTENANCE PERIOD:**

The free maintenance period is 1 (one) year for all the works covered under this contract from date of completion of the entire work as certified by the Chief Engineer.

10. **FACILITIES TO THE CONTRACTOR:**

Tenderers are advised to price their bids after taking into account, among other provisions of the tender documents:

- a) Secured advance against materials brought to site for Permanent Works, will be paid to the contractor. (Refer Clause No. 54 (1) (b) of (G.C.C)
- b) **MPT may supply Permanent Way material for the work if available in stock and same shall be informed to successful contractor during execution of work within one month from acceptance of work.**
- c) MPT will supply water for construction purpose subject to availability as per the Special Condition of Vol .I Clause No. 9.19 on payment of applicable charges. In the event water is not supplied by MPT, the contractor will have to make his own arrangements for water which shall be from an approved source.
- d) It is possible to give electric supply subject to availability from the MPT as per Special Conditions of contract Vol. I Clause No. 9.20 on payment of applicable charges. The contractor will have to make his own arrangements for drawing the electricity which shall be approved by MPT. Contractor has to maintain generator set of the adequate capacity for the electrical supply.

11. **FACILITIES NEED TO BE PROVIDED BY THE CONTRACTOR:**

Tenderer's are advised to price their bids after taking into account the facilities need to be provided by them free of cost to the Employer, which shall include following facilities.

a) Contractor shall at his cost obtain all necessary permissions/clearances of statutory/non-statutory authorities, test certificates alongwith inspection report of the railway materials brought to site, for successful completion of the work.

12. **EXPENSES INCURRED BY THE TENDERER:**

Mormugao Port Trust will not reimburse any costs or expenses incurred by the tenderer in connection with the preparation or delivery of this tender, including costs and expenses related to visit the site.

13. **INSPECTION OF SITE:**

Tenderers are strongly advised to inspect the site of work and acquaint themselves with the site conditions and quantum of work involved etc. before tendering. Access to the site for inspection will be arranged by Executive Engineer, Civil Engineering Department, Mormugao Port Trust, Administrative Office Building, Headland Sada, Goa - 403804, Telephone No. 0832 2594611. Mobile: 09764006075.

14. **RIGHT OF ACCEPTANCE / REJECTION OF ANY TENDER :**

The Board of Trustees of the Port of Mormugao reserves the right to reject any or all tenders without assigning any reason or to accept any tender in part or whole and does not bind itself to accept the lowest or any tender.

15. **DEADLINE FOR RECEIPT SUBMISSION AND OPENING OF TENDER:**

15.1. The tenders duly completed shall be submitted as per laid down procedures and in accordance with **Notice Inviting Online Tenders and Instructions for Online Bid Submission. MPT may not seek any clarification /Details in post tender scrutiny and incomplete tender may be termed as non responsive.**

16. **VALIDITY OF THE TENDER:**

The tenders shall remain valid for a period of 120 days from the date of submission of Bid offer.

CHIEF ENGINEER



MORMUGAO PORT TRUST
ENGINEERING (CIVIL) DEPARTMENT

TENDER No. CE/24/2018

Name of Work: Extension of Railway Line No.8 at Mormugao Port, Goa.

FORM OF BANK GUARANTEE FOR SECURITY DEPOSIT

1. In consideration of the Board of Trustees of the Mormugao Port Trust (hereinafter called “The Board”) having offered to accept the terms and conditions of the proposed agreement between _____ and _____ (hereinafter called “the said Contractor(s)”) for the work _____(hereinafter called ”the said agreement”) having agreed to production of an irrevocable Bank guarantee for Rs. _____ (Rupees _____ only) as a security/guarantee from the Contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement.
2. We _____ (hereinafter referred to as the “Bank”) hereby undertake to (indicate the name of the Bank) pay to the Board an amount not exceeding Rs. _____ (Rupees _____ only) on demand by the Board.
3. We _____ do hereby undertake to pay the amounts due and payable (indicate the name of the Bank) under this Guarantee without any demur, merely on a demand from the Board stating that the amount claimed is required to meet the recoveries due or likely to be due from the said Contractor(s). Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs. _____ (Rupees _____ only).
4. We, the said Bank, further undertake to pay to the Board any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any Court or Tribunal relating thereto, our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be

a valid discharge of our liability for payment thereunder, and the Contractor(s) shall have no claim against us for making such payment.

5. We _____ further agrees that the Guarantee herein contained shall (indicate the name of the Bank) remain in full force and effect during the period that would be taken for the performance of the said agreement, and it shall continue to be enforceable till all the dues of the Board under or by virtue of the said agreement have been fully paid, and its claims satisfied or discharged, or till the Engineer-In-Charge, on behalf of the Board, certifies that the terms and conditions of the said agreement have been fully and properly carried out by the said Contractor(s), and accordingly discharges this Guarantee.
 6. We _____ further agree with the Board that the Board (indicate the name of the bank) shall have the fullest liberty without our consent, and without effecting in any manner our obligations hereunder, to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Board against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said agreement, and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor(s) or for any forbearance, act of omission on the part of the Board or any indulgence by the Board to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.
 7. This guarantee will not be discharged due to the change in the Constitution of the Bank or the Contractor(s).
 8. We _____ lastly undertake not to revoke this Guarantee except with (indicate the name of the Bank) the previous consent of the Board in writing.
 9. This Guarantee shall be valid upto _____ unless extended on demand by the Board. Notwithstanding anything mentioned above, our liability against this Guarantee is restricted to Rs. _____ (Rupees _____ only), and unless a **claim in writing is lodged with us within six months of the date of expiry** or extended date of expiry of this Guarantee all our liabilities under this Guarantee shall stand discharged.
- Dated the _____ day of _____ For _____

(indicate the name of the Bank)



MORMUGAO PORT TRUST
ENGINEERING (CIVIL) DEPARTMENT

TENDERNo. CE/24/2018

Name of Work: Extension of Railway Line No.8 at Mormugao Port, Goa.

6. SCOPE OF WORK

1.The proposed work comprises of:

- a) Earth work in filling with ordinary soil/murum.
- b) Murum Blanketing on the Railway formation with blanket material viz murum, quarry/ crusher grit etc
- c) Earthwork in cutting in formation and side & catch water drains etc. In Ordinary/ Hard Soil and In Soft Rock (RNRB)
- d) Contractor shall survey the proposed site and prepare the drawing based on the survey and peg marks shall be made at site as per the alignment proposed on drawing.
- e) Dismantling of plain tracks from existing railway line including sleepers, ballast and utilizing the same in laying and linking.
- f) Dismantling of turnouts in 1 in 8½ from existing railway line including sleepers, ballast and utilizing the same in laying and linking.
- g) Supplying transporting and handling machine crushed stone ballast of 50mm size clean angular, hard and durable track ballast
- h) Laying and linking Permanent way on straight /curve with 60 Kg rails on 60 kg PSC sleepers with elastic fastenings fish plated tracks from the dismantled track.
- i) Assembling and Insertion of 1 in 8 1/2 Turnouts 60 kg with curved switch and CMS crossing on Fan shaped PSC sleepers
- j) Assembling & fixing of Spring Loaded hand operated Lever boxes to the Turnouts
- k) Through packing of newly laid tracks Ist packing, IInd packing and Final packing on straight or curve with any sleeper density to a good and acceptable geometry to conform to specified alignment & level and other track parameters
- l) Through packing of newly laid 1 in 8 1/2 turnouts/points and crossing Ist packing, IInd packing and Final packing to bring them to a good and acceptable geometry to conform to specified line, and

levels and parameters

- m) Fixing check rails with complete fittings on PSC sleepers at level crossings, curves, etc., if required as per the specification and drawings
- n) Erection of prefabricated Buffer stop.
- o) Supply of 1 in 8 1/2 Turnouts (L.H. = 2) 60kg with curved switch and CMS crossing suitable to 60 kg on Fan shaped PSC sleepers including transportation and handling.
- p) Providing Soling for storm water drain and paving area to the required thickness.
- q) Providing & fixing shuttering /formwork, concrete of (1:2:4) grade, for storm water/service trenches.
- r) Providing and laying Non pressure NP-4 Class (Heavy Duty) RCC hume pipes of size 450mm dia.
- s) Providing and fixing of G.I pipes, B class, 80mm dia complete with all fittings.
- t) Contractor shall have to submit '**As Made Drawing**' in soft and hard form on completion of work.



An ISO 9001:2015 Certified
ISPS Code Compliant Port

MORMUGAO PORT TRUST
ENGINEERING (CIVIL) DEPARTMENT

TENDERNo. CE/24/2018

Name of Work: Extension of Railway Line No.8 at Mormugao Port, Goa.

7. ADDITIONAL SPECIAL INSTRUCTIONS

1. Tenderers are required to sign with date the Schedule of Quantities and Rates and the form of tender and fill in all the particulars and details called for therein. Unsigned tenders, without the details called for are liable for rejection.
2. **Measurements**
The quantities provided for in the Schedule of Quantities and Rates are only approximate and are given to provide a common basis for tendering. The actual quantity may differ from those provided for in the Schedule in view of the special and complex nature of the work. Payments will be made according to the actual quantities of work ordered and carried out, jointly measured by the representative of Chief Engineer and the Contractor.
3. **Rates and Prices to be inclusive.**
The rates entered in the Schedule of Quantities by the tenderer shall include the provision of all supporting special equipment, labour of required skill, supervision, materials, overheads and profits, watch and ward, insurance charges, during execution and every incidental and contingent costs and charges, whatsoever, including sales tax on works contracts, Entry tax, etc. if any, for compliance with conditions of contract and specification. **GST is applicable as per relevant provisions of the act time to time and shall be paid extra.**
4. The tenderer shall inspect the site and fully study the work involved vis-à-vis the specifications etc. before tendering for the work.
5. Any damage to the property of Port should be made good or compensated by the contractor.

6. After completion of the days, work / contract period the contractor shall clean, clear the work site to the satisfaction of the Chief Engineer or his site representative.
7. Permission for working beyond the normal working hours of the Port or on Sundays and Public Holidays as stipulated under clause no.43 of the General Conditions of Contract, volume – I of the tender document will be given to the contractor subject to his agreeing to bear the cost of overtime, if any, which may have to be paid to the Port's supervisory staff.
8. The contractor and his workers / agents shall be required to obtain from MPT and display a Photo Identity Card during entry, stay and exit from the Port security areas guarded by CISF personnel.
9. All applications for issuance of Photo Identity cards shall be routed through the Chief Engineer, from online portals and shall forwarded the same to the Port's Traffic Department, whose pass section will issue the Photo Identity Card to the contractor or his agents on free of cost. The RFID Harbour Entry Permit (HEP) issued by Traffic Department shall be returned /surrendered on expiry failing which cost of RFID HEP will be recovered from contractor.
10. Subject to the availability, land for construction of temporary sheds/stores/labour hutments, etc. will be given to the contractor in Port areas at Headland. The contractor shall clear away all the temporary structures built within a period of fourteen days after completion of the work and leave the whole of the site clean to the satisfaction of the Chief Engineer. In case the contractor fails to vacate the Port area / premises allotted to him for site office / store within the stipulated period after the completion of the work, the Board shall have the right to debar such defaulting contractors for future contracts of the Board by blacklisting him and shall also be charged penal lease rental at the prescribed rates.
11. Lease rent shall be charged to the contractors for the area allotted for construction of their temporary sheds for site office/store/labour hutments required in the contract works. The licence fee shall be as per Port's scale of Rates vide item (i) and (ii) of Part-I (Appendix-III).
12. No temporary structures/sheds which are constructed to house the contractor's office/store/labour hutments shall be permitted to be retained during the period of maintenance.
13. All the materials to be used in the structure shall be conforming to relevant ISI specifications or as specified in the Tender Schedule. Contractor shall undertake laboratory test as specified in the relevant

- I.S.I. at the discretion of Chief Engineer and only approved materials/approved brand of materials shall be used.
14. Electrical power and water required for the work shall be supplied as per the availability at the Port's Scale of Rates vide Item No. I & II of Part - I (Appendix - II).
 15. The contractor shall have EPF Registration No. of the firm and shall contribute towards Employees Provident Fund (EPF) and submit the copy of the same along with the details in prescribed format while submitting bills.
 16. The contractor shall register with E.S.I. and should submit the copy of the minimum amount of insurance (ESI) etc. obtained before the commencement of the work.
 17. **SITE REGISTERS:-**

The contractor shall maintain following registered at Site, which shall be entered on day to day basis and produced on demand.

 1. Cement Register (Starting total received, daily consumption and balance on each day.)
 2. Steel Register (Starting total received, consumption, balance and rolling margin on each day)
 3. Sand Register
 4. Aggregate Register
 5. Concrete Cube Register (Testing 7 days and 28 days)
 6. Test Register (Performed on Cement, Steel, Sand, Aggregate and other Construction Material)
 7. Hindrance Register
 8. Site Instruction Book
 9. Joint Record / Measurement Register.
 10. Pour Card Register
 11. Labour Register
 12. Any other register required by the Chief Engineer or his representative.
The Contractor shall keep all registers in safe custody.
 19. Contractor shall have to survey the proposed alignment as per the drawing issued and prepare detailed drawing of cross sections at every 20 mtrs. interval, longitudinal section for each railway line as per CSR, drawing of services such as cross drainage work, details drawing of curves and any other working drawing required, if any, for the execution of work as directed by the Chief Engineer or his representative. Approval of all such drawings shall be obtained before commencement of the work.
 20. **Contractor shall consider 'Phase working of MPT Railway expansion works and Traffic block stagewise' as a reference. However, during execution of work for each Traffic block condition, contractor shall**

submit detailed program of traffic block conditions, alongwith the details as per Clause No.1.2.10 and 4.0 of the Additional General Specification for the approval of the Chief Engineer.

21. On completion of the work, 'As MADE DRAWINGS' shall be submitted in soft form on Compact Disk (CD) and also in hard copy on tracing paper.
22. Contractor shall also liaison with South Western Railway Officials as and when required.
23. The Additional Special Instructions given above shall prevail over those stipulated elsewhere in the tender documents forming part of the contract. The volume containing the Instructions of Tenderers, the General conditions, Special conditions and Specifications forms an integral part of the tender document and the same shall be submitted along with the Volume-I of the tender documents all duly signed by the tenderer.



MORMUGAO PORT TRUST
ENGINEERING (CIVIL) DEPARTMENT

TENDERNo. CE/24/2018

Name of Work: Extension of Railway Line No.8 at Mormugao Port, Goa.

8. ADDITIONAL GENERAL SPECIFICATIONS

1.0 WORKS IN TRAFFIC BLOCK CONDITIONS

1.1 Track on diversions and in yards, wherever space is available, shall be laid prior to block. The connection to railway track is to be done under traffic block as per railways requirements. however, some work are required to be done under running traffic conditions (Pre- Block activities) and some works are to be done after completion of Block period works.

1.2 Pre Block Activities

1.2.1 Contractor shall make a complete foot to foot survey of site of track work, terrain, approach roads accessibility for road cranes, vehicles etc., locations of ballast stacks or plot where ballast supply is in progress, PRC sleepers stacks, new rails lying along the track, etc. so as to have a complete idea of the section before quoting the rates.

1.2.2 Based on L-section, yard plans and LWR plans, which are available in the office of Chief Engineer and can be seen during working hours of the office, contractor shall arrange for fixing of reference pegs of centre lines of tracks in main line and loop lines, location of stock, rail joints of different points, traps, dead ends, SEJ, Glued joints, etc. Central line peg shall be fixed (by steel flat or angles, tie bars 5mm thick and 1.0 meter length) on the line at 3 Maway from the central line or at suitable locations as decided by Chief Engineer or his representative at an interval of 100 meters in straight and 20m in curved track besides at every change of grade, beginning of transition of curve, beginning of circular curve, other obligatory points such as bridges, level crossing, points and crossing. Formation level, rail level, ballast level are to be marked on these iron pegs (Fixed in cement concrete) by water level tube. No extra payment will be made for the same.

- 1.2.3 Released tie bars may be utilized as reference pegs. The reference pegs shall indicate its distance from existing and proposed central line of track as well as proposed formation level and rail level. No extra payment will be made for fixing of reference pegs being preparatory work for linking of track.
- 1.2.4 The PRC sleepers shall be lying along the track. These shall be uniformly spread, so that during block period track linking work can progress expeditiously. For spreading of PRC sleepers, no dragging shall be permitted. Sleepers are to be handled with the help of cranes. Where accessibility of crane is not possible, manual handling shall be permitted. If the cess of formation gets disturbed while placing the sleepers, the contractor shall make good the same at his own cost.
- 1.2.5 The contractor shall arrange for transportation, end cropping, pairing, pulling back, and drilling of holes etc. in rails/ rail panels, by machine by his own equipments, wherever required.
- 1.2.6 The contractor shall identify all obstructions and infringements coming in the linking of BG track. Such obstructions wherever feasible, shall be removed in pre block period. The obstructions include C.C. foundations of signal posts/ electrical posts/ rails posts, water columns and its foundations, masonry walls, curbing stones, ash pits, etc.
- 1.2.7 The contractor shall also identify locations where there is any deficiency or excess of earthwork in the alignment of BG tracks. The contractor shall arrange for execution of such earthworks before stacking of Permanent Way materials on the cess and also before linking gets underway.
- 1.2.8 Advance work for linking of track in diversions, loops, points and crossings etc. where space is available, shall be completed in pre block period.
- 1.2.9 The contractor shall arrange for sufficient numbers of supervisors and labours, plants, equipments such as crane, tractors, Permanent Way tools and small machines etc. before commencements of any operations to suit the Stage Target specified by the Chief Engineer or his representative.
- 1.2.10 The contractor shall arrange to submit at the time of taking the block work Tools, Plant and machine as per the broad list given below before the start of the block period. These plants/ equipment and tools are to

be kept in good serviceable order as and when required during the progress of work. Contractor may add tools if he wishes so:

Tentative list of tools & plants required.

1	JCB/Loader	
2	Truck/ Tractor.	
3	Road Crane	
4	Rail tongs	
5	Crow Bar	
6	Rake ballast	
7	Phawrah	
8	Tagari	
9	Cane basket	
10	Spanners D/E	
11	Hammer 4 lbs	
12	Jim Crows	
13	Roller (2 to 8 Tone)	
14	Cutting Blades	
15	Drilling bits for 20mm, 28mm & 32mm dia.	
16	Beater	
17	Version measuring kit.	
18	Roller for de Stressing	
19	ERC Applicators.	
20	Chamfering equipments.	
21	Rail drilling machines.	
22	Rail cutting machines.	
23	Track lifting jack.	
24	Box spanners for P&C	
25	Gauge Cum Level	

1.2.11 This list of machines, Tools and Plant is for guidance and making advance actions for arrangements of the same. However, any other tools and plants, equipments, machinery etc. required for linking of track, shall also be arranged by him. It is the responsibility of the contractor to keep all P. Way tools and plants in safe custody after days work. Mormugao Port shall not be responsible at all for loss or theft.

2.0 Activities of Block Period.

2.1.1 With the start of block, the contractor shall arrange for dismantling of existing BG track. At locations, where earthwork is to be done to achieve the desired formation level, track is to be dismantled first as directed by Chief Engineer or his representative. Such locations shall

be identified by contractor in advance in consultation with Chief Engineer or his representative.

- 2.1.2 The released materials shall be properly shifted and stacked so that space can be made available for linking of new BG track. Transportation and stacking of released Permanent Way materials shall also be organized simultaneously as per details given in special conditions of the relevant item.
- 2.1.3 After dismantling of the BG track, formation shall be prepared as specified.
- 2.1.4 Spreading of PRC sleepers for linking of track on rolled ballast bed shall be permitted by the Chief Engineer or his representative after verifying the quality of scarifying, sorting/ shifting, spreading and rolling of old/new ballast bed.
- 2.1.5 The PRC sleepers shall be laid on the approved ballast bed with the help of road cranes. Manual laying of sleepers shall be permitted by Chief Engineer or his representative where accessibility of such cranes is not possible. No dragging of sleepers shall be permitted.
- 2.1.6 Linking of BG track in mid section and linking / insertion of P&C, loop lines shall progress simultaneously and separate teams shall work for these activities.
- 2.1.7 The contractor shall do linking of track on curves, culverts etc. including fixing of guard rails and check rails along with insertion of SEJs and Glued Joints.
- 2.1.8 During the course of linking of BG track, any earthwork in cutting or filling with depth more than 150mm shall have to be done by the contractor for which payment shall be made under relevant items.

3.0 Activities of Post Block Period:

- 3.1.1 Post Block period starts after completion of inspection Chief Engineer or his representative.
- 3.1.2 All the deficiencies noted during inspection pertaining to this contract shall be make good.

4.0 Stage Target: Before taking up Block work contractor shall submit following time schedule:

Sr. No.	Details of activity	Duration (Days)
Pre Block Period.		
1	Foot to foot survey of the section for getting acquainted with the section i.e. terrain, accessibility to the approach road, locations of ballast stacks, PSC Sleepers, rails, construction of site office (Temporary Shed), Inventory of materials required.	
2	Thorough study of “L” section, yard plans and LWR plans etc. and clarifications, if any, from the Chief Engineer or his representative.	
3	Assessment of materials and carting them to respective locations.	
4	Linking of BG track on already prepared formation in lead lines, railways premises, in-plant yards, points & crossings, cross over’s, etc..	
5	Fixing of reference pegs, setting out of curves, fixing of various boards for LCs etc., which do not infringe with the running traffic.	
6	Carting and pairing of rails panels, spreading of sleepers etc.	
7	Any other works such that assembly/ hiring of tools and plants, arrangement of consumable items for tamping etc., in consultation with Chief Engineer or his representative.	
Block period.		
1	Dismantling of BG track and stacking as directed by Chief Engineer or his representative.	
2	Dismantling of P&C	
3	Picking up ballast	
4	Laying of BG track including preparing ballast bed and other associated activities.	
5	Assembly and fixing of turn outs.	

6	Tamping of track.	
7	Track at LCs to suit BG standard.	
8	Opening of section for BG Power/ Track Machines / goods trains for a minimum speed of 20 KMPH.	
9	Opening of section for BG (Goods) trains.	
10	Any other work as directed by Chief Engineer or his representative.	
Post Block period.		
1	Compliance of observations raised by Chief Engineer or his representative.	
2	Fixing of Hectometer, KM, gradient posts, fouling marks etc.	
3	De stressing of track.	
4	Any other work as directed by Chief Engineer or his representative.	



MORMUGAO PORT TRUST
ENGINEERING (CIVIL) DEPARTMENT

TENDER No. CE/24/2018

Name of Work: Extension of Railway Line No.8 at Mormugao Port, Goa.

9. TECHNICAL SPECIFICATIONS

I) TECHNICAL SPECIFICATION FOR EARTHWORK

1.0 EARTHWORK

1.1 Specifications

The work will be carried out as per Railway Standard Specifications with up to date errata and as per RDSO "Guide lines for Earthwork in Railway Projects" Guideline no GE-G-1, July, 2003.

- 1.1.1 Earthwork in filling on the approaches of road over bridges will be carried out as per Indian roads congress publication 58" guidelines for use of fly ash in road embankments.

1.2 Introduction

The following IS codes shall be followed for classification of soils, and for conducting various tests on soils where required.

- i) **IS-2720 Part-II 1973** Method of tests for soil determination of water contents (II Edition)
- ii) **IS-2720 Part-III Section-I of 1980**
Method of test for soil determination of specific gravity.
- iii) **IS-2720 Part-IV 1975**
Method of test for soil grain size analysis
- iv) **IS-2720 Part-V 1974**
Determination of liquid and plastic limit.
- v) **IS-2720 Part-VIII 1983** Determination of moisture contents dry density using heavy compaction.
- vi) **IS-2720 Part-XIV 1985** Determination of density index (relative density) of cohesion less soil.
- vii) **IS-2720 Part-XVIII 1964 (reprint in Jan. 1980)** Method of test for soil determination of field moisture equivalent.
- viii) **IS-2720 Part-XXIX** Determination of dry density of soil in place by Core cutter methods.

- ix) **IS-1798-1970** Classification and identification of soils for General Engineering purpose.
- x) **IS-1037-1982** Method of field test for soil being taken from the borrow pits.

1.2.1 The earthwork in filling over existing bank will be done with contractor's own earth as per approved profile by borrowing the earth from outside the MPT premises and the rate quoted will be deemed to be inclusive of all taxes, royalty, loading, unloading, leading, handling and re-handling of earth, lifts, ascents, descents, crossing of nallahs, streams, tracks, levelling, dressing spreading in layers as a complete work in all respects as per specifications indicated in succeeding paras.

1.2.2 **Embankment**

Before taking up embankment work:

- i) All vegetation shall be uprooted and taken away from the site of work.
- ii) All big size of boulders and other items not related to the work should be removed.
- iii) Earthwork shall be carried out in layers, each layer sloping out 1:30 and compacting it mechanically using vibratory rollers to provide the compaction to the specified level.
- iv) The width of each layer of earthwork shall be in excess by 500 mm on either side of the designed profile to enable compaction near the edges. The excess width, thereafter, cut and dressed, so as to achieve the required bank profile.
- v) Earthwork shall be completed up to designed formation level keeping due allowance for the blanket; if need be.

1.3 The earth filling shall be compacted mechanically using heavy roller to 98% MDD at OMC or 70% of Relative density, layer by layer as per specification. Compaction of earth filling to be paid under respective items.

1.4 The soil has to conform to specifications as mentioned under Para 3.14 "Suitability of soils for Railway Formations". The Chief Engineer or his representative may ask the contractor/s to get the soils samples tested as per specifications. It may please be noted that under no circumstances, the contractors will be allowed to form the bank with unapproved earth. Such tests may be repeated by the Chief Engineer or his representative during the execution of the work. If the soil samples are found not conforming to the required specifications the contractors may have to bring earth from other approved sources. The cost of all tests will have to be borne by the contractor/s.

- 1.5 The contractor/s shall, set out and provide all stakes, ballies, bamboo, strings, pegs and labour for setting out profiles, of embankment required for the correct execution of the work and shall also be responsible to maintain the same in proper order. This is deemed to be included in the item rate for the earthwork. The contractor/s shall take necessary precautions to prevent their being removed, altered and disturbed and shall be responsible for the consequences of such removal, alterations and disturbance and will take action for their proper re-instatement.
- 1.6 Before the earthwork is started by the contractor, the ground between the lines where filling is to be done for embankments at site of work shall be cleared of all trees along with their roots, shrubs, heavy grass and undergrowth of every kind. None of the items of work mentioned in this Para will entitle the contractor/s to any extra payment except cutting of trees which shall be paid separately as per relevant item of schedule. All trees so removed by the contractor will be the property of MPT. No trees falling outside the Toe of the bank shall be allowed to be cut. All trees having girth above 30cm (measured at 1m above GL) shall be cut of trunks and branches. Digging and removing of roots up to a depth of 1m below the ground, filling the same cavity with good earth, transporting the tree duly cut into standard log size to store shall be ensured by the contractor at its own cost.
 - 1.6.1 The contractor/s should commence the work systematically at one or more points in consultation with the Chief Engineer or his representatives should maintain continuous and steady progress to complete the work in continuous lengths including levelling and dressing.
- 1.7 The payment shall be made for as per designed cross section only.
 - 1.7.1 It must be clearly understood that the rates are intended to cover the full cost of the finished works. The banks and cutting are to be correctly dressed, to profile with such slopes as specified in each case by the Chief Engineer or his representative. The rates for earthwork shall also include the site clearances and breaking of clods as per specifications.
 - 1.7.2 The rates also include maintenance of the banks to correct profile including repairs of all rain cuts, making good earth work due to base settlement natural or otherwise due to rains etc. until the final measurements have been recorded and banks taken over by the Chief Engineer or his representative. The item rates of Schedule of rates and quantities will cover the full cost of finished work of cuttings and embankments.

- 1.8 For the earthwork in embankment the toes of the slopes of bank (with 500mm extra width in on either side) on both sides of the centre line and also lines parallel to and 60 cm outside the toes of slopes of banks should be demarcated by the contractor with a deep borrow at least 15 cm deep. This is to be considered as a part of setting out the work and preliminary to his being allowed to break ground. This lock spitting is to be executed, maintained and renewed by him without any payment when necessary or/and when ordered by the Chief Engineer or his representative.
- 1.8.1 Centre line pillars in masonry shall be provided by the contractor in banks more than 1 m high the same should however, be made in stages as the work progresses. Pillars shall be provided at every 20 m or as directed by the Chief Engineer or his representative. The centre line pillars shall not be paid for separately and deemed to be included in the item rates.
- 1.8.2 The item rate quoted by the contractor shall include the provision of benching in the side long ground or side slopes in the existing bank where the earthwork joins old embankments. This aspect should be taken into consideration while quoting the rates.
- 1.8.3 The breaking of all clods shall be strictly insisted upon for all earthworks in embankment and the contractors must take special care to ensure this.
- 1.9 Extra bank width of 500 mm 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.
- 1.9.1 The top of the formation shall be finished with 60cm thick murrum blanket to a slope of 1 in 40 as per approved profile as per guide line for **“Earthwork in Railway project, “ Guide Line no. GE: G-1 July 2003”**.
- 1.9.2 Both the Up stream & Down stream side slope of the bank shall be protected by providing stone pitching up to 30 cm above HFL as per South Western Railway Standard Specification. The same shall be required to be done by the contractor/s under this contract for which extra payment shall be made under respective item.
- 1.10 SPECIFICATION FOR MECHANICAL COMPACTION OF EARTHWORK & MOORUM BLANKETING**

- 1.10.1 After site clearance all pockets and depression left in the soil, if any, shall be made good and compacted.
- 1.10.2 Earthwork shall be done in layers not exceeding 300 mm thick.
- i. Earthwork shall be compacted with suitable rollers to obtain the density specified as per IS 10379-1982 and RDSO's guidelines for **“Earthwork in Railway Project GC: G-1, July 2003”** with up to date amendments.
 - ii. Cohesionless soils and pond ashes shall be compacted to get a minimum density index (related to density of 70 percent as obtained in accordance with IS 2720 (Pt. XIV) 1985).
 - iii. All other types of soils if dry density as found out from the random samples works out to less than 98% of the maximum dry density at optimum moisture content further rolling shall have to be done by the contractor till such time the required density is obtained as confirmed from subsequent tests.
 - iv. Each layer shall be compacted to the specified density over its entire width commencing from the two sides, before another layer is started.
 - v. While compacting, it shall be ensured that there is a minimum overlap of 150 mm between each run of the rollers.
 - vi. Care should be taken during the compaction operation to slope the surface of the bank to facilitate the shedding and to minimize the absorption of rain water, particular attention being given to the prevention of pounding.
 - vii. The density of each layer of compacted soil shall be ascertained by the Chief Engineer or his representative by testing of adequate number of soil samples at the site lab provided by contractor.
 - viii. The contractor shall be allowed to lay a further layer of soil/Pond ash only after the compaction of particular layer has been found satisfactory.
 - ix. Where the moisture content of the earth in any layer is above OMC, it shall be left for drying for a suitable period to bring down moisture content very near to OMC before rolling is commenced. If the soil is dry, water shall be sprinkled either in the borrow pit or even on the spread layer, as convenient in order to obtain a

moisture content near to OMC before rolling is commenced. The contractor shall make his own arrangement of water and nothing extra will be paid for water used. To control moisture at which soil is compacted and to find out the dry density of the soil the moisture content of the soil in borrow pits and in the embankment after compaction will be determined.

- x. The optimum moisture content and the maximum dry density of the soil shall be determined by Standard proctor compaction test as per IS-2720 (Pt. VIII) 1983 followed by field trial as per IS-10379-1982. This test shall be conducted for the soil taken in the borrow pits at least every 100 meters and whenever there is a change in the nature of soil met with.
- xi. The site tests data and results shall be maintained in a Register as per the following Proforma:
 - 1) Serial No.
 - 2) Location
 - 3) Layer No.
 - 4) Laboratory Test results.
 - 5)
 - a) Maximum dry density in gm / CC or relative Density (%)
 - b) Optimum moisture content expressed as percentage of the dry weight of the soil
 - 6) Field Test Results:
Dry density in Grams, CC or Relative Density (%) Field moisture content expressed as the percentage of the dry weight of the soil.
 - 7) Degree of compaction expressed as percentage of the density
 - 8) Remarks.

1.11. The payment for the quantity of earthwork will be made on cross sectional measurement. The existing ground/bank profile will be taken and plotted by the Chief Engineer or his representative in the presence of the contractor or his authorised agent before commencement of the work. The profile of the bank required to be provided will also be plotted on the same sheets. The levels and cross Sections shall be signed by both the Chief Engineer or his representative and the contractor/s or his/their authorized agent. The profiles of the bank as required to be provided are for the guidance of the contractor and not for the purpose of measurement/payment.

1.12 The profiles of the finished and completed bank first with extra width and subsequently after dressing will likewise be taken in the presence of the contractor or his/their authorised agent and superimposed on

the original ground profile. The contractor shall be allowed to dress the bank to form finished profile only after the bank with wider width duly compact has been checked to the satisfaction of the Chief Engineer or his representative. The gross value of earth work in filling will be calculated from the original and finally finished profile for the purpose of payment.

- 1.13. Final measurements will be taken only after the bank has been completed to the required profile irrespective of the prolongation of period of completion and number of monsoon that may pass during execution.

1.14 SUITABILITY OF SOILS FOR RAILWAY FORMATIONS

Source of soil for embankments

- 1.14.1 No borrow pits shall be allowed within right of way and contractor shall bring the embankment material from his own resources outside the right of way.

The Characteristics of soils to be used and prohibited are:

- a) Soil having following characteristics should be used:

- Soils with fine particles (i.e. particles finer than 75 microns) not more than 50%
- Soil with liquid limits less than 35% and plasticity index less than 15%
- Soils having uniformity co-efficient preferably above 7.

- a) Following soils should not be used:

- Soils having 10 to 15% clay and silt greater than 50% exhibiting dispersive nature.
- Soils having maximum dry density less than 1.5 gm/cc by light compaction.
- Peat and organic soils, Marine clay.
- Soils likely to disintegrate early, like chalk with maximum dry density less than 1.7 gm/cc.
- Poorly graded sand with co-efficient of uniformity less than 2.

- 1.14.2 However, in practice it is seldom that exclusively coarse grained soils are available at site for use in embankments, and for practical reasons, and consideration of cost, other than good soils may have also to be used in embankments. In such cases, the Railway embankments should desirably have a top layer of about 450 mm to 1000 mm thickness, as mentioned in Para 4.1 (b,c,d) known as blanket to be

provided with coarse grained material like murrum. In any case, unsuitable material as indicated in Para 3.14 (b) above should not be used in embankment. For formation, a 600mm thick blanket shall be used.

- 1.14.3 Expansive clay like black cotton soils exhibiting marked swell and shrinkage properties shall be avoided. Clays that have a "Free swelling index" exceeding 50% when tested as per IS 2720-Part 40 shall not be used as a fill material.

2.0 SPECIFICATION FOR BLANKETING MATERIAL

2.1 The blanket should generally cover the entire width of the formation from shoulder to shoulder, materials on both edges. The depth of blanket shall be as follows as per RDSO no. RS/G/18 Vol-VII dtd 4.9.01

a) Following soils shall not need any blanket:

- Rocky beds except those consisting of shales and other soft rocks which become muddy after coming into contact with water.
- Well graded Gravel (GW)
- Well graded Sand (SW)
- Soils conforming to specifications of blanket material.
- Soils having grain size analysis curve lying on the right side of the enveloping curves for blanket material.

b) Following soils shall need minimum 45 cm thick Blanket:

- Poorly graded Gravel (GP) having Uniformity Co-efficient more than 2.
- Poorly graded sand (SP) having Uniformity Co-efficient more than 2.
- Silty Gravel (GM).
- Silty Gravel - Clayey Gravel (GM-GC).

c) Following soils shall need minimum 60 cm thick Blanket:

- Clayey Gravel (GC).
- Silty Sand (SM).
- Clayey Sand (SC).
- Clayey Silty Sand (SM-GC).

d) Following soils shall need minimum 1 m thick Blanket

- Silt with low plasticity (ML).
- Silty clay of low plasticity (ML-CL).

- Clay of low plasticity (CL).
- Silt of medium plasticity (ML).
- Clay of medium plasticity (CL). Note: The classification and nomenclature of soils given above is as per IS-1498-1970 Table -2 (Annexure 'A').

2.2 The blanket can be coarse-grained material like murrum which has inherent cohesive properties, or it may be manufactured out of non-cohesive materials.

2.3 The murrum blanket shall have following properties:

- (a) The liquid limit shall not exceed 35 and Plasticity Index shall be below 10.
- (b) Uniformity co-efficient $\frac{d_{60}}{d_{10}}$ should be above 4 and preferably above 7.
- (c) Co-efficient of curvature $\frac{d_{30}^2}{d_{60} \times d_{10}}$ should be between 1 & 3.

Note: d60 is sieve size through which 60% of blanket material passes and d10 is the sieve size through which 10% of the blanket material passes and 80 so on. The enveloping curve for the Blanketing Material recommended by RDSO is shown in the Diagram at Annexure B of Guideline no. GE-G-1 of RDSO for Earthwork in Railway Project.

2.2 In case of mechanically produced blanket material, RDSO Guide lines (GE: C-2) shall be followed.

II) TECHNICAL SPECIFICATION FOR PERMANENT WAY MATERIAL

1.1 Rails:

60 Kg Rails Flat bottom (1st quality) as per I.R. Specification T-12/96 RITES Certified.

1.2 Rail Fittings & Fastenings:

- a. 60 Kg Fish Plates to RDSO Drg. No. T-1898 conforming to IRS Specifications No. T. 1-1966.
- b. Fish Bolts 25 mm dia with nuts to RDSO Drg. No. 1899-IRS Specification T-23/67.
- c. Combination Fish Plates to suit the following rail sections including bolts and nuts complete as per relevant RDSO Drawing- 52 Kg to 60 Kg (RDSO Drg. No. T-696 to T-699) and IRS Specification T-6 (Set Consists of 2 RH and 2 LH Fish Plates with nuts, bolts and single coil spring washer complete).
- d. Double coil spring washer as per RDSO Drg. No. EDO/R-1214, conforming to IRS specification for Spring Washer-1980.
- e. Single coil spring washer as per RDSO Drg. No. T-10773 conforming to IRS Specification for Spring Washer RS T-1988

1.3 Mono Block Pre-stressed Concrete Sleepers (Pre-tensioned Type, Category-I) as per IRS Specification T-39/1996:

- a. For Plain track on straight to Drg. No. T-2496.
- b. For Curve track having Radius 20 to Drg. No. T-4183
- c. For Curve track having Radius 40 to Drg. No. T-4184
- d. For Curve track having Radius 60 to Drg. No. T-4185
- e. For Curve track having Radius 80 to Drg. No. T-4186
- f. For level crossing to RDSO Drg. No. T-4148.

1.4 PSC Sleeper Fittings:

The sleepers shall be 60 kg as per RDSO Drg. No. T-2496 and sleeper fittings shall be for 60 Kg Rail Section on 60 Kg Sleepers as per specifications and drawings.

- a. Grooved Rubber Sole plate 6 mm thick to RDSO Drg. No. T-3711/ALT-1 conforming to IRS Specification for 6 mm thick grooved rubber sole plates (Provisional) 1987 revised 2000
- b. Elastic Rail Clips to RDSO Drg. No. T-3701, IRS Specification T-31/1992.
- c. Glass Filled Nylon (GFN) Liners (For 60 Kg Rails on 60 Kg Sleepers) as per RDSO Drg. No. T- 3706 conforming to IR Specifications T-44/95.

- d. Check Rail C.I. Bracket to RDSO Drg. T-4917 to IS: 210-1962 (Grade 20, IRS / T-10) Elastic Rail Clips for 60 Kg Rail Section to RDSO Drg. No. T- 3701 conforming to IRS Specifications T-31/92.
- e. Elastic Rail Clips type 'J' for use at fish plated joints as per RDSO Drg. No. T- 4158 conforming to IRS Specification.

1.5 Points & Crossings:

60 Kg 1 in 8 ½ Turnout shall conform to RDSO Drg. No. T- 4865, Switch sub assembly Drg. No. T- 4966 & CMS sub assembly drawing no. T- 4967 with all parts, fittings and fastenings complete in all respect.

1.6 Turnout Sleepers:

1 in 8 ½ Fan Shaped Turnout Sleepers shall conform to Indian Railway Standard Specification for pre-tensioned concrete sleepers serial T-45-96 as per RDSO Drawings.

1.7 Fan Shape Layout Assembly:

1 in 8 ½ Turnout Main Drawing of Turnout 60 Kg RDSO T-4865, Switch Sub Assembly RDSO/T-4966, Crossing Sub-Assembly RDSO/T-4967.

III) TECHNICAL SPECIFICATION FOR PERMANENT WAY LINKING WORKS

MATERIAL

(A) Technical Specifications for laying of Permanent Way

1.0 Track Structure

1.1 Components:

The track shall consist of the following elements.

- i. Rails 60 kg/T-12, 90 UTS flat bottom (1st quality)
- ii. Rail fastenings – Fish plates 60 kg, with bolts and nuts.
- iii. Mono block pre-stressed concrete sleepers for plain tracks, level crossings, bridges, and fish plated joints, girder bridge approaches, fan shaped turnouts.
- iv. Guard rails on bridges, check rail on level crossings.
- v. Fittings for sleepers – grooved rubber sole plates, elastic rail clip Mark – III (RDSO drawing no. T-3701) for normal track and Elastic rail – J-clips for fish plated rail joints to RDSO Drg No. T-4158, GFN liners, metal liners.
- vi. Track Ballast as per RDSO Specifications of June 2004
- vii. Gradient posts, KM posts, curve monuments, curve boards, whistle boards, W/L boards, creep posts and other boards and indicators etc., as per IRPWM.
- viii. Points and crossings.
- ix. Steel Channel sleepers for girder bridges and track fittings.
- x. Glued Joints.

1.2 The track will be laid on mono block PSC Sleeper as specified in Schedule of Quantities. The ballast cushion will consist of Track ballast as per RDSO specifications to a depth of 250mm below the bottom of sleepers as measured under the rail seat.

- 1.3 The mono block PSC sleepers shall be laid @ 1540 nos/km as specified in IRPWM for main line and for loops and sidings in yards.
- 1.4 Guard rail to be provided at all major bridges as per Para 275 of IRPWM.
- 1.5 Check Rail at level crossings.

2.0 Procurement of Materials:

- 2.1 All the materials and equipment required for track construction shall be procured from the suppliers/manufactures approved by Rly/RDSO duly inspected by RITES/RDSO/Zonal Railways.
- 2.2 Other track materials for which approved manufacturers/suppliers are not available, shall be procured from sources after getting them approved/inspected from RITES.
- 2.3 All the materials shall be got inspected and passed from the Railway's authorized inspecting agencies such as RDSO/Rly/RITES etc. and certificates obtained to this effect which will be submitted to site Engineer-in-charge.

2.4 Ballast

The Contractor shall procure, at his own cost, track ballast conforming to RDSO's specifications for Track Ballast, June 2004 with up to date correction slips, of approved quality for use on all lines with 250mm cushion. The test reports for the ballast for quality as required should be submitted to Railway consultant for approval before ballast is brought to site. Ballast should be supplied in stacks on levelled ground along the proposed alignment.

3.0 Linking

The formation shall be constructed and mechanical compaction shall be done as per RDSO `Guidelines for Earthwork in Railway Projects' Guideline no.GE:G-1, July 2003. Track ballast is then compacted by at least 2 passes of 5 to 10 t roller before laying the PSC sleepers and rails.

3.2 Curves

- i. The alignment of track on certain locations is on curved alignment as per index plan. While laying track on such locations, the layout of the curve shall be done accurately with deflection angle, degree of curvature, transition length and curve length and laid to required super elevation for each curve as directed by Chief Engineer or his representative.
- ii. The design of curves specifying all parameters (transition length, total length of curve, super elevation etc.) shall be done by Chief Engineer or his representative and advised to the contractor who

shall then lay the curves accordingly as indicated in the above Para so that it conforms to the designed parameters.

- iii. The station numbers shall be marked, starting from zero at TP (i.e. from the start of curve) at 10 meter interval on the inside web of outer rail of the curve and shall be continued over the entire length of the curve with figures in white paint over black background and the super elevation at each station shall be indicated just opposite to the station number on inside web of inner rail with black background and figures with white paint.
- iv. Curve posts as per Railway's design shall be fixed at both ends of curves, at TP (Transition Point) and TTP (Transition Tangent Point), and the details of the curve shall be written on TP post of both ends mentioning curve no: degree of curvature, transition length, curve length and super elevation with appropriate painting scheme as followed by Railways.

3.3 Longitudinal level of Track The longitudinal level of the track shall be in accordance with the gradients as indicated in L-Section supplied by Chief Engineer or his representative. Gradient posts at each change of gradient shall be provided as per approved design and shall be engraved with the values and arrow indicating rise, fall or level as the case may be, on both faces with figures in black on white background.

* The gradient post shall be provided as per L-Section.

* Sketch of gradient post and km post is placed as Annexure PW-VI.

3.4 Kilometer & Gradient Posts RCC kilometer and gradient posts as per drawing, (Annexure PW-VI) shall be cast and fixed at each kilometer / Point of change of gradient on cess and number engraved on both faces and surface painted with white and engraved figure written with black.

3.5 Ballasting

- i) Once the central line and level pegs have been provided, the ballast should, on clearance by the Chief Engineer or his representative in charge/his authorized representative, be lead out from the stacks and spread on the track formation. The ballast layer shall be consolidated by running of heavy rollers (5-10 ton). The ballast cushion which is to be finally achieved shall be 250mm. Hence about 8% more cushion shall be provided initially, which on consolidation, shall come down to the required dimensions. The profile of ballast, finally to be provided shall be as per IRPWM Para 263, for SWR.

- ii) On all flat top, arch and pre-stressed concrete girder bridges with deck slab, where guard rails are not provided, the whole width of the bridge between the parapet walls shall be filled with ballast up to the top of the sleeper level.
- iii) The payment for supply of ballast will be made on the basis of stack measurement of ballast without deduction for any shrinkage, as laid down in RDSO specifications, June 2004. The measurement and passing of ballast in stacks shall be done by Chief Engineer or his representative.

3.6 Concrete Sleepers

- i. Concrete sleepers are very heavy and prone to develop cracks/ chipping, if handled roughly. Manual handling of these sleepers is, therefore, not desirable. The sleepers directly received at site through road trucks shall be unloaded using mechanical gantries/cranes; whereas those received on railway BFRS shall be unloaded through cranes/mechanical unloading equipment. One such device is Jib crane attachable to BFR/BRH for handling concrete sleepers. The shifting of sleepers shall be done using slings which should lift the sleepers through hooks fixed to inserts.
- ii. Unloaded sleepers shall be kept at site of placement, properly supported underneath.
- iii. On the ballast already laid and consolidated, PSC sleepers 60 kg to RDSO drg no. T-2496 shall be laid at specified spacing. All care should be taken in handling the sleepers so as to avoid breakage. The sleepers shall be laid to a density of 1540 nos/km/or as specified. For fish plated joints, the spacing shall be 40 cms (centre to centre) at joint. The sleeper spacing at welded joints shall be the same as intermediate sleeper spacing as per Para 244 (h) of IRPWM. No damaged sleepers will be accepted. The spacing of sleepers shall be done as specified in the list.
- iv. To get proper track alignment, it is necessary that the centre line of the sleepers coincides with the centre line of the alignment marked.
- v. **Greasing of Elastic rail clips and SGCI Inserts:** All the Elastic rail clips and inserts fixed in the concrete sleepers shall be thoroughly cleaned and greased to IS specification IS 15:408 – 1981 (Specification for Grease No. “O” Graphited) should then be applied on the central leg of ERC and eye of the insert and then the clip be driven at the time of assembly of the rail with the sleeper as per

provisions of Para 1411 (5) (a) of IRPWM. ERCs shall be provided with anticorrosive treatment before putting in track. Nothing extra shall be payable for any of the elements stated above.

3.7 Rail

3.7.1 Rails will not be supplied by the employer.

- a. The contractor at its own cost shall lead the same to site for use on the work.
- b. The rails and other fittings from depot area/complex to be lead to site of actual laying in track by any means convenient to the contractor depending upon the site conditions and be placed at places where these are to be laid. The rails shall be adjusted in pairs along the alignment on the cess. The contractor will remove kinks from each rail, if any, with the help of jim crow, etc. Handling of rails shall be done as per instructions issued by RDSO.
- c. The cutting of rails, where required shall be done using Abrasive rail cutting Machines and the holes drilled with rail drilling machines approved by Railways. All the holes drilled in rails shall be chamfered using approved chamfering kit in terms of Para 251 (5) of IRPWM (CS No. 51 dated 21.4.00)
- d. All rails to be ultrasonically tested by the contractor at his own cost and only defect free rails cost to be used. The contractor shall submit the test report to the Engineer-in-charge.

3.7.2 Bridges

- a) The rail joints on bridges with opening less than 6.1m shall be avoided. For other spans, the preferred position of rail joints is at 1/3rd of span from either end as per Para 272(3) of IRPWM.
- b) Guard rails shall be provided on bridges as per Para 275 of IRPWM.
- c) The design of guard rails on the bridge and its approaches shall be as per Para 275(2) of IRPWM.
- d) PSC sleepers to RDSO drg. No. T- 4089 to Drg. No. T- 4097 with complete fittings as shown in the drawings shall be used on ballasted deck bridges with guard rails and their approaches. The

fixing of guard rails shall be done as per RDSO drg. No. T- 4088 to Drg. No, T- 4097 as per Para 275(3) of IRPWM, CS no. 63 dated 27.1.2003 M.S. flat/tie bars for tying PSC sleepers together at ends is not required. (CS 63 dated 27.1.2003 to IRPWM).

3.7.3 Level Crossings

- i) Asphaltting of road surface between gate posts to full width of road on level crossings shall be provided by the contractor at his cost. The road shall be provided complying with instructions contained in items 12 to 15, of Annexure 9/1 Para 904, Chapter IX of IRPWM.
- ii) Gate posts made out of 60 kg rails shall be provided at the level crossing to hold the chain as per sketch, Annexure – PW-VIII chain shall also be provided by the contractor.
- iii) Whistle boards (W/L), Stop boards shall be provided for the approaching trains at a distance of 600m and 30m from the level crossing respectively (as per Annexure-PW-IX). Similarly, Level Crossing indicator boards and Speed breaker indicator boards (as per Annexure – PW-IX) shall be fixed on the road approaches as per IRPWM Para 916.

3.7.4 Points and Crossings

- (i) Points and crossings shall conform to RDSO Drawings and specifications and shall be procured from manufactures / vendors approved by RDSO duly inspected by RDSO/RITES as per direction of Engineer-in-charge.
- (ii) 60 kg 1 in 8 ½ turnout shall conform to RDSO Drg. No. T- 4965, Switch sub assembly drg. No. T- 4966 and crossing sub assembly drg. No. T 4967 with all parts, fittings and fastenings complete.
- (iii) 60 kg 1 in 12 turnout shall conform to RDSO Drg. No. T- 4218, Switch sub-assembly drg. No. T- 4219 and crossing sub-assembly drg. No. T 4220 with all parts, fittings and fastenings complete.

3.7.5. Turnout Sleepers

Turnout sleepers shall conform to Indian Railway Standard Specification for pre tensioned concrete sleepers serial no. T-45-96 (latest revision) as per RDSO Drawings. The same shall be procured from RDSO approved manufacturers / vendors duly inspected by Railway Consultant as per direction of the Engineer-in-charge.

Salient aspects of fan shape layout are:

- i. The sleepers under switch portion are having dowels in which slide chairs are fixed with the help of screws. These sleepers are laid perpendicular to the main line and therefore, can be used for left hand and right hand turnouts.
- ii. The sleepers between the switch and the crossing (lead portion) are designed and laid at an angle of $Q/2$ with respect to main line where Q is the angle between the main line and the lead rail at that particular location. The same sleeper of left hand turnout rail at that particular hand turnout by laterally shifting the sleepers by an angle of Q .
- iii. The sleepers under crossing are laid perpendicular to the center line of the crossing and as such the same sleeper can be used for left hand and right hand by lateral shifting.
- iv. For laying sleepers in the lead portion correctly, spacing of sleepers on left rail seat and right rail seat on main straight track are given which define the center line of the sleepers.

PRC fan shape layouts have curved switches. Before laying the turnouts, the correctness of the switch as well as its curvature should be checked in advance by pre-assembling and then once again after laying it in track.

This layout needs efficient drainage and adequate ballast cushion.

A mark 'RE' is provided on fan shape PRC turnout sleepers at one end. The sleepers should be laid in a manner that the end having the mark 'RE' is always laid on the right hand side.

The dowel fixed in the PRC sleepers should be cleared with the help of a suitable diameter soft brush so that all dirt/muck is removed. All the screws required to be fixed in the dowels should be greased before being put in.

Fan Shape Layout Assembly

	Main drg. Turnout of	Switch sub-Assembly	Crossing sub - Assembly
(A) 1 in 8 ½ Turnout			
60 Kg	RDSO/T-4965	RDSO/T-4966	RDSO/T-4967
(B) 1 in 12 Turnout			
52 Kg	RDSO/T-4218	RDSO/T-4219	RDSO/T-4220

Disposition of Sleepers

Type of layout	Sleeper under switch which are to be perpendicular to main line	Sleeper Nos. which are to be laid at angle Q/2 where Q is inclination of outer lead rail with respect to main line at that location	Sleeper Nos. to laid perpendicular to centre line of crossing
1 in 12	1 to 20	21 to 64	65 to 83
1 in 8 ½	1 to 13	14 to 41	42 to 54

Approach sleepers

Type of layout	Entry	Exit
1 in 8 ½	5 Nos. : 60-S, 60-4A, 60-3A, 60 2AS & 60-1AS	8 Nos. : (4 sleepers on main line and 4 on turnout side.)
1 in 12	5 Nos. : 60-S, 60-4A, 60-3A, 60-2AS & 60-1AS	8 Nos. : (4 sleepers on main line and 4 on turnout side.)

Long sleepers shall be provided for point machines to meet the requirement of S&T.

It shall be ensured that the turnout is perfectly in line and duly packed both for the main lines as well as the siding served/connected by the turnout. Any adjustments as required shall be carried out by the contractor so that the layout and the connections meet the standard requirements. Nothing extra shall be payable for the same.

Fouling Marks made out of Cement concrete shall be provided as per approved drawing at locations as required as per directions of the Chief Engineer or his representative.

4.0 Follow up Packings

- i) The track shall be lifted to the correct profile as directed by the Chief Engineer or his representative.
- ii) The sleepers shall be well packed with the ballast under them taking care that the ballast shall be worked under throughout the length of the sleepers without damaging the bottom edges of the sleepers and sleepers repacked till no more ballast can be packed in and or as directed by Chief Engineer or his representative.
- iii) Stone ballast from the stacks along the alignment shall be lead and dumped over the track to correct profile as indicated in Para 263 of Indian railway permanent way manual 1986 reprint to 1999 and as directed by the Chief Engineer or his representative.
- iv) Correct track parameters i.e. Gauge, alignment of rails, square ness of the sleepers, longitudinal and cross levels, expansion gaps at rail joints etc. shall be achieved as directed by the Chief Engineer or his representative.

5.0 Final Adjustment and Packing

- i) Any sleeper which has been shifted from correct spacing or gone out of square shall be moved back and squared after loosening the fastenings, care being taken not to cause damage to PRC Sleepers while slewing the sleeper. The fastenings shall be tightened again after squaring.
- ii) The track shall be slewed to correct alignment by sighting along the rail head of the base rail. It should be ensured that track does not get lifted in the process of slewing. Any defects developed in gauge shall be rectified by adjusting the liners.
- iii) The track shall then be given a final packing. For this, sighting shall be done along the base rail and any dip or low joint lifted correctly and packed, attending the adjacent sleepers also. After the base rail is thus packed for 2 or 3 rail lengths, the cross levels should be checked and the opposite rail lifted wherever necessary and sleepers under the rail seat packed.

- iv) The joint and shoulder sleepers shall be repacked and cross levels adjusted. The ballast section shall be dressed neatly as directed by Chief Engineer or his representative to uniform height and width with correct side slopes.
- v) Testing – The track completed as above will be rolled with a light, diesel engine for rolling complete with fuel. After 4 such movements of the engine, the contractor will attend to the defects developed, by packing, aligning, leveling and gauging the track. No extra payment will be made for this.

6.0 Specifications for Finished Work

a) Ballast Profile

- i) The ballast profile should be in conformity with Para 263 of IRPWM and brought to specified section, as directed by the Engineer-in-charge.
- ii) The ballast cushion shall be checked at three places in each km at random locations (these locations shall be recorded) and the average value shall be considered for acceptance.
- iii) The expression “Ballast Cushion” wherever used in these specifications, shall mean depth of clean layer of ballast below the bottom of sleepers and above the finished top of formation, measured under the rail seat of the sleeper.

b) New Track Tolerances

The new track shall conform to the following track standards. The track measurements should be taken in floating conditions.

S. No.	Track Parameter	Items for Measurement	Value
1	Gauge	Gauge Sleeper to Sleeper variation	1673 + 3mm + 2mm
2	Expansion Gap	Maximum deviation from the prescribed gap (Average gap worked out by recording 20 successive gaps)	+ 2mm
3	Joints	<ul style="list-style-type: none"> • Low joints not permitted • High joints not more than 	--- 2mm

		<ul style="list-style-type: none"> • Maximum out of squareness of joints on straight • Maximum out of squareness of joints on curves 	+ 10mm ½ pitch of fish bolts holes
4	Spacing of sleeper	With respect to theoretical spacing	+ 20mm
5	Cross level	To be recorded on every 4th sleeper	+ 20 mm
6	Alignment	<ul style="list-style-type: none"> • On straight on 7.5m chord • On curves – variation over theoretical versions. (on curves station to station variation in versine shall not be more than 10mm) 	+ 5mm* + 5mm** * Values up to 10mm can be accepted at few isolated locations ** Values up to 7mm can be accepted at few isolated locations
7	Longitudinal level	<ul style="list-style-type: none"> • Variation in longitudinal level with reference to approved longitudinal sections • Unevenness (variation in longitudinal profile of track as measured on 3.5m chord at the centre. 	50mm Not more than 6mm values of 10mm can be tolerated at few locations

7.0 Maintenance /Defect liability period

- i) The maintenance of all assets / works of the project handed over to the contractor by client/constructed by the contractor will be the responsibility of the contractor, during the period of construction. Defect liability period shall be 12 months from the date of issue of completion certificate/commissioning of the works, whichever is earlier.
- ii) The contractor shall be responsible for rectification of defects arising out of defective work man-ship/defective materials for this period of twelve months from the date of commissioning of the work and shall be responsible for replacement of all defective materials and for rectification of all defects at his own cost. The assets shall be handed over to **MPT** at the end of the defect liability period as per stipulations given below.

8.0 Handing over of track by the contractor to MPT

- 8.1 On completion & commissioning of work, the contractor shall handover the track to **MPT** for operation. The routine maintenance and rectification of defects noticed during the joint inspection by the Chief Engineer or his representative in the defect liability period is the responsibility of the contractor.
- 8.2 Performance security shall be released to the contractor on expiry of defect liability period and rectification of defects, if any.

IV) TECHNICAL SPECIFICATION FOR TRACK BALLAST

Special conditions and Specification for Supply of Ballast

1.0 Ballast Supply:

- 1.1 This specification will be applicable for stone ballast to be used for all types of sleepers on normal track, turn-outs etc.
- 1.2 The rates, as per the Schedule, are inclusive of all taxes viz. commercial sales tax, Octroi etc. and other charges levied by the State/Central government. The rate also includes all lead, lift, ascent, descent, loading, unloading, royalty etc. and all other incidental charges.
- 1.3 The contractor shall stack the ballast, normally over the entire length of the section at specified locations duly certified by the Chief Engineer or his representative except at those certain locations which are found to be inaccessible for certain reasons. The decision of Chief Engineer or his representative at site will be final and binding on the contract for the locations, inaccessible for supply of ballast.
- 1.4 The ballast shall be supplied as per the requirement given by the Chief Engineer or his representative at site.
- 1.5 The ballast shall be in conformity with “Specifications for Track Ballast” issued by RDSO in January, 1999 with latest correction slips, However, the Chief Engineer or his representative administration may alter these conditions of technical nature, which do not have bearing on rates.
- 1.6 The tenderer must submit the test report of impact value, Abrasion values and water absorption value.
- 1.7 The tenderer/contractor undertakes that the ballast supply at all times shall conform to Specifications for track ballast as specified by Railway.
- 1.8 The contractor shall make his own arrangement at his own cost for the construction of service roads within the **MPT** as well as outside **MPT** land, for transportation of ballast, if required. No separate payment shall be admissible to the contractor for the construction of such roads and its repairs and maintenance.
- 1.9 The contractor shall have to make necessary arrangement for levelling the nominated grounds for stacking of ballast at cess, as per the direction and to the satisfaction of Chief Engineer or his representative, without any additional claim of payment.

- 1.10 The cost of routine testing of ballast, as per RDSO guidelines shall be payable by the contractor. However, the **MPT** is at liberty to collect the ballast sample as and when, required and send the same for testing at the cost of Contractor.
- 1.11 The quantities of ballast mentioned in the schedule are approximate. **MPT** reserves the right to alter the quantity as per the actual requirement and nothing extra will be payable over and above the accepted rates. However, for increase in agreed mental value beyond 25%, clause 35 of General Conditions of Contract will be applicable.
- 1.12 The contractor shall make necessary arrangement for the security of the ballast supplied during the progress of the work till final bill is paid. No separate payment shall be admissible to the contractor for guarding the ballast.
- 1.13 The ballast shall be supplied as per the requirement given by the Chief Engineer or his representative. Quantity supplied extra over the required quantity may not be paid.
- 1.14 Safety of ballast against any theft or loss remains solely with the contractor during the entire period of the contract agreement and the same has to be made good by contractor. This responsibility of the contractor remains even if the ballast stacks are measured and paid for, unless Chief Engineer or his representative takes over measured ballast stacks from the contractor with a clear taking over certificate.

2.0 Quality of Stone ballast in General:

- 2.1 The Stone ballast should be machine crushed and shall consist of hard and durable stone and conform to the approved sample.
- 2.2 The stone ballast should be got inspected by the Chief Engineer or his representative at regular intervals to ensure quality and samples tested for physical properties (abrasion test, impact test and water absorption test values)
- 2.3 Attempts should be made to have ballast of the best available quality. For approving the ballast quarry, the following norms will be adopted.

Basic Quality: Ballast should be hard durable and as far as possible angular along edges/corners, free from weathered portions of parent rock, organic impurities and inorganic residues.

Particle Shape: Ballast should be cubical in shape as far as possible. Individual pieces should not be flaky and should have generally flat faces with not more than two rounded/sub-rounded faces.

Mode of Manufacture: The ballast shall be machine crushed and conforming to the Railway Specifications for machine crushed ballast.

Physical Properties: The ballast samples when tested for physical properties (abrasion and impact) in accordance with IS:2386 (part-IV)-1963 should have the under mentioned values:

- i. Aggregate Abrasion Test (Using 105 Angles Abrasion Testing Machine) Aggregate Abrasion Value (percent) – Maximum 30%
 - ii. Aggregate Impact Test.
 - iii. Impact Values (Percent) - Maximum 20%
- 2.4 The water absorption tested as per IS: 2386, Part-III-1963, which should not be more than 1%

Note: The specification of Track Ballast However should be as per Railway Board’s letter No. 94/CE-II/HB/2, dated 22.04.1997

- 2.5 Track ballast should be obtained from good quality stones/boulder; and top layer, if weathered, must not be used.

3.0 Size and Gradation of ballast:

3.1 The track ballast shall be well graded of the following size:-

- a) Retained on 65mm square mesh sieve - Nil
- b) Retained on 40mm square mesh sieve - 40% to 60%
- c) Retained on 20mm square mesh sieve - not less than 98%

4.0 Over-Size and under-Size ballast:

4.1.1 Over-size ballast: if ballast is retained on 65mm square mesh, the stack shall be rejected.

4.1.2 In case ballast retained on 40mm square mesh sieve exceeds 60% limit prescribed in 3.1 (b) above, payment at following reduced rates shall be made for the full stack.

Retained on 40mm Square Mesh	Rate for the whole stack as the percentage of accepted rate of supply.
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Between 40% (including) and 60% (including)	100%
Between 60% (excluding) and 65% (including)	95%
Between 65% (excluding) and 70% (including)	90%

In case retention on 40mm square mesh sieve exceeds 70%, the stack shall be rejected.

4.2 Under-size ballast-Tolerances:

The ballast shall be treated as under-sized and shall be rejected if-

- 4.2.1 Retention on 40mm Sq. Mesh Sieves less than 40%
- 4.2.2 Retention on 20mm Sq. Mesh Sieves is less than 98%

5.0 Sieve analysis for size and gradation:

5.1 The screens for testing ballast shall be square mesh and shall not be less than 100 cm in length, 70cm in breadth and 10 cm in height on the sides. The squareness of the individual hole in the sieves viz. 65,40 and 20mm should be ensured. The sieves to be used for the sieve analysis and ballast measurement should be of approved quality.

5.2 Sieve Sizes mentioned above are the nominal sizes. However the following tolerance in the sizes of holes for 65, 40 and 20mm nominal sizes are permitted.

- * 65mm Square mesh sieve plus minus (+) 1.5mm
- * 40mm square mesh sieve plus minus (+) 1.5mm
- * 20mm Square mesh sieve plus minus (+) 1.0mm

5.3 When carrying out sieve analysis, the screen shall not be kept inclined, but held horizontally, and shaken vigorously. The pieces of ballast retained on the Screen shall not be pushed through the screen openings.

5.4 The percentage of ballast passing through or retained on the sieve shall be determined by volume and not by weight.

6.0 Sampling of ballast:

6.1 In order to ensure supply of uniform quality of ballast, the following norms shall be followed in respect of sampling, testing and acceptance. Minimum of 3(Three) samples of ballast for sieve analysis shall be taken for measurement done on any particular date even if the number of stakes to be measures are less than 3(three).

6.2.1 On supply of first 100 cum. The test for size, Gradation, Abrasion value, Impact value and water absorption (if prescribed) shall be carried out. Further supply shall be accepted only after this ballast satisfied the specification for these test. Chief Engineer or his representative reserves the right to terminate the contract at this stage itself in case the ballast supply fails to conform with any of these specifications. All costs towards the laboratory test should be borne by the contractor.

6.2.2 Subsequent tests shall be carried out as follows:

Sr.No.		Supply in stacks	
		For each stack of volume less than 100 cum	For each stack of volume more than 100 cum
a	Size & Gradation Test: Testing Frequency----- - Size of Sample ----	One for each stack * 0.027 cum	One for each stack *0.027 cum. For ever 100 cum or part thereof.
b	Abrasion Value, Impact Value and Water absorption Tests**:- Testing Frequency:--- Weight of Sample-----	One for every 2000 cum 45 KG.	

* This sample should be collected using a wooden box of internal dimension 0.3m x 0.3m from different parts of the stack.

** These tests shall be done for the purpose of maintaining quality during supply. In case of the test results not being as per the prescribed specifications at any stage, further supplies shall be suspended till suitable corrective action is taken and supplies ensured as per the Specifications.

The above tests may be carried out more frequently if warranted at the discretion of Chief Engineer or his representative.

6.2.3 The ballast should be PURE, i.e it should not contain inorganic or organic residues, and must be free from inferior or harmful substance.

6.2.4 Contamination of ballast with the ground soil etc. of stacking area should be minimized by providing neat stacking areas with good drainage.

- 6.3 In the event of the ballast being rejected the Contractor/Agency will have to remove the rejected ballast from the work-site expeditiously at his own cost.
- 6.4 The Chief Engineer or his representative shall mark all rejected ballast in any manner he considers fit to prevent them from being removed and mixed with good/accepted ballast and the Contractor shall within a fortnight from the date of the order of removal, remove the rejected ballast to such place as may be directed by the Chief Engineer or his representative and, in the event of contractor's failure to do so the Chief Engineer or his representative may cause it to be removed and all costs of such removal shall be payable on demand by the Contractor to Chief Engineer or his representative and without prejudice to any other mode of recovery, may be deducted from any money, that may be due or may become due to the contractor or from the Contractor's bill for any other works executed for Chief Engineer or his representative on behalf of Client.
- 6.5 Should Chief Engineer or his representative, under any special circumstances, agree to take over all or part of the rejected ballast, the same will be paid for at rates to be fixed by the authority accepting the tender and agreed to by the contractor in writing.
- 7.0 The screen for sieve analysis as specified in specification as also the standard box for measuring volume should be kept available at site by the contractor at his own cost, for use by the Chief Engineer or his representative or his representative after proper check, in carrying out sieve analysis. Labours required for doing sieve analysis will be supplied by the Contractor free of cost. The contractor must also accept the results of such analysis in writing.
- 8.0 Each stack of ballast shall be serially numbered and may be as long and broad as possible. After the stacks are measured, they should be sprinkled with lime in the form of cross on all the sides of the stack at the contractor's own cost to the satisfaction of the Chief Engineer or his representative. Suitable space should be left in between stacks in adjacent zones so that there is no possibility of materials of fresh stacks in one zone mixing with stacks already measured in the adjacent zone.
- 9.0 Entries in the ballast measurement register should not be over written. If any correction is required the same should be done by striking off the old entry by drawing a line and showing proper entry by its side.
- 10.0 Ballast is to be stacked proper trapezoidal section on the cess or berms, or on the line or in depots as may be ordered by the engineer concerned,

in stacks as large as possible and ordinarily not less than 1/0 metre. Top of stack shall be kept parallel to the ground plane. The side slopes of stack should not be flatter than 1.5:1 (Horizontal: Vertical). Cubical content of each stack shall normally be not less than 30(thirty) cum in plain areas. The Chief Engineer or his representatives should, as far as possible, set out the sites for ballast stacks. Stacking ground must be fairly dressed to a proper plane by the contractor at his own cost before stacking is started. Completed stacks must be properly finished before being offered for acceptance and measurement. It must be distinctly understood that the accepted rate is for ballast which conforms in all particulars of quality, stack measurements, gauge, completion with in time limit and delivery at site fixed upon, with the specification and conditions of contract. If, therefore, the officer deputed to measure up a Contractor's ballast is not satisfied that the above conditions and specifications have been complied with, he is at liberty to take either of the following course.

- i. To refuse to measure up such ballast at all giving his reasons in writing for so doing to the Contractor.
- ii. To call upon the contractor in writing to screen his ballast of dirt and admixtures beyond the specified limit or to break it to gauge, or to re-stack it to proper dimensions, or all three as may be required, prior to further inspection an measurement by a fixed date, within the time limit imposed in the agreement.

11.0 The contractor shall provide at his own cost adequate labour and tools for opening out stacks for inspection and for carrying out screening test.

12.0 The contractor shall supply all necessary tools for the work and also bamboos, pegs, strings etc., necessary for measurement of ballast.

13.0 The quantity shall be calculated as per the following formula for the ballast supplied.

$$Q = \frac{LB+LT}{2} \times \frac{WB+WT}{2} \times H$$

- When,
- LB = Average length of the stack at the bottom
 - LT = Average length of the stack at the top
 - WB = Average width of the stack at the bottom
 - WT = Average width of the stack at the top
 - H = Average height of the stack

The plan of the stack should be either square or rectangular. Payment shall be made for the gross measurement in stacks without any deduction for shrinkage/voids. 90% of the payment will be paid in R.A. bills prepared against supply of ballast duly certified by Chief Engineer or his representatives supported with measurement details, test Certificates, royalties and all other necessary statutory taxes clearance certificates. Balance 10% shall be released after spreading the same in to the track.

- 14.0 The rates in this schedule are entirely inclusive so as to cover any purchase and/or royalties and/or compensation for surface charges incurred by him whatsoever. The accepted rate includes all quarry charges Sales Tax monopoly fee and other charges if any and tools and plants for clearing site for stacking, test and testing screens, carriage of materials to the site of stacking and removal of any material rejected by the Chief Engineer or his representative to any site when the rejected materials are to be thrown.
- 15.0 The rates quoted are inclusive of all charges including all taxes levied by Union of India or State Government or local bodies and includes GST, Royalty, Octroi duties etc.