

**National High-Speed Rail Corporation  
Limited (NHSRCL)**

(A Joint Sector Company of Govt. of India and  
Participating State Government)



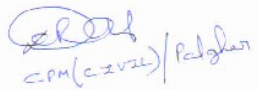
Name of the work: “Road Diversion work in Palghar District,  
under the Jurisdiction of  
CPM (Civil)/Palghar in connection with  
Mumbai Ahmedabad High-Speed Rail  
Corridor”.

Tender No.: NHSRCL/MUMBAI/CPM-PALGHAR/18-19/04

**TENDER DOCUMENT**

2018-19

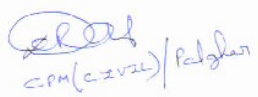
**National High Speed Rail Corporation Limited ( NHSRCL ),**  
102, Adinath Villa, Opposite of Tashish Hotel, Vagulsar, Mahim Road,  
Place, Taluka, District & Post Office: – Palghar, Pin: 401404, Maharashtra, India.



CPM (C.V. 22) / Palghar

**INDEX**

1	<b>BID SUMMARY</b>	Page No 3
2	<b>NOTICE INVITING TENDER</b>	Page 4 - Page 7
3	<b>BIDDING APPLICATION</b>	Page 8 - Page 9
4	<b>INSTRUCTION TO TENDERERS</b>	Page 10 - Page 23
5	<b>TERMS OF REFERENCE / SCOPE OF WORK</b>	Page 24 - Page 25
6	<b>GENERAL CONDITIONS OF CONTRACT</b>	Page 26 - Page 27
7	<b>SPECIAL CONDITIONS OF CONTRACT</b>	Page 28 - Page 32
8	<b>PROFORMAS</b>	Page 33 - Page 36
9	<b>BILL OF QUANTITIES (“BOQ”)</b>	Page 37- Page 58
10	<b>TECHNICAL SPECIFICATION</b>	Page 59 - Page 97

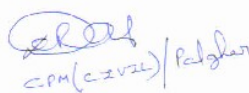


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**BID SUMMARY**

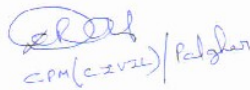
Tender Notice No.	NHSRCL/MUMBAI/CPM-Palghar/18-19/04
Name of Work	<b>“Road Diversion work in Palghar District, under the Jurisdiction of CPM (Civil)/Palghar in connection with Mumbai Ahmedabad High-Speed Rail Corridor.</b>
Client/ Employer	National High-Speed Rail Corporation Limited, New Delhi.
Tender to be submitted / deposited / addressed (if it is sent by Post) to the office of	Chief Project Manager-Palghar, National High Speed Rail Corporation Limited (NHSRCL), 102, Adinath Villa, Opposite of Tashish Hotel, Vagulsar, Mahim Road, Place, Taluka, District & Post Office: – Palghar, Pin: 401404, Maharashtra, India.
Estimated Cost	₹ 3,72,60,743.88 (Three crore Seventy Two Lakh Sixty Thousand Seven Hundred Forty Three and Paise Eighty Eight only)
Cost of Tender document	₹ 11,800/- (Eleven Thousand Eight Hundred) including GST @18%.
Earnest Money Deposit	₹ 3,36,400/- (Three Lakh Thirty Six Thousand Four Hundred Only).
Completion period	06 (Six months).
Date and time of issue of tenders	10:30 hrs. to 16:00 hrs. on all working days from 06.03.2019 to 28.03.2019.
Date and time of submission of tender	Up to 29.03.2019 up to 15:00 hrs.
Date and time of opening of Bid	On 29.03.2019 at 15:30 hrs.

**National High Speed Rail Corporation Limited ( NHSRCL ),  
Office of Chief Project manager (Civil),  
102, Adinath Villa, Opposite of Tashish Hotel,  
Vagulsar, Mahim Road,  
Place, Taluka, District & Post Office: Palghar,  
Pin: 401404, Maharashtra, India.**



CPM (CIVIL) / Palghar

**NOTICE INVITING TENDER**  
**(NIT)**



CPM (C-2022) / Palghar

**National High Speed Rail Corporation Limited**  
**(A Joint Sector Company of Govt. of India and Participating**  
**State Government)**



**Tender No: - NHSRCL/MUMBAI/CPM-PALGHAR/18-19/04**

**NOTICE INVITING TENDER**

Sub: Road Diversion work in Palghar District, under the Jurisdiction of CPM (Civil)/Palghar in connection with Mumbai Ahmedabad High-Speed Rail Corridor.

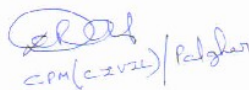
1.0 Chief Project Manager (Civil)- Palghar, National High Speed Rail Corporation Limited, Adinath Villa, Survey No 827/4, Plot No 19. Vagulsar, Palghar Mahim Rd., Tal & District – Palghar, Pin401402, Maharashtra, India, invites sealed Tender in prescribed forms for the above mentioned work.

<u>Sl. No.</u>	<u>Name of Work</u>	<u>Time &amp; Date of Submission</u>	<u>Earnest Money Deposit (₹)</u>	<u>Completion Period</u>
1.0	Road Diversion work in Palghar District, under the Jurisdiction of CPM (Civil)/Palghar in connection with Mumbai Ahmedabad High-Speed Rail Corridor.	Up to 29.03.2019 at 15:00 hrs.	₹ 3,36,400/- (Three Lakh Thirty Six Thousand Four Hundred Only)	06 (Six) Months

2.0 The cost of Tender Document is ₹ **11,800** /- (**Eleven Thousand Eight Hundred**) inclusive of GST@18%, in the form of DD or banker's cheque from any Nationalized or Scheduled Indian Bank in favour of "National High Speed Rail Corporation Limited".

The tender documents will be available for download on [www.nhsrcl.in](http://www.nhsrcl.in) under the link "Tenders -->Active Tenders" and on CPP portal (<https://eprocure.gov.in/cppp/>).

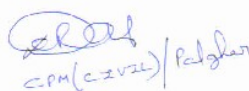
The cost of tender document should be submitted along with tender form in the form of Pay Order/Demand Draft/Fixed Deposit Receipt payable in favour of M/s National High Speed Rail Corporation Limited at New Delhi. Tenders received without tender fee shall be summarily rejected.



CPM (C.V.II) / Palghar

- 3.0 Completed original tender documents sealed in an envelope super-scribing the name of work; name of the bidder and address of the tender, shall be submitted at NHSRCL's office at address in Para 1.0 above on or before 15:00 hrs. on **29.03.2019**. Tender duly sealed in the prescribed manner above can also be sent through Registered Post/Courier so as to reach at the office address given in para 1.0 above **not later than 15.00 hrs. on 29.03.2019**. Any tender received later than 15:00 hrs. at NHSRCL's office at Palghar on **29.03.2019** shall be rejected and returned to the bidder unopened. Earnest Money Deposit of ₹ **3,36,400/- (Three Lakh Thirty Six Thousand Four Hundred Only)** may be submitted in the form of Pay Order/Demand Draft/Fixed Deposit Receipt payable in favour of M/s National High Speed Rail Corporation Limited at New Delhi. Tender received without Earnest Money Deposit shall be summarily rejected.
- 4.0 Tender shall be submitted in accordance with the terms of the "Instruction to Tenderers" in the attachment hereto, which forms part of this Notice Inviting Tender.
- 5.0 National High Speed Rail Corporation Limited reserves the right to cancel the tender before submission/opening of tender, postpone the tender submission/opening date and to accept /reject any or all tenders without assigning any reasons thereof.
- 6.0 Tenderer may note that they are liable to be disqualified at any time during the tendering process in case any of the information furnished by them is not found to be true. The decision of NHSRCL in this regard shall be final and binding.
- 7.0 The validity of the offer shall be 90 days from the date of opening of the tender.
- 8.0 Minimum Eligibility Criteria for Open Tenders Costing Above ₹ 50 Lakhs is as under:

<p>The tender must have successfully completed any of the following in last 07(seven) years, ending last day of month previous to the one in which tender is invited.</p> <p>Three similar works costing not less than amount equal to 40% of advertised value of the tender, or Two similar works costing not less than the amount equal to 50% of advertised value of tender, or One similar work costing not less than the amount equal to 80% of advertised value of the tender.</p>	<p>i) Similar nature of works physically completed within the <b>qualifying period</b> i.e. the last 7 financial years ending last day of month previous to the one in which tender is invited, shall <b>only</b> be considered in evaluating the eligibility criteria.</p> <p>ii) The total value of similar nature of works completed during the qualifying period, and not the total payments received within qualifying period, shall be considered.</p> <p>In case, final bill of similar nature of works has not been passed and final measurements have not been recorded, the paid amount including statutory deduction is to be considered. If final measurements have been recorded and work has been completed with negative variation, then also the paid amount with statutory deduction is to be considered. However, if final measurements have been recorded and work has been completed with positive variation but variation has not been</p>
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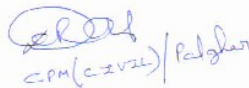
CPM (C-2022) / Palghar

	sanctioned, original value or last sanctioned agreement value whichever is lower shall be considered for judging eligibility.
2. Total contract amount received during the last three years and in three financial years and in current financial year.	Should be a minimum of 150% of advertise tender value of work in support of which attested certificate from Employer/ Client, audited Balance Sheet duly certified by Chartered Accountant etc. should be submitted by the tender.
3. Works costing less than 50 Lakhs	For works where advertised value is below 50.00 lakhs, but tenderers quoting their offer more than ₹ 50.00 lakhs, eligibility shall be evaluated with reference to face value of tender floated and not value of tender offer.

If the tenderer does not submit any proof for meeting with the eligibility criteria as given above and Tender Conditions, along with the offer, the same will be considered incomplete and will be summarily rejected.

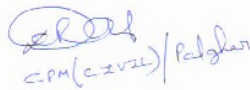
- 9.0 Similar Nature work for the current work will be considered as **“Road work Carried out for Govt/ Semi Govt/ PSU”**.
- 10.0 **Rates should be quoted in BOQ only.** Rate quoted elsewhere in the tender document or given in separate envelope shall not be evaluated and tender shall be considered incomplete.
- 11.0 **Any special conditions shall be brought out clearly in the forwarding letter.** Any special condition quoted elsewhere in the tender document shall not be considered part of offer.
- 12.0 **A notarized affidavit shall be submitted** on non-judicial stamp paper stating that they are not liable to be disqualified and all their statements/ documents submitted along with bid are true and factual. Standard format of the affidavit to be submitted by the bidder is enclosed in Instruction to tenderer.

**National High Speed Rail Corporation Limited ( NHSRCL ),**  
**Office of Chief Project manager (Civil),**  
 102, Adinath Villa, Opposite of Tashish Hotel,  
 Vagulsar, Mahim Road,  
 Place, Taluka, District & Post Office: Palghar,  
Pin: 401404, Maharashtra, India.



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# **BIDDING APPLICATION**



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**BIDDING APPLICATION**

To,

**NATIONAL HIGH SPEED RAIL CORPORATION LIMITED**

**Acting through**

**Chief Project Manager (Civil)- Palghar,  
National High Speed Rail Corporation Limited  
102, Adinath Villa, Opposite of Tashish Hotel,  
Vagulsar, Mahim Road,  
Place, Taluka, District & Post Office: Palghar,  
Pin: 401404, Maharashtra, India.**

Dear Sir,

I/We, \_\_\_\_\_ (Name and address of the Tenderer) have read the various terms and conditions of the tender documents attached herewith duly signed by me/us and agree to abide by the same. I/We also agree to keep this tender open for acceptance for a period of 90 days from the date fixed for opening the same.

I/We have quoted our rates in the Bill of Quantities taking into account all the above factors and we offer to do the work “**Road Diversion work in Palghar District, under the Jurisdiction of CPM (Civil)/Palghar in connection with Mumbai Ahmedabad High-Speed Rail Corridor**” quoted in the attached Bill of Quantities and hereby bind ourselves to complete the work in all respects within time schedule depicted in tender documents from the date of issue of letter of acceptance of tender.

I/We also understand that until a formal Contract Agreement is executed, Letter of Acceptance along with all tender documents shall constitute a binding contract between me/us and National High Speed Rail Corporation Limited.

Thanking you,

Yours faithfully,

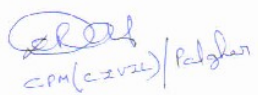
Signature \_\_\_\_\_ in capacity of \_\_\_\_\_

\_\_\_\_\_ duly authorised to sign bids for and on behalf of:

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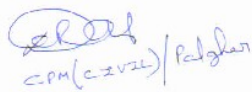
(In Block capital letters)

Date this \_\_\_\_\_ day of \_\_\_\_\_ 2019



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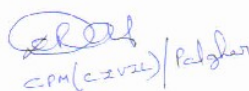
## **Instructions to Tenderers (ITT)**



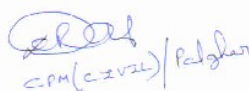
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## Instructions to Tenderers (ITT)

<b>1.0</b>	<b>General</b>
1.1	<b>Name of the Work:</b> As indicated in ‘Appendix to Tender. i.e. ““ <b>Road Diversion work in Palghar District, under the Jurisdiction of CPM (Civil)/Palghar in connection with Mumbai Ahmedabad High-Speed Rail Corridor</b> ”’.
1.2	<p>The bidder should accompany the following documents duly sealed in the tender envelope:</p> <ol style="list-style-type: none"> <li>i) Attested copies of Affidavit for sole proprietorship / partnership deed / memorandum and Articles of Association along with details pertaining to place of registration, principal place of business of the firm, etc.</li> <li>ii) Attested copy of power of attorney on non judicial stamp paper of appropriate value of the signatory of bid on behalf of the tenderer.</li> <li>iii) Earnest Money Deposit of ₹ 3,36,400/- (<b>Three Lakh Thirty Six Thousand Four Hundred Only</b>) may be submitted in the form of Pay Order/Demand Draft/Fixed Deposit Receipt payable in favour of M/s National High Speed Rail Corporation Limited at New Delhi. Tender received without Earnest Money Deposit shall be summarily rejected.</li> <li>iv) Attested copy of Goods and Service Tax Registration (as applicable) &amp; PAN Card.</li> <li>v) Details of deployment of resources.</li> <li>vi) Last Three financial year’s and current financial year audited Balance Sheet duly certified by Chartered Accountant for eligibility criteria @ 150% of Advertised Cost.</li> <li>vii) Copies of the work completion certificates duly attested from the clients for having completed works of similar nature should be as per enclosed format.</li> <li>viii) The work experience certificate of works executed on <b>back to back basis / Sub-let</b> works shall not be considered.</li> <li>ix) Certificate of accreditation from National Accreditation Board of Testing and Laboratories.</li> <li>x) A copy of notarized affidavit non-judicial stamp paper stating that they are not liable to be disqualified and all their statements/ documents submitted along with bid are true and factual. Standard format of the affidavit to be submitted by the bidder is enclosed as Annexure C. Non-submission of a copy of notarised affidavit by the bidder shall result in summarily rejection of his/ their bid. It shall be mandatorily incumbent upon the tenderer to identify, state and submit the supporting document duly self-attested by which they/he are/is qualifying the Qualifying Criteria mentioned in the tender document.</li> </ol>

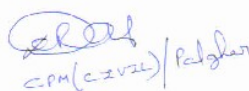
  
CPM(Civil)/Palghar

1.3	The work is proposed to be executed under the following relationship:
a)	<b>Client / Employer:</b> Chief Project Manager(Civil)-Palghar, National High Speed Rail Corporation Limited (NHSRCL ), 102, Adinath Villa, Opposite of Tashish Hotel, Vagulsar, Mahim Road, Place, Taluka, District & Post Office: Palghar, Pin: 401404, Maharashtra, India.
b)	<b>Contractor:</b> The successful Tenderer to whom the work is awarded shall become the Contractor who will execute the work.
1.4	Throughout these bidding documents, the terms “bid” and “tender” and their derivatives (“bidder”/ “Tenderer”) “bid/tendered”, “bidding”/ “tendering” etc are synonymous. Day means calendar day. Singular also means plural.
1.5	Scope of Work: The brief scope of work shall include but not limited to: Diversion of road by Asphaltic Surface or Concrete Pavement Providing Curbing stones, Providing retro reflective Road Signage, Providing thermoplastic pavement Markings, Providing crash barriers, Height Gauges, Providing grass turf, plantation etc., Construction of RCC minor bridges like RCC Box HP culverts and Miscellaneous Works Related to Diversion of Roads. <i>(Refer Terms of References for detailed scope of work)</i>
1.6	Tenderers may carefully note that they are liable to be disqualified at any time during the tendering process in case any of the information furnished by them is found to be in accurate or untrue Tenderers may carefully note that they are liable to be disqualified at any time during the tendering process in case any of the information furnished by them is found to be inaccurate or untrue.
1.7	A Tenderer shall submit only one bid in the capacity of an Individual or Sole Proprietor, Partnership firm or Company. Violation of this condition is liable to a Tenderer’s disqualification. Joint Venture (s) / Consortium (s)/ Association (s) cannot participate in this tender.
<b>2.0</b>	<b>Rates / Prices/Costs</b>
	The rates shall be offered in the enclosed “Bill of Quantity” (BOQ). The rates shall include cost of all activities, wages, all allowances and benefits, payment towards entitled medical and annual leave, PF & PF contributions, incidental costs, insurance (as applicable).
<b>3.0</b>	<b>BIDDING DOCUMENTS</b>
3.1	<b>Content of bidding documents</b> The bidding documents include the following: Notice Inviting Tender (NIT) Bidding Application Instruction to Tenderer (ITT) Special Conditions of Contract (SCC) Proformas Bill of Quantities



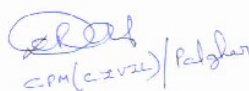
C.P.M (C.V.I.I.) / Palghar

3.2	The bidder is expected to examine all instructions, terms, conditions, forms, specifications and any other information in the bidding documents. Failure to furnish all information required by the bidding documents or submission of a bid not substantially responsive to the bidding documents in every respect will be at the bidder's risk and may result in rejection of their bid.
<b>4.0</b>	<b>COST OF BIDDING</b>
4.1	The bidder shall bear all costs associated with the preparation and submission of the bid and the Employer will in no case be responsible or liable for these costs regardless of the conduct or the outcome of the bidding process.
<b>5.0</b>	<b>UNDERSTANDING AND AMENDMENT OF TENDER DOCUMENTS</b>
5.1	The bidder must obtain for itself on its own responsibility and its own cost all the information including risks, contingencies & other circumstances in execution of the work. It shall also carefully read and understand all its obligations & liabilities given in tender documents.
5.2	The bidder is advised to visit and examine the site where the work is to be executed and its surroundings or other areas as deemed fit by the bidder and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and execution of the contract. The cost of visiting the site and collecting relevant data shall be at the bidder's own expenses. It is a condition of the tender that the Tenderer is deemed to have visited the site and satisfied himself with all the conditions prevailing including any difficulties for executing the work.
5.3	At any time prior to the deadline for submission of bids, Employer may for any reason whether at its own initiative or in response to any request by any prospective bidder amend the bidding documents by issuing Corrigendum, which shall be part of the Tender documents. The amendment shall also be published in NHSRCL website ( <a href="http://www.nhsrcl.in">www.nhsrcl.in</a> ) and on CPP portal ( <a href="https://eprocure.gov.in/cppp/">https://eprocure.gov.in/cppp/</a> ). Non-inclusion of corrigendum shall be considered incomplete submission and such offers shall be liable for rejection.
5.4	Employer may at its discretion extend the deadline for submission of the bids at any time before the time of submission of the bids and the same will be published in NHSRCL website ( <a href="http://www.nhsrcl.in">www.nhsrcl.in</a> ) and on CPP portal ( <a href="https://eprocure.gov.in/cppp/">https://eprocure.gov.in/cppp/</a> ).
<b>6.0</b>	<b>Language of Bid</b>
6.1	The bid prepared by the bidder and all documents related to the bid shall be written in English.
<b>7.0</b>	<b>Signing of all Bid Papers and Completing Bill of Quantities</b>
7.1	All the pages of the tender documents, Bill of Quantities and accompanying documents must be properly stamped and signed by the authorized signatory holding the Power of Attorney on each page. (The bidder is to enclose a copy of Power of Attorney).

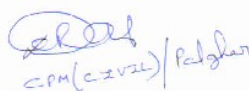


CPM (C-2022) / Palghar

7.2	The bidder must fill and submit the prices and % rate above or below as per instructions given in Bill of Quantities. He shall not make any addition or alteration.
7.3	Any overwriting, erasures or cancellations shall only be valid, if they are initialed by the signatory (ies) to the bid.
<b>8.0</b>	<b>DEVIATIONS</b>
8.1	The bidder should clearly read and understand all the terms and conditions, specifications, corrigendum etc. mentioned in the original tender documents. If the Tenderer has any observations, the same may be indicated in his forwarding letter along with the tender. The Tenderer is advised not to make any corrections, additions or alterations in the original bid documents. If bidder makes any correction in his own entries the same shall be initialed and stamped by him. If this condition is not complied with, bid is liable to be rejected.
<b>9.0</b>	<b>Deadline for submission of tender</b>
9.1	The tender duly filled must be received by Employer at address specified not later than the date and time as mentioned in the “Notice Inviting Tender”.
9.2	Any tender related documents received later than the deadline prescribed for submission of tender by Employer shall be rejected.
9.3	Tender brought to the office of Employer later than the deadline prescribed but before the opening time mentioned in the bidding document shall be declared as delayed tender and may be considered by Employer and decided on its merits. The decision of the Employer shall be final and binding.
9.4	Any Tender received after opening of the tender shall be rejected and returned unopened to the Tenderer.
<b>10.0</b>	<b>Withdrawal of tender</b>
10.1	No tender can be withdrawn after submission and during tender validity period.
10.2	Submission of a tender by a Tenderer implies that he had read all the tender documents including amendments if any, visited the site and has made himself aware of the scope and specifications of the work to be done, local conditions and other factors having any bearing the work.
<b>11.0</b>	<b>Sealing and Marking of tender document</b>
11.1	The bidder shall submit the sealed tender in original clearly mentioning the name of work, due date and time of submission of the tender, name and address of the bidder and address of the tenderer. All documents should be submitted in one envelope unless specified.
<b>12.0</b>	<b>Transfer of tender documents</b>
	Transfer of <b>Tender documents</b> purchased by one intending Tenderer to another Tenderer is not permissible. Tenderer can submit tender only on the documents purchased by him.

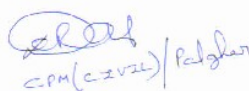
  
CPM (C-2022) / Palghar

<b>13.0</b>	<b>Earnest money</b>
13.1	<b>Earnest Money Deposit</b>
	The Tenderer must furnish the Earnest Money as indicated in ‘Notice Inviting Tender’ for the work as specified failing which the tender shall be summarily rejected. The Earnest Money may be in any one of the following forms:
	<p>a. Pay Order/Demand Draft of any Scheduled Bank in India in favour of National High Speed Rail Corporation Limited payable at New Delhi. It is mandatory for bidders to provide their bankers details (name of bank and branch) along with their own bank details (account no., name of account holder, NEFT / RTGS details).</p> <p>b. Fixed Deposit Receipt issued by any Scheduled Bank in India endorsed in favour of National High Speed Rail Corporation Limited payable at New Delhi.</p> <p>c. No interest shall be allowed on Earnest Money Deposit.</p> <p>d. Any firm recognized by Department of Industrial Policy and Promotion(DIPP) as ‘Startups’ shall be exempted from payment of earnest money deposit detailed above.</p> <p>For the successful Tenderer, earnest money will be retained as part of the security deposit.</p>
13.2	<b>Forfeiture of Earnest Money:</b>
	The Earnest Money of the successful Tenderer is liable to be forfeited if he fails to: sign the Contract Agreement in accordance with the terms of the tender, or Commence the work within the time period stipulated in the tender.
	In case of forfeiture of EMD, the Tenderer shall be debarred from bidding in case of re-invitation of the tenders.
13.3	<b>Return of Earnest Money:</b>
	The Earnest Money of the unsuccessful Tenderers in the form of FDR shall be discharged and returned as promptly as possible and the Earnest Money in the form of DD/Pay Order shall be directly credited to his bank account through Electronic Fund Transfer, under advice to the bidder.
<b>14.0</b>	<b>Period of validity of the tender</b>
14.1	The tender shall remain valid for the period indicated in “NIT” after the date of the opening of the tender. If the Tenderer gives validity period less than that fixed/prescribed by Employer, the tender shall be liable to be rejected.
14.2	Notwithstanding the above clause, Employer may solicit the Tenderers’ consent to an extension of the validity period of the tender. The request and the response shall be made in writing.
<b>15.0</b>	<b>Submission of tenders</b>
15.1	The tender shall be submitted on or before the due date and time with all the relevant documents as mentioned in the tender documents and the following:



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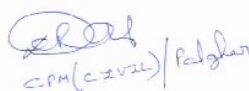
	Forwarding letter of the Tenderer. Any special conditions shall be brought out clearly in the forwarding letter. Any special condition quoted elsewhere in the tender document shall not be considered part of offer.
15.2	Before submitting the tender, the Tenderer/s will be deemed to have satisfied himself by his actual inspection of the site, climatic condition records from state government and/or Indian Meteorological Department and the locality of the works that all conditions liable to be encountered during execution of the works are taken into account and that the rates quoted by the Tenderer/s in the tender schedule are adequate and all-inclusive for the completion of works to the entire satisfaction of the Officer-in-charge.
<b>16.0.</b>	<b>Bid opening and evaluation</b>
16.1	Tenders will be opened at the address mentioned in “Notice Inviting Tender” in presence of Tenderers or authorized representatives of Tenderers who wish to attend the opening of tenders. Physical presence during Bid opening is optional.
16.2	Tenderers or their authorized representatives who are present shall sign register in evidence of their attendance.
16.3	Tenderers name, presence or absence of requisite total cost of work quoted or any other details as Employer may consider appropriate will be announced and recorded at the time of bid opening.
<b>17.0</b>	<b>Negotiation</b>
17.1	<p>The Employer/Officer-in-charge reserves the right to negotiate the offer submitted by the Tenderer/s to withdraw certain conditions or to bring down the rates to a reasonable level. The Tenderer must note that during negotiation of rates of items of BOQ can only be reduced and not increased by the Tenderer. In case the Tenderer introduces any new condition or increases rates of any item of BOQ, his negotiated offer is liable to be rejected and the original offer shall remain valid and binding on him.</p> <p>Should NHSRCL decide to negotiate with view to bring down the rates, the Tenderer called for negotiation should furnish the following form of declaration before the commencement of negotiation.</p> <p>“I _____ do declare that in the event of failure of contemplated negotiations relating to Tender No. _____ dated _____ my original tender shall remain open for acceptance on its original terms and conditions.”</p>
<b>18.0</b>	<b>Evaluation of Bid.</b>
18.1	The Employer shall examine the bids to determine whether they are complete, w of all relevant documents have been received not later than the prescribed date and submission and generally in order.



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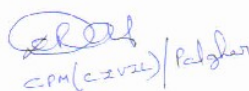


18.2	Arithmetical errors shall be rectified on the following basis. If there is a discrepancy between the unit price and the total price, which is obtained by multiplying the unit price and quantity, or between subtotals and the total price, the unit or subtotal price shall prevail, and the total price shall be corrected.
18.3	<p>Prior to the detailed evaluation, Employer shall determine whether each bid is of acceptable quality, is generally complete and is substantially responsive to the bidding documents. For purposes of this determination, a substantially responsive bid is one that conforms to all the terms, conditions and specifications of the bidding documents without material deviations, objections, conditionality or reservation. A material deviation, objections, conditionality or reservation is one:</p> <p>That affects in any substantial way the scope, quality or performance of the contract.</p> <p>That limits in any substantial way, inconsistent with the bidding documents, the Employers' rights or the successful Bidder's obligations under the contracts; or</p> <p>Whose rectification would unfairly affect the competitive position of other Bidders who are presenting substantially responsive bids.</p>
18.4	In case of tenders containing any conditions or deviations or reservations about contents of tender document, Employer may ask for withdrawal of such conditions/deviations/reservations. If the Tenderer does not withdraw such conditions/deviations/ reservations, the tender shall be treated as non- responsive. Employer's decision regarding responsiveness or non-responsiveness of a tender shall be final and binding.
<b>19.0</b>	<b>Canvassing</b>
19.1	No Tenderer is permitted to canvass to Employer on any matter relating to this tender. Any Tenderer found doing so may be disqualified and his bid may be rejected.
<b>20.0</b>	<b>Right to accept any tender or reject all tenders</b>
20.1	Employer/officer-in-charge reserves the right to accept, split, divide, negotiate, cancel or reject any tender or to annul and reject all tenders at any time prior to the award of the contract without incurring any liability to the affected Tenderers or any obligation to inform affected Tenderer, the grounds of such action.
<b>21.0</b>	<b>Award of contract</b>
21.1	Employer/ officer-in-charge shall notify the successful Tenderer in writing by a Registered Letter/Courier/ Speed Post/FAX or per bearer that his tender has been accepted.
21.2	Letter of Acceptance shall constitute a legal and binding contract between Employer/Officer-in-charge and the Contractor till such time the contract agreement is signed.



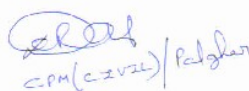
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<b>22.0</b>	<b>Standard of service (s)</b>
22.1	<p>Tenderer shall carry out the services in conformity with the generally accepted norms and sound standards. Tenderer shall be responsible for the services rendered. In case of any deficiency or otherwise Tenderer shall promptly correct the same.</p> <p>The Contractor shall indemnify and save harmless NHSRCL from and against all actions, suit proceedings losses, costs, damages, charges, claims and demands of every nature and description brought or recovered against NHSRCL by reason of any act or omission of the Contractor, his agents or employees, in the execution of the works or in his guarding of the same. All sums payable by way of compensation under any of these conditions shall be considered as reasonable compensation to be applied to the actual loss or damage sustained, and whether or not any damage shall have been sustained.</p>
<b>23.0</b>	<b>Completion of work (s)</b>
23.1	The duration of work shall be 06 months.
<b>24.0</b>	<p><b>Technical eligibility criteria</b></p> <p>a) The tender must have successfully completed any of the following in last 07(seven) years, ending last day of month previous to the one in which tender is invited.</p> <ul style="list-style-type: none"> <li>· Three similar works costing not less than amount equal to 40% of advertised value of the tender, or</li> <li>· Two similar works costing not less than the amount equal to 50% of advertised value of tender, or</li> <li>· One similar work costing not less than the amount equal to 80% of advertised value of the tender.</li> </ul> <p>Similar nature of work means “<b>Road Work Carried out for Govt/ Semi Govt/ PSU</b>”.</p> <p>b) The total value of similar nature of work completed during the qualifying period and not the payments received within qualifying period alone, shall be considered. In case, final Bill of similar nature of work has not been passed and final measurements have not been recorded, the paid amount including statutory deductions will be considered.</p> <p>If final measurements have been recorded and work has been completed with negative variation, then also the paid amount including statutory deductions will be considered.</p> <p>However, if final measurements have been recorded and work has been completed with positive variation but variation has not been sanctioned, original agreement value or last sanctioned agreement value whichever is lower shall be considered for judging eligibility.</p>



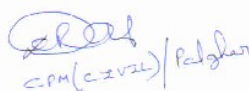
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	<p>c) The works executed by the tenderer for Government Departments or Semi Governments/ Public Sector undertakings/Corporations shall only be considered for eligibility. Works executed for private parties shall not be considered.</p> <p>Tenderers shall submit self-attested photo copies of their Experience Certificates issued by an officer not below the rank of Executive Engineer / Equivalent grade in other Central / State Government Departments / Semi Government Departments / Public Sector Undertakings.</p> <p>The certificate should indicate there-in the name of works executed, value of works, and period during which completed, bill paid etc., and with the signature, seal of the issuing officer, details of department, etc.</p>
<p><b>25.0</b></p>	<p><b>Financial eligibility criteria</b></p>
	<p>The tenderer(s) shall be eligible only if he / they fulfil Eligibility Criteria of having received total contract amount during the last three financial years and in the current financial year upto date of tender opening, with a minimum of 150% of the advertised tender value.</p> <p>Tenderer(s) should submit to this effect an attested certificate from the Government Departments or Semi Governments/Public Sector under takings for the work done for them, Audited balance sheet duly certified by the Chartered Accountant.</p>
<p><b>26.0</b></p>	<p><b>Conditions for Participation of Partnership Firm / Proprietary Firm /Private Limited Company / Limited Company:</b></p> <p>i) In case the tenderer is an individual / proprietary concern, the experience and turnover shall be in the name and style of the Individual / Proprietary concern only.</p> <p>(Note: The partner of a Partnership Firm cannot claim the credentials of Partnership Firm to the extent of his share either during the subsistence of the Partnership Firm or after its dissolution).</p> <p>ii) In case the tenderer is a Partnership Firm(s), the experience and turnover shall be in the name and style of the firm only.</p> <p>iii) If the Tenderer is a Partnership Firm, all the partners shall be jointly and severely liable for successful completion of the work and no request for change in the constitution of the Firm shall be entertained.</p> <p>iv) During the currency of the contract, no partner of the firm shall be permitted to withdraw from the Partnership business and in such an event it shall be treated as breach of trust and abandonment of contract work.</p> <p>2. Partnership deeds, Power of Attorney etc: - The tenderer shall clearly specify whether the tender is submitted on his own or on behalf of a Partnership concern. If the tender is submitted on behalf of a Partnership concern, he should submit the certified copy of Partnership deed along with the tender and authorization to sign the tender documents on behalf of Partnership firm. If these documents are not enclosed along with tender documents, the tender will be treated as having been submitted by individual</p>



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	<p>signing the tender documents. NHSRCL will not be bound by any Power of Attorney granted by the tenderer or by changes in the composition of the firm made subsequent to the execution of the contract. It may, however recognize such Power of Attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the contractor.</p> <p>3. The tenderer whether sole proprietor, a Limited Company or a Partnership Firm if they want to act through agent or individual partner(s) should submit along with the tender or at a later stage, a Power of Attorney duly stamped and authenticated by a Notary Public or by Magistrate in favour of the specific person whether he/they be partner(s) of the firm or any other person specifically authorizing him/them to submit the tender, sign the agreement, receive money, witness measurements, sign measurement books, compromise, settle, relinquish any claim(s) preferred by the firm and sign "No Claim Certificate" and refer all or any disputes to arbitration.</p> <p>4 a) In case Proprietary Firm or HUF, the following documents shall be enclosed: Affidavit on stamp paper of appropriate value declaring that his/her concern is a proprietary concern and he/she is sole proprietor of the concern or he/she is in position of "KARTA" of Hindu Undivided Family (HUF) and he/she has the authority, power and consent given by other partners to act on behalf of HUF.</p> <p>b) In case Partnership Firm(s), the following documents shall be enclosed:  i) Notary certified copy of the Partnership deed.  ii) Power of Attorney (duly registered as per prevailing law) in favour of one of the partners of the Partnership Firm to sign on the tender/agreement on behalf of the Partnership Firm and create liability against the firm.</p> <p>c) In case Private Limited /Limited Companies, the following documents shall be enclosed:  i) Notary certified copy of Resolution of the Directors of the Company permitting the company to participate in the tender, authorizing MD or one of the Directors or Managers of the Company to sign the agreement, such other documents required to be signed on behalf of the company and enter into liability against the company and/or do any other act on behalf of the company.  ii) Copy of Memorandum and Articles of Association of the Company.  iii) Power of Attorney (duly registered as per prevailing law) by the company authorizing the person to do/act mentioned in the para (c) (i) above.</p>
27.0	Rates should be quoted in BOQ only. Rate quoted elsewhere in the tender document or given in separate envelope shall not be evaluated and tender shall be considered incomplete.
28.0	Any special conditions shall be brought out clearly in the forwarding letter. Any special condition quoted elsewhere in the tender document shall not be considered part of offer.



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**ANNEXURE-A**

**FORMAT FOR WORK EXPERIENCE**  
(For Technical Eligibility)

- (i) The following information should be provided in the format indicated for each reference project for which your company, either individually as a corporate entity or as one of the major companies within a legally contracted by the client.
- (ii) The information should be specific & to the point to facilitate a quick and objective decision.
- (iii) CERTIFICATE FROM CLIENT SHALL BE ATTACHED AS A PROOF.

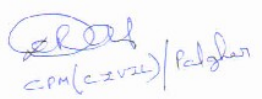
1	Name of Work	.....
2a	Date of Start	.....
2b	Date of Completion (Stipulated/Original)	.....
2c	Date of Completion (Actual/Final)	.....
2d	Completion Cost (Actual/Final)	.....
3	Detail of Client:	-Name of Client..... -Phone Number..... -Address.....
4	Were services provided as JV/Consortium?	YES / NO
5	If yes, then exact description of the division of responsibility between you & your Associate.	.....
6	Whether certificate from Client attached	YES / NO

Signature of Authorised Representative

\_\_\_\_\_

Name : \_\_\_\_\_

Signature of Tenderer



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**ANNEXURE-B**

**FORMAT FOR LIST OF WORKS ON HAND**

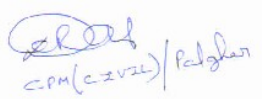
- (i) The following information should be provided in the format indicated for each reference work for which your company, either individually as a corporate entity or as one of the major companies was legally contracted by the client.
- (ii) List shall be provided for only those projects where vehicle services were provided during last five years.
- (iii) The information should be specific & to the point to facilitate a quick and objective decision.
- (iv) CERTIFICATE FROM CLIENT SHALL BE PRODUCED FOR CHECKING IF DEMANDED BY COMMITTEE MEMBERS DURING PRESENTATION

**1. List of organisations where work was undertaken:-**

<u>Sl. No</u>	<u>Name of Project</u>	<u>Name of Client</u>	<u>Value of Project (Rs)</u>	<u>Whether work executed in JV/Consortium.</u>	<u>Details of field survey undertaken</u>

Signature of Authorised Representative \_\_\_\_\_

Name : \_\_\_\_\_



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**ANNEXURE-C**

**FORMAT FOR AFFIDAVIT TO BE SUBMITTED / UPLOADED BY TENDERER ALONG WITH THE TENDER DOCUMENTS**

**(To be executed in presence of public notary on non-judicial stamp paper of the value of Rs. 100/-. The stamp paper has to be in the name of the tenderer) \*\***

I..... (Name and designation) \*\* appointed as the attorney/authorised signatory of the tenderer (including its constituents), M/s .....(herein after called tenderer) for the purpose of the Tender documents for the work of as per the tender No. \_\_\_\_\_ of NHSRCL, do hereby solemnly affirm and state on the behalf of the tenderer including its constituents as under:

1. I/ we the tenderer (s) am/are signing this document after carefully reading the contents.
2. I/ we the tenderer (s) also accept all the conditions of the tender and have signed all the pages in confirmation thereof.
3. I/ we hereby declare that I/we have downloaded the tender documents from NHSRCL website ([www.nhsrcl.in](http://www.nhsrcl.in)) and CPP portal (<https://eprocure.gov.in/cppp/>).
4. I/we have verified the content of the document from the website & CPP Portal and there is no addition, no deletion or no alteration to the content of the tender document. In case of any discrepancy noticed at any stage i.e. evaluation of tenders, execution of work or final payment of contract, the master copy available with the NHSRCL administration shall be final and binding upon me/us.
5. I/we declare and certify that I/we have not made any misleading or false representation in the forms, statements and attachments in proof of the qualification requirements.
6. I/we also understand that my/our offer will be evaluated based on the documents/credentials submitted along with the offer and same shall be binding upon me/us.
7. I/we declare that the information and documents submitted along the tender by me/us are correct and I /we are fully responsible for the correctness of the information and documents, submitted by us.
8. I /we understand that if the certificates regarding eligibility criteria submitted by us are found to be forged/false or incorrect at any time during process for evaluation of tenders, it shall lead to forfeiture of the tender EMD besides banning of business for a period of up to five year. Further, I /we (*insert name of the tenderer*) \*\*. \_\_\_\_\_ and all my/our constituents understand that my/our offer shall be summarily rejected.
9. I /We also understand that if the certificates submitted by us are found to be false/forged or incorrect at any time the award of the contract, it will lead to termination of the contract, along with forfeiture of EMD/SD and performance guarantee besides any other action provided in the contract including banning of business for a period of up to five years.

DEPONENT  
SEAL AND SIGNATURE  
OF THE TENDERER

**VARIFICATION**

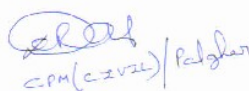
I/We above named tenderer do hereby solemnly affirm and verify that the contents of my/our above affidavit are true and correct. Nothing has been concealed and no part of it is false.

DEPONENT  
SEAL AND SIGNATURE  
OF THE TENDERER

Place:

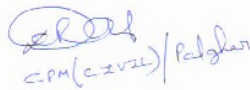
Dated:

\*\* The contents in Italics are only for guidance purpose. Details as appropriate are to be filled in suitably by tenderer.



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**TERMS OF REFERENCE / SCOPE OF  
WORK**

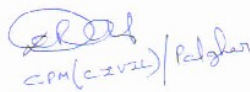


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1.0	<p><b>General Information</b></p> <p>The land acquisition for the Mumbai Ahmadabad High Speed Rail Project is in final phase. Some land parcels are already acquired and some are likely to be taken over. Now the work like road diversion etc being started as a preparatory work for the main execution phase.</p> <p>The USSOR items shall be executed, measured and paid, as per the provisions of Indian Railway Unified Standard Specifications.</p>
2.0	<p><b>Scope of Work</b></p> <p><b>Main scope of work is diversion of Road with asphalt pavement or Concrete pavement.</b></p> <p><b>2.1 Diversion of road by Asphaltic Surface:</b>  Excavation or filling (Cutting and/or filling) for embankment of diverted road.  Preparing Subgrade by dressing surface and Rolling of surface  Providing base layer like GSB, WMM  Providing binding layer by DBM/DBC  Finishing Layers</p> <p><b>2.2 Diversion of road by Concrete Pavement:</b>  Excavation or filling (Cutting or filling) for embankment of diverted road.  Preparing Subgrade by dressing surface and Rolling of surface  Providing base layer like GSB  Providing DLC layer  Providing PQC</p> <p>2.3 Providing Curbing stones  2.4 Providing retro reflective Road Signage  2.5 Providing thermoplastic pavement Markings.  2.6 Providing crash barriers, Height Gauges.  2.7 Providing grass turf, plantation etc.</p> <p><b>2.8 Construction of RCC minor bridges like RCC Box HP culverts.</b></p> <p>2.9 Miscellaneous Works Related to Diversion of Roads  To cater any unforeseen condition, schedule E of miscellaneous items is kept in BOQ. However during operation, it needs to be ensured that operated value of any item under this schedule does not exceed 5 lakh. In case of any such conditions where operation of any extra item of more than 5 lakh, is necessitated it will be done through variation.</p>

**GENERAL CONDITIONS OF  
CONTRACT**



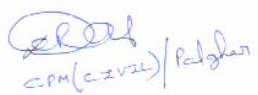
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## **GENERAL CONDITIONS OF CONTRACT**

The General Conditions of Contract governing the execution of the works covered by this tender are the “IR Standard General Conditions of Contract, November 2018” of the Engineering Department issued on 05.11.2018 including all corrections and Amendments issued up to date. A copy of the booklet incorporating the above “IR Standard General Conditions of Contract, November 2018” may be perused through the path: [www.indianrailways.gov.in/railwayboard](http://www.indianrailways.gov.in/railwayboard) >> "About Indian Railways" >> "Railway Board Directorates" >> "Civil Engineering" >> "Policy Matters" >> IR General Conditions of Contract, Nov 2018".

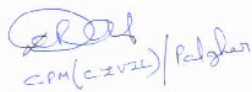
In submitting this tender it would be deemed that the tenderer has kept him fully informed of the provision of IR Standard General Conditions of Contract, November 2018 including all corrections and Amendments issued up to date and claim that he is not aware of any amendment or correction slip to IR GCC shall not be entertained.

In case of dissimilarity in the designation mentioned in the IR Standard General Conditions of Contract, November 2018 and NHSRCL, officer of equivalent grade of NHSRCL shall be referred.



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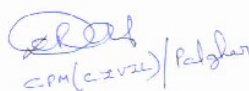
## **SPECIAL CONDITIONS OF CONTRACT**



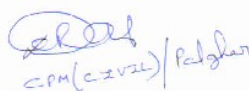
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1.0	<p><b>Security Deposit :</b></p> <p>The Earnest Money deposited by the Contractor with his tender will be retained by the NHSRCL as part of security for the due and faithful fulfillment of the contract by the contractor. The balance to make up the Security Deposit, the rates for which are given below, may be deposited by the Contractor in cash or may be recovered by percentage deduction from the Contractor's "on account" bills. Provided also that in case of defaulting contractor, the NHSRCL may retain any amount due for payment to the Contractor on the pending "on account bills" so that the amounts so retained may not exceed 10% of the total value of the contract.</p> <p><b>Recovery Of Security Deposit :</b> The Security Deposit/rate of recovery/mode of recovery shall be as under :</p> <ul style="list-style-type: none"> <li>(a) Security Deposit for each work should be 5% of the contract value,</li> <li>(b) The rate of recovery should be at the rate of 10% of the bill amount till the full Security Deposit is recovered,</li> <li>(c) Security Deposits will be recovered only from the running bills of the contract and no other mode of collecting SD such as SD in the form of instruments like BG (except Note (ii) below); FD etc. shall be accepted towards Security Deposit</li> </ul> <p>Security Deposit shall be returned to the contractor after the expiry of the maintenance period in all the cases other than Note (i) mentioned below and after passing the final bill based on No Claim Certificate with the approval of the Competent Authority. The Competent Authority shall normally be the authority who is competent to sign the contract. If this Competent Authority is of the rank lower than <b>JA</b> Grade, then a <b>JA</b> Grade Officer (concerned with the work) should issue the certificate. The certificate, inter alia, should mention that the work has been completed in all respects and that all the contractual obligations have been fulfilled by the contractor and that there is no due from the contractor to NHSRCL against the contract concerned. Before releasing the SD, an unconditional and unequivocal 'No Claim Certificate' from the contractor concerned should be obtained.</p> <p>Note - After the work is physically completed, Security Deposit recovered from the running bills of a contractor can be returned to him, if he so desires, in lieu of FDR/irrevocable Bank Guarantee for equivalent amount to be submitted by him.</p> <p>No interest will be payable upon the Earnest Money and Security Deposit or amounts payable to the Contractor under the Contract, but Government Securities deposited in terms of Sub-Clause (1) of this clause will be payable with interest accrued thereon.</p>
2.0	<p><b>Performance Guarantee:</b></p> <p>The procedure for obtaining Performance Guarantee is outlined below :</p> <ul style="list-style-type: none"> <li>(a) The successful bidder shall have to submit a Performance Guarantee (PG), as per the format provided in IR Standard General Conditions of Contract, November 2018, within 30 (thirty) days from the date of issue of Letter Of Acceptance (LOA). Extension of time</li> </ul>

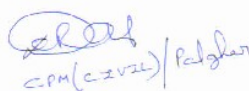
	<p>for submission of PG beyond 30 (thirty) days and upto 60 days from the date of issue of LOA may be given by the Authority who is competent to sign the contract agreement. However, a penal interest of 15% per annum shall be charged for the delay beyond 30 (thirty) days, i.e. from 31st day after the date of issue of LOA. In case the contractor fails to submit the requisite PG even after 60 days from the date of issue of LOA, the contract shall be terminated duly forfeiting EMD and other dues, if any payable against that contract. The failed contractor shall be debarred from participating in re-tender for that work. er annum shall be charged for the delay beyond 30 (thirty) days, i.e. from 31st day after the date of issue of LOA. In case the contractor fails to submit the requisite PG even after 60 days from the date of issue of LOA, the contract shall be terminated duly forfeiting EMD and other dues, if any payable against that contract. The failed contractor shall be debarred from participating in re-tender for that work.</p> <p>(b) The successful bidder shall submit the Performance Guarantee (PG) in the form of Irrevocable Bank Guarantee amounting to 5% of the contract value:</p> <p>(c) The Performance Guarantee shall be submitted by the successful bidder after the Letter Of Acceptance (LOA) has been issued, but before signing of the contract agreement. This P.G. shall be initially valid upto the stipulated date of completion plus 60 days beyond that. In case, the time for completion of work gets extended, the contractor shall get the validity of P.G. extended to cover such extended time for completion of work plus 60 days.</p> <p>(d) The value of PG to be submitted by the, contractor will not change for variation upto 25% (either increase or decrease). In case during the course of execution, value of the contract increases by more than 25% of the original contract value, an additional Performance Guarantee amounting to 5% (five percent) for the excess value over the original contract value shall be deposited by the contractor.</p> <p>(e) The Performance Guarantee (PG) shall be released after physical completion of the work based on 'Completion Certificate' issued by the competent authority stating that the contractor has completed the work in all respects satisfactorily. The Security Deposit shall, however, be released only after expiry of the maintenance period and after passing the final bill based on 'No Claim Certificate' from the contractor.</p> <p>(f) Whenever the contract is rescinded, the Security Deposit shall be forfeited and the Performance Guarantee shall be encashed. The balance work shall be got done independently without risk &amp; cost of the failed contractor. The failed contractor shall be debarred from participating in the tender for executing the balance work. If the failed contractor is a JV or a Partnership firm, then every member/partner of such a firm shall be debarred from participating in the tender for the balance work in his/her individual capacity or as a partner of any other JV /partnership firm.</p>
<b>3.0</b>	<b>SUB-CONTRACTING:-Not Applicable</b>
<b>4.0</b>	<b>Laws Governing the Contract</b>
4.1	The contract shall be governed by the laws in force in Maharashtra.
<b>5.0</b>	<b>MOBILISATION ADVANCE</b>
5.1	No mobilization Advance shall be paid by NHSRCL.

  
CPM (C-2022) / Palghar

<b>6.0</b>	<b>Working Hours</b>
6.1	The working hours normally should be from 8.30am to 6.30pm.
<b>7.0</b>	<b>Medical and Personal Accident Insurance</b>
7.1	Medical and Personal Accident Insurance will be borne by the Contractor.
<b>8.0</b>	<b>Payment Terms</b>
8.1	Payment of wages, all allowances and benefits, leave entitlement, EPF Contributions, insurance (as applicable) etc., shall be the Contractor's responsibility as per the Acts prevailing in India and Local Authority.
8.2	Payment shall be released to Contractor on submission of Bill in a format approved by NHSRCL in Hard and soft copy. Rates are inclusive of all taxes as applicable, no separate claim for tax shall be entertained.
8.3	All measurements and quantities shall be expressed in units as defined in "Bill of Quantities"
8.4	All payment to the Contractor shall be made through RTGS / A/c payee cheque. For the purpose of RTGS Contractor has to provide his A/c Number, name of Bank, IFSC code of Bank and Address of bank etc.
<b>9.0</b>	<b>Priority of Contract Documents.</b>
9.1	All tender documents forming the contract between NHSRCL and the Contractor are mutually explanatory of each other.  In case of any conflict, discrepancy, inconsistencies, ambiguities between the various documents in the contract, the order of priority shall be followed as per Contract Agreement.  However, the interpretation of Engineer/Employer shall be final in this regard.
<b>10.0</b>	<b>Accepted Rate applicable till the completion of work.</b>
10.1	The rates as per the accepted Bill of Quantities shall be firm and hold good till the completion of the work, and no additional claim or amount shall be admissible on account fluctuations in market rates, increase in taxes, GST, levies, fees royalties etc.
10.2	The Contractor shall be fully responsible for all welfare requirements of the manpower deployed, including (but not limited to), their accommodation, meals, wages, salary, transport to and from the site and entitlement.
<b>11.0</b>	<b>Indemnity by the Contractor</b>
11.1	The Contractor shall hold and save harmless and indemnify the Client/Employer/ officer-in-charge and their employees, from all actions, suits, proceedings, loss, costs, damages, charges, claims and demands of every nature and description brought against or recovered from the Client/Employer/ officer-in-charge and their employees by reason of any act or omission of the Contractor and/or his representative and/or his Employees and/or his Contractor in the execution of the works or in the guarding of the same. All the sums payable by Client /Employer/ officer-in-charge by way of compensation under any of these conditions shall be recovered from the dues of the Contractor, without reference to the actual loss or damage sustained, and whether or not any damage shall have been sustained.

  
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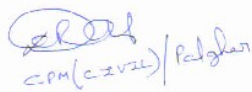
<b>12.0</b>	<b>Unfulfilled Obligations</b>
12.1	Notwithstanding the issue of Completion Certificate, the Contractor and the officer-in-charge shall remain liable for the fulfillment of any unfulfilled obligations under the provision of the contract, prior to the issue of such Certificate, and for the purpose of determination of the nature and extent of any such obligation, the contract shall be deemed to remain in force between the parties thereto.
<b>13.0</b>	<b>Jurisdiction of Courts</b>
13.1	All the disputes shall be within the jurisdiction of Maharashtra. No other court shall have jurisdiction to hear and determine any actions and proceedings arising from the contract.
<b>14.0</b>	<b>Secrecy/Non-disclosure</b>
14.1	The Contractor shall ensure that all the information is kept totally confidential in connection with this bid and the Contractor shall not disclose or divulge the same to any unauthorized person failing which Employer /officer-in-charge reserve the right to cancel the contract or cease further dealing with the Contractor.
14.2	<b>Payment Schedule</b> Payment shall be made after completion of work and submission of bill as per BOQ.
14.3	The employer will also provide any soft data related to the work e.g. CAD data etc. as and when required.
14.4	<b><u>Management of safety for field works</u></b> <ol style="list-style-type: none"> <li>1. It is a very important task to establish a safe and health-conscious working environment in order to achieve the goal of “ensuring human safety.” The establishment of such an environment should minimize the negative impact on the environment or society of the recipient countries and improve efficiency and productivity.</li> <li>2. The Contractor will compliance to ‘The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects’ September 2014 Japan International Co-operation Agency (JICA) Appendix-A.</li> <li>3. The Contractor/Tenderer shall prepare the safety plan in the bidding stage.</li> <li>4. The Contractor/Tenderer shall prepare the Safety Plan in the pre-study stage.</li> <li>5. The Contractor shall prepare Method statements on safety in the study stage</li> </ol>



CPM (C-2022) Palghar



# PROFORMAS



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**PROFORMA - A**

**FORM OF AGREEMENT**

*(To be executed on requisite value of stamp Papers)*

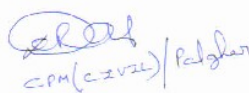
**AGREEMENT**

THIS AGREEMENT made on \_\_\_\_\_ day of \_\_\_\_\_ (Month/year) between **National High Speed Rail Corporation Limited**, (hereinafter called “the Employer/Engineer”) of the one part and \_\_\_\_\_ (name and address of the Contractor) (hereinafter called “the Contractor”) of the other part.

WHEREAS the Employer is desirous that work of  
“.....  
.....  
.....” should be executed by the Contractor viz. **Contract No.** \_\_\_\_\_ (hereinafter called “the Works”, and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

**NOW THIS AGREEMENT WITNESSETH as follows:**

1. In this Agreement, words and expressions shall have the same meaning as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement:
  - (a) Contract Agreement
  - (b) Letter of Acceptance of Tender
  - (c) Addendum(s)/ Corrigendum(s), if any.
  - (d) Financial Bid & Bill of Quantities
  - (e) Special Conditions of the Contract
  - (f) Terms of Reference / Scope of Work
  - (g) Technical Specifications and Standards.
  - (h) General Conditions of Contract
  - (i) Other Relevant Standards/codes/ any other documents forming part of agreement.
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.



C.P.M. (C.P.M.) / Palghar

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement executed the day and year first before written.

(Name, Designation and address of the authorised signatory)

(Name, Designation and address of the authorised signatory)

Signed for and on behalf of the Agency in the presence of:

Signed for and on behalf of the Employer in the presence of:

Witness:

Witness:

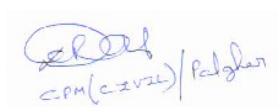
1.

1.

2.

2.

Name and address of the witnesses to be indicated



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**PROFORMA-B**

**SUPPLEMENTARY AGREEMENT**

Articles of Agreement made on this ..... in the year ..... and between National High Speed Rail Corporation Limited acting through the **Chief Project Manager-Palghar, National High Speed Rail Corporation Limited ( NHSRCL )**, 102, Adinath Villa, Opposite of Tashish Hotel, Vagulsar, Mahim Road, Place, Taluka, District & Post Office: Palghar, Pin: 401404, Maharashtra, India, hereinafter called as one party and ..... of the second part.

Where the party hereto of the second part executed an agreement with the party hereto of the first part being agreement No. .... dated ..... for the performance of ..... herein called the principal agreement.

And whereas it was agreed by and between the parties hereto that the works would be completed by the party hereto of the second part on ..... “date last extended” and whereas the party hereto of the second part has executed the work to the entire satisfaction of the party hereto of the first part and whereas the party hereto of the first part already made payments to the party hereto of the second part diverse sums from time to time aggregating to ..... including the final bill bearing voucher No. .... dated ..... (the receipt of which is hereby acknowledged by the party hereto of the second part) in full and final settlement of all his claim under the principal agreement.

Now it is hereby agreed by and between the parties in the consideration of sums already paid by the party hereto of the first part to the party hereto of the second part against all outstanding dues and claims for all works done under the aforesaid principal agreement including / excluding security deposit, the party hereto of the second part have no further dues / claims against the party hereto of the first part under the said principal agreement.

It is further agreed by and between the parties that they party hereto of the second part has accepted the said sums mentioned above in full and final satisfaction of all its dues and claims under the said principal agreement.

It is further agreed and understood by and between the party that in consideration of the payment already made under the agreement the said principle agreement shall finally discharged and rescinded all the terms and conditions including the arbitration clause.

It is further agreed and understood by and between the parties that the arbitration clause contained in the said principal agreement shall cease to have any effect and / or shall seems to be non-existent for all purposes.

Signature of the Tenderer/s

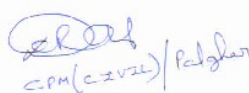
For & on behalf of

Signatures of the Witness:

Witness:

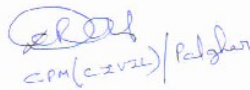
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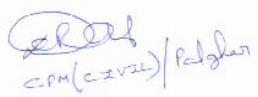
# **BILL OF QUANTITIES (BOQ)**



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**INSTRUCTIONS TO THE BIDDERS FOR FILLING THE BOO**

- 1) All prices should be in Indian Rupee.
- 2) In case of discrepancy between unit price and total, the unit price shall prevail. In case of discrepancy between sub totals and the total, the subtotal shall prevail.
- 3) In case of discrepancy between rates quoted in words and figures, rates quoted in words shall be considered.
- 4) Tenderers are required to quote their **rate in percentage only**.
- 5) Tenderers are required to quote their rate in % **above/below/at par** for Schedule items.
- 6) Items and quantities given in the Bill of Quantities are approximate and are just to give an idea of work involved. NHSRCL reserves the right to delete/operate any other items given in the schedule concerned, without any limit of variation to complete the work. The payment of schedule items shall be made at the accepted percentage **above/below/at par** of schedule and in terms of relevant clause of **SCC/GCC**.



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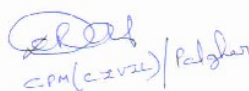
**BILL OF QUANTITIES (BOQ)**

**Name of the work: "Road Diversion work in Palghar District, under the Jurisdiction of CPM (Civil)/Palghar in connection with Mumbai Ahmedabad High-Speed Rail Corridor".**

**Schedule A : Central Railways USSOR 2011**

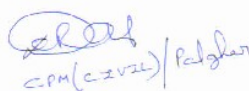
**Part I: Items Other than Cement and Steel**

Item No	Description of Item	Unit	Rate	Quantity	Amount
	<b><i>Excavation and Earthwork Items</i></b>				
011010	Earth work in excavation as per approved drawings and dumping at embankment site or spoil heap, within railway land, including 50m lead and 1.5m lift, the lead to be measured from the centre of gravity of excavation to centre of gravity of spoil heap: the lift to be measured from natural ground level and paid for in layers of 1.5m each, including incidental work, as per specifications-in-				
1	011011 All kinds of soils	cum	119.00	500	59,500.00
	013120 Earthwork in filling in embankment, guide bunds, around buried type abutments, bridge gaps, trolley refuges, rain bunds if provided, platforms etc. with earth excavated from outside railway boundary entirely arranged by the contractor at his own cost as per RDSO's latest guidelines and specifications and special condition of contract including all leads, royalty, lifts, ascents, descents, crossing of nallahs or any other obstructions. The rates shall include all dressing of bank to final profile, demarcation and setting out of profile, site clearance, removing of shrubs, roots of vegetation growth, heavy grass, benching of existing slope of old bank, all handling/re-handling, taxes, octroi and royalty etc. as a complete job. Cut trees shall be property of railways and to be deposited in the railway godown unless specified otherwise in the Special conditions of contract	cum	446.41	1500	6,69,615.00



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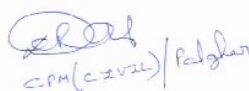
Item No	Description of Item	Unit	Rate	Quantity	Amount
	013110 Earthwork in cutting (Classified) in formation, trolley refuges, side drains, level crossing approaches, platforms, catch water drains, diversion of nallah & finishing to required dimension and slopes to obtain a neat appearance to standard profile inclus				
3	013111 In all conditions and classifications of soil except rock	cum	168.38	1500	2,52,570.00
4	013130 Extra for mechanical compaction of earth/blanketing material filled in embankment with contractor's rollers of suitable capacity, type and size to achieve specified density as per specification, testing as per IS codes incl. cost of water, T&P consumable	Cum	16.86	2000	33,720.00
5	014010 Dressing Surface (average excavation or filling upto 15 cm) including removing vegetation in all kind of soil. Payment against this item is to be made only if it is not included in earth work item	10 sqm	80.00	1500	1,20,000.00
6	021510 Hiring of JCB Machine (in good working condition) for levelling and dressing ground / dismantling structures including disposal of debris through dumpers etc. with contractor's labour, JCB machine, machine operator, fuel, etc. The contractor shall arrange	Hour	805.36	200	1,61,072.00
	<b>Drain Work</b>				
	031050 Providing and laying in position cement concrete of M 20 grade, excluding the cost of cement and of centering and shuttering, as per direction of the Engineer in charge :				
7	031051 All works upto Plinth level	cum	2,326.00	120	2,79,120.00
	031060 Centering and shuttering including strutting, propping etc. and removal of form work for :				
8	031061 Foundations, footings, bases of columns	Sqm	115.35	1000	1,15,350.00
9	031062 Retaining walls, return walls, walls (any thickness) including attached plasters, buttresses, plinth and string courses fillets etc.	Sqm	229.52	1700	3,90,184.00



CPM (C-2022) Palghar

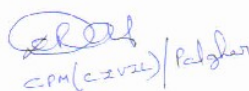


Item No	Description of Item	Unit	Rate	Quantity	Amount
	041010 Providing and laying in position M 20 Grade concrete for reinforced concrete structural elements but excluding cost of centering, shuttering, reinforcement and Admixtures in recommended proportion (as per IS:9103) to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer in charge				
10	041011 All work upto plinth level, including raft foundation of washable aprons, HS tank, pile cap, footings of FOB, and Platform shelter etc.	cum	2,564.70	170	4,35,998.41
11	041012 All work in buildings above plinth level upto floor two level.	cum	3,077.64	250	7,69,410.00
	042010 Centering and shuttering including strutting, propping etc. and removal of form for :				
12	042011 Foundations, footings, bases of columns, raft foundation of washable aprons, Pile caps, Footings of FOB etc.	Sqm	114.90	1000	1,14,900.00
13	042012 Walls (any thickness) including attached plasters, buttresses, plinth and string courses etc.	Sqm	229.50	2000	4,59,000.00
	<b>General Items</b>				
14	048070 Vacuum dewatering of all types & grade concrete by mechanical means including draining out the sucked excess water from concrete & then finishing the surface smooth with mechanical trowelling with suitable equipment etc. complete. The methodology to be adopted will be as per user manual of dewatering & trawling machine and as directed by Engineer.	Sqm	36.12	4500	1,62,540.00
	098020 Supplying and laying interlocking pre-cast CC block pavers of approved design factory manufactured of specified grade cement concrete on passenger platform, foot paths, circulating area, etc, including setting in position over 25mm thick bedding layer of fine sand, filling the joints with fine sand, leveling including compaction as per IS 15658.				

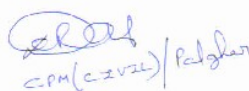


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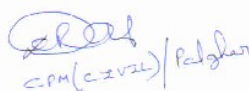
Item No	Description of Item	Unit	Rate	Quantity	Amount
15	098022 80mm thick blocks of M35 grade for medium traffic	m2	638.85	2000	12,77,700.00
16	098040 Extra over items for lacquer finish	Sqm	83.92	2000	1,67,840.00
	121010 Applying Priming Coat :				
17	121013 With ready mixed red oxide zinc chromate primer of approved brand and manufacture on steel galvanized iron/steel works.	sqm	19.71	5000	98,550.00
18	121030 Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coats applied @ 0.90ltr/ 10sqm over an under coat of primer applied @ 0.80ltr/ 10sqm of approved brand or manufacture.	sqm	77.68	4000	3,10,720.00
	121040 Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface etc. complete.				
19	121041 On steel work	sqm	102.62	4000	4,10,480.00
20	161010 Trenching in ordinary soil upto a depth of 60cm including removal and stacking of un-serviceable materials and then disposing of by spreading and neatly leveling with in a lead of 50m and making up the trenched area to proper levels by filling with earth or earth mixed with sludge or/ and manure before and after flooding trench with water (excluding cost of imported earth, sludge or manure). (Additional lead, if any will be paid as per rates in the Earth work Chapter).	cum	92.99	2000	1,85,980.00
21	161020 Supplying and stacking of good earth at site including royalty (earth measured in stacks will be reduced by 20% for payment).	cum	401.65	700	2,81,155.00
22	161030 Supplying and stacking sludge at site in dry caked form from approved disposal works including royalty & all lead and lift etc. (sludge measured in stacks will be reduced by 8% for payment).	cum	261.34	300	78,402.00

  
CPM(C-2022)/Palghar

Item No	Description of Item	Unit	Rate	Quantity	Amount
161040	Supplying and stacking at site dump manure / farm manure / animal dung manure from approved source; including all lead and lift etc. (manure measured in stacks will be reduced by 8% for payment)				
23	161041 Screened through sieve of I.S. designation 20mm	cum	108.58	400	43,432.00
24	161580 Laying of grass turf in proper level including scrapping of grass from the given site in turfs size 1x1 ft. approx. or desired size, transportation at site, watering, rolling, mowing, weeding and maintenance of the lawn upto a period of one month from the date of turfing as per direction of Officer in charge, with all labour, tools, and tackles complete. 50% payment after laying and 50% after one month	Sqm	65.56	4000	2,62,240.00
162050	Supply Of Plants/Trees {Notes - Supplying well grown plants-bushy and healthy, minimum height as specified (exposed height) including all lead & lift, carriage, handling etc.} (Size of pot will be upper inner dia of pot)				
162060	Avenue Plants				
25	162061 Alstonia scholaris of height 150-180 cm in earthen pots of size 25 cm	Each	98.96	300	29,688.00
26	162062 Alstonia scholaris of height above 180 cm in earthen pots of size 25 cm	Each	290.61	300	87,183.00
27	162063 Azadirachta Indica (Neem) of height 120-135 cm in big polybag of size 25-30cm	Each	75.73	150	11,359.50
28	162064 Bassia latifolia (Mahua) of height 90-120cm in big polybag of size 25-30cm	Each	69.92	150	10,488.00
29	162065 Bauhinia purpurea (Kachnar) of height 60-90 cm in big polybag of size 25-30cm	Each	58.77	250	14,692.50
30	162066 Bottle palm of height 150-165 cm in earthen pots of size 30 cm	Each	125.67	200	25,134.00
31	162067 Butea frondosa (Flame of forest) of height 60-90 cm in big polybag of size 25-30cm	Each	83.86	200	16,772.00
32	162068 Caryota mitis (Fish tail palm ) of height 120-135 in each earthen pots of size 25cm.	Each	126.02	200	25,204.00

  
CPM (C-2022) / Palghar

Item No	Description of Item	Unit	Rate	Quantity	Amount
	<b>Bridge work</b>				
142040	Providing and laying non-pressure NP3 class (medium duty ) R.C.C. pipes including bends etc with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1cement: 2fine sand) including testing of joints etc. complete above 800mm dia.				
33	142041 900mm dia. R.C.C. pipe	metre	3,827.52	50	1,91,376.00
34	142044 1200mm dia. R.C.C. pipe	metre	7,447.86	70	5,21,350.34
192010	Earth work in excavation for foundations and floors of the bridges, retaining walls etc., including setting out, dressing of sides, ramming of bottom, getting out the excavated material, back filling in layers with approved material and consolidation of the layers by ramming and watering etc. incl. all lift, disposal of surplus soil upto a lead of 300 M, all types of shoring and strutting with all labour and material complete as per drawing and technical specification as directed by Engineer in charge				
35	192011 All kinds of soils	cum	209.69	2000	4,19,380.00
36	192050 Providing and laying in position machine mixed, machine vibrated and machine batched Design Mix Cement Concrete M20 grade (Cast - in Situ) using 20 mm graded crushed stone aggregate and coarse sand of approved quality in Abutment, pier, wing walls and return walls of Mass cement concrete above RCC raft Including finishing complete as per specifications and direction of the Engineer in charge. Payment for cement, reinforcement and shuttering shall be paid extra	cum	2,093.25	200	4,18,649.20
37	194010 Providing and laying in position machine mixed, machine vibrated and machine batched Design Mix Cement Concrete M35 grade (Cast - in Situ) In Bottom/top slab, side walls, toe wall and sumps haunch filling head walls or any other component using 20 mm graded crushed stone aggregate and coarse sand of approved quality of cast-in-situ RCC	cum	2,093.25	200	4,18,649.20

  
CPM (C-2022) / Palghar

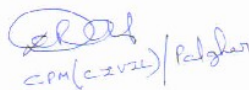
Item No	Description of Item	Unit	Rate	Quantity	Amount
	box of size upto 5 M (bigger inside dimension) including finishing, Admixtures in recommended proportions (as per IS 9103), if approved in Mix design, to accelerate, retard setting of concrete, improve workability without impairing strength and durability, complete as per drawings and technical specifications as directed by Engineer in charge. Payment for cement, reinforcement and shuttering shall be paid extra				
38	195020 Providing and applying two coats of coal tar or bitumen conforming to IS 3117 - 1965 on the top and sides of RCC box/slabs @ 1.70 Kgs / Sqm after cleaning the surface with all labour and materials complete job as directed by the Engineer	Sqm	108.41	4500	4,87,845.00
	195030 Centring and shuttering including strutting, propping etc. and removal of form for :				
39	195031 RCC raft foundation & Pile cap	Sqm	114.90	1500	1,72,350.00
40	195032 Abutment, pier, wing walls and return walls	Sqm	229.50	2000	4,59,000.00
41	195033 Abutment cap, Pier Cap, Inspection Platform & Pedestal over Pier cap, Fender wall, Diaphragm wall, etc.	Sqm	273.40	1000	2,73,400.00
42	195034 Approach slab at formation level, Dirt wall/ ballast wall at formation level	Sqm	114.90	500	57,450.00
43	222020 300 mm thick (average) Dry stone flooring with boulders of not less than 35 kg each in weight , hand packed with surface levelled off to the correct section with hammer dressing as necessary on the ground including filling the gaps with quarry spalls and ordinary sand complete including the cost of supply of all materials, labour, lead, lift, tools, plants, crossing of tracks and the like as per drawing and technical specification as directed by Engineer	cum	1,256.51	500	6,28,250.00
44	222180 Providing and laying of filter media consisting of granular materials of GW, GP, SW groups as per IS 1498-1970 in required profile behind boulder filling of abutments, wing walls / return walls etc	cum	1,503.94	500	7,51,969.62

Item No	Description of Item	Unit	Rate	Quantity	Amount
	above bed level with all labour and material complete job as per drawing and technical specification of RDSO Guidelines				
45	222290 Providing Boulder backing behind wing wall, return wall, retaining wall with hand packed boulders & cobbles with smaller size boulders toward the back including all lead, lift, labour & other incidental charges as complete work in all respect. Payment for boulder/cobbles will be done extra	cum	197.59	500	98,795.00
	<b>Road work</b>				
46	211060 Providing and fixing 65/50 mm nominal dia B class G.I. pipe railing used in rows for footpath or anti-crash barrier railing incl. cost of M.S. angle and channels in vertical posts, riveting, welding / rivetting, priming painting two coats, at all heights labour and material as a complete job	Kg	66.66	5000	3,33,300.00
47	231010 Preparation of subgrade by excavating earth upto 22.5cm depth, dressing to camber and consolidating with power road roller of 8 to 12 tonne capacity including making good the undulations etc. and disposal of surplus earth with lead upto 50 metres	Sqm	54.36	5000	2,71,800.00
48	231020 Consolidation of subgrade with power road roller of 8 to 12 tonne capacity including making good the undulations etc. with earth or quarry spoils etc. and re-rolling the subgrade	Sqm	1.65	5000	8,250.00
	234020 4cm thick bitumastic sheet with hot bitumen of approved quality using stone chippings (60% 12.5mm nominal size and 40% 10mm nominal size) 2.60cum and coarse sand 2.60cum of road surface and with 478kg bitumen per 100sqm of road surface over a tack coat in				
49	234021 With paving bitumen 80/ 100 heated and then mixed with solvent at the rate of 70grams per kg. of asphalt	Sqm	344.25	4500	15,49,125.00
50	235010 Providing and laying seal coat of premixed fine aggregate (passing 2.36mm and retained on 180micron sieve) with bitumen using 128 kg of	Sqm	63.36	4500	2,85,120.00

Item No	Description of Item	Unit	Rate	Quantity	Amount
	bitumen of grade 80/ 100 bitumen and 0.60cum of fine aggregate per 100sqm of road surface including rolling and finishi				
51	237050 Supplying and laying precast Kerb Stone of concrete M25 Grade 30cmX 20 cm (In Section / including chamfering as per design if any) including fixing in 1:6 cement sand mortar and pointing with 1:2 cement mortar (1cement:2 Sand ordinary) including all ex	metre	378.80	2000	7,57,599.99
	Providing and laying Dense Bituminous macadam on prepared surface with specified graded crushed stone aggregate for profile corrective base/ binding course mixing of stone aggregate, filler and bitumen in hot mix plant, transporting the mixed material and laying with paver finisher fitted with electronic sensing device to the required level and grade and rolling by road roller as per specification to achive the desired density, but excluding the cost of primer/tar coat				
52	238011 75 mm average compacted thickness with bitumen of 60/70 grade @ 5% by weight of total mix and lime filler @ 2% by weight of Aggregate. (For very heavy traffic condition)	Sqm	617.65	4500	27,79,425.00
	Providing and laying Dense Bituminous concrete on prepared surface with specified graded stone aggregate for wearing course, mixing of bitumen, filler & stone aggregate in hot mix plant, transporting the mixed material and laying with mechanical paver finisher fitted with electronic sensing device to the required level and grade and rolling by road roller as per specification to achive the desired density, but excluding the cost of primer/tar coat				
53	238021 40 mm / 50mm compacted thickness with bitumen of grade 60/70 @ 6.5% and lime @ 3% by weight of total mix	cum	8,952.37	200	17,90,473.54
	238040 Manufacturing supplying and fixing retro reflective sign boards made up of 2mm thick aluminium sheet, face to be				

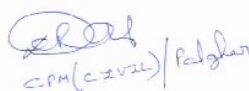


Item No	Description of Item	Unit	Rate	Quantity	Amount
	fully covered with high intensity encapsulated type heat activated retro reflective sheeting conforming to type - IV of ASTM-D 4956-01 in blue and silver white or other colour combination including subject matter, message (bi-lingual), symbols and borders etc. as per IRC ; 67:2001, pasted on substrate by an adhesive backing which shall be activated by applying heat and pressure conforming to class -2 of ASTM-D-4956-01 and fixing the same with suitable sized aluminium alloy rivets @ 20 cm c/c to back support frame of M.S. angle iron of size 25x25x3 mm alongwith theft resistant measures, mounted and fixed with 2 Nos. M.S. angles of size 35x35x5 mm to a vertical post made up of M.S. Tee section ISMT 50x50x6 mm - contd. ...				
	... contd.- welded with base plate of size 100x100x5 mm at the bottom end and including making holes in pipes, angles flats, providing & fixing M.S. message plate of required size steel work to be painted with two or more coats of synthetic enamel paint of required shade and of approved brand & manufacture over priming coat of zinc chromate yellow primer (vertical MS-Tee support to be painted in black and white colours). Backside of aluminium sheet to be painted with two or more coats of epoxy paint over and including appropriate priming coat including all leads and lifts etc. complete as per drawing, specification and direction of Engineer-in-charge. (Note : Concreting for fixing may be done as per site requirement and paid for separately)				
54	238041 Cautionary/warning sign boards of equilateral triangular shape having each side of 900mm with support length of 3650mm	Each	1,973.30	20	39,465.93
55	238050 Providing and applying 2.5mm thick road marking strips (retro-reflective) of specified shade/ colour using hot	Sqm	695.40	50	34,770.17

  
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Item No	Description of Item	Unit	Rate	Quantity	Amount
	thermoplastic material by fully/ semi automatic thermoplastic paint applicator machine fitted with profile shoe, glass beads dispenser, propane tank heater and profile shoe heater, driven by experienced operator on road surface including cost of material, labour, T&P, cleaning the road surface of all dirt, seals, oil, grease and foreign material etc. complete as per direction of Engineer-in-charge and in accordance with applicable specifications				
56	238060 Providing and fixing of raised pavement markers made of polycarbonate moulded body and reflective panels with micro prismatic lens made of polycarbonate with abrasion resistant coating. The length, weight and width of body shall not exceed 95 mm, 18mm and 105mm respectively. The lower surface of the RPM shall be supported with two nylon shanks, each of length not less than 25mm. Fixed to the road by using twin nylon shanks using bituminous adhesive on bitumen roads or without nylon shanks with epoxy resin adhesive on concrete roads as per directions of Engineer Incharge. The RPM should conform to the quality standards as laid down in IR Standard Specifications	Each	636.27	100	63,626.97
57	237010 Providing and fixing Cat's Eye (Glow studs) heavy integral stem, reflective, aluminium die cast with elegant finish of size 100x100mm and 20mm high having a stem of 50mm (or 12mm dia. 90mm long) screwed and nailed to fix into the road surface or at the nosing of the central verge. The road studs should have reflectors fitted on one side of the studs (3Nos. 7 element or 1No. 29 element reflector) complete	Each	772.09	100	77,208.78
	<b>Sub Total of Part I</b>			Rs.	2,02,48,629.15
	<b>Add prevailing %</b>	<b>20%</b>		Above	40,49,725.83
	<b>Total of Part I</b>				2,42,98,354.98



CPM (C-2022) / Palghar

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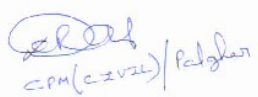
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- The Contractor shall be fully responsible for Compliance of all labour laws and including (but not limited to), their accommodation, meals, wages, salary, transport to and from the site and entitlement.

Signature of Contractor \_\_\_\_\_

Name of Authorised person \_\_\_\_\_

Date & Seal of Company \_\_\_\_\_



CPM (C-2022) / Palghar

**Name of the work: “Road Diversion work in Palghar District, under the Jurisdiction of CPM (Civil)/Palghar in connection with Mumbai Ahmedabad High-Speed Rail Corridor”.**

**Schedule ‘A’:**

**Part II: Cement Supply Items**

Item No	Description of Item	Unit	Rate	Quantity	Amount
	033060 Supply and using cement at worksite				
58	033062 OPC 53 grade	Tonne	6,095.00	500	30,47,500.00
	Sub Total of Part II			Rs.	30,47,500.00
	Add prevailing %	14.00%		above	4,26,650.00
	Total of Part II				34,74,150.00

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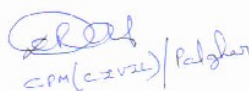
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Date & Seal of Company \_\_\_\_\_



CPM (CIVIL) / Palghar

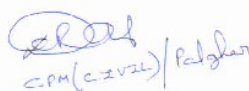
**Name of the work: "Road Diversion work in Palghar District, under the Jurisdiction of CPM (Civil)/Palghar in connection with Mumbai Ahmedabad High-Speed Rail Corridor".**

**Schedule 'A' : Part III: Steel Items**

Item No	Description of Item	Unit	Rate	Quantity	Amount
045020	Supplying anti corrosive reinforcement bars with fusion bonded epoxy coating after sand blasting, cleaning, induction, heating etc. of the reinforcement bars complete as per specification. including cutting, bending, placing in position and binding all complete.				
59	045021 Upto 16mm dia bars	Kg	65.39	10000	6,53,900.00
60	045022 More than 16mm dia bars	Kg	62.76	20000	12,55,200.00
081010	Structural steel work in single section including cutting, bending, straightening, drilling, riveting, bolting, hoisting, fixing in position, including applying a priming coat of approved steel primer, complete - upto 6m height above GL				
61	081011 In RSJ, tees, angles and channels	Kg	69.85	3000	2,09,550.00
62	081012 In flats, plates, round or square bars	Kg	69.65	2000	1,39,300.00
63	081360 Providing and fixing M.S. round holding down bolts with nuts and washer plates complete	Kg	72.52	500	36,260.00
	Sub Total of Part III			Rs.	22,94,210.00
	Add prevailing %	9.00%		Above	2,06,478.90
	Total of Part III				25,00,688.90

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CPM (CIVIL) / Palghar

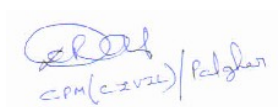
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Signature of Contractor \_\_\_\_\_

Name of Authorised person \_\_\_\_\_

Date & Seal of Company \_\_\_\_\_



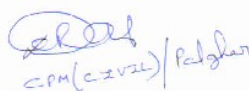
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**Name of the work: “Road Diversion work in Palghar District, under the Jurisdiction of CPM (Civil)/Palghar in connection with Mumbai Ahmedabad High-Speed Rail Corridor”.**

**Schedule -B (NS Items)**

Item No	Description of Item	Unit	Rate	Quantity	Amount
64	NS-1 provide and laying, sprearading compacting crushed stone in granular sub-base course (drainage layer) including premixing the material in mechanical mixer laying in uniform grader/ paver finisher on prepared murrum surface &compating with 10 ton vibratory tandem roller to achived density of 98% of Modified proctor density including all material labour, machinery all life and lead etc. complete and as directed by engineer incharges as per MORTH specification.	cum	2,532.00	300	7,59,600.00
65	NS-2 Providing and laying and spreading and compacting specified graded crushed stone aggregate to wet mixe macadam in layer of 75 mm thick compacted including premixing the material with water to OMC in mechanical mixer (pug mill ) carriage of mix material by tipper with site laying with paver finisher on prepared grunular subbase and compactive with vibratory tendem ( 10 ton ) roller to achive the density 98% of Modified proctor density including all material labour, machinery all lift and lead ect. complete and as directed by engineer incharge as per MORTH specification.	cum	2,943.00	300	8,82,900.00
66	NS-3 providing and laying dry lean concrete ( Grade M-10) base including providing coarse and fine aggregate, (blending of material and crushed sand ) to the specified gradzation with OPC 43 grade cement, including approved admixture, mixing of concrete as per approved mixed design using mechanical, batch mix plant of appropriate capacity, transporting and laying with self-propelled paver with electronic sensor devise and compacting with vibratory roller of minimum 8 to 10 mt. static	cum	5,630.00	100	5,63,000.00

Item No	Description of Item	Unit	Rate	Quantity	Amount
	weight to give desire compacted density and average compressive strength of 10 MPA at 7 days and curing with liquid curing compound and sprinkling water including providing construction joint including all material labour, machinery with all lead and lift etc. complete as specified and discrete by the engineer incharge (ready mix concrete only ) ( cement content 150 kg/cum)				
67	NS-4 Providing laying pavement quality concrete of M40 grade obtained from approved RMC plant including providing 125 micron thick impermeable plastic sheet membrane over the surface to be covered, coarse and fine aggregate of specified, graded using minimum cement content of 350 kg/cum, of admixures, mixing with mechanical batch mix plant of appropriate capacity as per design mix to the specified workability, transporting the mix with transit mixer and laying curing approved resin based alluminised reflective curing compound covering with moist hessain or ponding and sprinkling of water for a minimum period of 14 days and including and providing and fixing MS dowes MS ties bars cutting of groves and filling the same with approved polysulfied sealent and sealing all types of joints and finishing to the desired surface texture including all material labour, machinery with all leads, lifts ect. complete as directed by Engineer- in - charge.(without using slip form paver)	cum	10,451.00	50	5,22,550.00
68	NS-5 Applying and laying hot applied thermoplastic pavement marking paint with resin and 10% approved glass beads with 3 years guarantes ( white)/ yellow ect. Complete and as directed by Engineer- in – charge	sq.m.	796.00	2000	15,92,000.00



CPM Palghar

Item No	Description of Item	Unit	Rate	Quantity	Amount
69	NS-6 Extra over above for mixing polypropylene fibers 300e ^3 multi dimensional Graded Fibrillated 100% Virgin as per ASTM C1116 Type 4.1.3.std. At the rate of 125 gms. Per bag of 50 kgs. Of cement etc.	cum	535.00	500	2,67,500.00
	Total of Schedule 'B'(NS)				45,87,550.00

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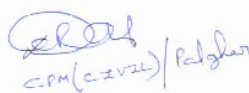
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Signature of Contractor \_\_\_\_\_

Name of Authorised person \_\_\_\_\_

Date & Seal of Company \_\_\_\_\_



CPM (C-2022) / Palghar



**Name of the work: “Road Diversion work in Palghar District, under the Jurisdiction of CPM (Civil)/Palghar in connection with Mumbai Ahmedabad High-Speed Rail Corridor”.**

**Schedule -C**

Item No	Description of Item	Unit	Rate	Quantity	Amount
70	C-1	Any Other Item of USSR-2011 of Central Railway within the scope of work.			20,00,000.00
		Add Departmental premium		20%	4,00,000.00
		Total of Schedule 'C'			24,00,000.00

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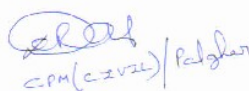
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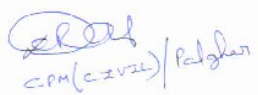


CPM (C-2011) / Palghar

**Name of the work: “Road Diversion work in Palghar District, under the Jurisdiction of CPM (Civil)/Palghar in connection with Mumbai Ahmedabad High-Speed Rail Corridor”.**

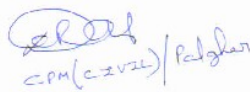
### **Summary**

Description of Schedule of BOQ	Amount as per BOQ	Contractors offer in % above/Below	Amount after Contractors Quote
Schedule 'A' : Central Railways USSOR 2011			
Part I: General Items Other than Cement and Steel	2,42,98,354.98		
Part II: Cement Supply Items	34,74,150.00		
Part III: Steel Items	25,00,688.90		
Schedule -B (NS Items)	45,87,550.00		
Schedule C	24,00,000.00		
	<b>3,72,60,743.88</b>		



CPM(Civil)/Palghar

# TECHNICAL SPECIFICATIONS



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## TECHNICAL SPECIFICATIONS

### 1 GENERAL

1.1. **Central Railway Specifications** for Materials & works shall be adopted. Some additional specifications are added herewith. Notwithstanding any provisions made in the C.R specifications, the provisions made in the technical specifications shall be binding. In the absence of any specification for any work on material the relevant Indian standard specification would be applicable and where no Indian standard specification exists, relevant international specification or the specification given by Railway would be followed. Decision of Railway in this regard would be final and binding on the contractor.

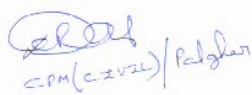
1.2. **Field Laboratory:**

The work covers the provision and maintenance of an adequately equipped field laboratory as required for site control on the quality of materials and the works. The lab should be manned, managed & maintained by suitable, qualified personnel from the contractor. The equipment given in Annexure XIV shall be provided in the field laboratory.

1.3. **Setting Out:**

The Contractors authorized/nominated Engineer/s shall establish working Bench Marks tied with the Reference Bench Mark in the area soon after taking possession of the site. The working Bench Marks/levels should be got approved from the Engineer. All dimensions and levels shown on the drawings or mentioned in documents forming part of or issued under the Contract shall be verified by the Contractor on the site and he shall immediately inform the Engineer of any apparent errors or discrepancies in such dimensions or levels.

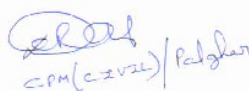
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CPM (C-2022) / Palghar

## 2. OPEN EXCAVATION

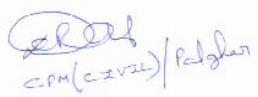
- 2.1 **EXCAVATION:** After the site has been cleared, the limits of excavation shall be set out true to lines, curves and slopes.
- 2.2. Excavation shall be taken to width at the lowest step of the foundation and the sides shall be left plumb where the nature of soil allows it. Where the nature of soil or the depth of the trench and season of the year do not permit vertical sides, the Contractor at his own expense shall put up necessary shoring, strutting and planking or cut slopes to a safer angle or both with due regard to the safety of personnel and works and to the satisfaction of the Engineer.
- 2.3. The depth to which the excavation is to be carried out shall be as shown on the drawings, unless the type of material encountered is such as to require changes, in which case the depth shall be as ordered by the Engineer.
- 2.4. **Dewatering and Protection:** If water is met within excavation, the Contractor shall take adequate measures such as bailing, pumping water at his own cost.
- 2.5. At the discretion of the Contractor, cement grouting or other approved methods may be used to prevent or reduce seepage and to protect the excavation area.
- 2.6. The Contractor shall take all precautions in diverting channels and, in discharging the drained water as not to cause damage to the works or any other property. *No separate payment shall be made on this account.*
- 2.7. **Preparation of Foundation** The bottom of the foundation shall be levelled both longitudinally and transversely or stepped as directed by the Engineer. As rock or other hard strata is being to be encountered, it shall be freed of all soft and loose material, cleaned and cut to a firm surface either level and stepped as directed by the Engineer.
- 2.8. **Backfilling:** Backfilling shall be done with approved material after concrete is fully set and carried out in such a way as not to cause undue thrust on any part of the structure. All space between foundation concrete and the sides of excavation shall be refilled to the original surface in layers not exceeding 150 mm compacted thicknesses. The compaction shall be done with the help of suitable equipment such as mechanical tamper, rammer, plate vibrator etc., after necessary watering, so as to achieve a density not less than the field density before excavation.
- 2.9. **Disposal of Excavated Materials:** All the excavated materials shall be the property of the Railways. The good/usable material obtained from the excavation of foundation shall be used for back filling of foundation, and the existing pits in the right-of-way and filling in that embankment, including loading of surplus good earth into truck, transporting, unloading, spreading, watering, ramming, levelling, etc. with all lifts and lead as per specifications of Earthwork and as directed by the Engineer. Unsuitable and surplus material not intended for use shall also, if necessary, be transported with all lifts and lead, disposed of out of railway land or used as directed by the Engineer and no extra payment shall be admissible.



CPM (C-2022) / Palghar

- 2.10 **Measurement for Payment:** Excavation for retaining structures shall be measured in cum. for all class of material encountered, limited to the dimensions shown on the drawings or as directed by the Engineer. Side slope payable for excavation is limited to 1 horizontal to 1 vertical (1H: 1V) or actual whichever is less. Excavation over increased width, cutting of slopes, shoring, shuttering and planking shall be deemed as convenience for the Contractor in executing the work and shall not be measured and paid. Rate of excavation is inclusive of dewatering & refilling. No separate payment will be made for dewatering and refilling.

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### 3. STRUCTURAL CONCRETE

#### 3.1 MATERIALS

##### 3.1.1 Cement:

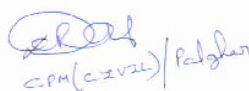
- a) Cement older than 3 months from the date of manufacture shall not be used.
- b) The cement used shall be any of the following, with prior approval of the engineer in charge.
  - Ordinary Portland Cement (53 grade) conforming to IS 12269- 1987
  - Ordinary Portland Cement (43 grade) conforming to IS:8112-1989
  - Ordinary Portland Cement (33 grade) conforming to IS:269-1989
  - Portland slag cement confirming to IS:455-1989
  - Portland pozzolana cement confirming to IS:1489 (Part-I) -1991 fly ash based

Note: -

- 1) All updated specifications up to date of opening of tender are applicable.
  - 2) Only readymade Portland Pozzolona Cement [confirming to IS:1489 (Part-I) - 1991 fly ash based] shall be allowed to use. **Mixing of fly ash and OPC cement at site/ RMC plant to produce Portland Pozzolona Cement shall not be allowed.**
  - 3) In case of blended cement i.e. Portland pozzalana cement and Portland slag cement rate of development of strength is slow as compared to ordinary Portland cement hence period of removal of formwork and period of curing should be suitable increased.
  - 4) Only Ordinary Portland Cement (53 grade) conforming to IS 12269- 1987 shall be allowed for Prestressed Concrete work (PSC).
- c) Cement manufactured by the following company shall only be allowed to use.
    - Ambuja
    - ULTRATECH
    - ACC
    - Birla
    - Grasim
    - JK

##### d) Testing frequency for cement:

Sr. No	Type of test	Test frequency	Remark.
1	Physical test	One sample for every 50 MT of cement consumed or part thereof or each batch of cement in case of time lapse of 15 days in supply of consecutive batches and manufacturers test certificate for each lot.	Test to be done. a) Initial and final setting time. b) Fineness. c) Compressive strength. d) Soundness e) Specific Gravity.
2	Chemical test.	One sample for every 100 MT of cement consumed or part thereof or each batch of cement in case of time lapse of 15 days in supply of	a) Lime saturation factor. b) Alumina Iron ratio c) Insoluble residue d) Magnesium oxide.



C.M.(C-2022)/Palghar

Sr. No	Type of test	Test frequency	Remark.
		consecutive batches and manufacturers test certificate for each lot.	e) Sulphuric Anhydride f) Loss of Ignition g) Chlorides h) C <sub>3</sub> A content. i) Specific Surface.

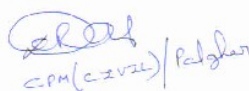
**3.1.2 Fine Aggregates (Sand)**

- Creek sand shall not be used in the construction of any concrete/Masonry work .
- Sand, if found too coarse, shall be suitably blended with finer sand obtained from approved resources to obtain the desired grading. The provision of two types of sand, their stacking separately and their mixing in the specified proportions shall be at the contractor's cost.
- The river sand shall not contain silt more than a total of 3% by weight. Chloride content in sand shall not be greater than 0.04% by weight.
- Artificial or crushed sand may be allowed to be used subject to passing from 75 micron sieve shall not be more than as provided in the IS code.
- The grading of the sand shall conform to IS: 383

**I. F) TEST FREQUENCY FOR FINE AGGREGATE**

II.[CONFIRMING TO IS: 383-1970, IS-2386-1963 )

Sr.No.	Characteristics to be checked	Acceptance Criteria		Method of testing	Test Frequency																
PHYSICAL TESTS		Code	Value																		
1	Determination of particle size – Grading zones (Sieve Analysis)	Table 4 of IS:383 – 1973	Zone- II <table border="1"> <thead> <tr> <th>Sieve</th> <th>Passing %</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>100</td> </tr> <tr> <td>4.75</td> <td>90-100</td> </tr> <tr> <td>2.36</td> <td>75-100</td> </tr> <tr> <td>1.18</td> <td>55-90</td> </tr> <tr> <td>600</td> <td>35-59</td> </tr> <tr> <td>300</td> <td>8-30</td> </tr> <tr> <td>150</td> <td>0-10</td> </tr> </tbody> </table>	Sieve	Passing %	10	100	4.75	90-100	2.36	75-100	1.18	55-90	600	35-59	300	8-30	150	0-10	Part –I of IS :2386	One sample per Lot of every 50 M <sup>3</sup> or part from each source for each site
Sieve	Passing %																				
10	100																				
4.75	90-100																				
2.36	75-100																				
1.18	55-90																				
600	35-59																				
300	8-30																				
150	0-10																				
2	Silt Content		Not more than 3% by wt.& shale, clay, and other structurally weak particles- 2% by weight.																		
3	Specific Gravity		2.6 to 2.85																		
4	Absorption Value		Not more than 3%	Part III of IS:2386 – 1963	One sample randomly 500 m <sup>3</sup> of concrete or																



CPM (C-2022) Palghar



5	Soundness of Aggregate	Cl. 3.6 of IS ; 383	Not more than 10% with Na <sub>2</sub> SO <sub>4</sub> & 15% with MgSO <sub>4</sub>	Part IV of IS: 2386 – 1963	change of source.
6	Presence of deleterious material (total)		5% Max(Total)		
7	Coal and Lignites	Table (1) of IS ;383	1.0% Max.	Part –II of IS :2386	
8	Clay lumps		1.0% Max.		
9	Material finer than 75 micron		3.0% Max.		
10	Soft fragments		-Nil-		
11	Shale		1.0% Max.		
	<u>CHEMICAL</u>				
12	Cl – content	Cl. 4.2.2 of CBC	0.04% Max.		
13	SO <sub>3</sub> - Content	Cl. 4.2.2 of CBC	0.4% Max.		

### 3.1.3 Coarse Aggregates

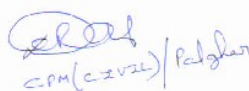
- Coarse aggregates for the works shall be crushed stone aggregates conforming to IS:383 obtained from approved sources
- Coarse aggregate containing flat or flaky pieces or mica shall be rejected.

### III. C) TEST FREQUENCY FOR COARSE AGGREGATE

[Confirming to IS: 383-1970, IS-2386-1963 & IS: 456-2000]

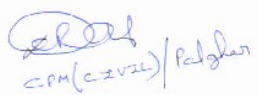
#### *Physical Tests*

Sr. No.	Characteristics to be checked	Acceptance Criteria			Method of testing	Test Frequency	
		Code	Value				
1	Determination of particle size (Sieve Analysis)	Table (2) of IS :383	Sieve size	40 mm 20mm 63mm 40mm 23mm 10 mm 4.75mm	100 - 100 85-100 0-20 0-5 0-5	IS :2386 (part I) – 1963	One sample every <b>50m<sup>3</sup></b> or part thereof
2	Moisture Content		As per site condition Max. 4 %				
3	Flakiness Index	Client	Not more than 30%				
4	Elongation index	--do --	Not more than 30%				



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Sr. No.	Characteristics to be checked	Acceptance Criteria		Method of testing	Test Frequency
		Code	Value		
5	Specific gravity		2.60 to 2.85		One sample per Lot of every <b>500 M<sup>3</sup> of concrete</b> or part thereof from each source.
6	Absorption value		Not more than 3%		
7	Crushing Value	C1.3.3 of IS: 383	Not more than 30% for concrete for wearing surfaces & 45% for other concrete	IS :2386 (part IV) – 1963	
8	Impact Value	C1.3.4 of IS: 383	Not more than 30% for concrete for wearing surface & 45% for other concrete	--DO --	
9	Abrasion Value	C1.3.5 of IS: 383	Not more than 30% for concrete for wearing surface & 50% for other concrete	--DO --	



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**Water :**

Creek water shall not be used. Potable water of proper quality should be used.

a) The permissible limits for solids shall be as follows:

Permissible limits (Max.)

Organic	200 mg/lit.
Inorganic	3000 mg/lit.
Sulphates (SO <sub>4</sub> )	500 mg/lit.
Chlorides (Cl)	2000 mg/I for plain concrete works, 500 mg/I for reinforced concrete works and 500 mg/I for pre-stressed concrete works.
Suspended matter	2000 mg/lit.
Acidic material	2 mg/lit.

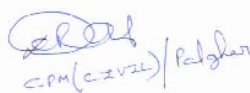
b) The PH value shall not be less than 6.

c) Test frequency for water.

[Confirming to Cl.5.4 of IS: 456 – 2000 & IR Bridge Code]

Sr. No.	Characteristics to be checked	Acceptance Criteria		Method of testing	Test Frequency
		Code	Value		
1	PH Value	Cl.-5.4.2 of IS : 456	Not less than 6	IS: 3025	100 m3 of concrete at site
2	Chloride content		Not more than 2000 mg/I for plain concrete works, 500 mg/Litre for reinforced concrete works and prestressed concrete works.	Part -32	
3	Sulphate content	Table (1) Cl. 5.4	Not more than 400 ppm	Part -24	
4	Organic impurities	Table (1) Cl. 5.4 IS:456	200 mg/ lit.	Part –18	Every 3 month
5	Inorganic impurities		3000 mg /lit	IS : 3025	
6	Suspended matter		2000 mg/lit.	Part –15 of IS; 3025	
7	Alkalinity		10mg/lit	Part 22& 23 of IS :3025	
8	Acidity		2 mg / lit		

**Concrete Admixtures:**



CPM (C-2022) Palghar

Concrete admixtures are proprietary items of manufacture and shall be obtained only from established manufacturers with proven track record, quality assurance and full-fledged laboratory facilities. The brand and type of admixture should be tested at site for various properties imparted to the concrete and to be used only if found suitable with prior approval of the engineer in charge.

a) Test frequency for admixture.

[Confirming to IS: 9103 & IRC CBC 1997]

Sr. No	Characteristics to be checked	Acceptance Criteria Value	Method of testing	Test Frequency
1	Chloride content	NIL	IS:6925	Each batch Up to 4000Kg
2	Air content	< Air content of controlled mix +1%	IS:1199	
3	Uniformity test	As per table 1 as given below.	Annexure E OF 9103	Each batch
4	Bleeding	< 5%	TABLE 1 A of IS:9103	Regular at site With various trial

**Table 1**

**Uniformity test & Requirements of Admixtures**

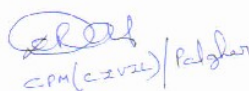
Sr no	Properties to be checked	Values	Test method
1	Dry moisture content	Within 3 % of MTC	Annexure E of 9103
2	Ash content	Within 1 % of MTC	Annexure E of 9103
3	Relative density	Within 0.02 % of MTC	Annexure E of 9103
4	Chloride ion content	Within 10% of the value or Within 0.2 % of MTC whichever is greater as stated by the manufacturer	Annexure E of 9103
5	Ph value	7 – 8	Annexure E of 9103
6	SO <sub>3</sub>	NIL	CBC:4.4.2

\* MTC= Manufacturers Test Certificate.

3.2 **Storage of Materials**

a. General:

All materials should be stored at proper places so as to prevent their deterioration or intrusion by foreign matter and to ensure their satisfactory quality and fitness for the work. All such materials even though stored in approved godowns/places, must be subjected to acceptance test prior to their immediate use.



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**b. Aggregates :**

Aggregate stockpiles should be made on ground that is denuded of vegetation, is hard and well drained. If necessary, the ground shall be covered with 50 mm plank. Aggregates placed directly on the ground shall not be removed from the stockpile within 15 cm of the ground until the final cleaning up of the work, and then only the clean aggregate will be permitted to be used. Aggregate shall be stored in such a way as to prevent segregation of sizes and avoid contamination with fines and other undesirable material.

**c. Cement :**

Cement shall be transported, handled and stored on the site in a godown in such a manner as to avoid deterioration or contamination. Cement shall be stored above ground level in perfectly dry and water-tight sheds and shall be stacked not more than eight bags high.

d. The Contractor shall prepare and maintain proper records on site in respect of delivery, handling, storage and use of cement and these records shall be available for inspection by the Engineer at all times.

**3.3 Design Mix :**

For all items of concrete only design mix shall be used. Prior to the start of construction, the contractor shall design the mix, the proportions of materials, including chemical admixtures to be used and submit to the Engineer for approval, Water-reducing admixtures (including plasticisers or super-plasticisers, retarders) or mineral admixture such as fly ash, GGBS or silica fumes may be used at the Contractor's option, subject to the approval of the Engineer, attaining the required strength and other properties of the concrete. Following are the requirements for Designed Mixes.

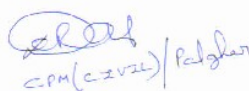
- a) The cement content shall not exceed 500 kg/cum.
- b) The minimum cement content and maximum water cement ratio to be taken for the design mix shall be as follows:

	Plain Concrete	RCC	PSC
Minimum cement content	300	350	440
Maximum water cement ratio	0.50	0.45	0.35

- c) Target Mean strength for design mix of concrete shall be as per IS 456
- d) The contractor may be allowed to use mineral additive like fly ash / silica fumes etc. to achieve the required strengths at his own cost.
- e) Whenever there is significant change in the quality of any of the ingredients for concrete, the Engineer may at his discretion order to carry out of fresh trial mixes. All costs for trial mixes & tests shall be to the contractors account and held to be included in the contract rates.
- f) When the proportions of a concrete mix have been approved by the Engineer, the contractor shall not vary the quality or source of the materials or the mix without the written approval of the Engineer.

**3.4 Special Measures**

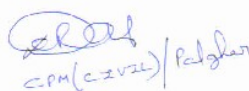
- a) Mixing Concrete: Concrete shall be mixed in a microprocessor controlled automatic batching and mixing plant, as per these specifications. Hand mixing shall not be permitted. The mixers or the plant shall invariably be fitted with water



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measuring (metering) devices. The Engineer shall approve the concrete mixer or the plant.

- b) Mixing shall be continued till materials are uniformly distributed and a uniform colour of the entire mass is obtained, and each individual particle of the coarse aggregate shows complete coating of mortar containing its proportionate amount of cement.
- c) To have the uniformity and homogeneity and to achieve the strength, and durable concrete, contractor shall use RMC (Ready Mix Concrete) from renowned approved microprocessor controlled automatic batching plant like L&T or the contractor shall install his own microprocessor/computer controlled automatic batching and mixing plant of concrete having capacity of mixing minimum 0.50 cum of concrete in one batch with minimum rated capacity of 30cum of concrete per hour at site.
- d) The method of transporting and placing concrete shall be approved by the Engineer. Concrete shall be transported and placed as near as practicable to its final position, so that no contamination, segregation or loss of its constituent materials takes place.
- e) When concrete is conveyed by chute, the plant shall be of such size and design as to ensure practically continuous flow. Slope of the chute shall be so adjusted that the concrete flows without any segregation of its ingredients. The delivery end of the chute shall be as close as possible to the point of deposit. Concrete shall not be moved by vibrators. The chute shall be thoroughly flushed with water before and after each working period and the water used for this purpose shall be discharged outside the formwork.
- f) All formwork and reinforcement contained in it shall be cleaned and made free from standing water, dust, snow or ice immediately before placing of concrete.
- g) No concrete shall be placed in any part of the structure until the approval of the Engineer has been obtained. If concreting is not started within 24 hours of the approval being given, approval shall have to be obtained again from the Engineer. Concreting then shall proceed continuously over the area between the construction joints
- h) Except where otherwise agreed to by the Engineer, concrete shall be deposited in horizontal layers to a compacted depth of not more than 300 mm
- i) Concrete for RCC when deposited shall have a temperature of not less than 5 degrees Celsius, and not more than 30 degree Celsius. Use of ice may be required to lower the temperature of the concrete at the discretion of the engineer in charge.
- j) Concrete shall be thoroughly compacted by vibration using electrically driven needle vibrators or other suitable means to produce a dense homogeneous void-free mass having the required surface finish. When immersion type vibrator needles are used, contact of needle with reinforcement and all inserts like ducts



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etc. shall be avoided. Additional vibrators in serviceable condition shall be kept at site so that they can be used in the event of breakdowns.

k) The permanent structure shall not be allowed to come in contact with sea water for at least 72 hours

l) Special precaution to be taken at Ready Made Concrete mixing plant

i. Calibration of plant shall be checked from authorized independent agency once in 6 months.

ii. Minimum initial setting time of concrete shall be 3 Hrs.

3.5 Construction Joints:-

Construction joints shall be avoided as far as possible. Sequencing of concrete placement should be organized in such a way that cold joints are totally eliminated. The sequence of concreting shall be submitted for approval of Railway prior to concreting of the structural element. Construction joints shall be located so as not to impair the strength of the concrete. Concrete placed to form the face of a construction joint shall have all laitance removed. One of the method to remove laitance is applying retarders by brush on freshly laid concrete and wash it by water jet after initial setting of concrete. The laitance at top does not get set and easily removed by washing. Before concreting is resumed, all loose matter on the existing concrete surface shall be removed.

3.6 Concreting Under Water:

All concreting shall preferably be done under dry conditions & concreting under water conditions shall be avoided as far as possible. If concreting under water is not avoidable then following precaution shall be taken.

The permanent structure shall not be allowed to come in contact with sea / creek water for at least 72 hours. When it is necessary to deposit concrete under water, the methods, equipment, materials and proportions of mix to be used shall be got approved from the Engineer before any work is started and in such cases concrete shall contain 10 per cent more cement than that required for the same mix placed in the dry.

All under-water concreting shall be carried out by tremie method only, using tremie of appropriate diameter. The tremie concreting when started should continue without interruption for the full height of the member being concreted. The concrete production and placement equipment should be sufficient to enable the underwater concrete to be completed uninterrupted within the stipulated time

3.7 Protection and Curing: Concreting operations shall not commence until adequate arrangements for curing have been made by the Contractor. Curing and protection of concrete shall start immediately after compaction of the concrete to protect it from:

- ✓ Premature drying out particularly by solar radiation and wind
- ✓ Avoiding plastic shrinkage cracks
- ✓ High internal thermal gradients
- ✓ Leaching out by rain and flowing water

a) Water Curing: Only potable water shall be used. Sea/creek water shall not be used for curing. Sea/creek water shall not come into contact with concrete members unless it has attained adequate strength.

Exposed surface of concrete shall be kept continuously in a damp or wet condition by pounding or by covering with a layer of sacks, canvas, Hessian or similar materials and shall be kept constantly wet for a period of not less than 14 days from the date of placing of concrete. In case of the Portland pozzolana cement and Portland slag cement curing period shall be 28 days.

- b) Curing compound: Curing compounds shall normally not be used. If proposed to be used, they can be permitted at selected locations, at the directive of the Engineer.

### 3.8 Finishing :

- a) Immediately after removal of forms, exposed bars or bolts, if any, shall be cut inside the concrete member to a depth of at least 50 mm below the surface of the concrete and the resulting holes filled with polymer cement grout .
- b) All construction and expansion joints in the completed work shall be left carefully tooled and free from any mortar and concrete. Expansion joint filler shall be left exposed for its full length with clean and true edges.
- c) The finished surfaces of concrete after removal of formwork should be such that no touching up is required. All kind of fins / protrusion caused by formwork joints, if any, shall be ground using electric surface grinder.
- d) Immediately on removal of forms, the concrete work shall be examined by the Engineer before any defects are made good.
- e) The work that has sagged or contains honeycombing to an extent detrimental to structural safety or architectural appearance shall be rejected.
- f) Surface defect of a minor nature may be accepted. On acceptance of such work by the Engineer, the same shall be rectified as directed by Engineer.

### 3.9 Equipment:

All equipment used for concreting shall have the approval of engineer in charge.

### 3.10. Measurement for Payment :

Structural concrete shall be measured in cubic meters. In reinforced or pre-stressed concrete, the volume occupied by reinforcement or pre-stressing cables and sheathing shall not be deducted. Payment shall be made based on the dimensions as per the drawing if the structure is within prescribed tolerance.

### 3.11 TESTS AND STANDARDS OF ACCEPTANCE

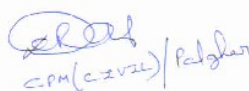
Concrete shall conform to the surface finish and tolerance as prescribed in these specifications for respective components.

#### a) Open Foundation

- i) Variation in dimensions. : + 50 mm , - 12 mm
- ii) Misplacement from specified position in plan. : 15 mm
- iii) Surface irregularities measured with 3m straight edge. : 3 mm

#### b) Substructure /Superstructure

- i) Variation in cross-sectional dimensions. : + 12 mm, - 6 mm
- ii) Misplacement from specified position in plan. : 10 mm
- iii) Variations from plumb over full height. :  $\pm$  10 mm



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3.12 Sampling and testing :

a) Compressive strength

- Green concrete, for making 3 test cubes, shall be taken from a batch of concrete at point of delivery into construction, according to procedure laid down in IS:1199. Frequency shall be as per IS:456

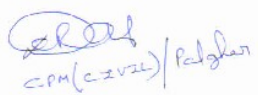
Quantity of Concrete in work, m <sup>3</sup>	No. of samples For 28 days	No. of samples For 7 Days
1-5	1 Set	1 Set
6-15	2 Sets	2 Sets
16-30	3 Sets	2 Sets
31-50	4 Sets	3 Sets
51 and above	4 Sets plus one Set additional sample for each additional 50 m <sup>3</sup> or part thereof.	3 Sets plus one Set additional sample for each additional 50 m <sup>3</sup> or part thereof.

At least one sample shall be taken from each shift of work. Each set consists of 3 cubes.

- 150 mm cubes shall be made, cured and tested at the age of 28 days for compressive strength in accordance with IS: 456-2000.
- Three test specimens shall be made from each sample for testing at 28 day. Additional cubes shall be made for various purposes such as to determine the strength of concrete at 7 days for any other purpose as given in above table.
- The test strength of the sample shall be the average of the strength of 3 cubes.

b) Permeability test to be done as follows:

- Prepare the cylindrical test specimen 150 mm dia. and 160 mm high.
- After 28 days of curing, the test specimen is fitted in a machine such that the specimen can be placed in water under pressure up to 7 bars.
- At first a pressure of one bar is applied for 48 hours, followed by 3 bars for 24 hours and 7 bars for next 24 hours.
- After the passage of the above period, the specimen is taken out and split in the middle by compression applied on two round bars on opposite sides above and below.
- The water penetration in the broken core is to be measured with a scale and the depth of penetration assessed in mm (max. permissible limit 25 mm).
- Frequency of testing for permeability: 2 sets of 3 sample each per 100 m<sup>3</sup> of RCC concrete.



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c) Test for Total chlorides and Sulphates in concrete.

Sr .No.	Characteristics to be checked	Acceptance Criteria ( Value)	Test Frequency
1	Total Chlorides in concrete as cl	0.06%by wt. Of Cement for PSC(0.29Kg./ m3) 0.15% by wt. of Cement for RCC(0.66kg/ m3)	Every 500 m3 of concrete.
2	Total Sulphate content as SO <sub>3</sub>	4% by the mass of cement	

3.13 Acceptance criteria:

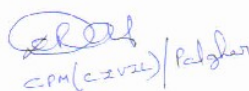
- a) The strength requirement of any particular grade of concrete will be considered satisfactory if the 28 days' compressive strengths of individual sets (each set consists of 3 cubes) and of individual cubes satisfy the acceptance criteria as given in the IS 456-2000.
- b) Whenever a mix is redesigned due to a change in the quality of aggregate or cement or for any other reason, it shall be considered a new mix and initially subject to the acceptability criteria above.
- c) If the concrete produced at site does not satisfy the above strength requirements, the Engineer will reserve the right to require the contractor to improve the methods of batching, the quality of the ingredients and redesign the mix with increased cement content, if necessary. The contractor shall not be entitled to claim any extra cost for the extra cement used for the modifications stipulated by the Engineer for fulfilling the strength requirements specified.
- d) It is the complete responsibility of the contractor to design the concrete mixes by approved standard methods and to produce the reinforced concrete conforming to the specification and the strength requirements approved by the Engineer.
- e) As frequently as the Engineer may require, testing shall be carried out in the field for:
  - a. Moisture content and absorption and density of sand and aggregate.
  - b. Silt content of sand, Grading of sand and aggregates.
  - c. Slump test of concrete.
- f) Before concreting commences on any section of the works the contractor shall obtain approval of the Engineer or his representative as regards the formworks and reinforcements conforming to the drawings. He shall also indicate to the Engineer in writing and obtain his approval for positions of construction joints.

3.14 Cracks: If cracks develop in concrete construction, which in the opinion of the Engineer may be detrimental to the strength of the construction, the contractor shall dismantle the construction, carry away the debris, replace the construction and carry out all consequential work thereto.

If any cracks develop in the concrete construction, which in the opinion of the Engineer, are not detrimental to the stability of the construction, the Contractor at his own expense shall grout the cracks with polymer cement grout of approved quality and also at his own expense and risk shall make good to the satisfaction of the Engineer.

The Engineer's decision as to the extent of the liability of the Contractor in the above matter shall be final and binding.

3.15 Defective Concrete :Should any concrete be found honeycombed or in any way defective which may be suspected to affect the performance of the structure, shall be



C.P.M (C-2022) / Palghar

rejected outright. However, some surface defects like minor honey combing etc. not affecting the structural properties shall on the instruction of the Engineer repaired as per the approved procedure.

**3.16 Additional Specification Ready Mixed Concrete:**

The concrete should conform to the specifications given in IS -4926.

**3.16.1 Quality control:**

The producer of RMC shall adopt quality assurance programme, which shall get approved by Engineer. It shall cover forward, immediate and retrospective control. He shall have necessary laboratory facilities to carry out tests to ensure quality control at each stage during production of concrete. In case, few tests are done outside, which are not required frequently, the record of test results shall be available with RMC manufacturer.

**3.16.2 Approval of Design Mix concrete:**

Only design mix concrete shall be produced for the required grade and strength of concrete. For design of concrete mix IS : 10262 or any other standard may be used for guidance. The design mix computation shall be submitted in advance to the Engineer for approval indicating the testing of mix for workability, initial setting time, permeability, total chloride content & sulphate content. In case there is any change in ingredients or in the process/ plant, design mix shall be redesigned and got approved from Engineer.

**3.16.3 Loss in workability and strength of concrete during transportation:**

The loss in workability and strength during the transit time from batching plant to the place of work, shall be determined and shall be accounted for while designing the concrete mix.

**3.16.4 Access to Engineer/representative to Ready Mixed Concrete plant:**

RMC manufacturer shall allow the Engineer to supervise/inspect the operations and materials, process of manufacture and delivery of concrete involved in concrete production. He shall also provide adequate facility to the Engineer to take samples of materials used.

**3.16.5 Accessibility of technical records maintained by RMC manufacturer :**

RMC manufacturer shall allow Engineer to peruse the past and present technical records maintained by him.

**3.16.6 Deputation of Engineer :**

Manufacturer shall allow deputation of Engineer at Ready Mixed Concrete plant to ensure that concrete is being produced as per the requirement of work and as per approved mix design. Every transit mixture shall be provided with computer (Mixing & Batching plant of concrete) generated batch slip giving details of various ingredients used in each batch of concrete mixed.

**3.16.7 Temperature of concrete:**

Temperature of produced concrete shall not be less than 5<sup>0</sup> C and shall not exceed 35<sup>0</sup> C.

**3.16.8 Transportation of concrete:**

The concrete shall be transported in concrete transit agitators conforming to IS : 5892. Agitating speed of the agitators during transit shall not be less than 2 revolutions per minute but not more than 6 revolution per minute.

**3.16.9 Transit time and placement of concrete:**

- (a) The concrete shall be delivered at the site of work and discharge shall be completed within specified hours of adding mixing water to the dry mix of cement and aggregate. Concrete received after the transit time, as specified above, shall not be accepted.
- (b) Concrete, thereafter, shall be placed in position within the designed initial setting time. At the end of initial setting time, the left over portion of concrete, if any, shall be rejected.

**3.16.10 Re-mixing of water:**

Under any circumstances addition of any water shall not be allowed after the initial mixing of concrete.

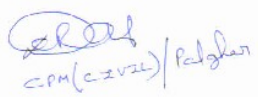
**3.16.11 Testing for workability and strength at the time of placement of concrete:**

The concrete shall be tested for the required workability and strength at the time of placement. Concrete shall be deemed to satisfy/ comply with the strength requirement when it fulfills the criteria laid down in IRS Concrete bridge Code clause 8.7.6.

**3.16.12 Dosing of admixture at site of concreting:**

After arrival of Ready Mixed Concrete at site, additional dose of admixture, if provided for in approved mix design, shall be added in presence of Engineers representatives.

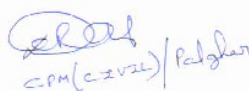
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#### 4 FORMWORK

- 4.1 Description: Formwork shall include all temporary or permanent forms required for forming the concrete of the shape, dimensions and surface finish as shown on the drawing or as directed by the Engineer, together with all props, staging, centering, scaffolding and temporary construction required for their support.
- 4.2 Materials :Materials and components used for formwork shall be examined for damage or excessive deterioration before use and shall be used only if found suitable after necessary repairs. Forms shall be constructed with metal. The metal used for forms shall be of such thickness that the forms remain true to shape. The use of approved internal steel ties or steel or plastic spacers shall be permitted. All shuttering plates, props, H frames, screw jacks and all necessary fittings required for formwork shall be of steel. Wooden planks and props shall not be allowed to be used for formwork and staging work.
- 4.3 Design of Formwork :The Contractor shall furnish the drawing of complete formwork (i.e. the forms as well as their supports) for approval of the Engineer before any erection is taken up. Notwithstanding any approval or review of drawing and design by the Engineer, the Contractor shall be entirely responsible for the adequacy and safety for formwork. The foundation of all supports shall be designed to suit the bearing capacity of soil to support the designed loads without settlement
- 4.4 The formwork shall be robust and strong and the joints shall be leak-proof.
- 4.5 The number of joints in the formwork shall be kept to a minimum by using large size panels. The design shall provide for proper “soldiers” to facilitate alignment. All joints shall be leak proof and must be properly sealed. Use of PVC JOINT sealing tapes, foam rubber or PVC T-section is essential to prevent leakage of grout.
- 4.6 As far as practicable, clamps shall be used to hold the forms together.
- 4.7 Use of ties shall be restricted, as far as practicable. Wherever ties are used they shall be used with HDPE sheathing so that the ties can easily be removed. No parts prone to corrosion shall be left projecting or near the surface.
- 4.8 Unless otherwise specified, or directed, chamfers or fillets of sizes 25 mm x 25 mm shall be provided at all angles of the formwork to avoid sharp corners. The chamfers, bevelled edges and moulding shall be made in the formwork itself. Opening for fixtures and other fittings shall be provided in the shuttering as directed by the Engineer.
- 4.9 Shuttering for walls, sloping members and thin sections of considerable height shall be provided with temporary opening to permit inspection and cleaning out before placing of concrete.
- 4.10 The formwork shall be so made as to produce a finished concrete true to shape, line and levels and dimensions as shown on the drawings, subject to the tolerances specified in respective sections of these specifications, or as directed by the Engineer.



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- 4.11 Where metal forms are used, all bolts and rivets shall be countersunk and well ground to provide a smooth, plane surface.
- 4.12 Forms shall be made sufficiently rigid by the use of ties and bracings to prevent any displacement or sagging between supports. They shall be strong enough to withstand all pressure, ramming and vibration during and after placing the concrete. Screw jacks or hard wood wedges, where required, shall be provided to make up any settlement in the formwork either before or during the placing of concrete.
- 4.13 The formwork shall be coated with an approved release agent that will effectively prevent sticking and will not stain the concrete surface.
- 4.14 The formwork shall be constructed with pre-camber to the soffit to allow for deflection of the formwork.
- 4.15 Formed Surface and Finish The formwork shall be lined with material approved by the Engineer so as to provide a smooth finish of uniform texture and appearance. This material shall leave no stain on the concrete and so fixed to its backing as not to impart any blemishes. It shall be of the same type and obtained from only one source throughout for the construction of any one structure. The contractor shall make good any imperfections in the resulting finish as required by the Engineer. Internal ties and embedded metal parts shall be carefully detailed and their use shall be subject to the approval of the Engineer.
- 4.16 Precautions
- i) Special measures in the design of formwork shall be taken to ensure that it does not hinder the shrinkage of concrete. The soffit of the formwork shall be so designed as to ensure that the formwork does not restrain the shortening and/or hogging of beams during pre-stressing. The forms may be removed at the earliest opportunity subject to the minimum time for removal of forms with props retained in position.
  - ii) Provision shall be made for safe access on, to and about the formwork at the levels as required.
  - iii) Close watch shall be maintained to check for settlement of formwork during concreting. Any settlement of formwork during concreting shall be promptly rectified
- 4.17 Preparation of Formwork before Concreting  
The inside surfaces of forms shall, except in the case of permanent form work or where otherwise agreed to by the Engineer be coated with a release agent supplied by approved manufacturer or of an approved material to prevent adhesion of concrete to the formwork. Before re-use of forms, the following actions shall be taken :
- i) The contact surfaces of the forms shall be cleaned carefully and dried before applying a release agent.
  - ii) It should be ensured that the release agent is appropriate to the surface to be coated. The same type and make of release agent shall be used throughout on similar formwork materials and different types should not be mixed.
  - iii) The form surfaces shall be evenly and thinly coated with release agent. The vertical surface shall be treated before horizontal surface and any excess wiped out.

- iv) The release agent shall not come in contact with reinforcement or the hardened concrete.

All forms shall be thoroughly cleaned immediately before concreting.

The Contractor shall give the Engineer due notice before placing any concrete in the forms to permit him to inspect and approve the formwork, but such inspection shall not relieve the contractor of his responsibility for safety of formwork, men, machinery, materials and finish or tolerances of concrete.

4.18 Removal of Formwork

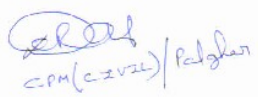
The scheme for removal of formwork (i.e. de-shuttering and decentring) shall be planned in advance and furnished to the Engineer for scrutiny and approval. No formwork or any part thereof shall be removed without prior approval of the Engineer.

The formwork shall be so removed as not to cause any damage to concrete. Centering shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually to avoid any shock or vibration.

4.19 Measurements for Payment:

The rate for concrete in Plain Concrete or Reinforced Concrete do not include formwork and temporary works required in accordance with this section and that shall be paid separately.

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## 5 REINFORCEMENT

5.1. Steel: Steel used in the works shall be Thermo Mechanically Treated high yield strength bars of grade FE-500 conforming to IS:1786-2008 manufactured by primary manufacturers i.e. SAIL, TISCO, Rastriya Ispat Nigam Limited and Jindal only .

5.2. Inspection & Testing

Every bar shall be inspected before assembling on the works and any defective, brittle, excessively rusted or burnt bars shall be removed. Cracked ends of bars shall be cut out. Physical and Chemical tests.

Test Frequency:-

- i) Upton 10 mm. dia. : One sample for 25 MT or part thereof for each dia. of bar
- ii) Above 10 mm. dia. : One sample for 40MT or part thereof for each dia. of bar.

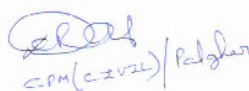
5.3. Lapping & Welding

- i) As far as possible, bars of the maximum length available shall be used.
- ii) In case the Contractor wishes to use shorter bars, laps shall be provided at the Contractor's cost in the manner and at the locations approved by the Engineer. Such overlaps shall not be paid for.
- iii) **If theoretical required length of reinforcement bar is more than 12 m then only overlaps will be measured for payment as authorized overlaps.**
- iv) **The number of authorised overlaps payable, if theoretical cut length of bar is more than 12 m, are as per table given below.**
- v) **Overlaps are also payable if there is change in diameter of bar (i.e. bars of different diameter are to be overlapped) as per approved detailed structural drawing.**
- vi) No other overlaps will be measured for payment.

Sr. No	Required Theoretical length of Bar	Number of overlap payable
1	More than 12 m but less than 23 m	1 (one)
2	More than 23 m	1+1 for every 11m or part thereof in excess of 23 m

5.4. Spacing, Supporting & Cleaning

- i) All reinforcement shall be placed and maintained in the positions shown on the drawings.
- ii) The Contractor shall provide approved types of supports as specified on the drawings for maintaining the top bars of the slab in position during concreting. All cover blocks shall be of concrete (not sand cement mortar) and of the same strength as that of the surrounding concrete and properly compacted and vibrated



CPM (C-2022) Palghar



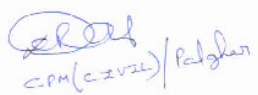
on a vibrating table. They shall be cured for a minimum period of 21 days before they are used in the works. PVC or similar material cover blocks can be permitted with specific approval of engineer in charge.

- iii) 18 SWG G.I. wire shall be used as binding wire. All frame crossing one another shall be bound with this wire twisted tight to make the skeleton on network rigid so that the reinforcement is not displaced during placing of concrete.
- iv) Bars must be cleaned before concreting commences of all scale, rust or partially set concrete which may have been deposited there during placing of a previous lift of concrete.

5.5. Measurement for Payment

- a) Reinforcement shall be measured in length separately for different diameters as actually used in the works as per drawing, excluding overlaps and over weights. From the length so measured, the weight of reinforcement shall be calculated in tonnes on the basis of standard weights as per IS:1732.  
-
- b) Lengths shall include hooks at ends, authorized overlaps (as mentioned in para 5.3 above), chairs and spacer bars.  
-
- c) Wastage, overlaps(Except those overlaps as mentioned in para 5.3 above), coupling, welded joints etc., and annealed G.I. wire (18 SWG) for binding , cover blocks shall not be measured and cost of these items shall be deemed to be included in the rates of reinforcement.

The bending, placing, binding, welding and fixing in position of reinforcement steel as shown on the drawings and as directed by the Engineer will be paid under separate item. It shall also include cost of all devices for keeping reinforcement in approved position, cost of jointing as per approved method and all wastage.



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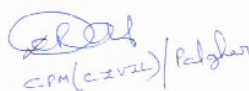
## 9. STRUCTURAL STEEL

### 1.0 **Description**

- a) This section is for general structural steel work required for any of the schedules. It shall include supply, fabrication, transportation, erection and painting structural steel, rivet steel, cast steel, steel forgings, cast iron and other incidental metal construction of the kind, size and quantity in conformity with drawings, specifications and as desired by Engineer.
- b) All steel works whether in fabrication, transportation or erection shall be done in accordance with relevant IS and IRS specifications and codes, subject to any further provisions contained in these specifications. In case of any variance, these specifications shall prevail.

### 2.0 **General:**

- a. General requirements relating to supply of material shall conform to specification of IS: 1387, for the purpose of which the supplier shall be the contractor and the purchaser shall be the Engineer.
- b. Finished rolled material shall be free from cracks, flaws, injurious seams, laps, blisters, ragged and imperfect edges and other defects. It shall have a smooth, uniform finish, and shall be straightened in the mill before shipment. They shall also be free from loose mill scale, rust, pitting or other defects affecting strength and durability.
- c. The acceptance of any material on inspection at the mill, i.e., rolling mills, foundry or fabricating plant where material for the work is manufactured, shall not be a bar to its subsequent rejection, if found defective.
- d. All steel materials, plates, bars and structural shall have straight edges, flat surfaces and be free from twist. If necessary, they shall be cold straightened or flattened by pressure before being worked or assembled unless they are required to be of curvilinear form. Even formation of curve should be by cold working. Pressure applied should be such as not to injure the material. Adjacent surfaces or edges shall be in close contact or at uniform distance throughout.
- e. Unless specified otherwise, high tensile steel rivet conforming to IS: 1149 shall be used for members of high tensile steel conforming to IS: 961 and shall not be used for mild steel members.
- f. The use of cast steel shall be limited to bearings and other similar parts. Generally all steel pins (including knuckle pins) and rollers shall be of forged steel.
- g. Cast iron shall not be used in any portion of a steel structure, except where it is subject to direct compression.

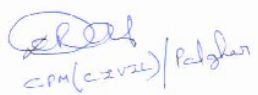


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3.0 **Materials:**

All materials shall conform to relevant Clause of tender documents. Special requirements are given below:-

- a) Mild steel for bolts and nuts shall conform to IS: 2062 but have a minimum tensile strength of 44 Kg/Sq.m. and minimum percentage elongation of 14. High tensile steel for bolts and nuts shall conform to IS: 961 but with a minimum tensile strength of 58 Kg/Sq.m. High strength friction grip bolts shall be permitted for use only on satisfactory evidence of performance to the requirements of BS. ASTM, DIN or other equivalent specifications as specified by Engineer or included in special provisions.
- b) For cast steel the yield stress shall be determined and shall not be less than 50 percent of minimum tensile strength.
- c) Plain washers shall be of steel. Tapered or other specially shaped washers shall be of steel or malleable cast iron.
- d) Parallel barrel drifts shall have a tensile strength of not less than 55 Kg/sq. mm with elongation of not less than 20 per cent measured on a gauge length of 4 So (So= cross sectional area).
- e) Copper alloys, mechanite or special steels used for bearings or similar other parts shall conform to requirements specified by Engineer or included in special provision.
- f) Mild Steel electrodes shall conform to IS: 814 and those of high tensile steel shall conform to IS: 1442.
- g) All paints and enamels used shall conform to requirements specified on drawings or other special provisions laid down by Engineer. Unless otherwise specified, paints shall conform to relevant IS specification.



CPM (C-2022) / Palghar

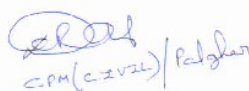
#### **4.0 Fabrication**

##### **4.1 General**

- a) All work shall be in accordance with drawings and as specified in these specifications, care being taken that all parts of an assembly fit accurately together. These shall form the provisions of relevant IS codes supplemented and prevailed by IRS specifications B-1-62, B-3-61, Parts 2 and 4 and IRS steel Bridge Code.
- b) Normally for repetitive works like bridge girders, in industrial structures and sheds when different components are built in units for assembling at site, similar units will be required to be made interchangeable.
- c) Unless specially required under the contract, corresponding parts need not be interchangeable but the parts shall be match marked as required under relevant Sub-Clause.
- d) Templates, jigs and other appliances used for ensuring accuracy of work shall be of mild steel; where specially required, these shall be bushed with hard steel. All measurements shall be made by means of steel tape or other device properly calibrated. Where bridge materials have been used as templates for drilling, these shall be inspected and passed by Engineer before they are used in the finished structure.
- e) All structural steel members and parts shall have straight edges and blunt surfaces. If necessary, they shall be straightened or flattened by pressure unless they are required to be of curvilinear forms. They shall also be free from twist. Pressure applied for straightening or flattening shall be such as would not injure the materials. Adjacent surfaces or edges shall be in close contact or at uniform distance or edges shall be in close contact or at uniform distance throughout.

##### **4.2 Preparation of Edges and Ends**

- a) All structural steel parts, where required shall be sheared, cropped, sawn or flame cut and ground accurately to required dimensions and shape.
- b) In the case of high tensile steel at least 6 mm of material from the flame-cut edge shall be removed by machining.
- c) Longitudinal edges of all plates and cover plates in plate girders and built-up members shall be machined except in the following areas:
  - a. Rolled edges of single universal plates or flats may not be machined.
  - b. Covers to single flange plates may be left unmachined.
  - c. Machine flame cutting instead of machining is acceptable for edges of single plates in compression and for edges of single plate, 25 mm or less thick, in tension.
  - d. Edges of single shaped plates over 25 mm thick not capable of being machined by ordinary method may be machine flame cut and the end surface ground.
  - e. Edges of universal plates or flats of same nominal width used in tiers may be left unmachined, if so authorized by Engineer.



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- d) All edges of splice and gusset plates 12 mm thick and over shall be machined and those less than 12 mm thick may be sheared and ground.
- e) The ends of plates and sections forming main components of plate girders or of built-up members shall be machined, machine flame cut, sawn, or hand flame cut and ground.
- f) In joints and splices of compression members, in girder flanges and in tension members where so specified on drawings, the abutting surfaces shall be faced and brought to an even bearing. A tolerance of 0.5 mm may be permitted locally. Where close fitting is not specified, any clearance shall not exceed 3 mm.
- g) Where ends of stiffeners are required to be fitted, they shall be machined, machine flame cut, sawn, sheared and ground, or hand flame cut and ground. The ends of lacing bar shall be rounded unless otherwise required. Other edges and ends of mild steel parts may be sheared and any burrs at edges shall be removed.

#### 4.3 **Preparation of Holes**

##### 4.3.1 **Drilling and Sub-punching**

- a) All holes for rivets shall be drilled or drilled in smaller diameter and reamed. However, if preferred, the holes may be sub-punched to a diameter of 6 mm less than the finished size and then reamed to the proper size. Sub-punching is not permitted for truss members of open web girders.
- b) Where several plates or sections form a compound member, they shall, where practicable, be firmly connected together by clamps or tacking bolts and holes drilled through the group in one operation or alternatively, in the case of repetition work plates and sections may be drilled separately using jigs and templates. The jigs and templates shall be checked at least once after 25 operations. All burrs shall be removed.
- c) Forming holes by flame cutting is severely forbidden. Holes finally formed for rivets and bolts shall be 1.5 mm larger in diameter than that of bar or bolt. Care shall be taken not to exceed this limit. In case of holes for turned bolts they shall be drilled to tolerances as per IS or IRS specification B-1 clause 29.5.
- d) In the case of repetition of spans, the erection of every span shall not be insisted upon, except where close tolerance or turned bolts are use, provided that acceptable methods are adopted to ensure strict interchange ability. In such cases, one span in ten or any number less than ten of each type shall be erected from pieces selected at random by Engineer and should there be any failure of pieces to fit, all similar spans shall be erected complete. In the event of the spans being proved completely interchangeable, all corresponding parts shall carry the same mark so that sorting of materials at site is facilitated.

##### 4.3.2 **Block Drilling**

Where the number of plates to be riveted exceeds three or the total thickness is 90 mm or more, the rivet holes, unless they have been drilled through steel bushed jigs,

shall be drilled out in place 3 mm all round after assembling. In such cases, the work shall be thoroughly bolted together.

#### 4.3.3 **Size of Holes**

The sizes of holes in millimetre are given in the following table. (Table 800.1).  
(TABLE 800.1) DIAMETER OF HOLES FOR RIVETS

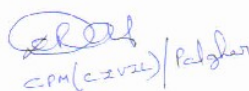
<u>Nominal dia. of Rivets (mm)</u>	<u>Dia. of Holes (mm)</u>
12	13.5
14	15.5
16	15.5
18	19.5
20	21.5
22	23.5
24	25.5
27	29.0
30	32.0
33	35.0

#### 4.3.4 **Close tolerance bolts and barrel bolts**

- a) The diameter of holes shall be equal to nominal diameter of the bolt shank or barrel minus 0.15 mm to 0.0 mm.
- b) The holes not drilled through all thicknesses at one operation shall be drilled to smaller size and reamed after assembly.

#### 4.4 **Rivet and Riveting**

- a) The diameter of rivets shown on drawings shall be the size before heating. Each rivet shall be of sufficient length so as to fill in the hole thoroughly and to form a head of standard dimensions as given in Indian Standard Handbook on Steel Sections, Part I. It shall be free from burrs on the underside of the head. Table 800.1 gives the sizes of holes which are generally found sufficient.
- b) When countersunk heads are required, the heads shall fill the countersunk. The included angle of the head shall be as follows:
  - a. for plates over 14 mm thick: 90 degrees
  - b. For plate's up to and including 14 mm thick: 120 degrees



CPM (C-2022) Palghar

- c) The tolerance on diameter of rivets shall be in accordance with IS: 1148 and IS: 1149 for mild steel rivets and high tensile steel rivets respectively and unless otherwise specified the tolerance shall be minus tolerance.
- d) Rivets shall be heated uniformly to a "light cherry red" and shall be red hot from head to the point when inserted and shall be upset in its entire length so as to fill the hole as completely as possible when hot. In no case shall tip of the rivet be hotter than the head. Rivets after being heated and before being inserted in the hole shall be made free from scale by striking the hot rivet on a hard surface. Rivets less than 10 mm in diameter may be driven cold.
- e) The rivets shall be machine driven, preferably by direct acting riveters. The driving pressure shall be maintained on the rivets for a short time after the upsetting is completed. High tensile steel rivets shall be heated up to 1100 degree Celsius. Any rivet whose point is heated more than prescribed shall not be driven. Hand riveting shall not be resorted to except with prior approval of Engineer.
- f) Where flush surface is required, any projecting metal shall be chipped or ground off.
- g) Before riveting is commenced, all work shall be properly and tightly bolted together. The bolts should be frequently tightened as the riveting proceeds.
- h) Drifts shall be used only for drawing the work into position and shall not be used to such an extent as to distort the holes. Drifts of a larger size than the nominal diameter of the hole shall not be used. The riveting shall be done by hydraulic or pneumatic machine unless otherwise specified by Engineer.
- i) Driven rivets, when struck sharply on the head with a quarter-pound rivet testing hammer, shall be free from movement and vibration.
- j) All loose or burnt rivets and rivets with cracked or badly formed defective heads or with heads which are unduly eccentric with the shanks, shall be removed and replaced. In removing rivets, the head shall be sheared off and the rivet punched out so as not to injure adjacent metal and, if necessary, they shall be drilled out. Recouping and caulking shall not be permitted.

#### 4.5 **Bolts, Nuts and Washers**

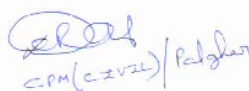
##### 4.5.1 **Black Bolts (black all over)**

Black bolts are forged bolts in which the shanks, heads and nuts do not receive any further treatment except cutting of screw threads. They shall be true to shape and size and shall have standard dimensions as shown on drawings.

##### 4.5.2 **Close Tolerance Bolts**

Close tolerance bolts shall be faced under the head and turned the shank.

##### 4.5.3 **Turned Barrel Bolts**



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The diameter of the screwed portion of turned barrel bolts shall be 1.5 mm smaller than the diameter of the barrel unless otherwise specified by Engineer. The diameter of the bolts as given on drawing shall be the nominal diameter of the barrel. The length of the barrel shall be such that it bears fully on all the parts connected. The threaded portion of each bolt shall project through the nut by at least one thread. Faces of heads and nuts bearing on steel work shall be machined.

#### 4.5.4 Washers

- a) In all cases where the full bearing area of the bolt is to be developed, the bolt shall be provided with a steel washer of sufficient thickness under the nut to avoid any threaded portion of the bolt being within the thickness of the part bolted together and to prevent the nut when screwed up, from bearing on the shank of the bolt.
- b) For close tolerance of turned barrel bolts, steel washers whose faces give a true bearing shall be provided under the nut. The washer shall have a hole diameter not less than 1.5 mm larger than the barrel and a thickness of not less than 6 mm to that the nut, when screwed up, will not bear on the shoulder of the bolt.
- c) Taper washers with a correct angle of taper shall be provided under all heads and nuts bearing on bevelled surfaces.
- d) Spring washers may be used under nuts to prevent slackening of the nuts when excessive vibrations occur.
- e) Where the heads or nuts bear on timber, square washers having a length of each side not less than three times the diameter of the bolts or round washers having a diameter of 3.5 times the diameter of bolts and with a thickness not less than one quarter of diameter shall be provided.

#### 4.5.5 Studs

Ordinary studs may be used for holding parts together, the holes in one of the parts being tapped to take the thread of the stud. Counter-sunk studs may be used for making connections where the surfaces are required to be clear of all obstruction, such as protruding heads of bolts or rivets, studs may also be welded on steel work in positions as required.

#### 4.5.6 Service Bolts

- a) Service bolts shall have the same clearance as black bolts and where it is required that there should be no movement prior to final riveting, sufficient drifts or close tolerance bolts shall be used to assemble and locate the work.
- b) But no drifting to match up unfair holes shall be allowed. Any apparent error in fabrication which prevents assembly or fitting up of parts by the use of drifts shall be investigated immediately. If some ream ring is required and uses of special rivets are called for, same will not be undertaken without prior approval of Engineer. No extra payment shall be admissible for such additional work unless fabrication is done by a different agency and is established to be defective.



#### 4.5.7 Drifts

The barrel shall be drawn or machined to the required diameter for a length of not less than one diameter over the combined thickness of the metal through which the drifts have to pass. The diameter of the parallel barrel shall be equal to the nominal diameter of the hole subject to a tolerance of +0 mm and -0.125 mm. Both ends of the drift for a length of equal to 1.5 times the diameter of the parallel portion of the bar shall be turned down with a taper to a diameter at the end equal to one-half of that of parallel portion.

#### 4.5.8 Use of Drifts and Bolts

- a) In cases where the joint seems to withstand stresses arising from special methods of erection before being riveted up, parallel barrelled drifts and bolts shall be used to withstand the full stresses/forces arising thereof. In such case number of drifts used will be subject to a maximum of 40%.
- b) In the event of anticipated emergencies such as staying being in danger of being affected by floods or storms before riveting can be completed, the joints to be riveted shall be made secure by filling 40% holes by drifts and 40% with service bolts fully tightened up. Otherwise, in normal course filling not less than 50% of holes with service bolts shall make joints.

#### 4.6 Pins and Pin Holes

##### 4.6.1 Pins

- a) Pins shall be parallel throughout and shall have a smooth surface free from flaws. They shall be of sufficient length of ensure that all parts connected thereby shall have a full bearing on them. Where the ends are threaded, they shall be turned to a smaller diameter at the ends for the thread and shall be provided with a pilot nut, where necessary, to protect the thread when being drawn to place.
- b) Pins more than 155 mm in length or diameter shall be forged and annealed.

##### 4.6.2 Pin Holes

- a) Pin holes shall be bored true to gauge, smooth, straight, at right angles to the axis of the member and parallel to each other, unless otherwise required. Tolerance in the length of tension members from outside to outside of pin-holes and of compression members from inside to inside of pin holes shall be one millimetre. In built-up members, boring shall be done after the members have been riveted or welded.
- b) The specified diameter of the pin hole shall be its minimum diameter. The resulting clearance between the pin and the hole shall not be less than 0.5 mm and not more than 1.0mm.

#### 5.0 Shop Erection and Match-Marking

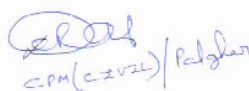
- a) Engineer and inspecting officials shall be given free access to the templating fabrication shop and for frequent inspection of different parts under fabrication.
- b) Before being dispatched, steel work shall be temporarily erected in fabrication shop for inspection by Engineer of other inspecting official either wholly or in such portion as Engineer may require so that he may be satisfied both in respect

of alignment camber and fit of all connections. For this purpose, sufficient number of parallel drifts and service bolts tightly screwed up shall be employed. All parts shall fit accurately and be in accordance with drawings and specifications.

- c) After the work has been passed by Engineer and before being dismantled, each part shall be carefully marked for re-erection with distinguishing marks and stamped with durable markings. Drawings showing these markings correctly shall be supplied to Engineer.
- d) Unloading, handling and storage of steel work as per these specifications shall be the responsibility of the contractor. The cost of repairs or of rejected material, its removal and the cost of transporting replacement material to the site shall be borne by the Contractor.
- e) Where close tolerance or turned barrel bolts are used for those cases where interchangeability is not insisted upon, each span shall be erected and members of each span marked distinctly.

## 6.0 **Welding**

- a) All welding shall be done with the prior approval of Engineer and workmanship shall conform to provisions of IS: 823 or other relevant Indian Standards as appropriate.
- b) All the welds shall be done by submerged arc welding process either fully automatic or semi-automatic. Manual metal arc welding may be done only with prior permission of Engineer. In case of bridge girders this would be permissible only in case
- c) of very short runs or of minor importance or where access or locations of welds to not permit automatic or semi-automatic welding.
- d) Except for special types of edge or end preparation, like double "U" or single "J" or double "J" (which would be prepared by machining or grouting) the fusion edges of all plates to be jointed shall be prepared by using mechanically controlled automatic flame cutting equipment and then ground to a smooth surface.
- e) When material thickness is 20 mm or more, special precautions like preheating shall be taken, as laid down in IS: 823.
- f) The general welding procedures including particulars of preparation of fusion faces for metal arc welding shall be carried out in accordance with IS: 9595. Welding shall not be done when the air temperature is less than 10 degree Celsius. Welding shall not be done when the surfaces are moist, during periods of strong winds unless the work and the welding operations are adequately protected.



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- g) Welding shall be permitted to be performed for the project either in the shop or in the field, only by operators who have passed qualification tests to the satisfaction of Engineer.

7.0 **Tolerances:**

Tolerances work shall be specified on the drawings and shall be subject to the approval of Engineer.

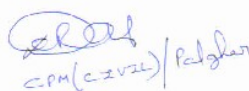
8.0 **Erection**

8.1 **General**

The contractor shall erect structural steel, remove temporary construction, and undertake all work required to complete the construction of works included in the contract in accordance with approved drawings and specifications to the entire satisfaction of Engineer.

8.2 **Organization and Equipment**

- a. The contractor shall submit erection plans prepared by the fabricator, showing the method and procedure of erection, compatible with the details of fabrication.
- b. Unless otherwise provided in the contract, the contractor shall supply and erect all necessary false work and staging and shall supply all labour, tools, tackles, erection plant and other materials necessary to carry out the work complete in all respects.
- c. The contractor shall supply all rivets, bolts, nuts, washers, etc., required to complete erection at site with an allowance for wastage, etc., of 12.5 per cent of the net number of field rivets, bolts, washers required, or a minimum of five number of each item whichever is higher.
- d. Service bolts and nuts, ordinary platters, washers, and drifts for use in erection work shall be supplied at 60 percent (45 percent bolts and 15 percent drifts) of the number of field rivets per span in each size (this includes wastage). A reduction in quantities of service bolts, etc., may, however, be specified by Engineer if more than one span of each type is ordered.
- e. Deflection and vibratory tests shall be conducted in respect of supporting structures, launching truss as also the structure under erection and unusual observations reviewed; looseness of fittings are to be noted.
- f. For welded structures, welder's qualifications and skill are to be checked as per standard norms. Non-destructive tests of joints as per designer's directives are to be carried out.
- g. Precision non-destructive testing instruments available in the market should be used for noting various important parameters of the structures frequently and systematic record is to be kept.
- h. Safety requirements should conform to IS:7205; IS: 7273 and IS: 7269 as applicable and should be a consideration of safety, economy and rapidity.
- i. Erection work should start with complete resources mobilized as per latest approved drawings and after a thorough survey of foundations and other related structural work. In case of work of greater magnitude, maximum mechanization is to be adopted.



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- j. The structure should be divided into erectable modules as per the scheme. This should be pre-assembled in a suitable yard/platform and its matching with members of the adjacent module checked by trial assembly before erection.
- k. The structure shall be set out to the required lines and levels. The stocks and masses are to be carefully preserved. The steelwork should be erected, adjusted and completed in the required position to the specified line and levels with sufficient drifts and bolts. Packing materials are to be available to maintain this condition. Organized "Quality Surveillance" checks need to be exercised frequently.
- l. Before starting work, the contractor shall obtain necessary approval of Engineer as to the method of erection, the number and character of tools and plants, type and quantity of labour to be maintained, and safety precautions taken. Approval of Engineer shall not relieve the contractor of his responsibility for safety of his method or equipment or from carrying out the work fully in accordance with drawings and specifications.
- m. During the progress of the work, the contractor shall have a competent engineer or foreman in charge of work, who shall be adequately experienced in steel erection and acceptable to Engineer.

9.0 **Handling and Storing Materials**

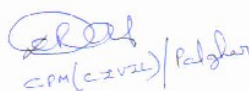
- a) Materials to be stored shall be placed on skids above ground. It shall be kept clean and properly drained. Long members shall be supported on skids placed bear enough together to prevent injury from deflection. The contractor shall be held responsible for loss or damage to any material paid for by the Department while in his care or for any damage to such material resulting from his work.
- b) IS: 7293 and IS: 7969 dealing with handling of materials and equipment for safe working should be followed.

10.0 **Formwork and Staging**

Formwork, staging and supports shall be properly designed, substantially built and maintained for all anticipated loads. The contractor, if required, shall submit plans and designs for approval to Engineer. Approval of plans, however, shall not relieve the contractor of his responsibility.

11.0 **Straightening Bent Material**

The straightening of plates, angles and other shapes which are slightly bent in transit or handling shall be done by methods not likely to produce fracture or any injury to the material. The metal shall not be heated unless permitted by Engineer for special cases when heating shall not be done to a temperature higher than that producing a dark 'cherry red' colour followed by as slow cooling as possible. Following the straightening of a bend or buckle, the surface shall be carefully investigated for evidence of fracture. Sharp kinks and bends and sign of any fracture may be cause for rejection of material.



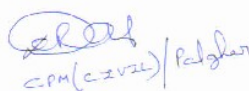
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## 12.0 **Assembling Steel**

- a. The parts shall be accurately assembled as shown on drawings and match marks shall be followed. The material shall be carefully handled so that no parts will be bent, broken or otherwise damaged.
- b. Hammering, which will injure or distort members, shall not be done. Bearing surface or surfaces to be in permanent contact shall be cleaned, before the members are assembled.
- c. All fasteners shall have a washer under nut or bolt head, whichever is turned in tightening.
- d. Any connection to be riveted or bolted shall be secured in close contact with service bolts or with a sufficient number of permanent bolts before the rivets are driven or before the connections are finally bolted. Joints shall normally be made by filling not less than 50 percent of holes with service bolts and barrel drifts in the ratio 4:1. The service bolts are to be fully tightened up as soon as the joint is assembled. Connections to be made by close tolerance or barrel bolts shall be completed as soon as practicable after assembly.
- e. Any connections, to be site welded, shall be securely held in position by approved methods to ensure accurate alignment, camber and elevation before welding is commenced.
- f. Field riveting, welding and bolted and pin connections shall conform to the requirements of appropriate Sub-Clause.
- g. The correction of minor misfits involving harmless amounts of reaming, cutting and chipping will be considered a legitimate part of erection. However, any error in shop fabrication or deformation resulting from handling and transportation which prevents proper assembling and fitting up of parts by moderate use of drifts or by a moderate amount of reaming and slight chipping or cutting shall be reported immediately to Engineer and his approval of the method of correction obtained. The correction shall be made in the presence of Engineer.

## 13.0 **Field Inspection**

- a. All materials, equipment and work of erection shall be subject to inspection of Engineer who shall be provided with all facilities including labour and tools required at all reasonable times. Any work found defective is liable to be rejected and no material or work shall be painted until inspected and approved.
- b. Structural steel and components viz., rivets, bolts, nuts, washers, welding consumables, etc., shall be tested for mechanical and chemical properties to the requirements of appropriate IS codes.
- c. Rivets and riveted connection shall be inspected and tested for compliance of Codal requirements. Welding procedure, welded connection and testing shall be in compliance with Codal requirements. All facilities necessary for stage inspection during welding and on completion shall be provided to Engineer or inspecting official.



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- d. Adequate means of identification either by identification mark or other record shall be provided to enable each weld to be traced to the welder(s) by whom it was carried out. The fabricated member/component made out of rolled and built-up section shall be checked for compliance of the tolerances specified in these specifications or as stipulated in relevant IS Codes and the checking for deviations shall be made over the full length.
- e. During inspection, the component/member shall not have any load or external restraint.

#### 14.0 **Painting**

##### 14.1 **General**

- a) Unless otherwise specified, all metal work shall be given approved shop coats as well as field coats of painting. The item of work shall include preparation of metal surfaces, application of protective covering, drying of paint coats and supply of all tools, scaffolding, labour and materials necessary :
- b) General steel work shall be protected against corrosion by :
  - i. Minimum of three coats of paint, or
  - i. A metal coating followed by two coats of paint.

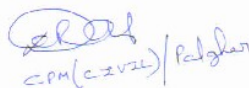
Unless otherwise specified, all painting and protective coating work shall generally be done in accordance with IS: 1477 (Part 1) and IRS specification B1-79.

##### 14.2 **Surface Preparation**

- a. Steel surface to be painted either at fabrication shop or at site of work shall be prepared in a thorough manner with a view to ensuring complete removal of mill scale by one of the following processes as agreed to between fabricator and Engineer:
  - i. Grit and sand blasting ;
  - ii. Pickling which should be restricted to single plates, bars and sections ;
  - iii. Flame cleaning ;
  - iv. Scraping and wire brushing.
- b. Primary coat shall be applied as soon as practicable after cleaning and in case of flame cleaning, primary coat shall be applied while the metal is still warm.
- c. All slag from welds shall be removed before painting. Care shall be taken to brush the surface clean prior to painting. Surfaces shall be maintained dry and free from dirt and oil. Work out of doors in frosty or humid weather shall be avoided.

##### 14.3 **Coatings**

- a. Prime coat to be used shall conform to specification of primers approved by Engineer. Metal coatings shall be regarded as priming coats.
- b. All coats shall be compatible with each other. When metal coatings are used, the undercoat shall be compatible with the metal concerned. The undercoat and the finishing coat shall preferably be from the same manufacturer. Successive coats of paints shall be of different shades or colours and each coat shall be allowed to dry thoroughly before the



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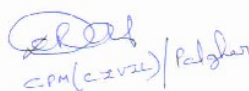
next coat is applied. Particular care shall be taken with the priming and painting of edges, corners, welds and rivets.

#### 14.4 Painting in Shop

- a. All fabricated steel shall be painted in shops, after inspection and acceptance, with at least one priming coat, unless the exposed surfaces are subsequently to be cleaned at site or metal coated.
- b. Shop contact surfaces, if specifically required to be painted, shall be brought together while the paint is still wet.
- c. Surface not in contact but inaccessible after shop assembly shall receive the fully specified protective treatment before assembly.
- d. Where surfaces are to be welded, the steel shall not be painted or metal coated within a suitable distance from any edges to be welded, if the specified paint or metal coating would be harmful to welders or is expected to impair the quality of site welds.
- e. Exposed machined surfaces shall be adequately protected.

#### 14.5 Painting at Site

- a. The methods of application of all paint coatings shall be in accordance with the manufacturer's written recommendation and shall be as approved by the Engineer. Spray painting may be permitted provided it will not cause inconvenience to the public and is appropriate to the type of structure being coated. Areas hard to gain access to for painting and areas shaded for spray application shall be coated first by brushing.
- b. Oil based red lead primers must be applied by brush only, taking care to work into all corners and crevices.
- c. The primer, intermediate and finishing coats shall all be applied so as to provide smooth coatings of uniform thickness. Wrinkled or blistered coatings or coatings with pinholes, sags, lumps or other blemishes shall not be accepted. Where the Engineer so directs, the coating shall be removed by abrasive blast cleaning and replaced at the contractor's expense.
- d. Surfaces, which will be inaccessible after site assembly, shall receive the full-specified protective treatment before assembly.
- e. Surfaces, which will be in contact after site assembly, shall receive a coat of paint (in addition to any shop priming) and shall be brought together while the paint is still wet.
- f. Damaged or deteriorated paint surfaces shall first be made good with the same type of coat as the shop coat.
- g. Where steel has received a metal coating in the shop, this coating shall be completed at site so as to be continuous over any welds, bolts and site rivets.
- h. Specified protective treatment shall be completed after erection.



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**15.0 Tests And Standards of Acceptance**

- a. The materials shall be tested in accordance with relevant IS and/or IRS specifications/codes and necessary test certificates shall be furnished. Additional tests, if required by Engineer, shall be got carried out by the Contractor at his own cost.
- b. The fabrication, furnishing, erecting, painting of structural steel work shall be in accordance with these specification and shall be got checked and approved by the Engineer.

**16.0 Measurements For Payment**

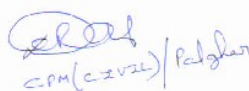
- a. Measurements of this item shall be in tones based on net weight of metal in the fabricated structure computed on the basis of nominal weight of materials.
- b. The weight of rolled and cast steel and cast iron shall be determined from the dimensions shown on drawings on the following basis:
 

Rolled or cast steel: 7.85gm/cu.cm  
Cast iron: 7.21 gm/cu.cm
- c. Weight of structural sections shall be nominal weight.
- d. The weight of castings shall be computed from dimensions shown on drawings with an addition of 5 (five) percent for fillets and over-runs.
- e. The weight of weld fillets and the weight of protective coatings shall not be included.
- f. The weight of rivet heads shall be computed by taking the weight of 100 snap head as given in Table 800.2.

**WEIGHT OF RIVET HEADS**

Dia. of rivet as manufactured (mm)	Weight of 100 snap heads (kg)
12	1.3
14	2.1
16	3.4
18	4.45
20	6.1
22	8.1
24	10.5
27	15.0
30	20.5
33	27.2

- g. When specially agreed upon, allowance for snap heads may be taken as a flat percentage of the total weight unless otherwise specified in tender documents. This percentage may be taken as 3 per cent or modified by mutual agreement.

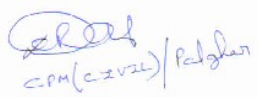


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- h. The Contractor shall supply detailed calculation sheets for the weight of metal in the fabricated structures. No additions shall be made for the weight of protective coatings or weld fillets.
  - i. Where computed weight forms the basis for payment, the weight shall be calculated for exact cut sizes of members used in the structure, deductions being made for all cuts, except for rivet holes. Additions shall be made for rivet heads as mentioned above.
  - j. When especially agreed upon, the basis for payment may be the fabricated structure weight complete, according to specifications included in special provisions of the Contract.

\*\*\*\*\*END OF TENDER DOCUMENT\*\*\*\*\*



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