



AN ISO 9001 & 14001 COMPANY

TENDER DOCUMENT

e-TENDER No: ERO/CON/941/1354

Tender for Turnkey Labour / Petty contract for Mechanical Works comprising Supply, Erection, Testing & Commissioning of Machinery & Plant in connection with Development of Infrastructure for Integrated Maintenance of MEMU, DEMU & other Coaching Stock in SER (Phase-1) at Anara, South Eastern Railway in PKG 2.

VOLUME – II

**Additional Conditions of Contract (ACC), Excerpts of Client's GCC, Client's Special Conditions of Contract (SCC), Client's Technical Specification, Client's Specifications for Mechanical Works, Technical Specification
&
Client's SCC for design & drawing.**

ENGINEERING PROJECTS (INDIA) LIMITED

**(A GOVT. OF INDIA ENTERPRISE)
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ADDITIONAL CONDITIONS OF CONTRACT (ACC) OF EPI

- 1.0 The following Additional Conditions of Contract shall be read in conjunction with General Conditions of Contract (GCC) of EPI, Client's Conditions and other conditions of the tender documents. If there are any provisions in these Additional Conditions of Contract, which are at variance with the provisions of GCC of EPI, Client's Conditions and other conditions of the tender documents, the provisions in these Additional Conditions of Contract shall take precedence. Following shall be the order of Precedence of Documents:-
- a. Contract Agreement.
 - b. Letter of Intent.
 - c. Notice Inviting Tender, Instruction to tenderers including Addendum/Corrigendum if any.
 - d. Additional Conditions of Contract (ACC) of EPI.
 - e. General Conditions of Contract (GCC) of EPI.
 - f. Client's SCC.
 - g. Client's / Railway GCC.
 - h. Price Bid / Bill of Quantity.
 - i. Specifications.
 - j. Drawings.
 - k. Any other documents, Minutes of meeting etc. forming part of the Contract.
- 2.0 Subsequent upon becoming the Lowest Eligible bidder in open tender invited by WORKSHOP PROJECTS ORGANIZATION (Indian Railway), Engineering Projects (India) Limited (EPI) awarded of the work of "Composite Work (Civil, Electrical & Mechanical) involving Construction of Industrial shed with Pre- Engineered Building (PEB), Sick line pit, Service building, Community Hall, Road, Overhead Tank, Electric Sub Station (ESS), Septic Tank, Drainage, Water Supply arrangement, Track works etc., Electrification and illumination works, Procurement and commissioning of specified Mechanical Machineries & Plant and other associated Civil, Mechanical, Electrical & Telecommunication works in connection with Development of infrastructure for integrated maintenance of MEMU, DEMU & other coaching stock in SER (phase-1) at Anara, South Eastern Railway (Indian Railway), who is the employer for the project.
- 3.0 This work is related to "Mechanical Works in connection with Development of Infrastructure for Integrated Maintenance of MEMU, DEMU & other Coaching Stock in SER (Phase-1) at Anara, South Eastern Railway" and referred as "Project" wherever mentioned in the tender documents.
- 4.0 The word "Contractor" appearing anywhere in the GCC and the other tender document shall mean the 'sub-contractor' i.e. the successful tenderer on whom the work under the present tender is awarded by EPI.
- GCC shall refer to EPI's General Conditions of Contract and SCC shall refer to General Conditions of Contract and Special Conditions of Contract of Client respectively. Wherever Proforma in EPI's GCC or ACC is mentioned, shall mean EPI's Proforma.

Contractor should promptly follow all the terms & conditions including specifications of **Mechanical Works** of Railway enclosed herewith which is integral part of this tender. Any clarification / modification / deviation at any stage must be clarified in writing from Railway / EPI before execution. EPI / Client will nowhere be responsible for any loss due to wrong / misinterpretation /without approval for any manner whatsoever. Contractor will provide all the design, drawings and other data as when demanded by EPI /Railway without any delay.

5.0 Clause no 3.0 of GCC shall stand amended as below:

The items of work given in the tender documents are for general guidance of the contractors and the works shall be carried out by the contractor on percentage rate basis in conformity with the detailed drawing, scope of work, technical specifications, additional conditions of contract (including any addition / modification / alteration / deletion made from time to time therein found essential for completion of works).

The contractor shall be deemed to have satisfied himself before tendering as to the sufficiency and correctness of his tender for the works and of the rates and prices quoted in the brief specifications, drawings, scope of work and payment (billing) schedule, which rates and prices shall, except as otherwise provided, cover all obligations under the contract and all matters and things found necessary for proper completion and maintenance of the works. It shall be the responsibility of the contractor to incorporate the changes that may be in the scope of work envisaged at the time of tendering and as actually required to be executed. The contractor has quoted his rates after clearly studying the scope of work given in Tender Documents availed by him by downloading from the website at the tendering stage itself and getting fully satisfied with the various items and technical intricacies involved in the work under his scope of work as envisaged in the tender. EPI shall not entertain any claim of the contractor on account of error or omission by him in this respect except what is admitted by the client.

6.0 MOBILIZATION ADVANCE – PAYMENT, RECOVERY & INTEREST THEREOF:-

Clause 8.1 of GCC Shall stand replaced with the following modifications wherever applicable:-

Interest Bearing, as mentioned in the “Memorandum” to the “Form of Tender”, Mobilization advance up to 10% of contract Price (Excluding GST) amount shall be payable to the Contractor in two stages as indicated below:-

1. State-I –5% of contract value on signing of the contract agreement.
2. Stage-II –5% on mobilization of site-establishment, setting up offices, bringing in equipment and actual commencement of work.

The 1st stages of advances shall be payable immediately after signing of contract documents. Second Installment shall be released only when the contractor submits statement of utilization of the First Installment of mobilization Advance and the Employer is

satisfied that the utilization has been done in a purposeful manner. Disbursement of mobilization advance to contractor shall be subject to mobilization advance received by EPI from the client.

The above advance will be paid on submission of Requisite non-revocable and unconditional Bank Guarantee for an amount equal to 110% of the Mobilization Advance from a Nationalized Bank / Scheduled Bank as per EPI's proforma for Mobilization advance as mentioned in the Tender Document.

The above advance will carry interest @ 12% per annum as mentioned in the "Memorandum" to the "Form of Tender".

The recovery shall commence when the value of contract executed reaches 15% of original contract value and shall be completed when the value of work executed reaches 85% of the original contract value. The instalments on each "on account bill" will be on pro-rata basis.

Regardless, anything contained hereinabove, any advance/payment shall become payable to the sub-contractor only if the corresponding advance/payment is received from client.

7.0 **SECURITY DEPOSIT PERFORMANCE BANK GUARANTEE & RELEASE THEREOF:**

The clause 9.0 of General Conditions of Contract stands modified as hereunder.

- a) The successful bidder shall have to submit SDPBG equivalent to 5% (Five percent only) of the Contract Value including GST for the due and proper execution of the contract Value within **21 (Twenty One) days** from the date of issue of Letter of Intent (LOI). If required, any extension of time beyond 21 days and upto 60 days may be granted by the Competent Authority. However, a panel rate of interest @ 12% per annum shall be charged for the delay in submission of SDPG after 21(Twenty One) days i.e. from 22nd Day to the date of submission of SDPBG but within 60 days after the date of issue of LOI. Further, if 60th. Day happens to be declared holiday in the concerned office of EPI, submission of SDPG can be accepted on the next working day.
- b) The SDPBG shall be submitted in the form of Bank Guarantee (format enclosed), from any Nationalized Bank / Scheduled Bank / Commercial Bank or in the form of Insurance Surety Bonds or Account Payee Demand Draft or Fixed Deposit Receipt or Online Payment in an acceptable form. Thus SDPGs shall be initially remain valid upto 90 (ninety) days after the end of Defect Liability Period (DLP). In case, the time for completion of work gets extended, the contractor shall get the validity of SDPBG extended to cover such extended time for completion of work plus DLP plus 90 days.
- c) In case after 60 days from the date of issue of LOI, the Bidder fails to submit the SDPG of the requisite amount, LOI will be stand withdrawn and EMD of Bidder shall be forfeited.

8.0 Adjustment for changes in Legislation: -

Adjustment in contract Time and Cost pertaining to the portion of the contractor shall be made provided such has taken place in the contract between EPI and the Client.

9.0 Taxes and Duties:

Clause no. 13 & 14 of GCC of EPI shall stand amended /deleted as illustrated below:

The award of the Contract shall be on 'Work Contract' as defined in section 2 (119) of the CGST Act, 2017. The rates/amount quoted in the Bill of Quantities shall be inclusive of all taxes, duties, labour cess, other cess, levies, fees, royalty, etc, including Goods and Service Tax (GST).

Due Input Tax credits under GST as per the relevant Govt. Policy, wherever applicable, shall be taken into account by the Bidder while quoting his price. Income Tax and other Deduction of Taxes at source & labour cess as applicable shall be deducted from Bills / due payment of the Sub Contractor/Supplier.

Contract price shall be adjusted to take into account - any increase or decrease in cost, resulting from a change in the laws of the country (Including the introduction of new laws and repeal or modification of existing laws) or in the judicial or official governmental interpretation of such laws, made after the base date as specified in memorandum to NIT, which affect the contractor in the performance of obligations under the contract. If the successful bidder becomes liable there under to pay and actually pays the said new tax, duty or levy for genuine use on the Works contracted, the same shall be reimbursed to the successful bidder against documentary evidence of proof of payment subject to the condition that same is borne by the client in terms of client's SCC clause number 38.1 (iii).

Similarly, in case there is a decrease in cost as a result of change in the laws of the country (Including the introduction of new laws and repeal or modification of existing laws) or in the judicial or official governmental interpretation of such laws, made after the base date as specified in memorandum to NIT, same should be passed on to EPI, failing which EPI shall have right to recover the differential amount from the amounts due to the sub-contractor.

The decision of Engineer-In- Charge in this matter will be final and binding on the contractor.

The Contractor/Supplier shall, within a period of 15 days of such change in the laws of the country (Including the introduction of new laws and repeal or modification of existing laws) or in the judicial or official governmental interpretation of such laws, made after the base date, give a written notice thereof to the Engineer-in-Charge of EPI that the same is given pursuant to this condition, together with all necessary information and documents relating thereto. If the Contractor fails to give notice of a claim within such period of 15 days, the Contractor shall not be entitled to such claim/ additional payment, and EPI shall be discharged from all liability in connection with the claim.

1. The increase/ decrease of such cost as per this clause shall be restricted only to direct transactions between EPI and the successful bidder.
2. It shall be incumbent upon the successful bidder to obtain a registration certificate under the GST Law, and other law(s) relating to levy of tax, duty, cess etc. and necessary evidence & GSTIN number to this effect shall be furnished by the successful bidder to the EPI.
3. The successful bidder must submit as compliances of GST Act, the invoices in GST compliant format failing which the GST amount shall be recovered / adjusted by EPI without any prior notice from the next invoices or available dues with EPI.
4. The successful bidder should update /upload the GST/Taxes data periodically so as to avail ITC credit by EPI failing which it shall be recovered / adjusted by EPI without any prior notice from the next invoices or available dues with EPI.

The rates/amount quoted in the Schedule of Quantities shall be inclusive of all taxes, duties, cess, levies, fees, royalty, etc, including Goods and Service Tax (GST). The bidder should quote his rates knowing fully well that submission of return and display of the same on GSTN portal is mandatory and comply. The successful bidder should comply with all future compliance as notified by statutory authorities in relates to GST, failing which EPI without any prior notice reserve the right to withheld/adjust/recover suitable amount from next invoices or available dues with EPI.

10.0 The clause nos. 17.0 & 19.0 of GCC of EPI shall stand amended as under:

Insurance charges for insurances to be taken by EPI for the project shall be borne by the contractor in proportion to his contract price and the same shall be recovered from his payments. Notwithstanding payment of such insurance premiums and the resulting recovery thereto, the contractor shall remain bound to furnish details of his liabilities / assets / resources / workmen deployed for the work in prescribed proforma and in prescribed periods of the Insurance company and assist EPI in follow up with the insurance company in case of any claim related to the contractor's scope of work. EPI is not liable to pay any claim to the contractor if it is not paid by insurance company due to any reasons whatsoever. The insurance company providing such insurance cover shall be approved by IRDA.

- 11.0 The contractor shall remain liable to pay to EPI all cost of materials, T&P etc. belonging to EPI and issued to him in case they are lost or damaged by contractor or any of his employees.

12.0 The following shall stand added to the Clause No. 20 of GCC:

The sub-contractor shall keep EPI indemnified against all claims, damages, compensation and expenses payable, if any, in consequence of any accident, or injury sustained by any workman or any other person employed by the contractor.

- 13.0 The following shall stand added to Clause No. 21.0 and 23.0 including their sub-clauses of the GCC:
Notwithstanding the fact that EPI may have obtained or may be in the process of obtaining a

valid license under the Contract labour (Regulation and Abolition) Act 1970 and Contract Labour Act (R & A) Central Rules 1971 and amended from time to time and registration under Building and other Construction Works (Regulation of Employment and Conditions of Service) Act 1996 and Building and other Construction Workers' Welfare Cess Act 1996 from the relevant authority and continues to have them until the completion of work including the maintenance and defect liability period, the contractor shall at all times remain bound to comply with and observe the provisions of the all laws and regulations pertaining to the deployment of contract labour. He shall also extend all assistance to EPI during inspection of the officials of such law enforcing agencies including the rectification of defects / observations (if any) made / pointed out during the visit(s) of the officials of the said ALC / RLC under jurisdiction of whom the work site shall be covered.

14.0 Clause no 27.0 including its sub-clauses of GCC of EPI stands amended as below:-

Deployment of Contractor's Technical and Management personnel shall be guided by Client's SCC Clause no: 20 and its sub clauses. However, the deployment for the contractor for his portion of work shall be minimum of the following of the Personnel list provided in the Clause no: 20.1 with suitable modifications as under:-

1.1.1 S. No: 1 (Graduate in Mechanical Engg.)

1.1.2 S. No: 5 (Resident Mechanical Engineer)

15.0 **GCC Clause No. 28.3** stands amended as per below:

The site facilities for the employer/ Client to be provided by the contractor shall be as follows: The contractor shall at his cost, establish/provide and maintain following facilities for EPI till Defect Liability period.

Description	Unit	Qty
Following facilities till defect liability period.		
A. OFFICE : Subcontractor should establish a site office with all facility and provide a separate cabin for EPI officer with facility of table, chairs, almirah, desktop computer, drinking water facility etc	each	1
B. Arrangements, lights, other facilities for winter and summer season period.	each	1
C. CONSUMABLES All consumables like stationary, ink etc shall be provided by tenderer till the end of defect liability period. (Stationary items are inclusive of visiting cards, rubber stamps, letter pads, photocopies papers & other items of daily office use). Amount shall be restricted to Rs. 4000/- per month.		

EPI will have the liberty to recover the amount from payables of contractor including Security

/Retention money for not providing any of the above facilities during execution.

16.0 **Secured Advance : Clause. 35.0 of GCC of EPI stands deleted.**

17.0 The following shall be added to the clause no. 36.0 of the GCC:

The measurement of the works as certified/recorded by the client for the portion of works executed by the contractor shall be final and binding on the contractor. The contractor shall remain liable to provide all assistance at the time of recording the measurements by the client.

18.0 Payments: The clause no. 37.0 of the GCC stands modified as under:

All Payments as and when received by EPI from the Client for the contractor's portion of work shall be released only to him within 15 working days of its receipt by EPI, provided that the contractor has complied the procedures for release of payments as mentioned in the contract documents after making the recoveries towards facilities mentioned at ACC **clause 15.0** hereinabove and other recoveries if any.

Rates for any Supply materials including wastages due to handling, transportation, storage etc. Bidder will arrange the storage, loading, unloading & handling all the supply materials. Bidder must consider the same before quoting the rates. Nothing shall be paid extra on account of any damages, theft, wastage etc.

The Running Bill and final bill payment to the contractor shall be released only after receipt of corresponding payment from client and when the contractor submits GST Clearance, EPF clearance certificate, all other clearances, approvals, certificates etc. as per agreement of EPI with the client for the "Works" and as per statutory requirement. Any excess payment if any shall be adjusted / recovered as when reconciled / detected in any stage of payment.

The contractor shall have no claim on EPI in case the payments are delayed / withheld by the client due to any reason whatsoever.

19.0 Time of Completion:

Time allowed for carrying out all the works as entered in the Tender shall be as mentioned in the "Memorandum" to the "Form of Tender" which shall be reckoned from the 10th day from the date on which the letter/ telegram of Intent is issued to the Contractor.

Contract Key Dates are important for timely completion of the project. In case the contractor fails to meet the Milestones / Key Dates, the contractor shall be liable to pay compensation for delay as mentioned elsewhere in the tender documents.

Key Dates	Date	Description of stages to be achieved
Key Date 1	20 Days from issue of LOI	Submission of Construction program. Mobilization of all resources and materials for execution work.
Key Date 2	1 Month from issue of LOI	Preparation and submission of all drawings, source of supply for approvals.

Key Date 3	4 Months from issue of LOI	Completion of all works
Key Date 4	5 Months from issue of LOI	Testing & commissioning
Key Date 5	6 Months from issue of LOI	Handing over & clearance of site

16.0 Following stands added to the clause no. 45.0 of the GCC:

The contractor shall, at his own expense, provide all materials as required for completion of the works under the sub-contract. The contractor shall at his own expense and without delay supply to EPI / Client samples of all materials to be used on the works and shall get the same approved by EPI/client. All such materials shall be in conformity with the specifications laid down or referred to in the sub-contract. In case the contractor fails to submit the samples in time, EPI shall be at liberty to finalize the type and source of the materials and that shall be binding on the contractor at no extra cost to EPI. The contractor shall at all time remain bound to provide the samples in quantity and manner as instructed by EPI to be analyzed or tested in an outside laboratory or in the field laboratory at site. The cost of testing charges is included in the prices of the contractor. EPI shall, however, be at liberty to get the materials tested independent of the contractor and the contractor shall remain bound to render all assistance to EPI in conductance of such tests including making available the materials in sufficient quantity and in time and payment of the testing charges. EPI/client shall at all times have full access to the works and to all workshops and places where work is being prepared or from where materials, manufactured articles or machinery. The contractor shall afford every facility and assistance and cost in obtaining the right and visit to such access.

EPI shall have full powers to require the removal from the premises of all materials which in their opinion are not in accordance with the specifications and in case of default, EPI shall be at liberty to employ at the expense of the contractor, other persons to remove such materials without being answerable or accountable for any loss or damage that may happen or arise to such materials. EPI shall also have full powers to require other proper materials to be substituted thereof any in case of default by the contractor, any cause the same to be supplied and all costs which may require such removal and substitution shall be to the contractor's account. Warranty/guarantee of all equipment, plant & masonry shall be considered from the date of completion of work or handing over of work, whichever is later.

17.0 The following shall be added to clause no. 53.1 of GCC:

The Contractor shall carry out the various mandatory tests as per specifications and the technical documents that shall be furnished to him during the performance of the work. All the tests on materials, as recommended by RDSO, CPWD, MORTH / Railway standard specifications (as the case may be) and relevant Indian Standard Codes or other standard specifications (including all amendments current at the last date of submission of Tender Documents) shall be got carried out by the Contractor at any recognized institution/ laboratory, at the direction of EPI. All testing charges, expenses etc. shall be borne by the

Contractor. All the tests, conducted at outside laboratories concerning the execution of the work and supply of materials shall be got carried out by the Contractor or EPI at the cost of the Contractor.

18.0 ALTERATION IN SPECIFICATION, DESIGN & DRAWING

The following provisions shall supersede that of clause no. 69 of GCC wherever applicable:

Claim on account of extra / substituted / variation of items etc. pertaining to the contractor's portion of work shall be allowed to the extent what is admitted and paid by Client. Any claim by the contractor, if not paid by the Client, for whatsoever reason, shall not be admitted by EPI. The amount, if at all admitted and paid by the Client for the contractor's portion of work, shall be paid to him after making a provision of 10% (Ten percent) towards EPI's overhead and administrative charges. EPI's decision in this respect shall be final and binding on the contractor.

The Methods of evaluations and quantum of variations shall be guided by Client's SCC Clauses 2.0 and its sub-clauses. The variation as may be worked out by client shall be passed onto the contractor for the contractor's portion of work.

- 19.0 In case the project execution is delayed beyond the contractual scheduled completion period due to reason attributable to the contractor, the staff and site office expenses of EPI for extended period shall be paid by him to EPI at the rate of Rs.20,000/- per month. Other recoveries, if applicable as per clause no. 72 (including its sub-clauses) of GCC and Penalties etc. if any, levied by Client for the works pertaining to the contractor's scope of work. The decision of EPI in this regard shall be final & binding on the contractor.
- 20.0 The contractor shall be responsible for obtaining all approvals from Client with regard to design, drawings, plans and methodology wherever applicable, quality of materials & workmanship and measurements etc. for their portion of work. All such approvals shall be in the name and title of EPI. The contractor shall be responsible for reconciliation of issued materials with Client/EPI, if any, and the contractor shall make arrangements for safe up keeping / custody of the material and final reconciliation is also to be done by the contractor. In case there is any shortfall of any issued items during reconciliation, recovery at double the cost of materials prevailing at that time of recovery shall be made from the contractor's due payment. Sub-contractor should follow the technical specifications of Railway for civil, electrical and mechanical works.
- 21.0 The contractor shall not deal directly with Client and all the correspondence in matters regarding bills, claims, interpretation of the specifications, conditions and all matters related to the contract with Client, Client's Consultants, all other agencies including Government and Statutory bodies etc. shall be done through EPI only.

The contractor shall prepare and submit expeditiously all bills, claims, details, clarifications, documents, information, etc. as required by EPI/Client for proper execution and successful completion of the "Works".

- 22.0 Issues related to interpretation and claims, if any, related to the contractor's scope of work, arising out of contract between EPI and Client shall be referred with full justification by the contractor to EPI for settlement with Client including arbitration with Client, if inescapable, and outcome of such a settlement shall be binding on the contractor. EPI at its option may associate the contractor in the above process of settlement for his portion of work. The cost expenses on arbitration with Client shall be shared by EPI and the contractor in proportion of his offer and EPI's mark up towards its overheads & profits. In case the award/settlement with the Client is in favour of EPI, ninety percent of the award/settlement amount shall be shared between EPI and contractor in proportion of contractor's contract price with EPI and EPI's mark up towards its overheads & profits. The balance ten percent of the award/settlement amount shall be retained by EPI towards its administrative charges. In case the award/settlement is against EPI, the entire damages/counterclaims imposed, if any shall be borne by the contractor alone and the contractor shall have no claim whatsoever against EPI in such a settlement. Further, EPI shall have no liability towards any claim of the contractor, which is not paid by the Client.
- 23.0 In case of non-approval of contractor's association for the Project by the Client and/or by the corporate office of EPI due to any reasons whatsoever at any stage of the "Works", the contractor shall have no claim on EPI.
- 24.0 The work executed by the contractor shall be subject to audit and quality control checks from Quality Control Division & Technical Audit of EPI, Client, and Inspection Agency of the Client and Chief Technical Examiner of Central Vigilance Commission, C&AG, Govt. of India. In the eventuality of any defect / sub-standard works as brought out in the report or noticed otherwise at any time during execution, maintenance period etc. the same shall be made good by the contractor without any cost to EPI. In case the contractor fails to rectify the defect/sub-standard work within the time period stipulated by EPI, EPI shall get it rectified at the risk and cost of the contractor and shall recover the amount from the dues of the contractor.
- 25.0 EPI has agreed to associate the contractor on the basis of details regarding his experience profile, financial standing, credentials, fulfillment of statutory obligations, etc. by him to EPI. In case, at a later stage if it is found that the contractor has submitted incorrect, false details and credentials resulting in apprehensions on the capabilities of the contractor with regard to quality & timely completion of works, financial capabilities etc. EPI can terminate this order solely at its option. In this eventuality the contractor shall be liable for the losses suffered by EPI and further the contractor shall have no claim on EPI, whatsoever.
- 26.0 If EPI is granted some concession or exempted from certain obligations by Client, by virtue of EPI being a Public Sector Company, the same concessions / exemptions shall not be applicable to the contractor. The decision of EPI in this regard including interpretation of terms & conditions shall be final & binding on the contractor.
- 27.0 The bidder may take clear note that, as may be decided by EPI -Civil, Mechanical and Electrical works and some works related to the project shall be got executed by other

agencies, the Civil contractor shall at all times remain bound to co-ordinate with the agencies, deployed by EPI for the above works, including providing free access and making required provisions for them in execution of works pertaining to their portion of works. He shall also remain bound to ensure uninterrupted progress of work by these agencies in a peaceful and smooth manner. He shall also remain bound to make the required changes/ additions/ alterations in the works done by him to accommodate the items under the scope of work of such other agencies deployed by EPI or the client. The Contractor is deemed to have made the estimated allowances in this respect while quoting his rates at the tendering stage.

28.0 **Bonus for early completion:** Shall be guided by clause no. 17 C of client's GCC. Sub-Contractor however shall not be eligible for Bonus in case EPI has not received the Bonus from client for whatsoever reason.

29.0 **ARBITRATION: CLAUSE NO. 76.1 OF EPI GCC SHALL STAND AMENDED AS BELOW:**

Before resorting to arbitration as per the clause given below, the parties, if they so agree, may explore the possibility of conciliation as per the provisions of Part III of the Arbitration and Conciliation Act, 1996 as amended by Arbitration and Conciliation Act, 2015. When such conciliation has failed, the parties shall adopt the following procedure for arbitration:

29.1 Except where otherwise provided for in the contract, any disputes and differences relating to the meaning of the Specifications, Design, Drawing and Instructions herein before mentioned and as to the quality of workmanship or materials used in the work or as to any other questions, claim, right, matter or things whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions or these conditions or otherwise concerning the works of the execution or failure to execute the same whether arising during the progress of the work or after the completion or abandonment thereof shall be referred to the Sole Arbitrator appointed by the Chairman and Managing Director (CMD) of Engineering Projects (India) Limited (EPI) or any other person discharging the functions of CMD of EPI. The person approached for appointment as Arbitrator shall disclose in writing circumstances, in terms of Sub-Section (1) of Section (12) of the Arbitration and Conciliation Act, 1996 as amended by Arbitration and Conciliation (Amendment) Act, 2015 as follows:

29.1.1 Such as the existence either direct or indirect, of any past or present relationship with or interest in any of the parties or in relation to the subject- matter in dispute, whether financial, business, professional or other kind, which is likely to give rise to justifiable doubts as to his independence or impartiality; and

29.1.2 Which are likely to affect his ability to devote sufficient time to the arbitration and in particular his ability to complete the entire

arbitration within a period of twelve months.

The Arbitrator shall be appointed within 30 days of the receipt of Letter of Arbitration duly satisfying the requirements of this clause.

- 29.2 If the arbitrator so appointed resigns or is unable or unwilling to act due to any reason whatsoever, or dies, the Chairman & Managing Director aforesaid or in his absence, the person discharging the duties of the CMD of EPI may appoint a new arbitrator in accordance with these terms and conditions of the contract, to act in his place and the new arbitrator so appointed may proceed from the stage at which it was left by his predecessor.
- 29.3 It is a term of the contract that the party invoking the arbitration shall specify the disputes, differences or questions to be referred to the Arbitrator under this clause together with the amounts claimed in respect of each dispute.
- 29.4 The Arbitrator may proceed with the arbitration ex-parte, if either party, in spite of a notice from the arbitrator, fails to take part in the proceedings.
- 29.5 The work under the contract shall continue as directed by the Engineer-In-Charge, during the arbitration proceedings.
- 29.6 Unless otherwise agreed, the venue of arbitration proceedings shall be at the venue given in the 'Memorandum' to the 'Form of Tender'.
- 29.7 The award of the Arbitrator shall be final, conclusive and binding on both the parties.
- 29.8 Subject to the aforesaid, the provisions of the Arbitration and Conciliation Act, 1996 as amended by Arbitration and Conciliation (Amendment) Act, 2015 or any statutory modifications or re-enactment thereof and the Rules made there under and for the time being in force shall apply to the arbitration proceedings and Arbitrator shall publish his Award accordingly.

30.0 CLAUSE NO 76.2 OF EPI GCC SHALL STAND AMENDED AS UNDER:-

“In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSE) / Port Trust inter se and also between CPSE and Government Departments / Organisations (excluding disputes concerning Railways, Income Tax, Customs and Excise Departments), such dispute or differences shall be taken up by either party for resolution through AMRCD as mentioned in DPE OM No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22.05.2018”.

31.0 Earnest Money Deposit (EMD):

Clause 7.0 of GCC stands revised and shall be read as mentioned in the NIT Clause No. 10.

Earnest Money Deposit (EMD) of amount as mentioned in "Memorandum" to "Form of Tender" required to be submitted along with the tender shall be in the form of Account payee Demand Draft payable at place as mentioned in "Notice inviting Tender"/"instruction to Tenderers" in the favour of Engineering Projects (India) Limited as Banker's Cheque or payment online in an acceptable form or in the form of Bank Guarantee from any Nationalized Bank/Scheduled Bank/Commercial Bank as per the EPI's GCC format. The EMD shall be Valid for minimum period of 150 days (One hundred fifty days) from last day of submission of tender. Bidder has to upload the scan copy of EMD submitted online during tender submission.

32.0 Retention Money:

Clause no. 10 of General Conditions of Contract stands amended as following:

Retention money shall be 5% of the contract value. The Retention money recovered at the rate of 6% of the bill amount till the full Retention money is recovered.

Provided also that in case of defaulting Contractor, the EPI may retain any amount due for payment to the Contractor on the pending "on account bills" so that the amounts so retained (including amount guaranteed through Security Deposit cum Performance Bank Guarantee) may not exceed 10% of the total value of the contract.

The Retention money/BG shall be refunded to the contractor after expiry of defect liability period and release of final bill or on release of EPI's security deposit from Railway whichever later on expiry on defect liability period. Contractor will submit an unconditional and unequivocal No claim certificate before release of Retention money. No interest will be payable on the Retention money.

33.0 Jurisdiction:

This agreement will be deemed to have been executed at Kolkata and courts in Kolkata alone will have the jurisdiction to entertain any matter arising out of this agreement.

34.0 Co-ordination:

All necessary co-ordination with Design Consultant and other contractors e.g. PEB, Electrical & other Mechanical works' contractors must be maintained during execution. Contractor must co-ordinate and share necessary data as per drawings with all other agencies and must keep all required provisions as per drawings like electrical conduiting during brick work, PEB foundations & structures, drainage, Track work, machine foundations etc. and any other items as applicable with consultation of EPI /Railway. Notwithstanding anything stated hereinabove, any delay in works shall absolutely be attributable to the contractor and no alibi in this regard shall be entertained.

35.0 MAINTENANCE PERIOD:

The Contractor shall at all times during the progress and continuance of the works and also for the period of maintenance (12 months) after the date of issue of the certificate of completion by the Engineer or any other earlier date subsequent to the completion of the works that may be fixed by the Engineer, be responsible for and effectively maintain and uphold in good substantial, sound and perfect condition all and every part of the works and shall make good from time to time and at all times as often as the Engineer shall require, any damage or defect that may during the above period arise in or be discovered or be in any way connected with the works, provided that such damage or defect is not directly caused by errors in the contract documents, act of providence or insurrection or civil riot, and the Contractor shall be liable for and shall pay and make good to the Railway or other persons legally entitled thereto whenever required by the Engineer so to do, all losses, damages, costs and expenses they or any of them may incur or be put or be liable to by reasons or in consequence of the operations of the Contractor or of his failure in any respect.

To facilitate prompt attention during the maintenance period contractor shall employ maintenance team. A supervisor will also be available along with the maintenance team to take instructions from the employer. In case of default, the employer may employ any other person to rectify or make good such defects. All expenses consequent thereon or incidental thereto shall be borne by the contractor and shall be recoverable from him by the Employer and shall deduct from RA bills or security deposit as the case may be.

36.0 SUSPENSION OF BUSINESS DEALINGS

Notwithstanding anything contained herein, EPI shall suspend/ban business dealings with any Tenderer/Contractor/Consultant/Supplier who fail to implement business ethics, commitment and sincerity of highest standards for the tenders under bidding or the work being undertaken by them. EPI shall be bound to suspend/ban any such tenderer/contractor who default/deviate from the terms of tender/contract without any reasonable cause, is responsible for loss of reputation, finance and/or indulges on any kind of malpractices, cheating, bribery, fraud, misconduct or formation of cartels influencing tender processor influencing the price. The period of suspension/banning the Tenderer/Contractor shall depend on gravity of omission or commission which shall be not less than one year extending till maximum for a period of three years.

37.0 The clause no. 84 of the GCC stands modified as under:

Contract Agreement:

After the issue of Letter of Intent (LOI) / Letter of Acceptance (LOA) to the contractor, Security Deposit cum Performance Bank Guarantee (SDPG) shall have to be deposited to EPI. The event of signing of agreement shall be done only after receipt and verification of Security Deposit cum Performance Bank Guarantee (SDPG) or within such extended time, as may be granted by EPI.

Subsequently, Letter for Commencement of work (LOA) will be issued to Contractor that will be reckoned as an actual date of start of work. The cost of stamp papers, stamp duty, registration. If applicable on the contract, shall be borne by the Contractor. In case, the Contractor does not sign the agreement as above or does not start the work money is liable to be forfeited and letter of intent consequently will stand withdrawn.

37.0 The clause no. 85 of the GCC stands modified as under:

MANNER OF EXECUTION OF AGREEMENT

i. The agreement as per prescribed Performa as enclosed to the Additional Conditions of Contract shall be signed at the office of EPI within days as per GCC Clause No. 84. The Contractor shall provide for signing of the Contract, appropriate Power of Attorney in favour of the authorized representative duly attested by notary Public and the requisite documents / materials. Till a formal contract is prepared and executed, the Letter of Intent read in conjunction with the Bidding Documents will constitute a binding contract.

ii. The agreement will be signed in two originals and three more copies, EPI shall retain the 'Original', the Contractor shall be provided with the other signed original and the remaining three copies will be retained by EPI. In case of a dispute of any kind whatsoever, the 'Original' retained by EPI alone shall be treated as the 'Original Agreement'.

iii. The Contractor shall provide free of cost to EPI all the Engineering data, drawings and descriptive materials submitted along with the bid, in at least five (5) copies to form an integral part of the Agreement within days as per above GCC Clause No. 84.

iv. Subsequently to signing of the Agreement, the Contractor at his own cost shall provide to EPI with at least five (5) true hard bound copies of Agreement along with all the enclosures viz. Letter of intent. Tender Documents etc. within days as per above GCC Clause No. 84.

CHAPTER-4

INDIAN RAILWAY
WORKSHOP PROJECTS ORGANISATION
EXCERPTS OF GENERAL CONDITIONS OF CONTRACT

1. GENERAL

- 1.1 The tenderer[s] should not put any unusual condition from their side contradicting terms and conditions in the e-tender. Such unusual/contradictory conditions may not be considered.
- 1.2 COPY OF THE PROGRAMME IN THE FORM OF BAR CHART FOR COMPLETION OF WORK, MACHINERY DEPLOYMENT FOR ACHIEVING THE PROGRAMMED PROGRESS MUST BE UPLOADED ALONG WITH THE TENDER.

The Contractor who has been awarded the work shall as soon as possible but not later than 30 days after the date of receipt of the acceptance letter in respect of contracts with initial completion period of two years or less or not later than 90 days for other contracts have to submit the detailed programme of work indicating the time schedule of various items of works in the form of Bar Chart/PERT/CPM. He shall also submit the details of organization (in terms of labour and supervisors), plant and machinery that he intends to utilize (from time to time) for execution of the work within stipulated date of completion. The programme of work amended as necessary by discussions with the Engineer, shall be treated as the agreed programme of the work for the purpose of this contract and the Contractor shall Endeavour to fulfill this programme of work. The progress of work will be watched accordingly and the liquidated damages will be with reference to the overall completion date. Nothing stated herein shall preclude the Contractor in achieving earlier completion of item or whole of the works than indicated in the programme.

Further, in case the contractor fails to submit the detailed programme work, as aforesaid in this Para, a token penalty of upto Rs. 10,000/- per week or part thereof shall be imposed.

- 1.3 PLEASE FILL IN REQUIRED INFORMATION ASKED FOR IN THE SPECIFIED SPACE IN THE E-TENDER. TENDER WILL BE OTHER WISE TREATED INCOMPLETE AND HENCE WILL BE **LIABLE FOR REJECTION**.
- 1.4 THE QUANTITY SHOWN IN THE SCHEDULES ARE APPROXIMATE AND ARE LIKELY TO VARY ON EITHER SIDE [+/-] AS PER CLAUSE-2 OF SPECIAL CONDITIONS OF CONTRACT.
- 1.5 **MOBILISATION, MACHINERY OR ANY OTHER ADVANCES WILL BE APPLICABLE FOR VALUE OF WORK MORE THAN Rs.25 [TWENTY FIVE] CRORE.**

2.0 TENDER DOCUMENT

- 2.1 Tenderers are required to submit their offer through e-tender on website www.ireps.gov.in and the tenderer/tenderers shall quote his/their rates therein as required.
- 2.2 The authorized person of the tenderer[s] shall only submit the e-tender along with the enclosures.
- 2.3 **PROGRAMME OF COMPLETION OF WORK**
- 2.3.1 The Tenderer[s] shall attach scanned copy of a comprehensive list of plant and machinery which he/they propose[s] to use in the execution of work.
- 2.3.2 Tenderer[s] shall attach along with tender scanned copy of an attested BARCHART, Activity wise detailed programme of how he/they plan to complete the work in the time frame stipulated in the tender along with details of machinery proposed to be deployed to achieve the same.
- 2.4 **REFERENCE TO RULE BOOK AND DRAWINGS**
- 2.4.1 The drawings for the works as available can be seen in the office of the Dy. Chief Mechanical Engineer/WP, Workshop Projects Organization, Chamber Bhawan, J. C. Road, Patna-800001, at any time during office hours.
- 2.4.2 The terms "Correction Slip" as referred to in this tender document includes the following terms also.
Addendum Slip[s]
Corrigendum slips[s]
Addendum slip[s] and Corrigendum slip[s] which are issued in consecutive serials.

- 2.5 SER USSOR 2010 with “Indian Railways Unified Standard Specifications” [Vol-I and II] 2010 with up to date correction slips can be seen at above mentioned offices. Indian Railway Standard General Conditions of Contract-2020 can be downloaded from the IREPS website. Copies of the same can also be had on payment of an amount specified for copy of each Volume on any working day during office hours from the office of General Manager [Engg], S. E. Railway, Kolkata subject to availability.

3.0 EARNEST MONEY DEPOSIT [EMD]:

- (a) The tender must be accompanied with requisite EMD by a sum equivalent to the amount as mentioned in the tender document as Earnest Money deposited in cash through e-payment gateway or as mentioned in tender documents, failing which the tender shall not be considered. Any firm recognized by Department of Industrial Policy and Promotion (DIPP) as 'Startups' shall be exempted from payment of Earnest Money on submission of Registration Certificate issued by appropriate authority.
- (b) *The Tenderer(s) shall keep the offer open for a minimum period of 60 days (in case of single packet system of tendering 45 days) from the date of opening of the Tender. It is understood that the tender documents have been issued to the Tenderer(s) and the Tenderer(s), is / are permitted to tender in consideration of the stipulation on his / their part that after submitting his / their tender subject to the period being extended further, if required by mutual agreement from time to time, he will not resile from his offer or modify the terms and conditions thereof in a manner not acceptable to Workshop Projects Organisation, Patna. Should the tenderer fail to observe or comply with the foregoing stipulation, the amount deposited as Earnest Money for the due performance of the above stipulation, shall be forfeited to the Railway.*
- (c) If his tender is accepted the earnest money mentioned in sub clause (a) above will be retained as part security for the due and faithful fulfillment of the contract in terms of Clause 16 of the Standard General Conditions of Contract. The Earnest Money of other Tenderers shall, save as herein before provided, be returned to them, but the Railway shall not be responsible for any loss or depreciation to the Earnest Money that may happen theretowhile in their possession, nor be liable to pay interest thereon.
- (d) In case Contractor submits the Term Deposit Receipt/Bank Guarantee Bond towards full Security Deposit, the Railway shall return the Earnest Money so retained to the Contractor.

4.0 DOCUMENTS AND OTHER CONDITIONS

- 4.1 The submission of offer in the e-tender by a tenderer[s] shall be deemed to imply and taken as indicating that he has read, understood and abide by the conditions stated therein and the USSOR 2010 with “Indian Railways Unified Standard Specifications” [Vol-I and II] 2010 and Indian Railway Standard General Condition of Contract-2020 including correction slips issued up to the date of inviting of tender.
- 4.2 A certificate may be uploaded along with the offer that the Tenderer[s] has/have gone through all the conditions of contract and rates, specifications, etc. embodied in USSOR 2011 with “Indian Railways Unified Standard Specifications” [Vol-I and II] 2010 and Indian Railway Standard General Condition of Contract-2020 with correction Slips up to the date of inviting of the tender.
- 4.3 The certificates of completion of work and work under progress in support of the execution of similar type of work mentioned in the tender must be uploaded along with the offer issued by the concerned authority of any Government/Semi Government organization under whom the work executed. The certificate should contain name of work, agreement/work order No, value of the work, date of award, date of completion, total amount paid.
- 4.4 When work is tendered for by a firm or company of contractors, the tender shall be signed by the individual legally authorized to enter into commitments on their behalf.
- 4.5 **If the Tenderer[s] expires after the submission of his/their Tender or after the acceptance of his/their Tender, the Railway shall deem such Tender cancelled. If a partner of a Firm**

expires after submission of their Tender or after the acceptance of their tender, the Railway shall deem such Tender as cancelled unless the Firm retains its character legally acceptable.

- 4.6 If the Tenderer[s] deliberately gives/give wrong information in his/their Tender or creates/create circumstances for the acceptance of his/their Tender, Railway reserves the right to **reject such tender** at any stage.
- 4.7 The copies of the following documents should be uploaded along with the offer.
- [a] List of personnel, organization available on hand and proposed to be engaged for the subject work.
 - [b] List of Plant and Machinery available on hand [own] and proposed to be inducted [own and hired to be given separately] for the subject work.
- 4.8 The authority for the acceptance of the Tender will rest with the Railway. It shall not be obligatory on the said authority to accept the lowest tender or any other tender and no tenderer[s] shall demand neither any explanation for the cause of rejection of his /their tender nor the Railway undertake to assign reasons for declining to consider or reject any particular tender or tenders. The Railways reserve the right to accept the Tender either for the full quantity of work or part thereof or divide the works amongst more than one Tender without assigning any reasons for any such actions.
- 4.9 Should a Tenderer[s] find discrepancies in or omission from the drawings or any of the Tender Forms, or should be in doubt as to their meanings, he/they should at once, notify the authority inviting the Tender who may send a written instructions to all Tenderer[s]. It should be understood that every Endeavour has been made to avoid any error which can naturally effect the basis of the Tender and the successful Tenderer[s] shall take upon himself/themselves and provide for the risk of any error which may subsequently be discovered and shall make no subsequent claim on account thereof.
- 4.10 The documents submitted by Tenderer[s] online and generated/downloaded by Railway Authority shall become the property of the Railway and the Railway shall have no obligation to return the same to the Tenderer[s].
- 4.11 Subsequent to the enactment of GST Act, Para (a) of Clause 6, Part-I of Indian Railway Standard General Conditions of Contract September-2019 has been modified (Authority:- Rly.Bd's letter no. 2017/CE-I/CT/4/GST dt. 23.06.2017). The revised Para (a) of Clause 6, Part-I of Indian Railway Standard General Conditions of Contract September 2020.
- 4.12 **Care In Submission of Tender**
- (a)(i) Before submitting a tender, the tenderer will be deemed to have satisfied himself by actual inspection of the site and locality of the works, that all conditions liable to be encountered during the execution of the works are taken into account and that the rates he enters in the tender forms are adequate and all inclusive to accord with the provision in Clause-37 of the Standard General Condition of Contract for the completion of works to the entire satisfaction of the Engineer.
 - (ii) Tenderers will examine the various provisions of The Central Goods and Services Tax Act, 2017(CGST)/Integrated Goods and Services Tax Act, 2017(IGST)/Union Territory Goods and Services Tax Act, 2017 (UTGST)/ respective state's State Goods and Services Tax Act (SGST) also, as notified by Central/State Govt. & as amended from time to time and applicable taxes before bidding. Tenderers will ensure that full benefit of Input Tax Credit (ITC) likely to be availed by them is duly considered while quoting rates.
 - (iii) The successful tenderer who is liable to be registered under CGST/IGST/UTGST/SGST act shall submit GSTIN along with other details required under CGST/IGST/UTGST/SGST Act to railway immediately after the award of contract, without which no payment shall be released to the contractor. The contractor shall be responsible for deposition of applicable GST to the concerned authority.
 - (iv) In case the successful tenderer is not liable to be registered under CGST/IGST/UTGST/SGST act, the railway shall deduct the applicable GST from his/their bills under reverse charge mechanism (RCM) and deposit the same to the concerned authority."

[b] When work is tendered for by a firm or company of contractors, the tender shall be signed by the individual legally authorized to enter into commitments on their behalf.

[c] The Railway 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.

4.13 The successful Tenderer[s] shall be required to execute an Agreement with the President of India acting through the WPO for carrying out the work according to General Conditions of Contract, Special Conditions/Specifications annexed to the tender and specifications for work and materials as laid down in Indian Railways Unified Standard Specifications [volume-I and II]-2010 as amended/corrected up to the date of inviting of tender.

4.14 The Tenderer[s] whose tender is accepted shall appear at the office of the Chief Administrative Officer WP, Chief Mechanical Engineer/WP, Dy. Chief Mechanical Engineer-II/WP, Office Of The Chief Administrative Officer, Workshop Projects Organization, Chamber Bhawan, J. C. Road, Patna-800001 as the case may be in person or in case of a Firm or Corporation, a duly authorized representative thereof shall so appear to execute the Contract documents within 7 days after receipt of notice issued by Railway that such documents are ready. Failure to do so shall constitute breach of the Agreement effected by the acceptance of the Tender in which case the bidder shall be banned from submission of bids in any works/service tender issued by Indian Railways for a period of 12 months from the date of such banning done on e-platform IREPS by the Railway without prejudice to any other rights or remedies.

4.15 In the event of any tenderer whose tender is accepted shall refuse to execute/does not execute the contract documents as here in before provided, the Railway may determine that such tenderer[s] has/have abandoned the contract and there upon his/their tender and acceptance letter thereof shall be treated as cancelled and the bidder shall be banned from submission of bids in any works/service tender issued by Indian Railways for a period of 12 months from the date of such banning done on e-platform IREPS and to recover the damages for such default as per Clause No. 62[pt-II] of Indian Railway Standard General Conditions of Contract-2020 corrected/amended up to the date of inviting of tenders.

4.16 In case of non acceptance of a tender by the Railway Administration for any reason whatsoever, the Tenderer[s] cannot claim for any expenses incurred by him/them in submitting the Tender for the work or for any other account.

4.17 Where there is any conflict between the instructions to Tenderers, Special Conditions with stipulation and Conditions in these tender particulars in one hand, Indian Railway Standard General Conditions of Contract-2020 and Indian Railway Unified Standard Specifications [Vol-I and II]-2010 with corrections slips issued up to the date of inviting of tender on the other hand, the former shall prevail.

4.18 All the works included in the tender/contract shall be completed in all respect within the time specified in tender document.

4.19 Unusual terms and conditions in offers are liable to be ignored.

4.20 These instructions to the Tenderer[s] shall be deemed to form a part of the tender document.

Signature of tenderer

Dated: _____

CHAPTER-7**INDIAN RAILWAY
WORKSHOP PROJECTS****SPECIAL CONDITIONS OF CONTRACT****1.GENERAL:**

- 1.1 Principal items of works to be carried out by the tenderer/contractor are as noted in the tender document.
- 1.2 The quantities of works to be carried out by the tenderer/contractor will be as mentioned in the work order/Agreement.
- 1.3 The approximate value of the work is specified in the Tender Notice/Agreement.
- 1.4 Plans for the works as may be available, may be inspected in the Office of the concerned Chief Administrative Officer [WP]/Chief Mechanical Engineer[WP]/Dy. Chief Mechanical Engineer[WP] J C Road Chamber Bhawan Patna.
- 1.5 **[i] The successful tenderer/contractor will have to maintain all works for a period of 12[Twelve] Calendar months unless otherwise specified from the certified actual date of completion without any extra cost to the Railway.**
[ii] In case of P. Way works, the contractor shall maintain the same till six months from completion of the work or till allowing regular train services on the track whichever is earlier.
- 1.6 Mobilisation and other advance will be allowed for this work.
- 1.7 All the works included in the tender/contract shall be completed within the time specified in the tender/agreement.
- 1.8 The special conditions dealt in the document, Instructions to Tenderer[s] and the stipulations made in the Schedules of items of works shall govern the works under this contract, in addition to and/or in part super session of the WR-USSOR 2011 with "Indian Railways Unified Standard Specifications" [Vol-I and II] 2010 and Indian Railway Standard General Conditions of Contract-2020 corrected up to date of inviting of tender.
- 1.9 Where there is any conflict between the Instructions to Tenderer[s], Additional Special Conditions of Contract and the stipulations contained in the Schedules of Items quantities and rates on the one hand and the WR-USSOR 2011 with "Indian Railways Unified Standard Specifications" [Vol-I and II]2010 and Indian Railway Standard General Conditions of Contract-2020 corrected up to date of inviting of tender on the other, the former shall prevail.
- 1.10 **Any notes appearing in the Schedule of Quantities and Rates will take precedence over Special Conditions of Contract and also GENERAL CONDITIONS OF CONTRACT and STANDARD SPECIFICATIONS. The Railway will take for granted that Tenderer[s] has/have acquainted himself/themselves with all terms and words used in the tender before submitting the tender.**
- 1.11 Any specifications/conditions stated by the Tenderer[s] in offer submitted by him/them along with the tender shall be deemed to be a part of the contract only to such an extent as has been expressly accepted by the Railway.
- 1.12 All measurements, methods of measurements, meaning and item of specifications and interpretation of Special Conditions of Contract given and made by the Railway or by the Engineer on behalf of the Railway shall be final and binding and shall be considered as **"excepted matters"** in terms of Clause 63 of INDIAN RAILWAY STANDARD GENERAL CONDITIONS OF CONTRACT-2020 corrected up to date of inviting of tender.
- 1.13 Any change in the address of the contractor shall be forthwith intimated in writing to the Railways. The Railway will not be responsible for any loss or inconvenience suffered by the contractor on account of his failure to comply with this.
- 1.14 The Railway Administration reserves the right to alter the detailed plans and sections and to carry out minor alterations in the plans resulting in the corresponding increase/decrease in the quantity of work without being liable to pay enhanced rates for the work and to allow extra time for completion of the work.

2.0 VARIATION IN CONTRACT QUANTITIES:

2.1. Modification to Contract to be in Writing: In the event of any of the provisions of the contract required to be modified after the contract documents have been signed, the modifications shall be made in writing and signed by the Railway and the Contractor and no work shall proceed under such modifications until this has been done. Any verbal or written arrangement abandoning, modifying, extending, reducing or supplementing the contract or any of the terms thereof shall be deemed conditional and shall not be binding on the Railway unless and until the same is incorporated in a formal instrument and signed by the Railway and the Contractor, and till then the Railway shall have the right to repudiate such arrangements.

2.2 (1) Powers of Modification to Contract: The Engineer on behalf of the Railway shall be entitled by order in writing to enlarge or extend, diminish or reduce the works or make any alterations in their design, character position, site, quantities, dimensions or in the method of their execution or in the combination and use of materials for the execution thereof or to order any additional work to be done or any works not to be done and the Contractor will not be entitled, to any compensation for any increase/reduction in the quantities of work but will be paid only for the actual amount of work done and for approved materials supplied against a specific order.

2.2.(2) (i) Unless otherwise specified in the special conditions of the contract, the accepted variation in quantity of each individual item of the contract would be up to 25% of the quantity originally contracted, except in case of foundation work.

(ii) The Contractor shall be bound to carry out the work at the agreed rates and shall not be entitled to any claim or any compensation whatsoever up to the limit of 25% variation in quantity of individual item of works.

(iii) In case an increase in quantity of an individual item by more than 25% of the agreement quantity is considered unavoidable, then same shall be executed at following rates

(a)Quantities operated in excess of 125% but up to 140% of the agreement quantity of the concerned item, shall be paid at 98% of the rate awarded for that item in that particular tender;

(b)Quantities operated in excess of 140% but up to 150% of the agreement quantity of the concerned item shall be paid at 96% of the rate awarded for that item in that particular tender;

(c)Variation in quantities of individual items beyond 150% will be avoided and would be permitted only in exceptional unavoidable circumstances and shall be paid at 96% of the rate awarded for that item in that particular tender.

(d)Variation to quantities of Minor Value Item:

The limit for varying quantities for minor value items shall be 100% (as against 25% prescribed for other items). A minor value item for this purpose is defined as an item whose original agreement value is less than 1 % of the total original agreement value.

(i) Quantities operated upto and including 100% of the agreement quantity of the concerned minor value item, shall be paid at the

Rate awarded for that item in that particular tender;

(ii)Quantities operated in excess of 100% but upto 200% of the agreement quantity of the concerned minor value item, shall be paid at 98% of the rate awarded for that item in that particular tender;

(iii) Variation in quantities of individual minor value item beyond 200% will be avoided and would be permitted only in exceptional unavoidable circumstances and shall be paid at 96% of the rate awarded for that item in that particular tender.

(iv) In case of earthwork, the variation limit of 25% shall apply to the gross quantity of earthwork and variation in the quantities of individual classifications of soil shall not be subject to this limit.

(v) In case of foundation work, no variation limit shall apply and the work shall be carried out by the Contractor on agreed rates irrespective of any variation.

(vi) As far as SOR items are concerned, the limit of 25% would apply to the value of SOR schedule as a whole and not on individual SOR items. However, in case of NS items, the limit of 25% would apply on the individual items irrespective of the manner of quoting the rate (single percentage rate or individual item rate).

2.2.(3) Valuation of Variations: The enlargements, extensions, diminution, reduction, alterations or additions referred to in Sub-Clause (2) of this Clause shall in no degree affect the validity of the contract; but shall be performed by the Contractor as provided therein and be subject to the same conditions, stipulations and obligations as if they had been originally and expressly included and provided for in the Specifications and Drawings and the amounts to be paid thereafter shall be calculated in accordance with the accepted Schedule of Rates. Any extra items/quantities of work falling outside the purview of the provisions of Sub-Clause (2) above shall be paid for at the rates determined under Clause-39 of these Conditions.

3.0 AGREEMENT:

- 3.1. All expenses in drawing up the agreement and the cost of stamp duty, if any, shall be borne by the Railway Administration.
- 3.2. If it is detected at any stage during the currency of contract/Agreement that any document produced by the contractor during submission of his/ their tender related to finalisation of his/their tender and/or during execution of work is/are found wrong/false, the contract will be terminated with forfeiture of Security deposit [as the case may be] without any further correspondence with the contractor[s].

4.0 PASSES

- 4.1. No free Railway passes shall be issued by the Rly. to the contractor or any of his employee/worker.

5.0 EXTENSION OF TIME:

Force Majeure Clause: If at any time, during the continuance of this contract, the performance in whole or in part by either party of any obligation under this contract shall be prevented or delayed by reason of any war, hostility, acts of public enemy, civil commotion, sabotage, serious loss or damage by fire, explosions, epidemics/pandemics, strikes, lockouts or acts of God (hereinafter, referred to events) provided, notice of the happening of any such event is given by either party to the other within 30 days from the date of occurrence thereof, neither party shall by reason of such event, be entitled to terminate this contract nor shall either party have any claim for damages against the other in respect of such non-performance or delay in performance, and works under the contract shall be resumed as soon as practicable after such event has come to an end or ceased to exist, and the decision of the Engineer as to whether the works have been so resumed or not shall be final and conclusive, PROVIDED FURTHER that if the performance in whole or in part of any obligation under this contract is prevented or delayed by reason of any such event for a period exceeding 120 days, either party may at its option terminate the contract by giving notice to the other party.

GCC clause 17–A Extension of Time in Contracts: Subject to any requirement in the contract as to completion of any portion or portions of the works before completion of the whole, the Contractor shall fully and finally complete the whole of the works comprised in the contract (with such modifications as may be directed under conditions of this contract) by the date entered in the contract or extended date in terms of the following clauses:

- (i) **Extension due to Modification:** If any modifications have been ordered which in the opinion of the Engineer have materially increased the magnitude of the work, then such extension of the contracted date of completion may be granted as shall appear to the Engineer to be reasonable in the circumstances, provided moreover that the Contractor shall be responsible for requesting such extension of the date as may be considered necessary as soon as the cause thereof shall arise and in any case not less than one month before the expiry of the date fixed for completion of the works.
- (ii) **Extension for Delay not due to Railway or Contractor:** If in the opinion of the Engineer, the progress of work has any time been delayed by any act or neglect of Railway's employees or by other Contractor employed by the Railway under Sub-Clause (4) of Clause 20 of these Conditions or in executing the work not forming part of the contract but on which Contractor's performance necessarily depends or by reason of proceeding taken or threatened by or dispute with adjoining or to neighbouring owners or public authority arising otherwise through the Contractor's own default etc. or by the delay authorized by the Engineer pending arbitration or in consequences of the Contractor not having received in due time necessary instructions from the Railway for which he shall have specially applied in writing to the Engineer or his authorized representative then upon happening of any such event causing delay, the Contractor shall immediately give notice thereof in writing to the Engineer within 15 days of such happening, but shall nevertheless make constantly his best endeavours to bring down or make good the delay and shall do all that may be reasonably required of him to the satisfaction of the Engineer to proceed with the works. The Contractor may also indicate the period for which the work is likely to be delayed and shall be bound to ask for necessary extension of time.

The Engineer on receipt of such request from the Contractor shall consider the same and shall grant such extension of time as in his opinion is reasonable having regard to the nature and period of delay and the type and quantum of work affected thereby. No other compensation shall be payable for works so carried forward to the extended period of time; the same rates, terms and conditions of contract being applicable as if such extended period of time was originally provided in the original contract itself.

- (iii) **Extension for Delay due to Railways:** In the event of any failure or delay by the Railway to hand over the Contractor possession of the lands necessary for the execution of the works or to give the necessary notice to commence the works or to provide the necessary drawings or instructions or any other delay caused by the Railway due to any other cause whatsoever, then such failure or delay shall in no way affect or vitiate the contract or alter the character thereof or entitle the Contractor to damages or compensation therefor, but in any such case, the Railway may grant such extension or extensions of the completion date as may be considered reasonable.

GCC clause 17-B Extension of Time With liquidated Damage (LD): The time for the execution of the work or part of the works specified in the contract documents shall be deemed to be the essence of the contract and the works must be completed not later than the date(s) as specified in the contract. If the Contractor fails to complete the works within the time as specified in the contract for the reasons other than the reasons specified in Clause 17 and 17-A, the Railway may, if satisfied that the works can be completed by the Contractor within reasonable short time thereafter, allow the Contractor for further extension of time (Proforma at Annexure-VII) as the Engineer may decide. On such extension the Railway will be entitled without prejudice to any other right and remedy available on that behalf, to recover from the

Contractor as agreed damages and not by way of penalty for each week or part of the week, a sum calculated at the following rates of the contract value of the works.

For the purpose of this Clause, the contract value of the works shall be taken as value of work as per contract agreement including any supplementary work order/contract agreement issued. Provided also, that the total amount of liquidated damages under this condition shall not exceed 5% of the contract value or of the total value of the item or groups of items of work for which a separate distinct completion period is specified in the contract.

S.No.	Duration of extension of time under Clause 17-B	Rate of Penalty
(i)	Up to Twenty percent of original period of completion including period of extension of DOC granted under Section 17A(i)	As decided by Engineer, between 0.01% to 0.10% of contract value for each week or part of the week
(ii)	Above Twenty percent but upto Thirty percent of original period of completion including period of extension of DOC granted under Section 17A(i)	0.20% of contract value for each week or part of the week
(iii)	Above Thirty percent but upto Forty percent of original period of completion including period of extension of DOC granted under Section 17A(i)	0.30% of contract value for each week or part of the week
(iv)	Above Forty percent of original period of completion including period of extension of DOC granted under Section 17A(i)	0.50% of contract value for each week or part of the week

Provided further, that if the Railway is not satisfied that the works can be completed by the Contractor and in the event of failure on the part of the contractor to complete the work within further extension of time allowed as aforesaid, the Railway shall be entitled without prejudice to any other right or remedy available in that behalf, to appropriate the contractor's Security Deposit and rescind the contract under Clause 62 of these Conditions, whether or not actual damage is caused by such default.

GCC '20, Clause-17C Bonus for early completion of work:-

In case of open tenders having value more than Rs. 20 Crore and original period of completion 12 months or more, when there is no reduction in original scope of work by more than 10% and no extension granted on either Railway or Contractor's account, Contractor shall be entitled for a bonus of 1% for each 30 days early completion of work. The period of less than 30 days shall be ignored while working out bonus. The maximum bonus shall be limited to 3% of original contract value. The completion date shall be reckoned as the date of issuance of completion certificate by engineer.

6.0 DISSOLUTION OF CONTRACTOR'S FIRM:

- 6.1 If the contractor's firm is dissolved due to death or retirement of any partner or for any reasons whatsoever before fully completing the whole work or any part of it undertaken by the Principal agreement, the partners shall remain jointly, severally and personally liable to complete the whole work to the satisfaction of the Railway and to pay compensation for loss sustained, if any, by the Railway due to such dissolution. The amount of such compensation shall be decided by the General Manager of the Railway and his decision in the matter shall be final and binding on the contractor[s].

7.0 DEPLOYMENT OF PLANT AND MACHINERY:

- 7.1 The deployment of plant and machinery including moving machines shall be such as not to infringe or cause damage to Railway track or any other Government or private properties. Operation of such equipment involving infringement to moving dimensions prescribed in the Hand book of the Schedule of Dimensions of the Railway shall not be undertaken without the prior approval of the Engineer-in-charge. For any loss or damage resulting from violation of this clause the contractor[s] shall be wholly responsible.
- 7.2 It should clearly be understood that it is entirely the successful tenderer[s]/contractor[s] responsibility and liability to find, procure and use all machinery, tools and plants and their spare parts that are required for efficient and methodical execution of the work. Delay in procurement of such items due to their non-availability or import difficulties or any other cause whatsoever, will not be taken as an excuse for slow progress or non-performance of the work.

8.0 HIRING OF RAILWAYS PLANT and MACHINERY:

- 8.1 The Railway Administration may have at their disposals for hire to successful tenderers/contractors a certain number of such plant as concrete mixtures, compressors and portable engines for use during execution of the work, but it does not guarantee hiring of any such machines or will any claim or compensation be entertained due to Railway Administration's inability to supply the machinery and plant or the conditions of the machinery and/or plant supplied by the Railway Administration shall not be taken as an excuse for slow progress or for non-performance of the work.
- 8.2 The Railway Administration shall charge the successful tenderer/contractor for hire of machinery and plant supplied to him/them. The rate of hire charges for the plant and machinery given by the Railway will be calculated on the following basis:-
- [a] The cost of plant and machinery for the purpose of calculating the hire charges shall be its present day market value as on 1st April of the financial year in which the plant is given on hire plus 5% freight and 2% incidental charges to which supervision charges at 12.1/2 % on the total cost will be added.
- [b] The hire charge per annum will be calculated at the following rates on the cost of the plant and machinery as per [a] above:
- I] Interest at the ruling rate of dividend payable by the Railway to the Central Government.
- II] Ordinary repairs and maintenance charges @ 5%.
- III] Special repairs and maintenance charges @ 10%.
- IV] Depreciation charges at the rates mentioned in para 3505 of the I.R.W. and W. Manual [i.e. 16% for light, 10% for heavy and 6% for special type plant and machinery as classified in para 3502 of I.R.W.W.M.
- V] An additional 10% on the total of [I] to [IV] above to meet the contingencies.
- [c] The hire charges per day shall be arrived at by dividing the annual hire charges vide [b] above by 250. These hire charges will be payable from the day the plant is handed over to the hirer, to the day, it is returned by him to the Railway's representative. If the plant remains out of order for reasons, beyond the control of the hirer or is sent for periodical overhaul such periods will not be counted for levy of hire charges, provided a certificate to the effect is given by the Engineer.

The plant will be delivered from the Railway's godown/stores depot and the contractor is to make his own arrangement for transporting the same at work site free of charges and will return at the same Railway's godown/stores depot at his expenses.

[d] In case the contract is spread over a period of more than one year, the hire charges of the plant and machinery as arrived at on the above basis shall be operative during the currency of the contract.

- 8.3 The Railway shall reserve to itself the right to recall any plant/machinery without assigning any reasons by giving or at any time without notice in the event of its being required by the Railway for an unforeseen emergency. In either case, the Railway shall not be liable to pay any compensation to hirer for the loss that may be caused by the withdrawal of the plant.
- 8.4 While the machine[s] is/are in the possession of the contractor[s], he/they shall be responsible for seeing that any inspection certificate of license required under any Government Act is obtained in due time. The contractor shall also be responsible for seeing that all required precautions are observed in using the plants as well, and he shall be responsible for any accident which may occur from the use of the plant.
- 8.5 In case of lifting heavy consignments by cranes in connection with the work, charges for Railway cranes used will be levied against the successful Tenderer/Contractor as per the extant rules of the Railways.
- 8.6 The materials of the successful Tenderer/Contractor required for the execution of the work will have to be carried at the public rate of Railway freight and no concessional rate of Railway freight will be applicable. If called upon to do so the successful Tenderer/Contractor will be bound to state the source of supply of the materials to be used by him on the works. No. R.M.C. Notes or priority certificates will be issued for the carriage of tools, plant or any other materials belonging to the successful Tenderer/Contractor.

9.0 ISSUE OF MATERIALS:

- 9.1 If materials outside the contract are supplied for use on a work on the application of a contractor, the Engineer-in-charge of the work should specify in each case the rate to be charged, which should be the market rate prevailing at the time of supply or the issue rate whichever is higher,. Plus departmental charges which shall be computed as below:-Market rate or issue rate whichever is higher, plus freight 5%, incidental charges 2% and 12.1/2 % departmental charges to cover the cost of Supervision, Storage, interest on outlay.
- 9.2 [I]: In case, cement and/or steel and/or other materials stipulated as per agreement are issued to the contractor[s] either free of cost or on cost to be recovered for use on the work, the supply thereof shall be made in stages limited to the quantity/ qualities computed by the Railway according to the prescribed specifications and approved drawing as per the agreement. The cement and/or Steel and/or other materials issued in excess of the requirement[s] as above, shall be returned in perfectly good condition by the contractor to the Railway immediately after completion or determination of the contract. If the contractor fails to return the said stores, then the cost of cement and/or steel and/or other materials issued in excess of the requirement as computed by the Railway according to the specifications and approved drawings, will be recovered from the contractor[s] at twice the prevailing procurement cost at the time of last issued, viz. 2X [purchase price + 5% freight only].

If it is discovered that the quantity of cement and/or Steel and/or other materials used is less than the quantity ascertained as herein before provided, the cost of the cement and/or Steel and/or other materials not so used shall be recovered from the contractor[s] on the basis of the above stipulated formula.

The contractor shall not be entitled to cartage and incidental charges for returning the surplus materials issued as per contract or outside the contract on application, from and to the Stores where from they are issued. No lead will be paid for returning the empty cement bags.

[II]: The provisions of the fore-going sub-clause shall in addition to cement and other materials apply in the case of steel reinforcement or structural steel section, except that the theoretical quantity of steel shall be taken as the quantity required as per design or as authorised by the Engineer-in-Charge including authorised laps.

- 9.3 The materials issued to contractor but remaining unused and in perfectly good condition at the time of completion or determination of the contract shall be returned to the Engineer-in-Charge at a place where directed by him.
- 9.4 In case the contractor fails to return the unused or excess materials supplied outside the contract as per para 9.1 above, over the requirement as calculated, the cost as arrived at in para 9.1 above, increased by 100% will be charged and recovered from the contractor's dues without prejudice the provision of the relevant conditions regarding return of materials governing the contract.

10.0 STORAGE OF RAILWAY MATERIALS:

- 10.1 The Contractor shall make his own arrangements at the site of work for the safe storage and custody of Railway material issued to him. Such Railway materials issued to the Contractor and stored at the site of work shall be opened for inspection by the Engineer-in-charge or his representative at any time.
- 10.2 Contractor's sheds, stores, camp office, yard etc., for stacking Railway materials shall be located in the Railway premises only at the locations approved by the Engineer-in-charge. The land available will be given on standard charge fixed by the Railway for the period of construction only. On completion of work, he shall leave the site free of all structures, debris etc. non-compliance of same the Engineer-at-site will decide the amount to be deducted from payment due to the contractor[s] and this shall be final and binding on the contractor[s].

11. 0 OCCUPATION AND USE OF LAND:

No land belonging to or in the possession of the Railway shall be occupied by the Contractor without the permission of the Railway. The Contractor shall not use, or allow to be used, the site for any purposes other than that of executing the works. Whenever Non-Railway bodies/persons are permitted to use Railway premises with competent authority's approval. Conservancy charges as applicable from time to time may be levied.

12.0 FORCE MAJEURE CLAUSE:

Applicable as per Clause 17 of Part-II of Indian Railway Standard General Conditions of Contract-2020 corrected up to date of inviting of tender.

13.0 NIGHT WORK:

- 13.1 No work shall be carried out between sunset and sunrise without previous permission of Engineer-in-charge.
- 13.2 If the Engineer-in-charge is satisfied that the work is not likely to be completed in time except by resorting to night work, he may order the Contractor[s] to carry out the works even at night without conferring any right on the contractor for claiming any extra payment for the same. All arrangements in this connection shall be made by the Contractor at his own cost.

14.0 SERVICE ROADS:

- 14.1 No new facilities such as roads, level crossing, etc. other than those already in existence will be made available to the tenderer[s]/Contractor[s].
- 14.2 The successful tenderer[s]/Contractor[s] shall make his own arrangements at his own cost for the construction of service roads within the Railway land for the transport of materials. No separate payment shall be admissible to the Successful Tenderer[s]/Contractor[s] for the construction of such road or its repairs and maintenance. The Successful Tenderer[s]/Contractor[s] shall make his own arrangement at his own cost for the construction of any Service Roads outside the Railway land or for the use of any of the existing roads outside the Railway land, required for the transport of materials for the construction of such roads, its repair or maintenance and the successful tenderer[s]/Contractor[s] shall be responsible for payment of road taxes, toll charges, octroi duty, etc. if any. The Railway will have right to use the service roads at all times without any payment to the successful Tenderer[s]/Contractor[s].
- 14.3 Existing roads or water courses shall not be blocked, cut through, altered, diverted or obstructed in any way by the Contractor, except with the permission of the Engineer. All compensations claimed for any unauthorised closure, cutting through, alteration, diversion or obstruction to such roads or water courses by the Contractor or his agent or his staff shall be recoverable from the Contractor by deduction from any sums which may become due to him in terms of contract, or otherwise according to law.

15.0 WATER SUPPLY:

- 15.1 Water required for all the works shall be arranged by the contractor at his own cost. No arrangements will be made by the Railway Administration for supplying water to the Contractor either for drinking purpose or execution of work free of cost. Rate quoted shall include the cost of arranging water supply and no separate payment will be made to the contractor on account of water charges.
- 15.2 The Railway may supply if any surplus water available from its own sources to the Contractor part or whole of the quantity of the water required for the execution of works from the Railway's existing water supply system at or near the site of works on specified terms and conditions and at such charges as shall be determined by the Railway and payable by the Contractor, provided that the Contractor shall arrange, at his own expense, to effect the connections and lay additional pipe lines and accessories on the site and that the Contractor shall not be entitled to any compensation for interruption or failure of the water supply.

16.0 ELECTRICITY:

- 16.1 Any electric supply required at site for whatsoever purpose shall be arranged by the Contractor/s. The contractor/s shall be responsible for the arrangements for obtaining electric supply at his/their own cost and rates quoted shall include the cost of providing electric supply arrangements required for the work.
- 16.2 The Railway may supply to the Contractor part or whole of the electric power wherever available and possible, required for execution of works from the Railway's existing electric supply systems at or near the site of works on specified terms and conditions and such charges as shall be determined by the Railway and payable by the Contractor provided the cost of arranging necessary connections to the Railway's Electric Supply systems, and laying

of underground/overhead conductor, circuit protection, electric power meters, transmission structure, shall be borne by the Contractor and that the Contractor shall not be entitled to any compensation for interruption or failure of the Electric supply system.

- 16.3 If required by Contractor/s, the Railway administration may give required assistance in recommending to State Electricity Board for giving necessary electric connection to the Contractor for execution of works.

17.0 LOSS OF WORK ORDERS:

- 17.1 If the original work order issued to the contractor is lost by him for any reason whatsoever and the Contractor demands for supply of a duplicate of the same, a penal levy of Rs. 10/- [ten only] for each work order shall be imposed on him for the issue of a duplicate copy.

18.0 ROYALTY FOR MATERIALS COLLECTED FROM UNDER RAILWAY LAND :

- 18.1 If and when the contractor quarries and/or collects materials from or from under Railway land for the purpose of supply of materials and or of work under an agreement based on special rates obtained for various items of work or supplies, he shall be liable to pay to the Railway a royalty at the flat rates hereinafter set out. Such royalty shall be recovered by deduction from the contractor's bill for the supply of materials and or work done under this agreement or from any other sums due to him from the Railway, at the rate prescribed by the State Government authorities and in force during the period the contract is current.

- 18.2 In case of contracts entered into at specified percentage on Schedule of Rates WR-USSOR-2011, Volume-I, the royalty rate as fixed in the preceding para for materials extracted from Railway land will be subjected to tender increase or decrease and will be calculated as under:

Gross value payable as per Schedule of Rates USSR-2012 : X

Royalty leviable as per above : Y

Tender premium : Z

Net payment : $[X-Y] + [X-Y] Z$

- 18.3 Stores and other materials obtained from the dismantling of any structures within the Railway land and used as building stone pitching or breaking into ballast and stone chips etc., may be used by the successful Tenderer/Contractor on payment of appropriate rate as per Schedule of Rates increased/decreased by the Tender percentage accepted for miscellaneous works, treating the materials as belonging to the Railway.

- 19 The contractor shall be responsible to ensure compliance with the provision of the Apprentices Act, 1961 and the Rules and Orders issued from time to time in respect of Apprentices directly or through petty Contractors or Sub-Contractors employed by him for the purpose of carrying out the Contract. If the Contractor directly or through Petty Contractors or Sub-Contractors fails to do so, his failure will be a breach of the Contract and the Railway may in its discretion, rescind the contract. The Contractor shall also be liable for any pecuniary liability arising on account of any violation of the provision of the Act.

NOTE: The Contractors are required to engage apprentices when the work[s] is/are undertaken by them last for a period of one year or more and/or the cost of work is Rs. One lakh or more.

- 19.1 **Provision of Efficient and Competent Staff at work sites by the Contractor as per Clause 26 of IRS GCC- 2020.**

- 19.2** The Contractor shall place and keep on the works at all times efficient and competent staff to give the necessary directions to his workmen and to see that they execute their work in sound and proper manner and shall employ only such supervisors, workmen and labourers in or about the execution of any of these works as are careful and skilled in the various trades.
- 19.3** The Contractor shall at once remove from the works any agents, permitted sub-contractor, supervisor, workman or labourer who shall be objected to by the Engineer and if and whenever required by the Engineer, he shall submit a correct return showing the names of all staff and workmen employed by him.
- 19.4** In the event of the Engineer being of the opinion that the Contractor is not employing on the works a sufficient number of staff and workmen as is necessary for the proper completion of the works within the time prescribed, the Contractor shall forthwith on receiving intimation to this effect deploy the additional number of staff and labour specified by the Engineer within seven days of being so required and failure on the part of the Contractor to comply with such instructions will entitle the Railway to rescind the contract under Clause 62 of these conditions.

20.0 Employment of Graduate Engineers/Diploma Holders by Contractor:

20.1 Following minimum qualified engineers shall be provided to execute the work:-

Sl. No.	Position	Min. no. of personnel	Qualification	Min experience in similar work (years)
1	Project Manager cum Quality Officer	01	Graduate in Civil Engg	5 years
2	Safety in Charge	01	Degree/Diploma in construction safety	Minimum 5 years in safety (field) and out of which 1 year incharge and minimum total experience in civil engg work 10 Yrs
3	Resident Engineer RCC, steel structure	01	Graduate/Diploma in Civil Engg	3 Years
4	Resident Engineer Electrical	01	Graduate/Diploma in Electrical Engg	Minimum 2 years in resident engineer (field) and minimum total experience in Electrical engg work 10 Yrs
5	Resident Engineer Mechanical	01	Graduate/Diploma in Mechanical Engg	5 years (for Graduate) 10 years (for Diploma)

- 20.2** The Contractor shall also employ qualified Graduate Engineer(s) or equivalent or qualified Diploma Engineer(s), prescribed in the tender documents
 "Contractor's authorized Engineer" shall mean a graduate engineer or equivalent, having more than 3 years experience in the relevant field of construction work involved in the contract, duly approved by the Engineer.

20.3 In case the Contractor fails to employ the Engineer, as aforesaid in Para 20.1, he shall be liable to pay liquidated damages at the rates, as prescribed in the tender documents.

20.4 No. of qualified Engineers required to be deployed by the Contractor for various activities contained in the works contract shall be specified in the tender documents as 'Special Condition of Contract' by the tender inviting authority."

- (i) Further, in case the contractor fails to employ the Qualified Engineer, as aforesaid in para 1 above, he, in terms of provisions of Clause 19 [i.e. 26A.2 to the Indian Railway Standard General Conditions of Contract], **shall be liable to pay an amount of Rs.40,000 for graduate/degree holder and Rs.25,000 for diploma holder for each month or part thereof** for the default period for the provisions, as contained in Para 1[a] and 1[b] above respectively.
- (ii) Provision for deployment of Qualified Engineers [Graduate Engineer or Diploma Holder Engineer] shall be for the values as prescribed above. However, for the works contract tenders, if it is considered appropriate by the tender inviting authority, not to have the services of qualified engineer, the same shall be so mentioned in the tender documents by the concerned Executive with the approval of Officer not below the level of SAG Officer, for reasons to be recorded in writing.
- (iii) For track related contractual works of values as specified above individuals having Diploma in Railway Engineering awarded by IPWE [India] shall also be considered as qualified Diploma Holder Engineers and Contractors for track contract works can employ such individuals at their work site on Indian Railways. [Ref: Railway Board letter No. 2012/CE-I/CT/0/20 dtd. 12.07.2013].

20.5 Restrictions on the Employment of Retired Engineers of Railway Services Within One Year of their Retirement: The Contractor shall not, if he is a retired Government Engineer of Gazetted rank, himself engage in or employ or associate a retired Government Engineer of Gazetted rank, who has not completed one year from the date of retirement, in connection with this contract in any manner whatsoever without obtaining prior permission of the President and if the Contractor is found to have contravened this provision it will constitute a breach of contract and administration will be entitled to terminate the contract and forfeit his Performance Guarantee as well as Security Deposit.

21.0 Contractor must establish laboratories at site for E/w test, concrete test, structural steel test, TMT/Cement test and other tests as per scope of work at their own cost as instructed by site engineer.

22.0 For contract value more than 2.00 Cr. contractors must establish suitable site office/camp office of minimum 1000 Sqft with all essential facilities at their own cost within one month from date of issue of LOA. Failure to comply this will result in penalty of 50,000/- (Fifty thousand) per month.

23.0 COMPLIANCE TO THE PROVISIONS OF DIFFERENT ACTS:

The contractor shall comply with the provision of

- i) **Minimum Wages Act 1948.**
- ii) **Apprentices Act 1961.**
- iii) **Payment and Wages Act 1936.**
- iv) **Contract Labour [Regulation and Abolition] Act 1970.**
- v) **Contract Labour [Regulation and Abolition] Central Rules 1971.**
- vi) **Provisions of Employees Provident Fund and Miscellaneous Provisions Act, 1952.**
- vii) **Workmen's Compensation Act.**
- viii) **Mines Act-1952.**

[ix] The building and other construction workers Act -1996.

[x] The building and other construction workers welfare con Act -1996.

And the rules and orders issued from time to time for all the above acts.

24.0 Price Variation Clause (PVC):

24.1 Price variation clause (PVC) shall be applicable only for contracts of value (Contract Agreement value) Rs.5.0 crore and more, irrespective of the contract completion period.

24.2 Applicability: Price Variation Clause (PVC) shall be applicable only in those contracts where tender conditions specifically permit it and irrespective of the contract completion period. Materials supplied free of cost by Railway to the Contractors and any extra NS item(s) included in subsequent variation falling outside the purview of the Schedule of Items of tender shall fall outside the purview of Price Variation Clause. If, in any case, accepted offer includes some specific payment to be made to consultants or some materials supplied by Railway free or at fixed rate, such payments shall be excluded from the gross value of the work for the purpose of payment/recovery of price variation.

Base Month: The Base Month for 'Price Variation Clause' shall be taken as month 28 days prior to opening of tender including extensions, if any, unless otherwise stated elsewhere. The quarter for applicability of PVC shall commence from the month following Base month. The Price Variation shall be based on the average Price Index of the quarter under consideration.

24.3 Validity:

Rates accepted by Railway Administration shall hold good till completion of work and no additional individual claim shall be admissible except:

- (a) Payment/recovery for increase/decrease in GST on works contract or imposition/removal of any tax/cess on Works Contract as per Clause 37,
- (b) Payment/recovery for overall market situation as per Price Variation Clause given hereunder.

24.4 Adjustment for variation in prices of material, labour, fuel, explosives, detonators, steel, concreting, ferrous, non-ferrous, insulators, zinc and cement shall be determined in the manner prescribed.

24.5 Components of various items in a contract on which variation in prices be admissible, shall be Material, Labour, Fuel, Explosives & Detonators, Steel, Cement, Concreting, Ferrous, Non-ferrous, Insulator, Zinc, Erection etc. However, for fixed components, no price variation shall be admissible.

24.6 The percentages of labour component, material component, fuel component etc. in various types of Engineering contracts shall be as under:

Sl. No	Component	E/Work & Minor Bridges Contracts, Ballast Supply Contracts, Tunneling Contracts (without explosive)	Tunneling Contracts (with explosive s)	Major and Important Bridges Contracts	Building Contracts	Permanent Way linking Contracts (Manual)	Other Works Contracts
1	Labour Component	20	20	20	40	50	20

2	Other Material Components	10	15	30	35	5	20
3	Plant Machinery & Spares	30	15	20	5	15	30
4	Fuel & Lubricants Component	25	15	15	5	15	15
5	Fixed Component*	15	15	15	15	15	15
6	Detonators & Explosive Component	-	20	-	-	-	-

* It shall not be considered for any price variation.

24.7 Formulae: The Amount of variation in prices in several components (labour, material etc.) shall be worked out by the following formulae:

$$(i) \quad L = \frac{W \times (L_Q - L_B)}{L_B} \times \frac{L_C}{100}$$

$$(ii) \quad M = \frac{W \times (M_Q - M_B)}{M_B} \times \frac{M_C}{100}$$

$$(iii) \quad F = \frac{W \times (F_Q - F_B)}{F_B} \times \frac{F_C}{100}$$

$$(iv) \quad E = \frac{W \times (E_Q - E_B)}{E_B} \times \frac{E_C}{100}$$

$$(v) \quad \frac{PM}{PM_B} = \frac{W \times (PM_Q - PM_B)}{100} \times \frac{PM_C}{PM_C}$$

$$(vi) \quad S = S_W \times \frac{(S_Q - S_B)}{S_B}$$

$$(vii) \quad C = C_V \times (C_Q - C_B) / C_B$$

For Railway Electrification Works:

$$(viii) \quad T = [(C_S - C_O) / C_O \times 0.4136] \times T_C$$

$$(ix) \quad R = [(R_T - R_O) / R_O + (Z_T - Z_O) / Z_O \times 0.06] \times R_C$$

$$(x) \quad N = [(P_T - P_O) / P_O] \times N_C$$

$$(xi) \quad Z = [(Z_T - Z_O) / Z_O] \times Z_C$$

$$(xii) \quad I = [(I_T - I_O) / I_T] \times 85$$

Where,

L Amount of price variation in Labour

M Amount of price variation in Materials

F Amount of price variation in Fuel

E Amount of price variation in Explosives

PM Amount of price variation in Manufacture of machinery for mining, Quarrying and Construction

S Amount of price variation in Steel

C Amount of price variation in Cement

T	Amount of price variation in Concreting
R	Amount of price variation in Ferrous Items
N	Amount of price variation in Non-Ferrous Items
Z	Amount of price variation in Zinc
I	Amount of price variation in Insulator
L _C	% of Labour Component
M _C	% of Material Component
F _C	% of Fuel Component
E _C	% of Explosive Component
PM _C	% of Manufacture of machinery for mining, Quarrying and Construction Component
T _C	% of Concreting Component
R _C	% of Ferrous Component
N _C	% of Non-Ferrous Component
Z _C	% of Zinc Component
W	Gross value of work done by Contractor as per on-account bill(s) excluding cost of materials supplied by Railway at fixed price, minus the price values of cement and steel. This will also exclude specific payment, if any, to be made to the consultants engaged by Contractors (such payment shall be indicated in the Contractor's offer)
L _B	Consumer Price Index for Industrial Workers - All India : Published in R.B.I. Bulletin for the base period
L _Q	Consumer Price Index for Industrial Workers - All India : Published in R.B.I. Bulletin for the average price index of the 3 months of the quarter under consideration
M _B	Wholesale Price Index: All commodities – as published in the R.B.I. Bulletin for the base period
M _Q	Wholesale Price Index: All commodities – as published in the R.B.I. Bulletin for the average price index of the 3 months of the quarter under consideration
F _B	Wholesale Price Index for the group Fuel & Power as published in the R.B.I. Bulletin for the base period
F _Q	Index Number of Wholesale Price Index – By Groups and Sub-Groups for the group Fuel & Power as published in the R.B.I. Bulletin for the average price index of the 3 months of the quarter under consideration
E _B	Index number of Monthly Whole Sale Price Index for the category 'Explosive' of (g).Manufacture of other chemical products under (J). MANUFACTURE OF CHEMICALS AND CHEMICAL PRODUCTS, published by Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry, Department of Industrial Policy & Promotion (DIPP), for the base period.
E _Q	Index number of Monthly Whole Sale Price Index for the category 'Explosive' of (g).Manufacture of other chemical products under (J). MANUFACTURE OF CHEMICALS AND CHEMICAL PRODUCTS, published by Office of Economic Adviser, Govt. of India, Govt. of India, Ministry of Commerce & Industry, Department of Industrial Policy & Promotion (DIPP), for the average price index of 3 months of the quarter under consideration.
PM _B	Index number of Monthly Whole Sale Price Index for the category 'k. Manufacture of machinery for mining, quarrying and construction' under (R) MANUFACTURE OF MACHINERY AND EQUIPMENT, published by Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry, Department of Industrial Policy & Promotion (DIPP), for the base period.
PM _Q	Index number of Monthly Whole Sale Price Index for the category 'k. Manufacture of machinery for mining, quarrying and construction' under (R) MANUFACTURE OF MACHINERY AND EQUIPMENT, published by Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry, Department of Industrial Policy & Promotion (DIPP), for the average price index of 3 months of the quarter under consideration.
S _w	Gross value of steel supplied by the Contractor as per the 'on-account' bill for the month under consideration

S _B	Index number of Monthly Whole Sale Price Index for the relevant category of mild steel item as mentioned in Clause 24.7 below, published by Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry Department of Industrial Policy & Promotion (DIPP); for the base period.
S _Q	Index number of Monthly Whole Sale Price Index for the relevant category of mild steel item as mentioned in Clause 24.7 below, published by Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry Department of Industrial Policy & Promotion (DIPP); for the average price index of the 3 months of the quarter under consideration.
C _V	Value of Cement supplied by Contractor as per on account bill in the quarter under consideration
C _B	Index No. of Wholesale Price Index of sub-group Cement, Lime & Plaster as published in RBI Bulletin for the base period
C _Q	No. of Wholesale Price Index of sub-group Cement, Lime & Plaster as published in RBI Bulletin for the average price index of the 3 months of the quarter under consideration
C _S	RBI wholesale price index for Cement, Lime & Plaster for the month which is six months prior to date of casting of foundation
C _O	RBI wholesale price index for Cement, Lime & Plaster for the month which is one month prior to date of opening of tender
R _T	IEEMA price index for Iron & Steel for the month which is two months prior to date of inspection of material.
R _O	IEEMA price index for Iron & Steel for the month which is one month prior to date of opening of tender.
P _T	IEEMA price index for Copper wire bar for the month which is two months prior to date of inspection of material.
P _O	IEEMA price index for Copper wire bar for the month which is one month prior to date of opening of tender.
Z _T	IEEMA price index for Zinc for the month which is two months prior to date of inspection of material
Z _O	IEEMA price index for Zinc for the month which is one month prior to date of opening of tender
I _T	RBI wholesale price index for the sub-group "other Portland and Ceramic product" for the month which is two months prior to date of inspection of material
I _O	RBI wholesale price index for the sub-group "other Portland and Ceramic product" for the month which is one month prior to date of opening of tender

24.8 Relevant categories of steel for the purpose of operating Price Variation formula as mentioned in this Clause shall be as under:

SL	Category of Steel Supplied in Railway Work	Category of Steel Items as mentioned in Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry Department of Industrial Policy & Promotion (DIPP).
1.	Reinforcement bars and other rounds	'MS Bright Bars' individual commodity of group item (d) Mild Steel-Long Products under (N) MANUFACTURE OF BASIC METAL.
2.	All types and sizes of angles, channels and joists	'Angles, Channels, Sections, Steel' individual commodity of group item (d) Mild Steel-Long Products under (N) MANUFACTURE OF BASIC METAL.
3.	All types and sizes of plates	'e. Mild Steel – Flat Products' of (N) MANUFACTURER OF BASIC METAL.
4.	Any other section of steel not covered in the above categories and excluding HTS	Average of price for the 3 categories covered under SL 1, 2 & 3 above

24.9 The demands for escalation of cost shall be allowed on the basis of provisional indices as

mentioned above in Clause 24.6. Any adjustment needed to be done based on the finally published indices shall be made as and when they become available.

24.10 Price Variation during Extended Period of Contract

The price adjustment as worked out above, i.e. either increase or decrease shall be applicable upto the stipulated date of completion of work including the extended period of completion where such extension has been granted under Clause 17-A of the Standard General Conditions of Contract. However, where extension of time has been granted due to Contractor's failure under Clause 17-B of the Standard General Conditions of Contract, price adjustment shall be done as follows:

- a. In case the indices increase above the indices applicable to the last month of original completion period or the extended period under Clause 17-A, the price adjustment for the period of extension granted under Clause 17-B shall be limited to the amount payable as per the Indices applicable to the last month of the original completion period or the extended period under Clause 17-A of the Standard General Conditions of Contract; as the case may be.
- b. In case the indices fall below the indices applicable to the last month of original/ extended period of completion under Clause 17-A, as the case may be; then the lower indices shall be adopted for the price adjustment for the period of extension under Clause 17-B of the Standard General Conditions of Contract.

25.0 DAMAGES BY ACCIDENTS/FLOODS/RAINS/CYCLONES, ETC.

- 25.1 The Contractor[s] shall take all precautions against damages from accidents, floods or tides etc. No compensation shall be allowed to the contractor for his tools, plants, materials, machines and other equipments lost or damaged by any cause whatsoever. The Contractor[s] shall make good the damages to any structure, plant or materials of every description belonging to the Railway Administration, lost or damaged by any cause during the course of construction work.
- 25.2 The Railway Administration will not be liable to pay the contractor any charges for rectification or repairs which may have occurred from any cause whatsoever, to any part of the new structures during currency of contract.

26.0 SETTING OUT OF WORKS:

The Contractor shall be responsible for the correct setting out of all works in relation to original points, lines and levels of reference at his cost. The Contractor shall execute the work true to alignment, grade, levels and dimensions as shown in the drawing and as directed by the Engineer's representative and check these at frequent intervals. The Contractor shall provide all facilities like labour and instruments and shall co-operate with the Engineer's representative for checking of all alignment, grades, levels and dimensions. If, at any time, during the progress of the works any error appear or arise in any part of the work, the Contractor, on being required so to do by the Engineer's representative shall, at his own cost rectify such errors, to the satisfaction of the Engineer's representative.

Such checking shall not absolve the Contractor of his own responsibility of maintaining accuracy in the work. The Contractor shall carefully protect and preserve all bench marks, sight rails, pegs and other things used in setting out the work.

27.0 MAINTENANCE PERIOD:

The Contractor shall at all times during the progress and continuance of the works and also for the period of maintenance (12 months) after the date of issue of the certificate of completion by the Engineer or any other earlier date subsequent to the completion of the works that may be fixed by the Engineer, be responsible for and effectively maintain and uphold in good substantial, sound and perfect condition all and every part of the works and shall make good from time to time and at all times as often as the Engineer shall require, any damage or defect that may during the above period arise in or be discovered or be in any way connected with the works, provided that such damage or defect is not directly caused by errors in the contract documents, act of providence or insurrection or civil riot, and the

Contractor shall be liable for and shall pay and make good to the Railway or other persons legally entitled thereto whenever required by the Engineer so to do, all losses, damages, costs and expenses they or any of them may incur or be put or be liable to by reasons or in consequence of the operations of the Contractor or of his failure in any respect.

28.0 ANTILARVAL WORK:

28.1 During execution of the works against this contract the Contractor[s] shall be responsible for antilarval work at his/their own cost.

29.0 NON-ITEMIZED WORKS:

29.1 Where item not covered by the schedules are to be executed, the rates for such non-itemised works shall be negotiated before commencement of such work or to be got executed through any other agency by the Railway at the discretion of the Railway Administration.

30.0 TIME IS THE ESSENCE OF CONTRACT:

Time is the essence of contract. All the works are required to be completed in all respects as stipulated by the Railway within the completion date. Progress shall be maintained strictly in accordance with the programme given by the Contractor and accepted by the Engineer-in-charge from time to time as per the programme chart as per [BAR/CE/PERT chart] as will be finalised.

31.0 **INCENTIVE BONUS PAYMENT CLAUSE FOR WORKS RELATING TO THROUGHPUT ENHANCEMENT WORKS COMING UNDER PLAN HEADS "DOUBLING" and "TRAFFIC FACILITIES". - Not APPLICABLE-**

32.0 LEAD AND LIFT ON CONTRACTOR'S MATERIALS:

32.1 No lead and lift for the contractors materials is payable for the works executed under this contract or for the materials issued by the Railway mainly cement, steel, hume pipes, E.W. pipes, etc. unless otherwise specified.

33.0 ISSUE OF RAILWAY MATERIALS:

33.1 Only cement, steel or any other materials which if the Railway Administration is under obligation to supply for the specific items as considered necessary by the Railway Administration for the execution of works will be supplied by the Railway Administration free of cost. This material will be delivered from the nearest Railway store depot **as directed by the engineer-in-charge** and the contractor is required to make his own arrangements at his own cost for the carriage of the same to the site of work. This is, however, not applicable to works being carried out under WR-USSOR 2011 with "Indian Railways Unified Standard Specifications." Cement will normally be supplied in bags of nominal weight of 50 kg the volume of which shall be taken as 1.23 cft for all calculation purposes.

33.2 In case of free supply of cement in bags by the Railway, the Contractor[s] is/are required to carry from Railway Depots as stated in Clause-31.1 above at his/their own cost. The cost of the empty cement bags will be recovered at the rates fixed by Railway from time to time. Railway reserves the right to take back empty cement bags if will be required for use.

33.3 For the works carried out under the Western Railway Unified Standard Schedule of Rates - 2010, the cost of the transportation and handling of Railway's materials will be paid to the contractor in accordance with the actual leads from the Railway's godown at which the materials are supplied to the site of work at the appropriate rate of the schedule of rates increased or decreased by the percentage quoted by the contractor as per terms of SOR.

- 33.4 The materials referred to above shall be issued to the contractor as per actual requirements. The contractor/s has/have to return excess materials if any issued, to the Railway's store depot in perfectly good condition to the railway at his/their own cost failing which the cost thereof shall be recovered from him/them at issue rates plus Railway's freight, handling, loading, supervision and other incidental charges at rates fixed by the Railways. To this will have to be added an increase of 100%.
- 33.5 If during the course of execution of the work, the District engineer/Dy. Chief Engineer, in charge of the works consider it necessary to issue Railway materials in the interest of the Railway work i.e. to supply certain unforeseen materials not readily available in the market, the contractor will be paid at labour and materials rate and the cost of such materials will be recovered from the contractor at the market rate or Railway's issue rate whichever is higher plus 30.37%.
- 33.6 The contractor shall arrange GI binding wire for all reinforcement work at his own cost and the rate quoted by him shall be inclusive of this.

34.0 CUTTING/UPROOTING OF TREES.

- 34.1 No extra rate shall be paid for cutting or uprooting trees, grubbing root of trees or jungle clearance involved in any work under this contract.
- 34.2 The trees cut by contractor shall be property of the Railway.
- 34.3 If the section passes through forest land, the contractor or his labour is prohibited to cut the trees for the purpose of fire wood or for any other purpose. Cutting of trees as required under the items of works indicated in the tender schedules may be carried out strictly as directed by the Engineer-in-Charge of the work. Unauthorised cutting of trees will result in prosecution and imprisonment. It is the contractor's responsibility to cause no damage to the forest growth and any fuel required by the Contractor for his own use or for the use by his labourers, or for the work shall be arranged by the Contractor at his own cost. The Contractor shall take this aspect into consideration while quoting the rates against the tender.

35.0 BLASTING.

- 35.1 The contractor has to make his own arrangements to get the necessary license/permits for storing and use of explosive. The contractor has to make his own arrangements for procurement of explosive and detonators required for the work. Wherever a cutting passes through or near OHE Transmission Line or near the villages, only controlled blasting is to be resorted to as per schedule. The guidelines for blasting as provided in Indian Railways Unified Standard Specifications [Works and Materials] Volume –I and II to be followed.

36.0 SECURITY DEPOSIT:

- 36.1 **The Security Deposit shall be 5% of the contract value.** Security Deposit may be deposited by the Contractor before release of first on account bill in cash or Term Deposit Receipt issued from Scheduled Bank, or may be recovered at the rate of 6% of the bill amount till the full Security Deposit is recovered. Provided also that in case of defaulting Contractor, the Railway may retain any amount due for payment to the Contractor on the pending "on account bills" so that the amounts so retained (including amount guaranteed through Performance Guarantee) may not exceed 10% of the total value of the contract.

Further, in case of contracts having value equal to or more than ₹ 50 crore (Rs Fifty crore) the Security Deposit may be deposited as Bank Guarantee Bond also, issued by a scheduled bank after execution of contract documents, but before payment of 1st on account bill. Provided further that the validity of Bank Guarantee Bond shall be extended from time to time, depending upon extension of contract granted in terms of Clause 17 of the Standard General Conditions of Contract.

Note: After the work is physically completed as certified by competent authority, Security Deposit recovered from the running bills of a Contractor can be returned to him, if he so desires, in lieu of Term Deposit Receipt/irrevocable Bank Guarantee for equivalent amount from Scheduled Bank, to be submitted by him..

36.2 (i) Refund of Security Deposit: Security Deposit mentioned in sub clause (1) above shall be returned to the Contractor after the following:

- (a) Final Payment of the Contract as per GCC 2020 clause 51.(1) and
 - (b) Signature of Final Supplementary Agreement or Certification by Engineer that Railway has No Claim on Contractor and
 - (c) Issue of Maintenance Certificate on expiry of the maintenance period as per GCC 2020 clause 50.(1).
- (ii) Forfeiture of Security Deposit:** Whenever the contract is rescinded as a whole under clause 62 (1) of GCC'20, the Security Deposit already with railways under the contract shall be forfeited. However, in case the contract is rescinded in part or parts under clause 62 (1) of GCC'20, the Security Deposit shall not be forfeited.

36.3 No interest shall be payable upon the Security Deposit or amounts payable to the Contractor under the Contract, but Government Securities deposited in terms of Sub-Clause 16.(4)(b) of GCC July'2020 will be payable with interest accrued thereon.

37. Performance Guarantee

The procedure for obtaining Performance Guarantee is outlined below:

- (a) The successful bidder shall have to submit a Performance Guarantee (PG) within 21 (Twenty one) days from the date of issue of Letter of Acceptance (LOA). Extension of time for submission of PG beyond 21 (Twenty one) 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 12% per annum shall be charged for the delay beyond 21(Twenty one) days, i.e. from 22nd day after the date of issue of LOA. Further, if the 60th day happens to be a declared holiday in the concerned office of the Railway, submission of PG can be accepted on the next working day.

In all other cases, if the Contractor fails to submit the requisite PG even after 60 days from the date of issue of LOA, the contract is liable to be terminated. In case contract is terminated railway shall be entitled to ban the bidder from submission of bids in any works/service tender issued by Indian Railways for a period of 12 months from the date of such banning done on e-platform IREPS and forfeit other dues payable against that contract.

- (b) The successful bidder shall submit the Performance Guarantee (PG) in any of the following forms, amounting to 3% of the contract value:

- (i) A deposit of Cash;
- (ii) Irrevocable Bank Guarantee;
- (iii) Government Securities including State Loan Bonds at 5% below the market value;
- (iv) Deposit Receipts, Pay Orders, Demand Drafts and Guarantee Bonds. These forms of Performance Guarantee could be either of the State Bank of India or of any of the Nationalized Banks;
- (v) Guarantee Bonds executed or Deposits Receipts tendered by all Scheduled Banks;
- (vi) Deposit in the Post Office Saving Bank;
- (vii) Deposit in the National Savings Certificates;
- (viii) Twelve years National Defence Certificates;
- (ix) Ten years Defence Deposits;
- (x) National Defence Bonds and

- (xi) Unit Trust Certificates at 5% below market value or at the face value whichever is less. Also, FDR in favour of FA&CAO (free from any encumbrance) may be accepted.

(Railway Board letter no. 2020/CE-1/CT/3E/GCC/Policy dated 20.11.2020.)

- (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.
- (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 3% (Three percent) for the excess value over the original contract value shall be deposited by the Contractor. On the other hand, if the value of contract decreases by more than 25% of the original contract value, Performance Guarantee amounting to 3% (three percent) of the decrease in the contract value shall be returned to the Contractor. The PG amount in excess of required PG for decreased contract value, available with Railways, shall be returned to Contractor as per his request duly safeguarding the interest of railways
- (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.
- (f) Whenever the contract is rescinded, the Performance Guarantee already submitted for the contract shall be encashed in addition to forfeiture of Security Deposit available with railway.
- (g) The Engineer shall not make a claim under the Performance Guarantee except for amounts to which the President of India is entitled under the contract (not withstanding and/or without prejudice to any other provisions in the contract agreement) in the event of:
- i. Failure by the Contractor to extend the validity of the Performance Guarantee as described herein above, in which event the Engineer may claim the full amount of the Performance Guarantee.
 - ii. Failure by the Contractor to pay President of India any amount due, either as agreed by the Contractor or determined under any of the Clauses/Conditions of the Agreement, within 30 days of the service of notice to this effect by Engineer.
 - iii. The Contract being determined or rescinded under clause 62 of the GCC-2020.
- (h) Specimen copy of standard BG format is given in the annexed document (Annex-2 to Chapter-7).
- (i) "Bank Guarantee [BGs] to be submitted by suppliers/contractors should be sent directly to the concerned authorities by the issuing bank under Registered post AD.

38.TAXES:

38.1 RECOVERY OF INCOME TAX

- i. Income Tax as per prevailing rate will be recovered of the gross amount of the each bill from all the bills of the contractor as per Income Tax Act, as introduced through the Finance Act-1972. A surcharge as per prevailing rate on the amount of Income Tax so deducted will also be recovered from the contractor's bills. This is further subject to increase or decrease as per extant instructions/Act/Rules in this regard.

ii. **RECOVERY OF GST:**

All the bidders/tenderers should ensure that they are GST compliant and their quoted tax structure/rates are as per GST law.

iii. **NEW STATUTORY TAXES:**

Any variation in statutory taxes if any, is levied subsequent to the date of opening/negotiation of tender may be reimbursed on submission of proof of document depositing such taxes to the concerned States Govt. or Central Govt.

39.0 The tenderer for carrying out any construction work in Bihar/Jharkhand/UP Pradesh/Chhattisgarh must get themselves registered from the Registering Officer under Section-7 of the building and other construction workers [Regulation of Employment and Conditions of Service] Act 1996 and Rules made thereto. The tenderer shall be required to submit certificate of Registration issued from the Registering Officer of the Govt. of Bihar/Jharkhand/UP [Labour Department]. For enactment of this Act, the tenderer shall be required to pay cess @ 1% of cost of construction work to be deducted from each bill. Cost of materials shall be outside the purview of cess, when supplied under a separate schedule item.

Accountal of Recovery:-

[i] The contractor bill amount shall be debited to concerned work and the recoverable amount of BOCW Cess @ 1% shall be credited under Suspense Head-Deposit Misc [BOCW Cess] before arranging payment to the contractor.

[ii] Suspense Head-Deposit misc [BOCW Cess] shall be cleared/debited at the time of payment to respective BOCW Fund/Board by credit to the Suspense Head-Cheques and Bills.

This is further subject to increase or decrease as per extant instructions/Act/Rules in this regard.

40.0 ASSESSMENT OF ROCK REQUIRING BLASTING:

40.1 Assessment of quantities of rock requiring blasting shall be based on cross sectional measurements. Where such measurement is found to be difficult, as in the case of isolated boulder, payment shall be based on stack measurement of blasted rocks/boulders subject to deduction of 25% volume towards voids. The classification of soil and certification thereto only to be done by Dy. Chief Engineer or higher Engineering officials in charge of the work.

41.0 APPROVAL OF SAMPLES OF MATERIALS

All materials to be used in the work by the contractor shall be subject to the prior approval of the Engineer-in-charge of the work. Before using in the works, the contractor[s] shall submit samples of materials and arrange for the supplies, for the work only, if the same are approved.

42.0 IS-CODES/IRS's SPECIFICATIONS.

42.1 [i] Whenever any reference to Code, Specification, Act, etc. is made in the documents, it shall be taken as a reference to the latest version thereof, including all amendments and corrections thereto or otherwise specified.

42.2 [ii] The Contractor shall not be entitled to any extra payment on any account for compliance with the various provision of I.S. Specifications and Additional Special Conditions. The rate indicated in the Schedule shall be deemed to include all works required to be done in compliance with the specifications.

43.0 PRECAUTION TO BE TAKEN WHILE PLYING OF VEHICLES ADJACENT TO RUNNING LINES TO PREVENT ACCIDENT TO TRAINS.

- 43.1 Vulnerable locations where construction work adjacent to running line can cause accident should be protected by suitable strong barrier which should be included as a paid item in contract schedule. These locations should be decided by Executive In-charge of the work at the beginning of construction and intimated to contractor in writing.
- 43.2 The barrier should be painted by retro-reflective paint at suitable interval to give warning at night.
- 43.3 No work adjacent to running track should be carried out at night without express written authority from the Engineer In-charge of the work. In fact, no contractor should do any kind of night working unless the Executive Engineer In-charge of the work gives the specified spots according to priority of work where night working has to be done. These spots should be well lit at night. In addition, the work should always; be done under supervision of Railway supervisors in addition to Contractor's supervisors. Suitable Railway personnel should be posted at site with safety equipment's like banner flags, hand signal flags, hand signal lamps and detonators to arrange protection of trains. The Railway supervisors in charge of such work should also give suitable message to adjacent stations as well as through control for issuing caution orders to the trains approaching the work site. For this purpose, he should be equipped with field telephone/walkie talkie set.
- 43.4 The Contractor shall not allow any road vehicle belonging to him or his suppliers etc., to ply in railway land next to the running line. If for execution of certain works viz, earthwork for parallel Railway Line and supply of ballast for new or existing rail line gauge conversion etc., road vehicles are necessary to be used in Railway land next to the railway line, the Contractor shall apply to the Engineer-in –Charge for permission giving the type and No. of individual vehicles, names and License particulars of the drivers, location, duration and timings for such work/movement. The Engineer in Charge or his authorised representative will personally counsel, examine and certify, the road vehicle drivers, Contractor's flagmen and supervisor and will give written permission giving names of road vehicle drivers, Contractor's flagmen and supervisor to be deployed on the work, location, period and timing of the work. This permission will be subject to the following obligatory conditions.
- [i] The road vehicles will ply only between sunrise and sunset.
 - [ii] Nominated vehicles and drivers will be utilised for work in the presence of at least one flagman and one supervisor certified for such work.
 - [iii] The vehicles shall ply 6m clear of track. Any movement/work at less than 6m and up to minimum 3.5m clear of track centre, shall be done only in the presence of railway employee authorised by the Engineer-in-Charge. No part of the road vehicle will be allowed at less than 3.5m from track centre. Cost of such railway employee shall be borne by the Railway.
 - [iv] The Contractor shall remain fully responsible for ensuring safety and in case of any accident, shall bear cost of all damages to this equipment and new and also damages to railway and its passengers.
 - [v] The Contractor shall also be bound by the provisions of this agreement to ply the road Vehicle only with adequate margin of safety, well clear of the fixed structure profile of infringement, as stipulated in the rules made under the Indian Railway's Act and to seek and be guided by the Signals and other directions of any look-out men or other personnel retained for the purpose of ensuring safety, and to ensure extra care and vigilance while turning, reversing or moving the road Vehicles in any other manner at an inclination to the running Railway Track or the siding as the case may be. The Contractor shall employ necessary look-out; men also at his own cost, irrespective of any other arrangement that Railway may make in this regard.
 - [vi] Any breach of these conditions by the Contractor and/or his agents affecting the safety of movement of Trains, Engines, or other rolling stock of the Railway shall constitute a breach of Contract by the Contractor entailing liability with termination of contract for default on the part of the Contractor.

- 44.0 **Employee Provident Fund and Miscellaneous Provisions:** The contractor shall comply with the provisions of Para 30 and 36-B of the employees Provident Fund Scheme, 1952; Para 3 and 4 of employees Pension Scheme, 1995 and Para 7 and 8 of Employees Deposit Linked Incurrence Scheme, 1976; as modified from time to time through enactment of Employees Provident Fund and Miscellaneous Provisions Act, 1952, wherever applicable and shall also indemnify the Railway from and against any claims under the aforesaid Act and the rules.
- 45.0 **Tenderers are advised not to put their own special conditions particularly related to specification and nature of work.**
However, in tenders of special nature like in-situ flash butt welding, Fusion welding of by Alumino Thermit process, fabrication and launching of steel girder, box pushing, epoxy grouting in distressing bridges, sinking of tube well etc., the condition quoted/clarification sought by the tenderers along with their offer should not be considered as "Conditional tender/offer". However, the same shall be evaluated and considered by the Railway as per the extent provisions.
46. **Payment of advances to contractors: - Applicable**
- (a) **General:** The applicability of this clause to this tender is subject to high value of tenders of value **Rs.25.00 (Twenty Five) crore** and above each as mentioned in Chapter –I of these documents. The Railway may consider sanction of the advances to the contractors vide sub-clause (b) & (c) only for works of high value of Rs. **25.00(Twenty Five) crore** and above each provided further that **the contractor has made a request with adequate justification for such advance(s) along with his tender. Request for grant of such advance shall not be entertained, if the same is made at any subsequent point of time.**
- (b) **Mobilization Advance:**

This shall be limited to 10% of the contract value and payable in 2 stages, as indicated below:
State I – 5% of contract value on signing of the contract agreement.
Stage II–5% on mobilization of site-establishment, setting up offices, bringing in equipment and actual commencement of work.

The 1st stages of advances shall be payable immediately after signing of contract documents. The 2nd stage of advance shall be payable at the time of mobilisation, after submitting a utilisation certificate by the contractor that the stage I advance should be given against old Plant & Machinery.
- (c) **Advance against Machinery and equipment:**
The advance shall be limited to a maximum of 10% of the contract value against new Machinery & Equipment, involving substantial outlay, brought to site and essentially required for the work. This advance shall not exceed 75% of the purchase price of such Equipment and shall be payable when hypothecated to the President of India by a suitable bond or alternatively covered by an irrevocable Bank Guarantee for full cost of the Plant & Equipment from a Nationalized Bank in India or the State Bank of India in a form acceptable to Railways. The Plant & Equipment shall be insured for the full value and for the entire period, they are required for the work. This plant & Equipment shall not be removed from the site of work without prior written permission of the Engineer No. advance should be given against old Plant & Machinery.
- (d) **Advance For Accelerating Progress Of The Work During Course Of Execution Of Contract:-**
The advance is to be decided on the merits of each case for contract lying within the powers of General Manager (upto Rs. 100 crore or less or as decided & circulated by Board from time to time) and shall be restricted to a maximum of 5% of contract value or Rs. 1 Crore whichever is less. This is to be granted by the General Manager on the recommendations of

the Chief Engineer in-charge in consultation with the Associate Finance. While recommending this advance for sanction of General Manager, the Chief Engineer in-charge shall also confirm that progress of the contract work has been as per milestones / targets laid down and no extension to Date of completion of the contract has been given on contractor's account.

(e) Advance in Exceptional Cases:-

General Manager are further empowered to grant advances in exceptional cases upto a maximum of Rs. 20 lacs in respect of even contracts of value of less than Rs. 25 crore, if considered absolutely essential, depending on the merits of each case and circumstances in each situation, to be recommended by the Chief Engineer in-charge and in consultation with the Associate Finance.

(f) The Above Advances Are Subject To the Following Conditions:-

- (i) The advance shall carry an interest at the rate to be decided by the Railway Board and communicated at the beginning of every financial year, to be applicable for tenders to be opened in that financial year.
- (ii) Advances except those against machinery and equipment, shall be payable against irrevocable guarantee (Bank Guarantee, FDRs, KVPs/NSCs) of at least 110% of the value of the sanctioned advance amount (covering principal plus interest). The Bank Guarantee shall be from a Nationalized Bank in India or State Bank of India in a form acceptable to the Railways.
- (iii) The recovery shall commence when the value of contract executed reaches 15% of original contract value and shall be completed when the value of work executed reaches 85% of the original contract value. The instalments on each "on account bill" will be on pro-rata basis.
- (iv) That the grant of advance is primarily in Railway's own interest.
- (v) That a contract does not receive advances for same work from different officers.
- (vi) That arrangements are made with the Accounts Officer for proper accounts being kept with regard to payment and recovery of these advances and
- (vii) That all necessary precautions are taken to secure Government from the possibility of loss and for preventing the system becoming more general or continuing longer than what may be absolutely necessary for proper of the work.

(g) Method of Recovery of Interest:-

Interest shall be recovered on the advance outstanding for the period commencing from the date of payment of advance till date of particular on-account bill (through which recovery of principal is effected) and adjusted fully against on-account bill along with pro-rata principal recovery. In the event of any short-fall, the same shall be carried forward to the next on-account bill and shall attract interest. The rate of interest shall be 10% per annum.

The Bank Guarantee for such advances shall clearly cover at least 110% of the value of the sanctioned advance amount (covering principal plus interest).

(Authority: Railway Board's letter No. 2007/CE-I/CT/18 Pt.3, dated 23.05.2012 and 2007/CE-I/CT/18 Pt.3 dt.22.01.18, 2018/CE-I/CT/1 dt 15.02.2019 and 2007/CE-I/CT/18/Pt.3 dt 05.03.2019).

47.0 Stage payment on supply of steel: (Applicable)

This clause will be applicable for works contract of value more than **Rs.15.00 (Fifteen)** crore each. Stage payment will be applicable for steel physically brought by the contractor to the site (even before its actual use in the work), subject to the following aspects:-

- a) The material shall be strictly in accordance with the contract specifications.
- b) The tender schedule shall provide for individual rate to be quoted by the tenderers for structural steel Work or Reinforcement steelwork separately.
- c) The material shall be delivered at site and properly stored under covered sheds in measurable stacks.

- d) The quantities of materials shall be brought to the site only in such instalments that would facilitate smooth progress of work and consumed in reasonable time.
- e) Proper account in the material registers to be maintained in the prescribed format at the site for the receipt and use of the material.
- f) Ownership of such material shall be deemed to vest with the Railways for which the contractor should submit an indemnity bond in prescribed format.
Indemnity Bond Performa is available at Annexure-3 of Chapter-7
- g) Before releasing the stage payment, the contractor shall insure the material at his own cost in favour of Railways against theft, damages, fire etc.
- h) Stage payment in all such cases shall not be more than 55% of the rate of reinforcement steel work awarded in the contract or shall not be more than 40% of the rate of structural steel work awarded in the contract. The balance payment shall be released only after the material is actually consumed in the work. .
- i) The price variation claim for steel would continue to be governed as per extant PV clause and with reference to delivery at site.
- j) The quantity of steel to be brought to site, and for which stage payment will be admissible, shall be worked out by the contractor in consultation with the Engineer, for the first quarter, from date of issue of LOA + 15 days. Subsequent supply to site shall be done with approval of Engineer, on a quarterly basis, based on actual progress.

48.0 REFUND OF PERFORMANCE GUARANTEE (P.G)

The Performance Guarantee (P.G) shall be released after satisfactory completion of work based on the 'Completion Certificate' as issued by 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 JA Grade, and then a JA Grade Officer (concerned with the work) should issue the certificate. The certificate, inter-alia, should mention that the work has been completed in all respect and that all the contractual obligations have been fulfilled by the contractors and that there is no due from the contractor to Railways against the contract concerned. Before releasing the Performance Guarantee (P.G), an unconditional and unequivocal no claim certificate from the contractor concerned shall be obtained.

No interest will be payable on the Performance Guarantee (PG)

49.0 SETTLEMENT OF DISPUTES – INDIAN RAILWAY ARBITRATION AND CONCILIATION RULES

- 49.1 Reconciliation of disputes:** All disputes and differences of any kind whatsoever arising out of or in connection with the contract, whether during the progress of the work or after its completion and whether before or after the determination of the contract, shall be referred by the Contractor to the "Chief Engineer" through "Notice of Dispute" provided that no such notice shall be served later than 30 days after the date of issue of Completion Certificate by the Engineer. Chief Engineer shall, within 30 days after receipt of the Contractor's "Notice of Dispute", notify the name of conciliator(s) to the Contractor.
- The Conciliator(s) shall assist the parties to reach an amicable settlement in an independent and impartial manner within the terms of contract. If the parties reach agreement on a settlement of the dispute, they shall draw up and sign a written settlement agreement duly signed by Engineer In-charge, Contractor and conciliator(s). When the parties sign the settlement agreement, it shall be final and binding on the parties.
- The parties shall not initiate, during the conciliation proceedings, any arbitral or judicial proceedings in respect of a dispute that is the subject matter of the conciliation proceedings. The conciliation proceedings shall be terminated:
- By the signing of the settlement agreement by the parties on the date of agreement; or
 - By written declaration of the conciliator, after consultation with the parties, to the effect that further efforts at conciliation are no longer justified, on the date of declaration; or
 - By a written declaration of any party to the conciliator to the effect that the conciliation proceedings are terminated, on the date of declaration; or

49.2 Matters Finally Determined by the Railway: All disputes and differences of any kind whatsoever arising out of or in connection with the contract, whether during the progress of the work or after its completion and whether before or after the determination of the contract, shall be referred by the Contractor to the GM and the GM shall, within 120 days after receipt of the Contractor's representation, make and notify decisions on all matters referred to by the Contractor in writing provided that matters for which provision has been made in Clauses 7(j), 8, 18, 22(5), 39, 43(2), 45(i)(a), 55, 55-A(5), 57, 57A, 61(1), 61(2) and 62(1) of Standard General Conditions of Contract or in any Clause of the Special Conditions of the Contract shall be deemed as 'excepted matters' (matters not arbitrable) and decisions of the Railway authority, thereon shall be final and binding on the Contractor; provided further that 'excepted matters' shall stand specifically excluded from the purview of the Arbitration Clause.

50 .0 Demand for Arbitration:

50.(1)(i): In the event of any dispute or difference between the parties hereto as to the construction or operation of this contract, or the respective rights and liabilities of the parties on any matter in question, dispute or difference on any account or as to the withholding by the Railway of any certificate to which the Contractor may claim to be entitled to, or if the Railway fails to make a decision within 120 days, then and in any such case, but except in any of the "excepted matters" referred to in Clause 63.1 of these Conditions, the Contractor, after 120 days but within 180 days of his presenting his final claim on disputed matters shall demand in writing that the dispute or difference be referred to arbitration.

50.(1)(ii)(a): The demand for arbitration shall specify the matters which are in question, or subject of the dispute or difference as also the amount of claim item-wise. Only such dispute or difference, in respect of which the demand has been made, together with counter claims or set off, given by the Railway, shall be referred to arbitration and other matters shall not be included in the reference.

50.(1)(ii)(b): The parties may waive off the applicability of Sub-Section 12(5) of Arbitration and Conciliation (Amendment) Act 2015, if they agree for such waiver in writing, after dispute having arisen between them, in the format given under Annexure XV of these conditions.

50.(1)(iii)(a): The Arbitration proceedings shall be assumed to have commenced from the day, a written and valid demand for arbitration is received by the Railway.

50.(1)(iii)(b): The claimant shall submit his claims stating the facts supporting the claims alongwith all the relevant documents and the relief or remedy sought against each claim within a period of 30 days from the date of appointment of the Arbitral Tribunal.

50.(1)(iii)(c): The Railway shall submit its defence statement and counter claim(s), if any, within a period of 60 days of receipt of copy of claims from Tribunal, unless otherwise extension has been granted by Tribunal.

50.(1)(iii)(d): Place of Arbitration: The place of arbitration would be within the geographical limits of the Division of the Railway where the cause of action arose or the Headquarters of the concerned Railway or any other place with the written consent of both the parties.

50.(1)(iv): No new claim shall be added during proceedings by either party. However, a party may amend or supplement the original claim or defense thereof during the course of arbitration proceedings subject to acceptance by Tribunal having due regard to the delay in making it.

50.(1)(v): If the Contractor(s) does/do not prefer his/their specific and final claims in writing, within a period of 90 days of receiving the intimation from the Railways that the final bill is ready for payment, he/they will be deemed to have waived his/their claim(s) and the Railway shall be discharged and released of all liabilities under the contract in respect of these claims.

50.(2): Obligation During Pendency of Arbitration: Work under the contract shall, unless otherwise directed by the Engineer, continue during the arbitration proceedings, and no payment due or payable by the Railway shall be withheld on account of such proceedings, provided, however, it shall be open for Arbitral Tribunal to consider and decide whether or not such work should continue during arbitration proceedings.

50.(3) : Appointment of Arbitrator:

50.(3)(a) : Appointment of Arbitrator where applicability of section 12 (5) of Arbitration and Conciliation Act has been waived off:

50.(3)(a)(i): In cases where the total value of all claims in question added together does not exceed ₹ 1,00,00,000/- (Rupees One Crore), the Arbitral Tribunal shall consist of a Sole Arbitrator who shall be a Gazetted Officer of Railway not below Junior Administrative Grade, nominated by the General Manager. The sole arbitrator shall be appointed within 60 days from the day when a written and valid demand for arbitration is received by General Manager.

50.(3)(a)(ii): In cases not covered by the Clause 64(3)(a)(i), the Arbitral Tribunal shall consist of a panel of three Gazetted Railway Officers not below Junior Administrative Grade or 2 Railway Gazetted Officers not below Junior Administrative Grade and a retired Railway Officer, retired not below the rank of Senior Administrative Grade Officer, as the arbitrators. For this purpose, the Railway will send a panel of at least four (4) names of Gazetted Railway Officers of one or more departments of the Railway which may also include the name(s) of retired Railway Officer(s) empanelled to work as Railway Arbitrator to the Contractor within 60 days from the day when a written and valid demand for arbitration is received by the General Manager.

Contractor will be asked to suggest to General Manager at least 2 names out of the panel for appointment as Contractor's nominee within 30 days from the date of dispatch of the request by Railway. The General Manager shall appoint at least one out of them as the Contractor's nominee and will, also simultaneously appoint the balance number of arbitrators either from the panel or from outside the panel, duly indicating the 'presiding arbitrator' from amongst the 3 arbitrators so appointed. General Manager shall complete this exercise of appointing the Arbitral Tribunal within 30 days from the receipt of the names of Contractor's nominees. While nominating the arbitrators, it will be necessary to ensure that one of them is from the Accounts Department. An officer of Selection Grade of the Accounts Department shall be considered of equal status to the officers in Senior Administrative Grade of other departments of the Railway for the purpose of appointment of arbitrator.

50.3.(a).iii: The serving railway officer working in arbitral tribunal in the ongoing arbitration cases as per clause 64.(3)(a)(i) and clause 64.(3)(a)(ii) above, can continue as arbitrator in the tribunal even after his retirement.

50.(3)(b): Appointment of Arbitrator where applicability of Section 12 (5) of Arbitration and Conciliation Act has not been waived off:

(i) In cases where the total value of all claims in question added together does not exceed ₹ 50,00,000/- (Rupees Fifty Lakh), the Arbitral Tribunal shall consist of a Retired Railway Officer, retired not below the rank of Senior Administrative Grade Officer, as the arbitrator. For this purpose, the Railway will send a panel of at least four (4) names of retired Railway Officer(s) empanelled to work as Railway Arbitrator duly indicating their retirement dates to the Contractor within 60 days from the day when a written and valid demand for arbitration is received by the General Manager.

Contractor will be asked to suggest to General Manager at least 2 names out of the panel for appointment as arbitrator within 30 days from the date of dispatch of the request by Railway. The General Manager shall appoint at least one out of them as the arbitrator.

(ii) In cases where the total value of all claims in question added together exceed ₹ 50,00,000/- (Rupees Fifty Lakh), the Arbitral Tribunal shall consist of a Panel of three (3) retired Railway Officer, retired not below the rank of Senior Administrative Grade Officer, as the arbitrators.

For this purpose, the Railway will send a panel of at least four (4) names of retired Railway Officer(s) empanelled to work as Railway Arbitrator duly indicating their retirement date to the Contractor within 60 days from the day when a written and valid demand for arbitration is received by the General Manager.

Contractor will be asked to suggest to General Manager at least 2 names out of the panel for appointment as Contractor's nominee within 30 days from the date of dispatch of the request by Railway. The General Manager shall appoint at least one out of them as the Contractor's nominee and will, also simultaneously appoint the balance number of arbitrators either from the panel or from outside the panel, duly indicating the 'Presiding Arbitrator' from amongst the 3 arbitrators so appointed. General Manager shall complete this exercise of appointing the Arbitral Tribunal within 30 days from the receipt of the names of Contractor's nominees. While nominating the arbitrators, it will be necessary to ensure that one of them has served in the Accounts Department.

50.(3)(c)(i): If one or more of the arbitrators appointed as above refuses to act as arbitrator, withdraws from his office as arbitrator, or vacates his/their office/offices or is/are unable or unwilling to perform his functions as arbitrator for any reason whatsoever or dies or in the opinion of the General Manager fails to act without undue delay, the General Manager shall appoint new arbitrator/arbitrators to act in his/their place in the same manner in which the earlier arbitrator/arbitrators had been appointed. Such re-constituted Tribunal may, at its discretion, proceed with the reference from the stage at which it was left by the previous arbitrator (s).

50.(3) (c) (ii): (a) The Arbitral Tribunal shall have power to call for such evidence by way of affidavits or otherwise as the Arbitral Tribunal shall think proper, and it shall be the duty of the parties hereto to do or cause to be done all such things as may be necessary to enable the Arbitral Tribunal to make the award without any delay. The proceedings shall normally be conducted on the basis of documents and written statements.

(b) Before proceeding into the merits of any dispute, the Arbitral Tribunal shall first decide and pass its orders over any plea submitted/objections raised by any party, if any, regarding appointment of Arbitral Tribunal, validity of arbitration agreement, jurisdiction and scope of the Tribunal to deal with the dispute (s) submitted to arbitration, applicability of time 'limitation' to any dispute, any violation of agreed procedure regarding conduct of the arbitral proceedings or plea for interim measures of protection and record its orders in day to day proceedings. A copy of the proceedings duly signed by all the members of tribunal should be provided to both the parties.

50.3(c)(iii): (i) Qualification of Arbitrator (s):

(a) Serving Gazetted Railway Officers of not below JA Grade level.

(b) Retired Railway Officers not below SA Grade level, one year after his date of retirement.

(c) Age of arbitrator at the time of appointment shall be below 70 years.

(ii) An arbitrator may be appointed notwithstanding the total number of arbitration cases in which he has been appointed in the past.

(iii) While appointing arbitrator(s) under Sub-Clause 48.(3)(a)(i), 48.(3)(a)(ii), 48.(3)(b)(i) & 48.(3)(b)(ii) above, due care shall be taken that he/they is/are not the one/those who had an opportunity to deal with the matters to which the contract relates or who in the course of his/their duties as Railway servant(s) expressed views on all or any of the matters under dispute or differences. A certification to this effect as per annexure- XVI shall be taken from Arbitrators also. The proceedings of the Arbitral tribunal or the award made by such Tribunal will, however, not be invalid merely for the reason that one or more arbitrator had, in the course of his service, opportunity to deal with the matters to which the contract relates or who in the course of his/their duties expressed views on all or any of the matters under dispute.

- 50.(3)(d)(i):** The arbitral award shall state item wise, the sum and reasons upon which it is based. The analysis and reasons shall be detailed enough so that the award could be inferred therefrom.
- 50.(3)(d)(ii):** A party may apply for corrections of any computational errors, any typographical or clerical errors or any other error of similar nature occurring in the award of a Tribunal and interpretation of a specific point of award to Tribunal within 60 days of receipt of the award.
- 50.(3)(d)(iii):** A party may apply to Tribunal within 60 days of receipt of award to make an additional award as to claims presented in the arbitral proceedings but omitted from the arbitral award.
- 50.(4):** In case of the Tribunal, comprising of three members, any ruling on award shall be made by a majority of members of Tribunal. In the absence of such a majority, the views of the Presiding Arbitrator shall prevail.
- 50.(5):** Where the arbitral award is for the payment of money, no interest shall be payable on whole or any part of the money for any period till the date on which the award is made.
- 50.(6):** The cost of arbitration shall be borne by the respective parties. The cost shall inter-alia include fee of the arbitrator(s), as per the rates fixed by Railway Board from time to time and the fee shall be borne equally by both the parties, provided parties sign an agreement in the format given at Annexure 4 below to these condition after/ while referring these disputes to Arbitration. Further, the fee payable to the arbitrator(s) would be governed by the instructions issued on the subject by Railway Board from time to time irrespective of the fact whether the arbitrator(s) is/are appointed by the Railway Administration or by the court of law unless specifically directed by Hon'ble court otherwise on the matter.
- 50.(7)** Subject to the provisions of the aforesaid Arbitration and Conciliation Act 1996 and the rules thereunder and relevant para of General Conditions of Contract (GCC) and any statutory modifications thereof shall apply to the appointment of arbitrators and arbitration proceedings under this Clause.

51. ROYALTY:

- 51.1** The minerals being used by the contractor should be purchased from valid authorized lease / permit holders / authorized dealers. It will be insured by Engineer-at-site.
In case of Mooram & earth these permits can be obtained from District Mining officer after entering into an agreement with land holder from where mineral is to be extracted.
- 51.2** The Railway shall do the followings to prevent evasion of royalty and illegal mining.
- i. Bill preferred by works contractor in which minor minerals has been used, must be accompanied with an affidavit form 'M' with particulars in form 'N' of the Rules along with a photocopy of said affidavit and particulars. Bill should not be entertained unless accompanied with aforesaid documents.
 - ii. The photocopy of the affidavit and the particulars received with the bill should be sent to District Mining Officer / Assistant Mining Officer within whose jurisdiction the mineral was allegedly purchased, for verification. If the said affidavit or information is found wrong, Mining Officer may take necessary / appropriate action against the contract as per rules.
- 51.3** Any increase in royalty after Tender Opening / Negotiation date shall be payable by the Railway. Similarly any decrease in Royalty shall be deducted from the contractor's bills by the Railway.

52.0. 'Letter of credit' as mode of payment:

- (i) For all the tenders having advertised cost of Rs.10 Lakh or above, the contractor shall have the option to take payment from Railway through a letter of credit (LC) arrangement.
- (ii) This option to taking payment through LC arrangement has to be exercised in IREPS (Indian Railway Electronic Procurement System- the e-application on which tenders are called by Railway by the tenderer at the time of bidding itself, and the tenderer shall affirm having read over and agreed to the terms and conditions of the LC option.
- (iii) The option so exercise, shall be an integral part of the bidder's offer.

- (iv) The above option of taking payment through LC arrangement, once exercised by tenderer at the time of bidding, shall be final and no change shall be permitted, thereafter, during execution of contract.
 - (v) In case tenderer opts for payment through LC, following shall be procedure to deal release of payment through LC:
 - (a) The LC shall be a sight LC.
 - (b) The contractor shall select his Advising/Negotiating bank for LC. The incidental cost towards issue of LC and its operation thereof shall be borne by the contractor.
 - (c) SBI, New Delhi, Main Branch will be the nodal branch for issue of LCs based on online requests received from Railway Accounts Units for tenders opened in financial year 2018-19. SBI branches where the respective Railway Accounts Office has its Account (local SBI branch) will be the issuance/reimbursing branch for LC issued under this arrangement. The Bank shall remain same for this tender till completion of contract. The incidental cost @0.15% per annum of LC value, towards issue of LC and operation thereof shall be borne by the contractor and shall be recovered from his bills.
 - (d) The LC shall be opened initially for duration of 180 to 365 days in consultation with contractor. The LC shall be extended time to time as per the progress of the contract, on the request of the contractor. The value of LC to be opened initially as well as extended thereafter shall be finalised by the engineer in consultation with the contractor on the basis of expected progress of work.
 - (e) The LC terms and conditions shall inter-alia indemnify and save harmless the Railway from and against all losses, claims and demands of every nature and description brought or recovered against the Railways by reason of any act or omission of the contractor, his agents or employees, in relation to the Letter of Credit (LC). All sums payable/borne by Railway's on this account shall be considered as reasonable compensation and paid by contractor.
 - (f) The LC terms and conditions shall inter-alia provide that Railways will issue a Document of Authorisation (format enclosed as Annexure 1) after passing the bill for completed work, to enable contractor to claim the authorized amount from their bank.
 - (g) The acceptable, agreed upon document for payments to be released under the LC shall be the Document of Authorisation.
 - (h) The Document of Authorisation shall be issued by Railway Accounts Office against each bill passed by Railways.
 - (i) On issuance of Document of Authorisation, a copy of Document of authorisation shall be posted on IREPS to download by the contractor. A digitally signed copy of Document of Authorisation shall also be sent by Railway Account Office to Railway's bank (Local SBI Branch).
 - (j) The contractor shall take print out of the Document of Authorisation available on IREPS and present his claim to his bank (advising Bank) for necessary payments as per LC terms and conditions. The claim shall comprise of copy of Document of Authorisation. Bill of Exchange and Bill.
 - (k) The payment against LC shall be subject to verification from Railway's Bank (Local SBI Branch).
 - (l) The contractor's bank (advising bank) shall submit the documents to the Railway's Bank (Local SBI Bank).
 - (m) The railway's bank (issuing bank) shall, after verifying the claim so received w.r.t. the digitally signed Document of Authorisation received from Railway Accounts Office, release the payment to contractor's bank (advising bank) for crediting the same to contractor's account.
 - (n) Any number of bills can be dealt within one LC, provided the sum total payments to contractor is within the amount for which LC has been opened.
 - (o) The LC shall be closed after the release of final payment including PVC amount, if any, to the contractor.
 - (p) The release of performance guarantee or security deposit shall be dealt directly by railway with the contractor i.e., not through LC.
- {Authority: Railway Board's letter no. 2018/CE-I/CT/9 dated:04.06.2018}.**

53.Rates for Extra Items of Works:

- (1) Any item of work carried out by the Contractor on the instructions of the Engineer which is not included in the accepted Schedules of Rates shall be executed at the rates set forth in the

"Schedule of Rates of Railway" modified by the tender percentage, and for such items not contained in the latter, at the rate agreed upon between the Engineer and the Contractor before the execution of such items of work and the Contractors shall be bound to notify the Engineer at least seven days before the necessity arises for the execution of such items of works that the accepted Schedule of Rates does not include rate or rates for the extra work involved. The rates payable for such items shall be decided at the meeting to be held between the Engineer and Contractor, in as short a period as possible after the need for the special item has come to the notice. In case the Contractor fails to attend the meeting after being notified to do so or in the event of no settlement being arrived at, the Railway shall be entitled to execute the extra works by other means and the Contractor shall have no claim for loss or damage that may result from such procedure.

The assessment of rates for extra items shall be arrived at based on the prevailing rates and by taking guidance from the following documents in order of priority:

- (i) Analysis of Unified Schedule of Rates of Indian Railways
- (ii) Analysis of Delhi Schedule of Rates issued by CPWD
- (iii) Market Analysis

- (2) Provided that if the Contractor commences work or incurs any expenditure in regard thereto before the rates as determined and agreed upon as lastly hereuntofore-mentioned, then and in such a case the Contractor shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of determination of the rates as aforesaid according to the rates as shall be fixed by the Engineer. However, if the Contractor is not satisfied with the decision of the Engineer in this respect, he may appeal to the Chief Engineer within 30 days of getting the decision of the Engineer, supported by analysis of the rates claimed. The Chief Engineer's decision after hearing both the parties in the matter would be final and binding on the Contractor and the Railway.
- 54. (1) Handing over of Works:** The Contractor shall be bound to hand over the works executed under the contract to the Railway complete in all respects to the satisfaction of the Engineer. The Engineer shall determine the date on which the work is considered to have been completed, in support of which his certificate shall be regarded as sufficient evidence for all purposes. The Engineer shall determine from time to time, the date on which any particular section of the work shall have been completed, and the Contractor shall be bound to observe any such determination of the Engineer.
- 54. (2) Clearance of Site on Completion:** On completion of the works, the Contractor shall clear away and remove from the site all constructional plant, surplus materials, rubbish and temporary works of every kind and leave the whole of the site and works clean and in a workman like condition to the satisfaction of the Engineer. No final payment in settlement of the accounts for the works shall be paid, held to be due or shall be made to the Contractor till, in addition to any other condition necessary for final payment, site clearance shall have been effected by him, and such clearance may be made by the Engineer at the expense of the Contractor in the event of his failure to comply with this provision within 7 days after receiving notice to that effect. Should it become necessary for the Engineer to have the site cleared at the expenses of the Contractor, the Railway shall not be held liable for any loss or damage to such of the Contractor's property as may be on the site and due to such removal there from which removal may be affected by means of public sales of such materials and property or in such a way as deemed fit and convenient to the Engineer.
- 54 (3)** At the final stage of completion and commissioning of work, in case the contractor's failure is limited to only some of the works costing not more than 2% of the original contract value, and the Contractor request the engineer that such works may be offloaded from him and got executed through another agency and additional cost incurred, if any, should be recovered from his dues; the Engineer on being convinced that the anticipated additional cost for such works will not be substantial and can be recovered from the dues of the contractor and that

such offloading will help in completion and commissioning of work, may agree to such offloading without any adverse repercussion on the performance guarantee and security deposit of the Contractor. However, the Engineer will not be under any compulsion to agree to such a request. Further, before issuing letter of acceptance to another agency for such work, the Contractor shall be informed of the rates at which the work will be got executed and the Contractor should give his consent to do so and certify that he would have no future claim on this account and that the extra expenditure so incurred, if any, by the Engineer in getting the offloaded work done, shall be recovered from subsequent Bills or any other dues of the Contractor. In case the Contractor fails to give such consent within three working days, the Engineer may treat the same as not acceptable to Contractor and proceed accordingly. In any case, Railway shall deduct 10% of cost of such work or Rs one lakh whichever is lower, from the Contractor's dues as administrative charges for the process of finalizing new agency for such work irrespective of whether or not such work is finally offloaded from Contractor or not.

- 54 (4)** The provision of Construction and Demolition Waste Management Rule 2016 issued by Ministry of Environment Forest and Climate Change dated 29.03.2016 and published in the Gazette of India, Part – II, Section -3, Sub-section (ii) are binding upon the Contractor. Contractor shall implement these provisions at worksites, for which no extra payment will be payable.

55 Assignment or Subletting of Contract:

The Contractor shall not assign or sublet the contract or any part thereof or allow any person to become interested therein in any manner whatsoever without the special permission in writing of the Chief Engineer, save as provided below. Any breach of this condition shall entitle the Railway to rescind the contract under Clause 62 of these Conditions and also render the Contractor liable for payment to the Railway in respect of any loss or damage arising or ensuing from such cancellation; provided always that execution of the details of the work by petty Contractor under the direct and personal supervision of the Contractor or his agent shall not be deemed to be sub-letting under this clause.

In case Contractor intends to subcontract part of work, he shall submit a proposal in writing seeking permission of Chief Engineer for the same. While submitting the proposal to railway, Contractor shall ensure the following:

- (a) (i) Total value of work to be assigned to sub-contractor(s) shall not be more than 50% of total contract value.

(ii) The subcontractor shall have successfully completed at least one work similar to work proposed for subcontract, costing not less than 35% value of work to be subletted, in last 5 years through a works contract directly given to him by a Govt. Department; or by a Public listed company having average annual turnover of Rs 500 crore and above in last 3 financial years excluding the current financial year, listed on National Stock Exchange or Bombay Stock Exchange, registered at least 5 years back from the date of submission of proposal by Contractor to Railway and work experience certificate issued by a person authorised by the Public Listed Company to issue such certificates.

In case contractor submits subcontractor's work experience certificate issued by public listed company, the contractor shall also submit along with work experience certificate, the relevant copy of work order, bill of quantities, bill wise details of payment received duly certified by Chartered Accountant, TDS certificates for all payments received and copy of final/last bill paid by company in support of above work experience certificate.

(iii) There is no banning of business with the sub-contractor in force over IR.

- (b) The Contractor shall provide to the Engineer a copy of the agreement to be entered into by Contractor with subcontractor. No subcontractor shall be permitted without a formal agreement between Contractor and subcontractor. This agreement shall clearly define the scope of work to be carried out by subcontractor and the terms of payment in clear & unambiguous manner.

- (c) On receipt of approval from Chief Engineer, Contractor shall enter into a formal agreement legally enforceable in Court of Law with subcontractor and submit a copy of the same to the Engineer.
- (d) The Contractor shall intimate to the Engineer not less than 7 days in advance, the intended date of commencement of subcontractor's work.
- (e) Once having entered into above arrangement, Contractor shall discontinue such arrangement, if he intends to do so at his own or on the instructions of Railway, with prior intimation to Chief Engineer.
- (f) The Contractor shall indemnify railway against any claim of subcontractor.
- (g) The Contractor shall endeavour to resolve all matters and payments amicably and speedily with the subcontractor.
- (h) In addition to issuance of work experience certificate to Contractor, the Engineer, when, based on documents, is satisfied that subcontracted work has been carried out by subcontractor, shall issue work experience certificate to the subcontractor also for the portion of work subcontracted and successfully completed by the sub-contractor.
- (i) The responsibility of successful completion of work by subcontractor shall lie with Contractor. Subcontracting will in no way relieve the Contractor to execute the work as per terms of the Contract.
- (j) Further, in case Engineer is of the view that subcontractor's performance is not satisfactory, he may instruct the Contractor to remove the subcontractor from the work and Contractor has to comply with the above instructions with due promptness. Contractor shall intimate the actual date of discontinuation of subcontract to Engineer. No claim of Contractor whatsoever on this account shall be entertained by the Railway and this shall be deemed as 'excepted matter' (matter not arbitrable).
- (k) The permitted subcontracting of work by the Contractor shall not establish any contractual relationship between the sub-contractor and the Railway and shall not relieve the Contractor of any responsibility under the Contract.

56.1 Measurement of Works by Railway:

The Contractor shall be paid for the works at the rates in the accepted Schedule of Rates and for extra works at rates determined under Clause 39 of these Conditions on the measurements taken by the Engineer or the Engineer's representative in accordance with the rules prescribed for the purpose by the Railway. The quantities for items the unit of which in the accepted Schedule of Rates is 100 or 1000 shall be calculated to the nearest whole number, any fraction below half being dropped and half and above being taken as one; for items the unit of which in the accepted Schedule of Rates is single, the quantities shall be calculated to two places of decimals. Such measurements will be taken of the work in progress from time to time and at such intervals as in the opinion of the Engineer shall be proper having regard to the progress of works. The date and time on which 'on account' or 'final' measurements are to be made shall be communicated to the Contractor who shall be present at the site and shall sign the results of the measurements (which shall also be signed by the Engineer or the Engineer's representative) recorded in the official measurements book as an acknowledgement of his acceptance of the accuracy of the measurements. Failing the Contractor's attendance, the work may be measured up in his absence and such measurements shall, notwithstanding such absence, be binding upon the Contractor whether or not he shall have signed the measurement books provided always that any objection made by him to measurement shall be duly investigated and considered in the manner set out below:

- (a) It shall be open to the Contractor to take specific objection to any recorded measurements or Classification on any ground within seven days of the date of such measurements. Any re-measurement taken by the Engineer or the Engineer's representative in the presence of the Contractor or in his absence after due notice has been given to him in consequence of objection made by the Contractor shall be final and binding on the Contractor and no claim whatsoever shall thereafter be entertained regarding the accuracy and Classification of the measurements.

- (b) If an objection raised by the Contractor is found by the Engineer to be incorrect the Contractor shall be liable to pay the actual expenses incurred in measurements.

56.2 Measurement of Works by Contractor's Authorized Representative:- Not applicable

(a) The Contractor shall be paid for the works at the rates in the accepted Schedule of Rates and for extra works at rates determined under Clause 39 of these Conditions on the measurements taken by the Contractor's authorized Engineer in accordance with the rules prescribed for the purpose by the Railway. The quantities for items the unit of which in the accepted Schedule of Rates is 100 or 1000 shall be calculated to the nearest whole number, any fraction below half being dropped and half and above being taken as one; for items the unit of which in the accepted Schedule of Rates is single, the quantities shall be calculated to two places of decimals. Such measurements will be taken of the work in progress from time to time. The date and time on which 'on account' or 'final' measurements are to be made shall be communicated to the Engineer.

The date and time of test checks shall be communicated to the Contractor who shall be present at the site and shall witness the test checks, failing the Contractor's attendance the test checks may be conducted in his absence and such test checks shall notwithstanding such absence be binding upon Contractor provided always that any objection made by Contractor to test check shall be duly investigated and considered in the manner set out below:

- (i) It shall be open to the Contractor to take specific objection to test checks of any recorded measurement within 7 days of date of such test checks. Any re-test check done by the concerned Railway's authority in the presence of the Contractor or in his absence after due notice given to him in consequent of objection made by the Contractor shall be final and binding on the Contractor and no claim whatsoever shall thereafter be entertained regarding the accuracy and classification of the measurements.
- (ii) If an objection raised by the Contractor is found by the Engineer to be incorrect the Contractor shall be liable to pay the actual expenses incurred in measurements.
- (b) Incorrect measurement, actions to be taken: If in case during test check or otherwise, it is detected by the Engineer that agency has claimed any exaggerated measurement or has claimed any false measurement for the works which have not been executed; amounting to variation of 5% or more of claimed gross bill amount, action shall be taken as following:
 - (i) On first occasion of noticing exaggerated/ false measurement, **Engineer shall recover liquidated damages equal to 10% of claimed gross bill value.**
 - (ii) On any next occasion of noticing any exaggerated/false measurement, railway **shall recover liquidated damages equal to 15% of claimed gross bill value.** In addition the facility of recording of measurements by Contractor as well as release of provisional payment shall be withdrawn. Once withdrawn, measurements shall be done by railway as per clause 55.1 above.

57. Final Supplementary Agreement:- After the work is completed or otherwise concluded by the parties with mutual consent, and taken over by the Railway as per terms and conditions of the contract agreement, and there is unequivocal no claim on either side under the Contract other than "as mentioned in Annexure XIV of GCC-2020" the parties shall execute the Final Supplementary Agreement as per Annexure XIV.

58 Approval only by Maintenance Certificate:- No certificate other than Maintenance Certificate, if applicable, referred to in Clause 50 of the Conditions shall be deemed to constitute approval of any work or other matter in respect of which it is issued or shall be taken as an admission of the due performance of the contract or any part thereof.

59. Maintenance Certificate:- The Contract shall not be considered as completed until a Maintenance Certificate, if applicable, shall have been signed by the Engineer stating that the works have been completed and maintained to his satisfaction. The Maintenance Certificate shall be given by the Engineer upon the expiration of the period of maintenance or as soon thereafter as any works ordered during such period pursuant to Sub Clause (2) to Clause 48 of these Conditions shall have been completed to the satisfaction of the Engineer, and full effect shall be given to this Clause notwithstanding the taking possession of or using the works or any part thereof by the Railway.

The Competent Authority to issue above Maintenance Certificate shall normally be the authority who is competent to sign the contract. If this Competent Authority is of the rank lower than JA Grade, then a JA 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 Railways against the contract concerned.

- 60 Final Payment:-** On the Engineer's certificate of completion in respect of the works, adjustment shall be made and the balance of account based on the Engineer or the Engineer's representative's certified measurements or Engineer's certified "contractor's authorized engineer's measurements" of the total quantity of work executed by the Contractor upto the date of completion and on the accepted schedule of rates and for extra works on rates determined under Clause 39 of these Conditions shall be paid to the Contractor subject always to any deduction which may be made under these presents and further subject to the Contractor having signed delivered to the Engineer enclosing either a full account in detail of all claims he may have on the Railway in respect of the works or having delivered No Claim Certificate and the Engineer having after the receipt of such account given a certificate in writing that such claims are not covered under excepted matter i.e. Clauses 7(j), 8, 18, 22(5), 39, 43(2), 45(i)(a), 55, 55- A(5), 57, 57A, 61(1), 61(2) and 62(1) (i) to (xv)(B) of Standard General Conditions of Contract or in any Clause (stated as excepted matter) of the Special Conditions of the Contract, that the whole of the works to be done under the provisions of the Contracts have been completed, that they have been inspected by him since their completion and found to be in good and substantial order, that all properties, works and things, removed, disturbed or injured in consequence of the works have been properly replaced and made good and all expenses and demands incurred by or made upon the Railway for or in the respect of damage or loss by from or in consequence of the works, have been satisfied agreeably and in conformity with the contract.
- 61** Contractor is to abide by the provisions of various labour laws in terms of above clause 54, 55, 55-A and 55-B of Indian Railways Standard General Conditions of Contract. In order to ensure the same, an application has been developed and hosted on website 'www.shramikkalyan.indianrailways.gov.in'. Contractor shall register his firm/company etc. and upload requisite details of labour and their payment in this portal. These details shall be available in public domain. The Registration/ updation in Portal shall be done as under.
- 62.0** Engineer" shall mean the Divisional Engineer or Executive Engineer, Divisional Signal & Telecom Engineer, Divisional Electrical Engineer, Divisional Mechanical Engineer in executive charge of the works and shall include the superior officers, both Open Line and Construction Organisations, of Engineering, Signal & Telecom, Mechanical and Electrical Departments, i.e. the Senior Divisional Engineer/Deputy Chief Engineer, Senior Divisional Signal & Telecom Engineer / Dy. Chief Signal & Telecom Engineer, Senior Divisional Electrical Engineer / Deputy Chief Electrical Engineer, Senior Divisional Mechanical Engineer/Deputy Chief Mechanical Engineer and shall mean & include the Engineers of the Successor Railway.

Annexure-1 to Chapter-7**INDIAN RAILWAY
WORKSHOP PROJECTS****LCDA No. (18 DIGIT IPAS GENERATED NO.)****DOCUMENT OF AUTHORIZATION**

Reference (i) Works Contract/Supply Contract No. _____ Dated _____
(ii) Inland Letter of Credit No. _____ Dated _____

This document is issued against contract No. ----- (FROM IREPS) ----- dated ----- for supply/work of DESCRIPTION OF GOODS/ WORK FROM IREPS) -----.

The beneficiary of the aforementioned Letter of Credit M/s (NAME AND VENDOR CODE) (Vendor Code as per IRPES) is entitled to received payment aggregating INR\$\$\$ (FROM ABSTRACT OF BILL PASSED) out of a total LC amount of INR(FROM MASTER TABLE OF LC OPENED) against the first/second" commercial Invoice No. (FROM IPAS) _____ dated ---- FROM IPAS _____ for INR (FROM IPAS) ----- raised against the above contract from State Bank of India ----- (branch- FROM MASTER TABLE)----- on the strength of this Certificate.

The details of payments already made to the beneficiary under this Letter of Credit are as follows:-

S. No.	Invoice No.	Invoice date	Invoice Amount (INR)	LCDA No.	LCDA date	Amount paid (INR)
Total Paid						

THIS PAYMENT: _____ \$\$\$ _____

LC BALANCE AFTER THIS PAYMENT: _____

(Signature of authorised Railway authority)

Name

Designation

Official Seal

Annexure-2 to Chapter-7

INDIAN RAILWAY WORKSHOP PROJECTS

SPECIMEN FORMAT OF BANK GUARANTEE BOND

1. In consideration of the President Of India (hereinafter called "the Government") having agreed to exempt (hereinafter called "then said Contractor(s)") from the demand, under the terms and conditions of as Agreement dated made between and for (herein after called "the said Letter of Acceptance/Agreement"), of **security deposit/performance guarantee/mobilization advance guarantee** for the due fulfillment by the said Contractor(s) of the terms and conditions contained in the said Letter of Acceptance/Agreement, on production of Bank Guarantee for Rs..... (Rupees We (hereinafter referred to as "The Bank").
(Indicate the name of the Bank) at the request of (contractor(s)) do hereby undertake to pay to the Government an amount not exceeding Rs. against any loss or damage caused to or suffered or would be caused to or suffered by the Government by reason of any breach of the said Contractor(s) of any of the terms or conditions contained in the said **Letter of Acceptance/Agreement**.
2. We (indicate the name of the bank) do hereby undertake to pay the amount due and payable under this guarantee without any demur, merely on a demand from the Government stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Government by reason of breach by the said (contractor(s)) of any of the terms or conditions contain in the said **Letter of Acceptance/Agreement** or by reason of the (contractor(s)) failure to perform the said **Letter of Acceptance/Agreement**. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs.
3. We undertake to pay to the Government any money so demanded notwithstanding any dispute or disputes raised by the (contractor(s)/supplier(s) in any suit or proceedings pending before any court of tribunal relating thereto our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the (contractor(s)/supplier(s) shall have no claim against us for making such payment.
4. We (indicate the name of the bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said **Letter of Acceptance/Agreement** and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said **Letter of Acceptance/Agreement** have been fully paid and its claim satisfied or discharged or till **FA&CAO/WP/ Patna** office/Department Ministry of **Railway** certifies that the terms and conditions of the said **Letter of Acceptance/Agreement** have been fully and properly carried out by the said contractor(s) and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the we shall be discharged from all liability under this guarantee thereafter.
5. We (indicate the name of the bank) further agree with the Government that the government shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said **Letter of Acceptance/Agreement** or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said **Letter of Acceptance/Agreement** and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of the Government or any indulgence by the Government to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.
6. The guarantee will not be discharged due to the change in the Constitution of the bank of the contractor(s)/supplier(s).
7. We (Indicate the name of the bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Government in writing.

Date the day of ... 20__
for

(Indicate the name of Bank)

Note: "The tenderer(s) are directed for submission of BG strictly as per proforma without any change in wording, style and contents. Any delay in execution of agreement and repercussion there of arising out of variation from the prescribed proforma will be on account of the tenders/contractors"

Annexure-3A to Chapter-7**PROFORMA OF INDEMNITY BOND**

Indemnity for Safe Custody of Reinforcement steel/Structural Steel as per Special Conditions of Contract Agreement No.: _____ dated: _____ for the work “ _____ ”

1. We (Name of Contractor) _____ hereby undertake that we shall hold at our Workshop at _____ for and behalf of the President of India and in trust for him the stores/articles(mentioned in annexure, details to be given for quantity for each section and grade) which may be and/or which has been made over to us, in connection with “_____” against the contract agreement No. _____ Dated. _____

2. We shall be and remain absolutely responsible for the safe custody and protection of the said stores and articles against all risks, whatsoever, till those and assembled in the bridge to be fabricated against the above mentioned contract and duly delivered to the President of India or to his representative as he may direct and as such do hereby indemnify the president of India against any loss and/or damage to the said stores and articles while in our possession/custody. The said stores and articles shall however be at all times, open to the inspection by officers who may be authored on that behalf by ministry of Railways or its nominee.

3. Should however, at any time any loss or damage to as aforesaid, occurs or a refund become otherwise due to the President of India, he or his representative shall be entitled to recover from us compensation for, and in respect of such loss or damage, if any, or the amount to be so refunded without prejudice to any other remedies which may be otherwise available to the said president of India by way of deduction from any sum due to/or any sum which at any time hereafter may become due to us under this or any other contract.

In the event of any loss or damage as aforesaid, the assessment of such loss or damage and the assessment of the compensation therefore would be made by the President of India or his authorized nominee and the said assessment would be final and binding upon us.

For _____

DECLARATION FORM

For receiving materials from the Railways by the Firm.

“I/We hereby solemnly declare that the _____(Material) obtained is required for the purpose of Manufacturing _____(finished product) against Contract Agreement No. _____ dated. _____. The _____(material) will not be utilized for any other purposes or other wise disposed of without the prior approval of the president of India/Railways or his nominee”

Note: - This Performa is only for guidance and may be changed/amended at any stage at the discretion of Engineer. This is to be submitted on stamp paper of appropriate value at the Contractor's cost.

Annexure-3B to Chapter-7**INDEMNITY BOND**

Indemnity for Guarantee of PEB Structure as per Special Conditions of Contract of PEB Agreement No.: dated: for the work

“ Name of Work :-----”

This deed of indemnity made on the day of by having its registered office(hereinafter referred to as 'Contractor' which expression shall unless excluded by or repugnant to the context be deemed to include his heirs, executors, administrators, legal representatives, successors and permitted assigns).

1.0 WHEREAS the contractor has agreed with the “President of India acting through CAO/Workshop Projects, Indian Railway, Chamber Bhawan, J. C. Road, Patna” (hereinafter referred to as 'Railway') vide agreement no. to execute the work which includes the Pre-Engineered Buildings (PEB) under this agreement.

2.0 AND WHEREAS, under Para for 'SPECIFICATIONS FOR PRE-ENGINEERING BUILDINGS (PEB)' contractor has agreed to guarantee for structural stability and undertake to maintain and rectify the various components of the PRE-Engineering buildings (PEB) for their successful performance for the periods of 20 (Twenty) years.

3.0 AND WHEREAS, under Para of 'SPECIFICATIONS FOR PRE-ENGINEERING BUILDINGS (PEB)' contractor has also agreed to indemnify the 'Railway' for the period mentioned in 2.0 above, against any damage to property and injury to persons on account of any defective work.

3.1 AND WHEREAS, under Para of 'SPECIFICATIONS FOR PRE-ENGINEERING BUILDINGS (PEB)', contractor has also agreed to indemnify the 'Railway' for the deflection limit of member shall generally be as open clause 3.13 of IS: 800-1984, provided the roofing and cladding sheets are capable of absorbing this deflection without any deformation/cracks. Responsibility of same is being given in writing by PEB's supplier.

AND WHEREAS, the various works described in 2.0 above have been executed by contractor under various items of this agreement as detailed under along with stipulated guarantee—

4.0 In consideration of Para of Specifications for Pre-Engineered Buildings (PEB) of tender documents as mentioned here in Para 2.0 above, the contractor hereby agrees and undertakes that –

He shall indemnify the Railways from any damage to the property and injury to persons on account of any defective work in Buildings mentioned in para 2.0 above provided that such damage and defect is not directly caused by errors in the contract documents, act of providence or insurrection or civil riot, and the contractor shall be liable for and shall indemnify and make good to the 'Railway' or other persons legally entitled thereto whenever required by the 'Railway' so to do. He shall indemnify all costs, losses or damages caused to the property of the Railways or the lives of persons, on account of defective work in the Buildings mentioned in Para 2.0 above.

Railways shall take such steps as may be considered necessary to mitigate the effect of such costs, losses or damages as the case may be.

- (i) He shall indemnify and save harmless the 'Railway' from and against all actions, suit proceedings, losses, costs, damages, charges, claims and demands of every nature and description brought or recovered against the 'Railway' by reason of any act or omission of the contractor, his agents or employees on account of defective work in the Buildings mentioned in Para 2.0. above

- (ii) Period specified in para 2.0 above will commence from the date of completion of entire civil works, (Actual date of completion) as mentioned by the Railway in the completion certificate.
- (iii) He will indemnify for all the liabilities under this indemnity bond within 30 days from the written information given by 'Railway' to this effect.
- (iv) It is also agreed that stipulated time for repair / replacement of the damages / defects or paying for any liabilities under this indemnity bond will commence as soon as written communication through fax, email or SMS is made to him.
- (v) The address, Email, Fax and SMS(Phone number for it) are given below
 - a) Postal Address
 - b) Email
 - c) Fax
 - d) Phone Number

5.0 Notwithstanding anything provided hereinabove the Contractor shall be liable and/or responsible to indemnify 'Railway' only in case defect and/or any loss has occurred directly due to structural instability of PEB structure. The name and mobile number of contact person is given below:

- a) Name
- b) Designation
- c) Phone Number

This will be responsibility of indemnifier to intimate any changes in above at least one month in advance and clear acknowledgement and confirmation will be taken by Railways to avoid any miscommunication.

6.0 IN WITNESS WHEREOF I,.....
 Chairman/Managing Director/Director of M/s..... duly
 authorized vide Power of Attorney dated hereunto have signed this deed
 under common seal of the company on the day and year first hereinabove written.

Encl:- i) Power of Attorney

ii) Guarantee by PEB's supplier

Signature of Tenderer

Signature & Address of Witnesses:

- 1. -----
- 2. -----

Annexure-4 to Chapter-7

Reference Para 64.3 & 64.6 of GCC 2020

Agreement towards Waiver under Section 12(5) and Section 31A (5) of Arbitration and Conciliation (Amendment) Act

I/we..... (Name of agency/Contractor) with reference to agreement no..... raise disputes as to the construction and operation of this contract, or the respective rights and liabilities, withholding of certificate and demand arbitration in respect of following claims :

Brief of claim:

- (i) Claim 1- Detailed at Annexure-
- (ii) Claim 2 –
- (iii) Claim 3 –

I/we..... (post of Engineer) with reference to agreement no..... hereby raise disputes as to the construction and operation of this contract, or the respective rights and liabilities, withholding of certificate and demand arbitration in respect of following claims:

I/we.....do/do not agree to waive off applicability of section 12(5) of Arbitration and Conciliation (Amendment) Act.

Signature of Claimant_____

Signature of Respondent

Agreement under Section 31(5)

I/we..... (Name of claimant) with reference to agreement no..... hereby waive off the applicability of sub section 31-A (2) to 31-A (4) of the Arbitration and Conciliation (Amendment) Act. We further agree that the cost of arbitration will be shared by the parties as per Clause 64(6) of GCC.

Signature of Claimant_____ Signature of Respondent_____

*Strike out whichever not applicable.

CHAPTER - 8

INDIAN RAILWAY
WORKSHOP PROJECTS ORGANISATION
Special Conditions of Contract for drawing and design

GENERAL NOTES:-**CODES & SPECIFICATIONS:**

- (1) I. All the designs are to be done using computer program as far as possible. The design is to be done as per the relevant IRS codes with up to date correction slips. The design is to be done satisfying all the latest codal provisions & procedures. The latest guidelines or the provisions in manuals & schedules will also have to be taken into consideration in design.
 In case of non availability of any codes on the subject design matter, standard practices. Standard books can be followed.
 II. In case of any disputes, Railways decision will be final.
 III. A preliminary scheme of design will be finalized between Railways & designer. There is Scope of inclusion of any suggestion/modification etc. later on also.
- (2) OBLIGATIONS OF DESIGNER:
- I. All minor modification which does not change the nature of in design/drawings to suit the site conditions shall be carried out by the designer.
 - II. In case of non standard computer programs being used by the designer, the programs shall be supplied to Railways.
 - III. The designer shall supply two sets of drawings each at conceptual stage (submission of drawing) and construction stage. The tracing in original and triplicate shall be handed over to Railway after drawings fit for construction have been released after proof checking and approval of Railway.
 - IV. Proof checking is to be arranged by the Agency from an independent agency as IIT in consultations with Railway (if required).
 - V. The Railway reserves the right to get the proof checker changed in consultation with the agency.
 - VI. All design calculation properly typed shall be submitted duly signed/stamped along with the drawings in duplicate in hard as well as soft copy.
 - VII. No payment of the cost of designs, drawings and proof checking will be paid separately by Railway. It is assumed that the cost is inclusive in the rate of items of work.
- (3) OBLIGATIONS OF THE RAILWAY:
- I. Co-ordination with the State Govt. & other authorities like PWD/Irrigation dept/Local bodies etc. for obtaining necessary details required for design work.
 - II. All related records and reports shall be made available by RAILWAY.
 - III. Railways shall supply the soil investigation report for the design of building/structure & services.
- (4) The architect/designer along with his team must visit to the proposed site to get a feel of the layout, the land, surroundings, roads, electrical cables, drainage & water lines, existing vegetation, etc which are likely to affect the site and design.

- (5) Rate is inclusive of taxes as admissible under relevant act/rule. Including CGST/SGST etc. as applicable on date of tendering.
- (6) Consultant may require to visit site 02 to 03 times during execution of work to clarify any points, issue necessary instructions to field Engineers regarding designs/drawings & specifications. Nominated Engineer of Railways may also visit consultant's office for further clarification on any point, after above 03 visits of consultant to site, on which consultant shall issue necessary clarification/guidelines to the nominated railway Engineer. No payment shall be made to consultant visit to site including transportation, fooding lodging, consultant's advice/clarification at site of work/consultant's office etc. complete. Cost is inclusive in the rate of Schedule item of works.
- (7) Any change in the work's tendered cost due to any reason what so ever shall not be considered for the purpose of payment.
- (8) Preparation of drawing is to be done satisfying all Codal Provisions, Plan, Geo-technical and Hydraulic data etc.
- (9) Proof checking of detailed design/drawings of structure to be done by IIT. The design and drawings shall be proof checked, approved and signed by the Proof checking Engineer.
- (10) Above finalized documents shall be submitted in 03 hard copies on good quality tracing paper and o1 soft copy (in DVD) stamped as "Fit for Execution" and signed both by the Design Engineer & the IIT as proof checking Engineer.
- (11) The work will be considered complete only after physical completion of the work and handing over to user. During this period, all required clarification and minor modifications is inclusive in cost.
- (12) TDS at the rate applicable would be recovered and Form 16 would be given to the contractor.
- (13) No claims shall be admissible if Railways modifies any data supplied to the consultant before approval of drawing by the Railways.
- (14) No claim shall be admissible for any variations in BUILDING's/SHED's cost at the time of construction.

Witness

1. Signature of Tenderer.

2.

Dated:

CHAPTER - 9

INDIAN RAILWAY
WORKSHOP PROJECTS ORGANISATION
SPECIAL CONDITIONS OF CONTRACT i.e. [Technical conditions]

- 1.0 All works under schedule **A1, A2, A3, A4, A5, A6, A7, B1, B2, B3, B4, B5, B6, B7, C1& C2** of tender document of these tender documents shall be carried out generally in accordance with provisions of Standard Specifications for Works and Materials and SER Unified Schedule of Rates 2010 of Engineering Department of S. E. Railway including up-to-date correction slips wherever needed.

1.1 Standard Specifications and Code of Practice:

- 1.1.1 The standard specifications, architectural and structural drawings of Railway, Indian Railway Standard & Indian Standard Rules & Codes of Practices as revised from time to time available from the Manager, Government of India, Publication Branch Patiala House, New Delhi/Director, ISI/ManakBhawan, BahadurShahZafar Nagar, New Delhi respectively must be followed with regard to design, material and workmanship.
- (i) IS Code of practice for plain and reinforced concrete (IS: 456)
 - (ii) IS Code of Practice for use of structural steel (IS: 800)
 - (iii) IS: 1742 Code of practice for building drainage.
 - (iv) IRS code of practice for Electric Arc welding of mild steel structures.
 - (v) IS specification for fine and coarse aggregate from natural sources for concrete (IS: 515).
- S E Railway Engineering Department's Standard Specifications for Work and Materials with errata and corrections up to date and S E. Railway Engineering Department's Schedule of Rates with errata and corrections slip up to date.

1.2 Plain/Reinforced Cement Concrete Works:

The IS code of practice for the structural use of reinforced concrete in building shall from part of these additional specification and this code and the standard practice in reinforced concrete construction that has been evolved by the adoption of this code shall be followed.

Fine and course aggregate: Fine and coarse aggregate for all type of concrete works shall conform to S E Railway Standard Specifications.

In addition to the routine test/ special test on material will be carried out whenever required by the Engineer. The cost of the special test will be borne by the Railways, if the results are as per standard laid down, failing which the cost of these tests will be borne by the contractor. Necessary facility in the form of moulds, cones, scales, materials, labour for casting, curing, specimens and such other facilities as per prerequisites required to any standard concrete test will be provided by the contractor free of cost.

1.3 Form Works:

1.3.1 General:

Shuttering shall be either of wooden planks of 35mm minimum thickness with steel sheet lining or plywood lining or of steel plates stiffened by steel angles. It should be ensured that the shuttering should be leak proof and there should not be any leakage of cement slurry during casting of the concrete. The shuttering shall be supported on wooden battens and beams and props of vertical ballies properly braced and cross braced together, so as to make the formwork rigid. In place of ballies props, brick pillars of adequate section built in mud/lean cement sand mortar may be used.

- 1.3.2 The form work shall conform to the shape, lines and dimension as showing in the plain. It shall be sufficiently rigid and strong to maintain correct shape of the members during deposition of concrete and shall be able to resist forces caused by vibration of concrete and

incidental loads, associated with men and machineries working over it. The battering shall have smooth and even surface and its joints shall not permit leakage of cement grout.

- 1.3.3 If at any stage of working during or after placing of concrete in the structure, the formwork bulges out beyond the required shape of the structure, the concrete shall be dismantled and removed and work redone with fresh concrete and adequately rigid formwork at contractors cost. Details of shuttering and centering shall be subject to the approval of the Engineer-in charge. The completed formwork shall be inspected and passed by the Engineer before the reinforcement bars are placed in positions.

1.3.4 **Camber:**

The shuttering on beams and slabs shall have camber of 4mm per meter (1 in 250) or as directed by Engineer-in charge, so as to offset the subsequent deflection. In case of cantilevers, the camber at free end shall be 1/50th of the projected length or as directed by the engineer-in charge.

- 1.3.5 Provision for holes shall be made in the shuttering for inserting fan hook clamps and provision of conduits etc. for concealed wiring and providing architectural finishing grooves if any at the junction of slabs with beams or walls or columns wherever required for architectural consideration, concealed sanitary and water supply pipes and fittings etc. as are required to be built in connection with the provision of various services in the buildings for service or architectural reasons. It may also be necessary to make holes in the shuttering of RCC columns for projecting bars. The tendered rates shall not be made to the contractor for making these provisions nor shall any deduction be made on account of any saving in RCC due to these. The formwork for the RCC chhajjas will be so made that the drip coarse band can be cast along with the chhajjas. No extra payment shall be made for this drip coarse band.

1.4 Reinforcement:

- 1.4.1 Reinforcement may be either with M.S. Round or Tor steel as decided by the Engineer as per approved drawing. No extra payment shall be made in case Tor steel is used in lieu of mild steel
- 1.4.2 It shall be the responsibility of the contractor to clean the reinforcement bars with dry gunny bags, if they are quoted with rust of impurities and nothing extra shall be paid for the same.
- 1.4.3 The rate for reinforced cement concrete should be including straightening and uncoiling of rolls of reinforcements. No extra payment for straightening and/or uncoiling of reinforcement shall be payable by the Railway.

1.5 Concreting:

- 1.5.1 The concrete shall be mixed properly in approved type mechanical mixer as per South Eastern Railway's standard specification. The proper consistency shall be determined by the Engineer by slump tests, which shall be carried out. Cost of moulds, labour, tools and plants, materials etc. for slumps tests of concrete shall be borne by the contractor.
- 1.5.2 The concrete shall be compacted immediately after placing by means of mechanical vibrator of suitable design for continuous operation.

1.6 Measurement:

- 1.6.1 All work will be paid for at the tendered rates on the basis of actual measurements at site. No account will be taken for heights and thickness over those shown in the plans, unless they are authorized by Engineer-in charge, in writing.
- 1.6.2 Measurement shall be made according to South Eastern Railway Standard Specification and relevant specification.

1.7 Rates:

- 1.7.1 For all items of reinforced concrete, the tendered rates shall include supplying and removal of scaffolding, supply of formwork, shuttering and centering etc. of approved design, their erection, dismantling, clearing and oiling, etc, cutting, hooking, bonding, binding, bending, unrolling and straightening of steel section, binding and placing in position of reinforcement etc. complete manufacturing of the reinforcement in required shape as per drawings, screening or washing the aggregate, mechanically mixing and placing the same in position & use of equipments including mechanical mixers, vibrator etc. all watering during the work and curing for the prescribed period after-wards & finishing exposed surface.

1.8 Foundation:**1.8.1 Timely Notice for Inspection of Foundations of Works to be covered Up:**

The contractor shall give notice to the engineer when and as soon as the excavation of any portion of the site for obtaining a foundation or bottom, whether above or below water, has reached the depth and width shown in the drawings. The contractor shall also give further notice to the Engineer whenever any bottom foundation is ready for inspection and whenever it is necessary to cover up any work in respect of which Engineer desires previous inspection, so that the Engineer may inspect the same before it is covered up. Bottom of foundation should be maintained by the contractor till execution of the work without any extra cost as directed by the Engineer - in -charge.

1.9 Brick Work:

1.9.1 All brickwork shall be done with well-burnt bricks as per South Eastern Railways Standard Specifications in cement mortar in proportion as may be specified in the drawings or as instructed by the Engineer-in- charge.

1.9.2 All pipes clamps or other fittings as may be required shall be fixed in position as the work proceeds. Chases will have to be cut out in the brick walls before housing the fitting and the contractor's rate for brickwork shall be inclusive of the cost of cutting chases.

1.9.3 No claim for any additional labour involved in doing the masonry work around the boards, telephone boxes etc. shall be entertained.

1.10 Rough Cast/Sand Faced Cement Plaster 20mm Thick.

1.10.1 All brick masonry shall be thoroughly wetted and joints raked out to a depth of at least 20 mm well washed with clean fresh water to ensure a clean depth of 13mm free from any mortar, and must be kept watered for a week before the plaster is applied if the masonry is old, otherwise the watering should be done for 2 days.

1.10.2 Samples of rough cast/sand faced shall be got approved from Engineer-in charge before commencement of work and work shall be done strictly according to South Eastern Railway's Standard Specifications.

1.11 Water Supply and Sanitary Installation:

a) For execution of sanitary installations and water supply works, the contractor shall arrange a licensed plumber and employ especially skilled artisans for these works. The work shall be executed as per South Eastern Railway's Standard Specification.

b) The work of providing GI and/or HCl pipes, as required, shall proceed along with the construction of building to avoid demolition or breaking up of masonry at a later stage.

c) Samples of sanitary installations and fittings such as W.C. Pans, wash basins, sinks etc. shall be submitted to the Engineer in charge for approval before supplying and fixing & shall be provided strictly in accordance with the approved samples.

d) G.I. pipes and fittings shall conform to BIS specifications and samples be got approved from the Engineer-in charge before using the materials in the work.

e) RCC pipes for sewer should conform to NP-2/NP-3 class of pipe specification as per BIS. These should be tested and certified by approved testing agencies/laboratories and the contractor, if asked for approval of materials by the Engineer, should produce certificate to the effect. Nothing extra will be paid for testing and certification by testing agency laboratory.

1.12 Flooring:

1.12.1 Flooring shall be laid using approved quality sand and coarse aggregates and as per South Eastern Railway's Standard Specifications. Floor shall be laid in panels and if dividing glass/metal strips shall be provided at the discretion of Engineer-in charge, no extra payment will be made for the same.

1.13 Roofing:

1.13.1 The roof shall be laid either with RCC or as per approved plan.

1.13.2 Openings for fan clamps and other fittings, connection with services shall be provided in shuttering as directed for which nothing shall be paid.

1.14 Testing of Building Materials:

1.14.1 Regular testing of building materials such as bricks, sand, aggregates, tiles, steel, cement, water proofing compounds, doors and windows etc. should be done.

1.14.2 Day to day quality control, sample testing facilities etc. must be available at work sites.

1.14.3 Test cubes for concrete should be made and tested as per IS specifications.

1.14.4 Concrete mix as specified in the tender documents should be followed at work site. In case of design mix, IS specifications for designing, producing, using, testing and accepting/rejecting must be followed.

1.14.5 Cement should be used by weight only in case of design mix concrete.

1.14.6 In case of cement, steel, HTS wires, besides obtaining test certificates from the contractors, regular independent tests to check the quality as per IS specifications should be done.

2.0. Structural Steel Work:**2.1. General Description:**

2.1.1 This section covers the requirements for providing fabrication, erection and placing of structural steel work for building construction including temporary supports and all other work as required for structural steel construction.

2.1.2 Applicable Codes and Standards:

The codes and standards generally applicable to the work of this section are listed hereinafter:

IS: 210 GRAY IRON CASTINGS.

IS: 226 STRUCTURAL STEEL (STANDARD QUALITY)

IS: 451 TECHNICAL SUPPLY CONDITIONS FOR WOOD SCREWS

IS: 800 CODE OF PRACTICE FOR USE OF STRUCTURAL STEEL IN GENERAL BUILDING CONSTRUCTION.

IS: 806 CODE OF PRACTICE FOR USE OF STEEL TUBES IN GENERAL BUILDING CONSTRUCTION.

IS: 813 SCHEME OF SYMBOLS FOR WELDING.

IS: 814 COVERED ELECTRODES FOR METAL ARC WELDING OF PART I & II) STRUCTURAL STEEL.

IS: 816 CODE OF PRACTICE FOR USE OF METAL ARC WELDING FOR GENERAL CONSTRUCTION IN MILD STEEL.

IS: 822 CODE OF PRACTICE FOR INSPECTION OF WELDS.

IS: 961 STRUCTURAL STEEL (HIGH TENSILE)

IS: 1024 CODE OF PRACTICE FOR USE OF WELDING IN BRIDGES AND STRUCTURES SUBJECT TO DYNAMIC LOADING.

IS: 1030 CARBON STEEL CASTING FOR GENERAL ENGINEERING PURPOSES.

IS: 1120 COACH SCREWS.

IS: 1161 STEEL TUBES FOR STRUCTURAL PURPOSES.

IS: 1182 RECOMMENDED PRACTICE FOR RADIOGRAPHIC EXAMINATION OF FUSION WELDED BUTT JOINTS IN STEEL PLATES.

IS: 1363 BLACK HEXAGON BOLTS, NUTS AND LOCK NUTS AND BLACK HEXAGON SCREWS.

IS: 1365 SLOTTED COUNTERSUNK SCREWS.

IS: 1367	TECHNICAL SUPPLY CONDITIONS FOR THREADED FASTENERS.
IS: 1915	CODE OF PRACTICE FOR STEEL BRIDGES.
IS: 2016	PLAIN WASHERS.
IS: 2062	STRUCTURAL STEEL (FUSION WELDING QUALITY)
IS: 3757	SPECIFICATION FOR HIGH TENSILE FRICTION GRIP BOLTS
IS: 5624	SPECIFICATION FOR FOUNDATION BOLTS
IS: 3063	SINGLE COIL RECTANGULAR SECTION SPRINT WASHERS FOR BOLTS, NUTS AND SCREWS.
IS: 3443	CRANE RAIL SECTIONS
IS: 3600	CODE OF PRACTICE FOR TESTING OF FUSION WELDED (PART I) JOINTS AND WELD METAL IN STEEL.
IS: 4923	HOLLOW STEEL SECTIONS FOR STRUCTURAL USE.
IS: 6227	CODE OF PRACTICE FOR USE OF METAL ARC WELDING IN TUBULAR STRUCTURE.
IS: 801	CODE OF PRACTICE FOR USE OF COLD FORMED LIGHT GAUGE STEEL STRUCTURAL MEMBERS IN GENERAL BUILDING CONSTRUCTION.
IS: 811	SPECIFICATIONS FOR COLD FORMED LIGHT GAUGE STRUCTURAL STEEL SECTIONS.

2.2 Submittals:

2.2.1 Material Report:

- (I) Prior to state of delivery of structural steel required, the Contractor shall submit the following to the Engineer for review:
 - a) Certified copies of mill test reports including chemical analysis and physical properties as required by the applicable Indian standards for each consignment of steel.
 - b) Where such mill certificates are not available or if the Engineer feels to substantiate conformance of the mill test reports, the contractor shall employ an approved testing laboratory to perform the required tests and chemical analysis at his own cost.
- (II) Shop Drawings- Before commencement of any structural steel fabrication work, the contractor shall submit the following to the Engineer for his approval:
 - a) Fabrication drawings including details of connections.
 - b) Assembly, erection and installation drawings and manuals indicating the sequence of work, welding and bolting procedure to be used. Cambers for trusses and large span girders shall be shown.
 - c) For composite construction the details and calculations of false work and forms supporting the concrete work in steel structure shall be submitted.

2.3. Materials:

2.3.1 Structural Steel:

Structural steel used in the works other than steel in Reinforced concrete, rails and fastenings shall be either of the following type:

- i) Mild steel conforming to IS: 226 - "Structural Steel (standard quality)" or IS: 2062 - "Structural Steel (fusion welding quality)" whichever is approved.
- ii) Whenever high tensile steel is specified it shall be conforming to IS 2062 - "Structural Steel (high tensile)"

- iii) All steel tubes shall be hot finished seamless steel tubes (hfs) of the specified strength and as approved by the Engineer and shall conform to IS: 1161. Tubes made by other processes and which have been subjected to cold working, shall be regarded as hot finished if they have been subsequently heat treated and are supplied in the normalized condition.
- iv) Hollow steel sections for structural use (RHS/SHS) as per IS: 4923-1997 in grade 'B' steel.

2.3.2 Threaded Fasteners:

- a) All bolts and nuts shall comply with IS: 1367.
- b) Black bolts, nuts and screws shall be in accordance with IS: 1363.
- c) Wherever counter sunk screws are specified, they shall be precision grade, slotted, countersunk head. Machine screws shall be conforming to type 'r' of IS: 1365.
- d) Wherever high tensile special quality bolts and nuts are specified, they shall comply with provision of IS: 800.
- e) Coach screws shall be in accordance with IS: 1120 and wood Screws shall conform to IS: 451.
- f) All plain washers shall conform to requirements of IS: 2016. Wherever spring washers for bolts, nuts and screws are specified, they shall be in accordance with the provisions of IS: 3063.

2.3.3 Cast Iron:

Cast iron shall be conforming to IS: 210. All cast iron goods shall be of best quality and make as approved by the Engineer.

2.3.4 Cast Steel:

Cast steel shall be conforming to IS: 1030. Unless specified otherwise, the steel shall be grade 2 and shall cater for all tests specified in the said standard.

2.3.5 Rails:

Rails shall comply with the requirements of IRST-12-64 or IS: 3443 if so instructed by the Engineer. They shall be obtained from an approved manufacturer.

2.3.6 Electrodes:

Electrodes used for metal arc welding of mild steel shall be medium coated type electrodes conforming to IS: 814 (parts I & II) and shall be of the best quality approved by the Engineer.

2.4. Handling and Storage:

- i) Structural steel shall be stored out of mud and dirt and proper drainage of the storage area shall be provided. Protect from damage or soiling by adjacent construction operations.
- ii) Fabricated steel shall not be handled until the paint has thoroughly dried. Care shall be taken to avoid paint abrasions and other damage. Steel work shall be transported in the largest practical lengths and in such a way as not to over-stress the fabricated sections. All pieces bent or otherwise damaged shall be rejected and shall be replaced by the contractor at his own cost.
- iii) Storage of fabricated steel at the job site shall be the responsibility of the contractor. Store material at the job site in a manner which does not overload the existing or newly constructed structures. Protect material against excessive deflection, corrosion or deterioration. As far as practicable, stacking of fabricated steel shall be done in sequence of erection. But heavy members shall not be stacked on top of the light ones.

2.5.Fabrication:**2.5.1. Shop Drawings:**

- i) The contractor shall prepare required detailed shop drawings giving complete information necessary for the fabrication of the structures. All information should be clearly given and the drawings shall be in conformity with the best modern practice. A marking diagram allotting distinct identification marks to each separate piece of steel work shall be prepared in sufficient detail to ensure convenient assembly and erection. Symbols used for welding in the drawings shall be in accordance with IS: 813.
- ii) The contractor shall prepare comprehensive bill of material sheets for each shop drawing giving therein all the items shown on the drawings together with their weights, mark numbers, cutting lengths etc. Three copies of all working drawings and bill of material sheets shall be submitted to the Engineer for approval. Fabrication shall not commence until the approval of the relevant drawings has been obtained from the Engineer. While the shop drawings prepared by the contractor and approved by the Engineer are deemed to represent the correct interpretation of the work to be done, the contractor is not relieved of the responsibility for accuracy of detailed dimensions shown therein.
- iii) Erection methodology for steel structures shall be submitted by the contractor and approval of the same shall be obtained before start of erection works.

2.5.2 Templates:

- i) All fabrication shall be in accordance with IS:800 and IS:1915. Extensive use of templates shall be made. The Templates shall be steel bushed where considered necessary by the Engineer.
- ii) In case, actual members are used as templates for similar pieces, it will be at the discretion of the Engineer to decide whether such pieces are fit to be incorporated in the finished structure. The contractor shall arrange for corresponding parts of each unit manufactured from the same drawings to be interchangeable as far as economic manufacturing conditions permit, and shall advise the Engineer of the precise arrangements made in this respect.

2.5.3 Straightening:

All materials shall be straight unless required to be of curvilinear form and shall be free from twists. If necessary, the materials shall be straightened and/or flattened by pressure. Heating of rolled sections and plates for purpose of straightening will not be permitted. Limited straightening may however be effected by local application of heat with a gas torch.

2.5.4 Cutting:

- i) Gas cutting shall normally be permitted for mild steel only. Gas cutting of high tensile steel may be permitted provided special care is taken to leave sufficient metal to be removed by machining so that all metal that has been hardened by flame is removed. Gas cutting shall preferably be done by machine. Hand flame cutting may only be permitted subject to the approval of the Engineer. Gas cut edges shall be free of gauge. Any gauges that remain after cutting shall be removed by grinding.
- ii) Rolled sections shall be sawed or flame cut to length. Small plate pieces like gussets may be sheared or cropped to size. Sawing, shearing and dropping shall be clean and free from any distortion. If necessary the edges shall be ground afterwards.

- iii) For tubular construction cutting of the pipe and preparation of joint surface shall be done in a neat manner for a good fit up. The ends of the tubes may be flattened or otherwise formed for connections provided that the methods adopted for such flattening do not injure the material. The change of section shall be gradual.

2.5.5 Holing:

- i) Holes shall preferably be done by drilling. Punching shall not be resorted to unless previously approved by the Engineer. In any case, punching of holes in materials having a thickness in excess of the connector diameter or in the materials thicker than 16 mm shall not be permitted. Where punching is permitted the holes shall be punched 3 mm less in diameter than the required size and reamed after assembly to the full size.
- ii) Holes shall be drilled or punched at right angles to surface of the member, not more than 1.5 mm/ 2.0 mm (as the case may be depending upon whether the connector diameter is less than or more than 25 mm) larger than the connector diameter. Holes shall not be formed or enlarged by burning or gas Cutting. Holes shall be clean-cut within torn or ragged edges. Outside burrs resulting from drilling operations shall be removed.
- iii) Holes through more than one thickness of material of members such as compound stanchions and girder flanges shall be drilled after the members are assembled and tightly clamped or bolted together. They shall then be separated and burrs removed if so directed by the Engineer.
- iv) Steel members' adjustment shall be provided with slotted holes as shown on the drawings. Suitable templates shall be used for proper location of the holes.

2.5.6 **Fabrication Tolerances:** As per relevant IS code/IRS B1-2001

2.6. Assembly:

- 2.6.1. All connections shall be either bolted or welded as shown on the drawings. The contractor shall not redesign or alter any connection without prior approval of the Engineer. The component parts shall be assembled in such a manner that they are neither twisted nor otherwise damaged and shall be prepared such that the specified cambers, if any, are provided. Drifting done during assembly shall not distort the metal or enlarge the holes. Poor matching of holes shall be cause of ejection. However, if permitted by the Engineer. Holes that must be enlarged due to mismatching shall be reamed.

2.6.2. Bolting:

- i) All steel work which is bolted together shall be in close contact over the whole surface. Where two bolted surfaces are to be in permanent contact after assembly, each shall be thoroughly scraped free of loose scales, dirt & burrs and a heavy coat of red oxide, zinc chrome or other approved paint applied after cleaning and drying.
All bolts shall be provided with washers under the nuts and the washers shall be tapered on the inside of the flanges of R.S. Joists and channels. Bolts and studs shall project not less than one full thread through the nut after tightening. Unless otherwise specified, the ends of the bolts shall be burred after erection to prevent the removal of nuts.
- ii) High strength bolts shall be used in bearing or friction as shown on the drawings. High strength bolted joints shall be made without the use of erection bolts. Bolts shall be of a length that will extend not less than 6 mm beyond the nuts. Bolts shall be entered into the holes without damaging the thread-members. They shall be brought tightly together with sufficient high-strength fitting up bolts which shall be re-tightened as all the bolts are finally tightened. Bolt heads shall be protected from damage during placing. Bolts that

have been completely tightened shall be marked for identification. Bolted parts shall fit solidly together and shall not be separated by interposed compressible materials. The contact surfaces in high strength bolted connections shall be free of oil, paint, lacquer, loose scale or other coatings. The facing surfaces shall be machined flat. Final tightening of high strength bolts shall be by turn-of-nut method. Re-tightening shall not be permitted. Whenever the contractor intends to use other means of tightening he shall obtain prior approval of the Engineer.

- iii) Anchor bolts shall be set by use of templates secured firmly in place to permit true positioning of the bearing plates and assemblies. When in drawings anchor bolts are shown to be installed in sleeves, the sleeves shall be completely filled with grout.

2.6.3. **Welding:**

Welding shall be done in accordance with IS: 816.

- i) Welding procedure shall be based on the specific analysis of any given heat of steel (based on the certified mill test reports) and shall be subject to the review of the Engineer. These procedures shall call for one or all of the following:
 - A. Proper bead shape.
 - B. Minimized penetration to prevent dilution of the weld metal with the alloy elements.
 - C. Preheating, controlled inter-pass temperature and controlled heat input.
- ii) Welding shall be performed only by qualified and tested welders specifically trained and experienced for the type of job required to execute the welding work to the complete satisfaction of the Engineer.
- iii) Use of standard weld symbols as adopted by IS: 813 are mandatory. Prequalified joints, that are detailed, prepared & welded in accordance with the requirement of IS: 816 shall invariably be used.
- iv) Structural welding shall not commence until joint elements are bolted or tacked in intimate contact and adjusted to dimensions shown with allowance for any weld shrinkage that is expected. Welding sequence shall be planned and controlled to minimize undue stress increase or undue distortions in restrained members. Heavy sections and those having a high degree of restraint shall be welded with low Hydrogen type electrodes.
- v) If copper wire spacers are used between two surfaces to be welded to reduce transverse stresses in the weld, care shall be taken that it does not mix with the weld metal.
- vi) Concave bead shape shall be avoided. Ratio of weld width to Weld depth shall preferably vary from a minimum of 1 to a maximum of 1.4.
- vii) Field welding shall not be permitted unless shown on the drawings.
- viii) Subsequent to fabrication, the overlapping or contacting surfaces or other closed sections (such as tubular, box section) which are inaccessible to painting shall be seal welded when the end of the tube is not automatically sealed by virtue of its connection by welding to another member. All the free ends of rectangular/square steel hollow sections shall be sealed properly by welding to prevent internal corrosion. Before sealing, the inside of the tube shall be made dry and free from loose scale.
- ix) Order of assembly of the tubular sections shall consist of welding the tensile member to the main member first. Compression member shall be cut back to overlap the tensile member and then welded to both of these members.
- x) **Sequence:**

Edges are to be tack welded to maintain uniform gap during welding to minimize residual stress

- Transverse weld before longitudinal one.
- Fillet weld following butt weld
- Starting from inside to outwards.

2.6.4. Testing of Welds:

- i) All welded connections shall be inspected as per IS: 822. Visual inspection method is the simplest and requires a competent person to observe the welder when he is performing the work.
- ii) All welds shall be tested by "dye penetration test" as per current practices.
- iii) At least 5% of the welds shall be tested by "radiographic examination" as per IS: 1182 at the locations specified by the Engineer. The radiographic test is best suited for the butt welds where the picture will show only the weld material. It is not adaptable to fillet welds because the parent material will also project on the picture. Percentage of welds to be tested may be increased or decreased by the Engineer depending on the quality of welds and results obtained for previous weld tests. All expenses on such testing shall be borne by the contractor.
- iv) At least 10% of fillet welds shall be tested by 'Ultrasonic test method'
- v) Agency for testing of weld shall be approved by the Engineer prior to testing.
- vi) Defective welds shall be repaired or replaced as decided by the Engineer. The repaired or replaced welds shall be tested using the same methods as above. Additionally, when defective welds are found, the cause of the defective welding shall be determined and the contractor shall institute immediate corrective action.

2.7 Shop Erection:

- i) Steel work shall be temporarily shop erected completely or partially as directed by the Engineer so that the accuracy of fit may be checked before dispatch. Due notice shall be given to the Engineer so that the accuracy of fit may be checked for dispatch. Due notice shall be given to the Engineer. When the work is ready for inspection, the assembly shall not be dismantled until it has been inspected and approval obtained.
- ii) The parts shall be assembled with a sufficient number of parallel drifts to bring and keep the components in place. In the case of parts drilled or punched through steel jigs with bushes resulting in similar parts being inter-changeable for portion of the steel work, trial assembly shall be carried out to the extent required by IS: 1915.
- iii) All erection marks shall be die-stamped and also distinctly stenciled in paint. The marking shall be as per the marking diagram approved by the Engineer.

2.8. Erection:

- i) As far as possible, the contractor shall deliver the fabricated steel work to the site in the same sequence as he wishes to follow for the erection. Dispatch should be scheduled to avoid cluttering up of the site. The bolts required for erection shall be bagged according to size prior to dispatch...
- ii) All structural work shall be erected in accordance with IS:800, IS:806 and IS:1915 and as per the approved erection drawings. The contractor shall be responsible for setting out the works. The suitability and capacity of all plant and equipment used for erection shall be to the satisfaction of the Engineer. These shall be regularly serviced and maintained. Occupational safety practices shall be strictly adhered to and shall be to the satisfaction of the Engineer.

- iii) Individual pieces shall be plumbed, leveled and aligned. Drift pins may be used only to bring together the several parts. They shall not be used in such manner as to distort or damage the metal. Temporary bracing, guy-line and staging shall be provided to ensure proper alignment and to adequately protect all persons, property and to withstand all loadings to which the structure may be subjected during erection.

Attachment of such temporary steel work to the permanent steel work shall only be done with the approval of the Engineer. Temporary steel work shall remain in position until the structure is stable and self supporting and permanently bolted or welded to the satisfaction of the Engineer. After removal of temporary steel work, the permanent structure shall be made good to the complete satisfaction of the Engineer.

No permanent bolting or welding shall be done until proper alignment has been obtained. Erection of the parts with any moderate amount of reaming, chipping or cutting shall be immediately reported to the Engineer. The steel work shall be rejected unless corrective action is approved by the Engineer.

- iv) No erection shall be permitted more than 2 storey's above a complete bolted and/or welded floor or above a decked surface.
- v) Placement of joists shall not start until the supporting work is secured. Temporary bridging, connections and anchors shall be provided to assure lateral stability during erection. Bridging to steel joists shall be installed immediately after joist erection, before any construction loads are applied. Horizontal or vertical bridging shall be provided in accordance with the type of span of the joists. Ends of the bridging lines shall be anchored at top and bottom chords where terminating to walls or beams.

2.8.1 **Erection Tolerances:** As per relevant IS code/IRS B1-2001

2.9 Field Modifications:

Corrections to accommodate minor misfits in steel structure by moderate use of drift pins and reaming will be permitted. Errors that cannot be corrected by these measures, but require modifications must be reported immediately to the Engineer along with contractor's proposed solution.

2.10 Grouting Under Base Plates:

Grouting under base plates shall be done after erection of the structural steel, unless otherwise approved by the Engineer. All bearing plates, bearing assemblies shall be set level and to the elevations shown on the drawings. These shall be shimmed with approved means and grouted to assure full bearings on the supporting substrata regardless of the tolerances otherwise permitted.

- i) The grout to be used in superstructure stanchion bases/ structural steel roof holding down bolts pockets and below base plates for trusses shall be Non-Shrink Grout Conbextra-GP2 of M/s Fosroc or equivalent. The surfaces which are to receive the grout shall be thoroughly cleaned immediately prior to the grouting operation. The grout shall be carefully worked under the base plates. Air pockets in the grout packing shall be avoided.
- ii) After the grout has had its initial set, the grout shall be cut back flush with the base plate and the surplus grout shall be removed. Before leaving the site the contractor shall re-tighten the nuts of all anchor bolts.

2.11.Inserts and Embedments:

Various steel inserts and embedments are required under the contract to be fabricated, positioned and secured firmly into place inside the formwork prior to concrete being poured. There are also requirements of jointing, threading, bolting and welding inserts and embedments of different concrete and structural steel elements in order to establish structural continuity and connection. Great care shall be exercised by the contractor in executing all aspects of the work related to inserts and embedments, including tolerances, so that the final assembly of the concrete elements can meet satisfactorily the continuity and contiguity requirements intended in the structure.

2.12 Painting Specification for Steel Structures:-

Description	
FABRICATION SHOP	EXTERNAL SURFACES
Surface Treatment	Sand blasting/Grit Blasting
1 st under-Coat	Inorganic zinc silicate primer (self curing solvent type) DFT-75 micron shall be Berger Zinc Anode 11 or approved equivalent. The primer should be applied by spray only.
2 nd Under-Coat	Epoxy zinc phosphate primer polyamide cured DFT-35 micron shall be Berger Equilux 610 primer or approved equivalent The primer should be applied by spray only.
3 rd Under-Coat	Epoxy zinc phosphate primer polyamide cured DFT-35 micron shall be Berger Equilux 610 primer or approved equivalent. The primer should be applied by spray only.
4 th Under-Coat	Epoxy high build micaceous iron oxide coating polyamide cured DFT-90 micron shall be Berger Epilux 4 High Build MIO. The primer should be applied by spray only.
ERECTION SITE	
Intermediate coat	Acrylic polyurethane finish aliphatic isocyanate cured DFT-30 micron shall be Bergerthane or approved equivalent applied by spray or brush in approved colour.
Finish Coat	Acrylic polyurethane finish aliphatic isocyanate cured DFT-30 micron shall be Bergerthane or approved equivalent applied by spray or brush in approved colour.
In case of purlins, in place of above two finishing coats apply two coats of Aluminum paint conforming to IS: 2339.	

Signature of Tenderer(s)

Date: _____

CHAPTER - 20**Workshop Projects Organisation
(Indian Railway)****SPECIAL CONDITIONS OF CONTRACT FOR MECHANICAL WORKS****1.0 Instruction to Tenderers for filling Technical and Financial Bids:**

- a) The Tenderer must furnish the informations as per the format given in **Annexure-E(M) of special conditions of contract for Mechanical Works**. All the information as asked for, in the format must be given accordingly e.g. wherever a parametric value is asked for, it should be furnished, if a write up is asked for, this should be provided and if a brochure or drawing or sketch is expected this should be provided. In case of incomplete/sketchy information, the technical offer being incomplete is **liable to be rejected**.
- b) Unless otherwise stated, latest alterations/ revisions of specifications/ standards/ drawings shall be applicable. In respect of safety standards and environmental standards relevant to the machine, the machine manufacturers shall ensure compliance with international (CE/ISO/DIN/JIS)/National standards (IS) (where applicable).
- c) The bidder should quote only for the specified make of machinery and plants, sub-assemblies and equipment wherever mentioned. Makes of sub-systems other than the specified ones will normally not be acceptable. In case, some other make is quoted, specific reasons for the same including its features/advantages over *specified* makes must be brought out in the offer.
- d) In case there is a contradiction in any information provided (some parametric values given in the specification and those given in the brochure or some other document enclosed by the tenderer), unless specifically mentioned in the deviation cum confirmation statement under **Annexure – M of chapter 6-of tender documents**, the values as given in the specification shall be taken as confirmed by the tenderer and offer evaluated accordingly.
- e) Tenderer or his authorized agent, in their own interest, should visit the work site with prior appointment with field officer and acquaint themselves with processes of maintenance work, site conditions, facility etc.
- f) The Railway may accept internationally accepted alternative specifications which ensure equal or higher quality than the specifications mentioned in the Technical Specification. However, the decision of the Railway in this regard shall be final. A copy of the alternative specifications offered should be sent along with the offer. The Tenderer should also furnish "Statement of Deviations" from tender specifications (as per **Annexure – M of chapter-6 of tender documents**) in packet-I of the tender document.
- g) Railway reserves the right to verify the details submitted by the bidder by actual site visit.
- h) The Tenderer should fill the **Annexure-E(M)** of this special condition along with information in schedule-I of specification for each M&P items, which shall be submitted in packet-I (Technical Bid) of the tender.
- i) The Bidder shall quote the prices in Indian Currency (Rupees) only. If any additional charge is quoted anywhere else in the offer, other than in the price schedule, the same will not be taken into consideration during evaluation. However, disclosing a rate elsewhere, in case of a two packet system shall render the offer **liable to be rejected**. Similarly, if a price or tax discount is offered anywhere else in the offer, the same will not be considered during commercial evaluation of the offers. However, the bidder will be bound to offer those discounts to the purchaser, in case order is placed on that bidder.

1.1 Definitions:

The following terms and expressions as used in this Contract shall have the meaning hereof assigned to them except where the context otherwise requires:

- 1.1.1 "Approval" shall mean the written approval by the Railway of a document or drawing or other particulars or matters in relation to the Contract.

- 1.1.2 "Contract Drawings" shall mean the designs, plans, drawings, sketches, tracings and prints thereof and details which have been supplied by the Contractor as per terms of the Contract for the execution of this Contract and shall include the once approved by the Railway. This shall also include "good for construction drawings" for construction work supplied by the Railway.
- 1.1.3 "Contract Specifications" or "Specifications" shall mean the Technical specifications, General Specifications, schedules, detailed design drawings, statements of technical data, performance characteristics value and all such "particulars" mentioned in the Contract and such other modifications required by the Railway relating to the work.
- 1.1.4 "Delivery" shall mean delivery by the dates on FOR site basis as specified in the Contract for work or materials which are found acceptable by the Railway and not the submission of equipment, materials and supplies which are not to the required standard or which are not delivered by due dates, and in case of erection work, delivery shall mean the approval by the Railway of the said erection work within the period prescribed for such completion.
- 1.1.5 "Dimensions" shall mean the extent of a line, area, volume. They are to be based on the metric system.
- 1.1.6 "Erection" shall mean the putting up of structures and / or installation of the Plant & Equipment under the supervision of the Contractor and / or sub-Contractor and will include any service which the Contractor is required to perform at the site with his own and/or other staff and/or labour for the due fulfillment of this Contract.
- 1.1.7 "Inspector"/"Inspecting Engineer" shall mean any person or firm nominated by or on behalf of the Railway or his duly authorized agent to inspect equipment, supplies, materials, tests or work under the Contract.
- 1.1.8 "Engineer" shall mean an Engineer appointed by designation from time to time by the Railway.
- 1.1.9 "Engineer's Representative" means any assistant of the "Engineer" or any other employee or Agent appointed from time to time by the Railway or the Engineer to perform the various duties.
- 1.1.10 "Plant" shall mean and include "Equipment", "Stores", "Item", and "Material", "Machinery" or any part thereof to be provided for under the Contract.
- 1.1.11 "Site" shall mean the place or places envisaged by the Railway at which the plant & equipment supplied under the Contract are to be erected and / or the construction are to be carried out and/or services are to be performed under the Contract with such other places as may be specifically provided by the Railway for the purpose of the Contract.
- 1.1.12 "Supervision" shall mean the successive control and directions given to the Contractor in relation to Contract work during execution of the Contractor's and/or his Sub- Contractor's work at site.
- 1.1.13 "Supply and Services" shall mean and include any and all equipment, supplies, materials, drawings, documents and engineering & technical services to be made/performed by the Contractor under this Contract.
- 1.1.14 "Test" shall mean and include any and all tests to be performed under the Contract in order to ascertain the quality and efficiency of the Contract work or part thereof and material tests in particular.
- 1.1.15 "Time" shall be reckoned by months, weeks, days and hours, the period of a month being equivalent to the calendar month according to the Gregorian Calendar. The day or days unless herein otherwise expressly defined shall mean calendar day or days of 24 hours each.
- 1.1.16 "Unit/sub-unit" shall mean the functional plant areas as described in Contract Specification.
- 1.1.17 "Writing" shall include manuscript, typewritten, printed statement under or over signature or seal as the case may be.
- 1.1.18 "Manufacturer" refers to a person or firm who is the producer and supplier of material or designer and fabricator of equipment to either the Railway or the Contractor or both under the Contract.

- 1.1.19 "Government" means the Central Government or a State Government, as the case may be.
- 1.1.20 "Preliminary Acceptance Test (PAT) Certificate" means the Certificate to be issued by the Engineer on completion of erection and commissioning of Plants and Equipments as per clause 7.2 of Special Condition of Contract for Mechanical Works.
- 1.1.21 "Proving-out Test (PTC) Certificate" means the Certificate to be issued by the Engineer on successful completion of Proving-out Tests as per clause 7.3 of Special Condition of Contract for Mechanical Works.
- 1.1.22 "Taking Over" means the physical possession by the Railway, after issuance of PAT and PTC Certificate as per clause 7.4 of Special Condition of Contract for Mechanical Works. However, the Contractor shall not be relieved of his obligations under the Contract.
- 1.1.23 "Final Acceptance Test (FAT) Certificate" means the Certificate to be issued by the Railway/Engineer on fulfillment of the obligations in accordance with the provisions of the Contract, as per Clause 7.5 of Special Condition of Contract for Mechanical Works.
- 1.1.24 "Works" shall mean the work contemplated in the drawings and schedules set forth in the tender forms and required to be executed according to the specifications.
- 1.1.25 "Project Manager" shall mean the Contractor who shall be overall in-charge of the Project at site shall be appointed /deputed in consultation with the Railway.

2.0 The scope of work is broadly divided into six major parts.

- (i) Design & drawing of machine layout and its sub-systems, process flow, Equipment layout, load data & other drawings as per specification of machineries and plant (M&P) will be prepared by contractor but can be improved upon by the Railway with or without associates within the time schedule and without extra cost to the Railway.
- (ii) Design, Manufacture, Inspection, Supply, Erection, Testing & Commissioning and Proving out tests of Machinery and Plant (M&P).
- (iii) Supply of Maintenance Spares, Maintenance tools and tackles, Manuals and Drawings of M&P as per technical specification.
- (iv) Inspection to be carried out as per the approved Drawings and QAP at firms premises.
- (v) Any other activities which are not mentioned in above scope for successful Design, Manufacturing, Inspection, Supply, Erection, Testing & Commissioning, training, Proving out tests of M&P and bidders scope shall be in contractor's scope.

(vi) Civil Engineering Works:

The bidder shall arrange for provision and construction of necessary foundation for the machines as per the drawings supplied by the OEM using expansion type bolts & buffer pads for vibration free operation of the machine and cost of the same (bolts, pads, rails, fittings etc) and **allied Electrical & Mechanical works of schedule F-1 of Chapter 24**—of tender documents shall be included in the cost of the machine except for

(A) Long Travel (LT)/Gantry Rail on Gantry Girder for EOT cranes and Rail of Surface traverser which will be paid separately as per Civil BOQ.

(B) Foundation work of surface Traverser & Turning Bridge/Turn Table will be paid separately as per Civil BOQ

***Any additional items like chequered plates, stairs, railings etc which are part of civil structure and essentially required towards completeness, maintenance, operations etc of M&Ps, will be covered from Civil BOQ.**

- 2.1 Supply of M&P equipment (as per (i) to (v) above): This includes design, engineering, manufacture and supply of equipment and facilities including mechanical equipment, electrical equipment & controls and utility services as per the Contract Specifications of Plant & Equipment together with the necessary vibration pad, foundation (if any), foundation bolts, special inserts, integrating parts, field foundation plates and bolts, railings, cross-over and safety guards within the stipulated delivery time. Unit cost of machine will be inclusive of cost of two years maintenance spares and other tackles/tools required for smooth operation and maintenance.

2.2 Commissioning spares Maintenance spares and consumables:

2.2.1 Commissioning spares:

The Contractor shall provide necessary commissioning spares as may be required during erection, cold tests, start-up and initial operation of the unit till successful completion of Proving-out tests.

2.2.2 Maintenance Spares:

- i) The Contractor shall supply two years maintenance spares. These are to be supplied **before issuance of Proving-out Test Certificate (PTC)**. List of two years maintenance spares to be submitted with the offer. Cost of these items is included in the contract price for the M&Ps.
- ii) The Contractor shall supply complete ordering specification and drawings including the list of suppliers to enable the Railway to procure maintenance spares after the warranty period. The Contractor shall furnish such information not later than two months from the date of approval of M&P by Railway.
- iii) The identification of maintenance spares shall be intelligibly engraved on the parts within or on a label securely fixed to the part.
- iv) The responsibility of the tenderer under the Warranty Clause will not be diluted in any way with regard to supply of spares during warranty period as per clause **23.0**

2.2.3 Tools & Tackles:

- i) The Contractor shall provide necessary tools, tackles, instruments and appliances for erection, testing, operation & maintenance, and commissioning of the unit as required. The cost of the same is included in the Contract Price for Plant & equipment.
- ii) The Contractor shall provide ordering specification including the names of suppliers giving sufficient details to enable the Railway to procure at a later date when necessary such special tools, tackles, instruments and appliances. The Contractor shall furnish such information not later than two months from the date of approval of M&P by Railway.

2.2.4 Initial Fill of Oils, Lubricants and Consumables, and initial supply of refractory (if any) and thermal insulations (if any).

- i) The Contractor shall, within the Contract price of the equipment, supply all consumables including oils, lubricants, fuels, chemicals, usual stores and small materials and other consumables required for flushing the first fill, as well the quantity required during the Contract with extra provision to cover the normal wastage for transportation, storage, handling, PAT and Proving-out tests till the machine is taken over after PTC. The Contractor shall be fully responsible for ensuring adequate quantities at site so as not to delay implementation of the project.
- ii) Equipment related consumables till the machine is taken over after PTC, are to be supplied by contractor.
- iii) The Contractor shall also furnish machine design specific consumables with optimal consumption rates of consumables along with estimated annual requirement and ordering specification to enable the Railway to procure these in time for uninterrupted operation of the unit. The Contractor shall furnish such information not later than two months from the date of approval of M&P by Railway.

2.3 Concomitant Accessories:

- a) The machine should be accompanied by all the concomitant accessories to make the machine fully operational on installation or as mentioned in technical specification of machine.
- b) The cost of concomitant accessory will be included in the basic price of the machine.

- c) The scope of concomitant accessories may also include among other things the anti vibration pads, voltage stabilizer and isolation transformers, loading and unloading systems etc, where necessary.

2.4 Tooling (Wherever applicable):

- a) The contractor shall provide all machines in fully tooled up condition.
- b) The tools should be supplied, sufficient for a period of two years covering normal consumption.
- c) The tenderer should quote separately for each of the tooling items (wherever applicable).
- d) The tenderer shall furnish full details in regard to tooling items including the make, part number, source and expected annual consumption for each of the tooling.

2.5 The Scope also includes preparation of the following:

2.5.1 Engineering & Technical services:

The engineering & technical services of the Contractor shall generally include amongst others the following:

- a) Equipment layout, load data & other part assembly drawings as per specification.
- b) Backup drawings, necessary data, to enable the Railway to check and approve drawings only where modifications and design changes are made by the contractor for system integration etc. also, in some packages, the contractor is required to design the system before construction. He will be required to supply the drawings and data for these items also.
- c) Quality control and time schedule control of site work.
- d) All coordination relating to design, manufacture, supply, transportation, insurance & claim settlement, inspection, construction planning and scheduling and all other services till handing over of the plant & equipment.
- e) Clearance of installations from the Statutory Authorities.
- f) Drawings of layout, proposed floor plan of the machines in the shed, layout drawings for pneumatic pipe lines, water pipe lines & industrial gas pipeline (if required) shall be prepared and submitted to Railway for approval before commencing the work

2.5.2 Scope of work for storage, handling, inspection, erection, testing, commissioning and carrying out demonstration of proving out tests.

The Contractor shall make all arrangements to deliver the equipment at site by trucks/trailers, build his own stores (covered, uncovered and air-conditioned, if necessary) for the proper storage of equipment, maintain the stores and all related documents and records, transport the equipment to site for erection purpose.

All security arrangement also shall be made by the Contractor. Only open space shall be made available to the Contractor by the Railway.

The Contractor shall be responsible for proper and neat storage and also undertake conservation of all consignments including damaged consignments.

During storage of equipment, the Contractor shall take into account deterioration and carry out the re-conservation of the complete equipment/parts/ supplies as may be necessary as per the Storage Instructions of the Manufacturer of equipment/components. The Contractor shall also supply the consumables required for such re-conservation work and repair/replace parts required thereof for the proper functioning of the equipment after erection and commissioning.

2.5.3 The Contractor shall unpack and do visual checking against physical damages to the equipment/cases, cleaning of equipment before start of erection. Damage/shortage if any, will be reported to the Railway and shall be rectified/ replaced expeditiously, free of charge to the Railway so as not to upset the erection and commissioning schedule. Delay on account of settlement of insurance claims by the Contractor shall not be considered an excuse for delay in completion.

- 2.5.4 The Plant and equipment will be installed on civil foundation/structures including grouting, anchoring and fixing etc. complete by the contractor **as applicable unless otherwise specified.**
- 2.5.5 The Contractor shall provide erection consumables like oxygen and acetylene gas, welding rods, solder lugs, oil, grease, kerosene, cotton waste, etc. required for erection of equipment.
- 2.5.6 The Contractor shall provide all necessary construction tools & tackles, compressors, small hand tools, instruments, all testing & commissioning instruments, welding equipment, service bolts, nuts, jigs and fixtures, winches, alignment tools, precision levels etc. and the material handling equipment and other equipment which may be required for carrying out the erection and commissioning work efficiently within the time schedule provided in the Contract. Unless otherwise specified, the above construction materials shall be the property of the Contractor after the erection work is over. The Contractor shall ensure that proper documentation is followed at entry gate of the Railway's premises for such items which shall be carried back by Contractor after completion of work.
- 2.5.7 The Contractor shall provide all temporary ladders, scaffolding materials, platforms, supports and other necessary facilities required for handling, erection, testing and visual inspection of supplies at the point of installation and shall also provide necessary packing plates, wedges, shims, leveling screws etc. required for erection of equipment.
- 2.5.8 The Contractor shall erect and maintain his own site offices, main stores and site stores as required for the work and arrange for maintaining in a neat manner the area placed at the Contractor's disposal. The plans for the same shall be approved by the Railway.
- 2.5.9 The contractor shall provide sufficient fencing, notice boards and lights to protect the work site, as well as contain the disturbance, noise and other pollution within tolerable limits within the worksite. He will also make necessary arrangements to prevent entry of outsiders and warn them of the ongoing work and prevent their entry to the worksite, accidentally or otherwise as may be considered necessary by the Railway.
- 2.5.10 The Contractor shall mobilize himself with adequate material handling equipment like mobile cranes, forklifts, trailers, etc. in addition to other erection tools and consumables, keeping in view the erection schedule. Within one month of placement of order, Contractor shall provide his detailed scheme for mobilization with Bar Chart indicating clearly the resources, manpower and machinery proposed to be deployed to ensure timely completion of work and quality of workmanship.
- 2.5.11 The equipment will be erected as per the instructions of the suppliers/manufacturers and under the supervision of the supervisory personnel to be deputed by the Contractor along with supervisory personnel of equipment supplier/ manufacturer, if so desired at site and with the approval of the Railway. The Contractor shall use to the maximum extent pre-assemblies and mechanization in order to fulfill erection targets.
- 2.5.12 The Contractor shall align, level and couple, and securely fix all equipment, appurtenances and accessories. All precision survey instruments including leveling instruments, theodolite etc. shall be arranged by the Contractor.
- 2.5.13 The Contractor shall procure and carry out flushing and filling of oil and lubricants till successful commissioning and demonstration of Proving-out tests.
- 2.5.14 The Contractor shall be responsible for checking the correctness of erection of mechanical equipment and auxiliary systems, electrical equipment etc as per the specification.
- 2.5.15 The Contractor shall be responsible for Installation and connection of all piping and fittings as per the specification/approved drawing.
- 2.5.16 The Contractor shall be responsible for installation and connection as well as supplying, laying and termination of cables, bus bars, bus ducts, lightning protection and earthing as well as to check electrical connections to individual items.
- 2.5.17 The Contractor shall be responsible for the management of erection work with proper and adequate supervision for ensuring progress of erection work and quality of workmanship.

- 2.6.18 The Contractor shall organize the work in a manner that other work at site is not impeded and the workmen therein not endangered and shall arrange temporary access at site, if required for the erection work.
- 2.5.19 The Contractor shall deploy required number of supervisory, skilled, unskilled and auxiliary labour as required for the erection work and comply with such reasonable instructions of the Railway/ in the interest of satisfactory progress and completion of the work according to the schedule. The Contractor shall work in 3 shifts per day basis for meeting the completion target, if required without any extra price. However, in such cases, Contractor shall obtain the prior approval from the Railway.
- 2.5.20 The Contractor shall return to the Railway all returnable materials such as empty crates, packing materials, supporting materials for consignment etc. belonging to the Railway at a place designated by the Railway.
- 2.5.21 All necessary tests/checks shall be conducted during erection by the Contractor. The Contractor shall attend to the rectification of erection defects, if any, expeditiously. The Contractor shall arrange all testing instruments for such testing at site.
- 2.5.22 The Contractor shall carry out final painting of the Plant & Equipment and structures erected as per the instructions of the Railway.
- 2.5.23 The Contractor shall be responsible for total commissioning of the Plant including trial run and carrying out demonstration of proving out Tests. Railway's supervisory and skilled operating personnel shall, however, be associated during erection of equipments and their commissioning and proving out tests.
- 2.5.24 The Contractor shall comply with all applicable statutory Rules & Regulations with respect to the employment of labour at site.
- 2.5.25 All safety measures as required to be adopted as per the Statutory Regulations and the Safety Rules of the Plant shall be strictly followed by the Contractor during the execution of the Contract. The Contractor shall set up a suitable safety organization of his own in this regard.
- 2.5.26 The Contractor shall be responsible for commissioning of all the machines, equipment and infrastructure as stipulated as per the Contract Specification and shall also ensure that it is fit for operation and achieve the Performance standards and other parameters as specified. Railway's supervisory personnel shall, however, be associated during erection of equipments and their commissioning and proving out tests
- 2.5.27 If the Railways is not satisfied with the progress of work at site, it shall direct the Contractor to depute more number of supervisory personnel/workers to meet the completion schedule as per the contract. Upon receiving such direction Contractor shall deploy additional personnel within 7 days without any extra cost.
- 2.5.28 All guarantees and test certificates obtained by the Contractor during the execution of work shall be transferred to the Railway before issue of PAT certificate.
- 2.5.29 The contractor shall provide and install all measuring instruments required for checking the guaranteed performance which are not included among the permanent measuring instruments of the Unit/sub-units
- 2.5.30 Materials brought to the site shall not be removed from the site without the written consent of the Railway. Any material brought to site and rejected by the Railway shall be removed by the Contractor from the site of work immediately at Contractor's expense.
- 2.5.31 The Railway may during the progress of work, order the removal of part or whole of the work executed, found not in accordance with the approved drawings/ specifications/ instructions. No extra claims shall be entertained for re- executing or altering of such work.
- 2.5.32 Construction of site office, labour huts, store sheds etcand arrangement of required water and electricity for all purposes in connection with this work shall be at the contractor's responsibility, liability and cost as per tender condition. Security as per the requirement shall also be arranged by the Contractor. Any delay in making arrangements for the same shall not be taken as an excuse for delay in starting the work. However Railway may give landat very

nominal rent for the purpose of fabrication yard, batching plant & site office within the project premises.

2.5.33 Contractor shall equip his site office with adequate number of Computers equipped with high speed internet facility, photocopy machine and Fax machine along with operators conversant with software programs such as Primavera/MS-Projects, MS-Office and AutoCAD. These are to be provided at site office till completion of the project. Contractor shall submit daily/weekly/monthly diagrammatic progress reports on approved format.

2.5.34 On completion of the work, the site shall be left in good order and the excess materials, scraps, debris, if any, shall be removed & dumped by the Contractor at place/places as designated by the Railway.

2.5.35 Certification:

- a) The design of the machine foundation & Construction of the foundation is in accordance with the latest version of the relevant part of the Indian Standard for Code of practice for design & construction of machine foundation as specified in IS:2974. The contractor shall arrange certification of the foundation design by approved design consultant. The original certificate issued by the design consultant for certification of foundation design and a copy of the same shall be submitted by the contractor to the Railway.
- b) The supplier shall stand a warranty for the foundation along with the machine. He shall arrange to rectify any defects (e.g. sinking or cracking) occurring during the warranty period in the foundation. He shall also be responsible for uprooting and reinstalling the machine if so required for carrying out the repairs to the foundation. The warranty period would be extendable by the time period for which the machine remains out of commission due to the defect in the foundation or a period of one year, whichever is more.
- c) Bidders must study the statutory requirements, laws like Indian Electricity Act, Indian Industrial Safety procedures, Contractor Labour Act, Pollution Control Act etc and once the work is awarded, they shall be liable to conform to all the statutory requirements including local and State laws, rules and regulations.

2.5.36 The Contractor shall be responsible for proper fencing, lighting, guarding and watching of all works at site until they are handed over and further proper provisions for like period of temporary power, drainage, roadways, footways, guards and fences as far as may be rendered necessary by reason of works for accommodation and protection of the Railway's and occupiers of adjacent property, the public and others. No naked light shall be used by the Contractor on the site otherwise than in the open air without the special permission in writing from the Railway.

2.6 Construction Water:

The Contractor shall at his own expenses, arrange for, and lay and maintain, the pipelines for the water required for construction purpose (including drinking water) for the work covered under the scope of the contract for his work site with suitable connections, storage reservoir, etc. as may be necessary. The Contractor shall ensure avoidance of misuse or wastage of water, make adequate arrangements for storage and regulate supply and if necessary install supplementary arrangements for supply of water. The Contractor will endeavor to maintain a regular supply of water to meet the construction requirements.

2.7 Construction Power:

2.7.1 The Contractor will make his own arrangement for electrical power for the construction, erection & commissioning work at the site till start of proving out test. Railway shall arrange power from Proving out test.

2.7.2 The Contractor shall make his own arrangements to lay and maintain further distribution lines and wiring necessary for the work at his own cost and in accordance with latest Indian Electricity Rules. The distribution diagram with loadings and specifications shall be submitted to the Engineer for his approval before the system is installed.

2.7.3 The Contractor shall obtain the approval of the Engineer for installation of machinery, construction of buildings and electric power supply connection to them. The Contractor shall be responsible for any defect therein. Any defects pointed out by the Engineer in the

distribution system shall be rectified forthwith to the satisfaction of Engineer by the Contractor, failing which the power supply may be cut off by the Employer/Engineer.

- 2.7.4 To operate any electrical equipments of the contractor at site for their activities, contractor should always use PVC insulated and PVC sheathed core cable and not with plastic cables (single core) and avoid using of many joints and with suitably rated fuses, switches and plugs in order to ensure safety at site.

2.8 **Completeness:**

- 2.8.1 Any supply and services as set forth hereinabove and which might not be even specifically mentioned in this Contract relating to the Project or in the specifications and drawings in respect of the Plant and equipment package under the scope of work of the Contractor and which are not expressly excluded there from but which are necessary for the performance of the Plant and Equipment in accordance with the specifications as an integral part of the Plant and/or for normal and efficient running and maintenance under Indian conditions, shall be provided for and rendered by the Contractor **without any extra cost**.

- 2.8.2 The approval by the Railway at any stage for any supplies and services by the Contractor shall not relieve him of his obligations under **Clause 2.8.1** above.

2.9 **Total responsibility:**

The Contractor shall be solely responsible for the entire supplies and services irrespective of whether supplies and services have been made/rendered by him directly or by his Sub-Contractors with or without the approval of the Railway.

2.10 **Progress Report and Photographs:**

- 2.10.1 The Contractor shall furnish copies of all Purchase Orders without prices placed by him on various sub-suppliers/ Contractors and work orders issued to his own manufacturing units containing scope of work, technical specification, time schedule etc.
- 2.10.2 THE RAILWAY shall have the right to depute his representatives to ascertain the progress of work at the premises of works of the Contractor or any of his Sub- Contractors.
- 2.10.3 The Contractor shall submit a weekly progress report in a proforma including photograph with such details as may be required by the Railway so as to enable the Railway to monitor the progress of the Project.
- 2.11 Total value of the offer will be calculated on the basis of scope of work as specified in the tender document, and shall include:
- a) The cost of all machinery & plant including concomitant accessories, complete foundation, installation and commissioning of the machines.
 - b) Applicable duties and taxes, insurance, freight, packing and forwarding charges.
 - c) Cost of training, maintenance spares, warranty spares, tools & tackles etc.
 - d) The cost of preventive maintenance to be carried out during warranty period of 2 years shall be included in the total value of the offer.

3.0 **Contract Price:**

The offer price should include following:

- 3.1 The offer may be quoted in format given in **Schedule F-1, Chapter 24** of tender documents. The single and common percentage will be uniformly applicable for each of the items shown in the schedule above. Indicate above by "+", below by "-" and at par by "=".
- 3.2 Price of Equipments/Machines:
- a) The prices are inclusive of all taxes and duties.

- b) The prices are inclusive of **civil work** including foundation **wherever applicable unless specified otherwise**, supply, Inspection, erection/installation, commissioning, Proving-out tests and training as per the specifications.
- c) The prices are inclusive of packing, forwarding, freight, insurance, & training charges.
- d) The prices are inclusive of cost of concomitant accessories and maintenance spares.
- e) Drawings, Manuals, documents, Part catalogues, Softwares with license key/dongle etc related to operation & maintenance of machine/equipments. The list of accessories and maintenance spares along with price may be obtained from OEM and supplied.
- f) The prices of warranty spares and services.
- g) The contract prices are inclusive of all charges & expenses including storage, loading, unloading, handling, erection, testing & commissioning and performance guarantee test towards labour, tools & tackles, construction plant & equipment, scaffolding, power, fuel, oil, lubricants, etc. including 3 shifts working, if required up to issue of FAT.
- h) No Service Tax is payable on Railway contracts as on date. If at a future date this becomes applicable, the contractor will be reimbursed at actual

3.3 Amongst other, the contract price for supplies shall be deemed to include the cost of all foundation bolts, anchoring parts, floor plates, hand railings, crossovers, safety guards etc and cover all royalty/fees for all articles and processes protected by letters, patents or otherwise incorporated in or used in connection with the work and all other payments in connection with obtaining all the materials for the work and shall indemnify the Railway.

Indemnity which, the Contractor hereby gives against all actions, proceedings, claims, damages, costs and expenses arising from the incorporation in or use of work of any such articles, processes or supplies.

3.4 The Contractor is responsible for the total scope of work starting from design and manufacture till the unit is successfully commissioned, and proved out.

The break-up of the contract price is only for the purpose of release of payments to the Contractor for the various activities involved in respect of this contract and this cannot be construed as full and final payment in respect of each activity for which such break-up is given.

In the event of the Contractor failing to fulfill all his contractual obligations till successful commissioning, proving out and Final acceptance of the whole unit covered under this contract, the Contractor shall be liable for forfeiture of all the amounts received under this contract, without prejudice to such rights and remedies which are available under this contract for the Railway and the Contractor.

3.5 The Contractor shall quote percentage value over/under/at par on total estimated cost of the machines. Additional amount shall be calculated based on the percentage quoted.

3.6 Total contract value of the work will be ascertained based on the total final value including the total cost of maintenance spares, concomitant accessories and warranty spares, Slings/Chains/Lifting tackles/tools as specified in respective technical specifications.

3.7 ***The rates quoted for machinery and plants by tenderer and accepted by Railway administration shall hold good till the Proving out Test (PTC) and no additional individual claim will be admissible on account of fluctuation in market rates, increase in taxes/ any other levies/tolls etc***

4.0 **Terms of Payment:**

Individual liabilities register for Supply, Erection & Commissioning and Maintenance Spares, tools & tackles, concomitant accessories to be maintained at site shall be jointly certified by the Railways and Contractor. Subject to any deductions from the Contract price, which the Railway is entitled to make, the Contractor shall receive the payment in the following manner:

4.1 **Manufacture and supply of plant & equipment:**

75% of the contract price of individual M&P items as per approved Billing Schedule of Schedule F-1 shall be released after receipt of equipment / items at site in full and good conditions, subject to submission of requisite documents as detailed in the Contract along with relevant supporting inspection certificates, duly certified by Railways. Establishment of "Good Conditions" as mentioned above would be done with a joint verification (Railway and tenderer) for completeness of supplies as per Bill of Materials and visual inspection as per the prescribed proforma.

- 4.2 15% of the contract price of individual M&P items covered under Schedule F-1 shall be released after issuance of PAT and PTC certificate including supply of maintenance spares, tools & tackles, concomitant accessories as per schedule, duly certified by the Railways as per the prescribed proforma. This 15% of the contract price as per approved Billing Schedule is further bifurcated into two stages i.e.

- a) 05% of total contract value of individual M&P items covered under Schedule F-1 shall be released after Issuance of PAT certificate.
- b) Balance 10% of total contract value of individual M&P items covered under Schedule F-1 shall be released after Issuance of PTC and supply of maintenance spares, tools & tackles, concomitant accessories, training etc.

4.3 **Final Payments:**

Balance 10% of the contract value shall be released on submission of a separate bill by the contractor for Schedule F-1 along with the following documents:-

- a) Final Acceptance Certificate issued by the Railway.
- b) Bank Guarantee of 10% of the contract price of individual M&P items under Schedule F-1 as **Warranty Guarantee (WBG)**.
- c) No objection certificate (NOC) issued by the Railway.
- d) No claim certificate (NCC) submitted by the firm.

- 4.4 Unit cost of machine will be inclusive of cost of two years maintenance spares and Slings/Chains/Lifting tackles, tools required for smooth operation and maintenance.

5.0 **Responsibility for Performance of Contract:**

- 5.1 The Contractor shall be responsible for the due and faithful performance of the Contract in all respects according to the intent and meaning of the drawings, specifications and all other documents referred to in this Contract. Any approval which the Railway may have given in respect of the stores, materials, supplies or other particulars and the work or the workmanship involved in the Contract (whether with or without test carried out by the Contractor or the Railway) shall not bind the Railway and notwithstanding any approval or acceptance given by the Railway, it shall be lawful for the Railway to reject the material on arrival at site, if it is found that the materials supplied and/or erection work carried out by the Contractor are not in conformity with the terms and conditions of the Contract in all respects.

- 5.2 The Contractor shall co-operate with the Railway's other Contractors, if any, for any associated plant and coordinate for any interface activity at his battery limits.

6.0 **Dispatch Schedule:**

- 6.1 The Contractor shall prepare and submit in triplicate detailed dispatch schedule for the Machinery and Plant to be dispatched to the Railway. Railway may alter/modify such dispatch schedules as per requirements/site conditions etc.

6.2 **Dispatch of Materials and Dispatch Documents:**

The dispatch of equipment / materials shall be as per dispatch schedule. All dispatch/shipment documents shall be submitted by the Contractor to the Railways at the time of supply of Machinery and Plants.

- 6.3 All packing cases, containers, packing and other similar materials shall be new and supplied free by the Contractor and same will not be returned unless otherwise stated in the contract specifications.

- 6.4 Notwithstanding anything stated in this Clause, the Contractor shall be entirely responsible for loss, damage or depreciation or deterioration to the materials & supplies due to faulty protective and insecure packing.
- 6.5 All dispatches must commence after fulfillment of Para 7.1 & Para 9.0.
- 7.0 **Acceptance of the Unit:**
- 7.1 **Inspection:**
Firm will be required to submit a detailed Quality Assurance Programme (QAP) for each of the machine that will be followed during the manufacturing of the machine. Railways may change/add/modify the Quality Assurance Programme (QAP) of a machine in case it is not satisfied with the QAP submitted by the firm. The QAP should incorporate check points at every stage from the raw material procurement stage to in-process inspection of various assemblies and final inspection of the machine.
- 7.2 **Preliminary Acceptance Test (PAT)**
- 7.2.1 On completion of erection and commissioning of the plant & equipment preliminary acceptance tests shall be performed to conduct the systematic check of the components which have been machined/assembled on the equipment supplied by the contractor.
- 7.2.2 Tests shall be performed on the individual sub-assemblies of the unit and shall be designed to conduct the systematic check of the components and of the functional operation thereof.
- 7.2.3 Tests shall be conducted by the Contractor as per **Clause 7.2** under his sole responsibility and employing his personnel. Results of tests shall be recorded jointly by the Contractor and the Railway. The Contractor shall hand over all the test certificates obtained by them during execution of the work.
- 7.2.4 A detailed programme of tests shall be drawn up by the Contractor and shall be subject to the approval of the Railway. Such programme may be revised and adjusted as may be required by the Railway during the test run.
- 7.2.5 The Contractor shall rectify the defects observed during commissioning. On successful completion of erection & commissioning and liquidation of the defects as mentioned in joint commissioning note (JCN) in prescribed performa (**Annexure-B(M)**), PAT Certificate shall be issued by the Railway within 30 days from JCN/liquidation of defects/deficiencies whichever is later.
- 7.3 **Proving out Test (PTC)**
- 7.3.1 Proving-out tests will be carried out and performance values achieved in accordance with **Clause 10**. Proving-out test will be carried out within 30 days after issuance of PAT certificate of the Machinery and Plant.
- 7.3.2 A Proving-out Test Certificate (PTC) shall be issued by the Railway within 30 days for each of the machine on a prescribed performa (**Annexure-D(M)** to standard condition of contract for Mechanical Works) on successful completion of proving-out test and supply of complete maintenance spares, Slings/Chains/Lifting tackles, tools required for smooth operation and maintenance.
- 7.3.3 Inspection and approval of installation of statutory authorities like electrical inspectorate/CEA etc shall be obtained by the Contractor before issue of Proving-out Test Certificate (PTC).
- 7.4 **Taking over of Machinery and Plants:**
- 7.4.1 The unit shall be taken over physically by the Railway when:
- Contractor has completed erection & commissioning and proving-out test of all the equipments as per respective technical specifications.
 - PAT and PTC certificates have been issued by the Railway.
 - The Contractor has submitted all documents as per provisions of this Contract/Technical Specification of Machinery and Plants.
 - The Contractor has supplied concomitant accessories, tools & tackles and maintenance spares required for smooth operation and maintenance.

- e) The Contractor has complied to the satisfaction of the Railway all the objections / observations, if any.

7.4.2 The Contractor shall submit un-priced copies of purchase orders placed on Sub-Contractors.

7.5 **Final Acceptance Test (FAT):**

Final Acceptance Test certificate shall be issued by the Railway within 60 days from the following date (whichever is later) when:

- a) PTC has been issued after Proving-out tests carried out and performance values achieved in accordance with **Clause 10**.
- b) The Contractor has rectified in a definitive manner all defects/ objections/ observations mentioned in the Proving-out Test Certificates (PTC) if any.
- c) Final documentation incorporating latest modifications has been submitted by the Contractor in requisite copies,
- d) The Contractor has met any and all other obligations under this Contract;

8.0. **Supply, Installation, commissioning and proving-out tests:**

- 8.1 **Joint Check:** The contractor or his agent would be required to carry out a joint check at consignee's end, along with the consignee, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages. It is necessary that this joint receipt inspection be done immediately on receipt of the machine by consignee & contractor representative to avoid commissioning delays due to shortages/transit damages.

After receipt of the machine as above a Joint Receipt Inspection Note (JRI) as per **Annexure-A(M)** to the special conditions of contract for Mechanical works shall be prepared by the consignee and the firms representative indicating the tentative time schedule for various activities of installation and commissioning.

- 8.2 A Joint Commissioning Note (JCN) to this effect shall be made as per the format at **Annexure-B(M)** to the special conditions of contract for Mechanical works. After joint recording of JCN, the PAT shall be issued within 30days after liquidation of defects as mentioned in JCN and other contractual obligations. If any breakdowns are noticed after issuance of JCN, these shall be attended by the contractor without any extra cost before issuance of PAT Certificate.
- 8.3 A Proving-out Test Certificate (PTC) shall be issued by the Railway within 30 days for each of the machine on a prescribed performa **Annexure-D(M)** to the special conditions of contract for Mechanical works) on successful completion of proving-out test and supply of complete maintenance spares, Slings/Chains/Lifting tackles, tools required for smooth operation and maintenance. If any breakdowns are noticed after the issuance of PTC, these shall be attended by the contractor without any extra cost before issuance of FAT Certificate.

9.0 **Inspection and Tests at Contractor's Premises:**

- 9.1 THE RAILWAY or his authorized Inspecting Agency shall have the right of inspecting and testing the contract work or any part thereof at any time during the manufacture. The Contractor on demand from the Railway/Inspection Agency shall carry out such tests in appropriate manner in the presence and free of charge to the Railway/Inspection Agency. Should a part of the plant be manufactured not on Contractor's own premises but on other premises, the Contractor shall likewise obtain permission the Railway to inspect and test the work as if the said plant were being manufactured on the sub-contractor's premises. The inspection, examination or testing carried out by the Railway/ Inspection Agency shall not relieve the Contractor from any of his obligations under this Contract.
- 9.2 The inspection and tests shall be so conducted as not to unreasonably impede the progress of manufacture.
- 9.3 The Contractor shall bear all costs of any and all inspections and tests as per **Clause 9.1** above and extend all such facilities to the Railway or his authorized representative to

accomplish the same. Where special tests in addition to agreed tests are required by the Railway, the Contractor shall bear the cost of the testing only if such special test proves that the equipment is not in accordance with the specifications. All expenses relating to travel, boarding etc shall be borne by Railways or its authorized inspecting agency. Other costs of organizing the inspection have to be borne by the contractor.

- 9.4 **THE RAILWAY upon giving 7 days notice in writing and stating any grounds of objection, shall have the right to reject any or all equipment or demand rectification or replacement thereof.**
- 9.5 The Contractor shall submit to the Railway quarterly programme of inspection and tests one month in advance of the commencement of the quarter. The Contractor shall give the Railway a minimum of six weeks clear notice of any work being ready for inspection and tests specifying the period likely to be required for such inspection and tests. Thereafter, the Railway or his inspector shall, unless inspection or test is voluntarily waived, on giving 3 days previous notice in writing to the Contractor attend at the Contractor's or his Sub-Contractor's premises, such inspection and test. Should however the Railway so instruct the Contractor, the Contractor shall proceed with the inspection and test which shall be deemed to have been made in the Railway's presence and shall forthwith forward to the Railway copies of inspection /test certificates for acceptance by the Railway. The proforma and number of copies for inspection/test certificates shall be mutually agreed and included in the project manual.
- 9.6 When the tests have been satisfactorily completed at the Contractor's or sub-Contractor's premises, the Railway shall forthwith issue a certificate to that effect. If the tests were not witnessed by the Railway or his representative the certificate shall be issued on receipt of the test reports from the Contractor but not later than 30 days after the receipt of the test reports by the Railway. No plant shall be shipped or otherwise dispatched before such certificates have been issued.
- 9.7 In case any inspection/tests fails, re-inspection/ retest shall be carried out after necessary rectification/ replacement by the Contractor. No plant & equipment and material shall be shipped before inspection certificate and dispatch instructions have been issued by the Railway.
- 9.8 The satisfactory completion of inspection/test or issuance of the certificate by the Railway or his inspector/representative shall not discharge the Contractor of his liability should the equipment on further inspection/ test during or after erection, be found not to comply with the requirement of the contract.
- 9.9 In the case of commissioning spares and operating & maintenance spares, the same shall be offered for inspection only after the main equipment has been inspected and satisfactorily tested. In the case of such plant & equipment, where tests set forth above cannot be conducted either partially or fully in Contractor's premises but have to be conducted at site only after assembly/erection, the provisions under this article shall also apply. However, in such cases prior approval of the Railway shall be obtained by the Contractor.
- 9.10 Railway reserves rights of 'Stage Inspection' i.e. during manufacture in the case of safety related/critical M&Ps which has to be facilitated by the contractor as per requirement of Railway. Tentative production schedule in this regard is required to be provided by the contractor in this regard.
- 10.0 **Proving-out Test for Machinery and Plants:**
- 10.1 The Contractor shall guarantee smooth, safe and reliable working of the project as per Contract Specification.
- 10.2 The Contractor shall also demonstrate and establish Proving-out Tests for the M&P and achieve performance parameters as indicated in Technical Specifications.
- 10.3 Performance of concern Machinery and Plants shall be demonstrated in a test run as specified in the Technical Specification. Performance parameters are specified in Technical Specification individually for each package. It is clarified that if the performance parameters of

- the various M&P and equipment, as laid down are achieved individually for 6 days continuously on two shifts basis(with 85% up time), the plant will be acceptable to Railways.
- 10.4 Proving-out Tests shall be held only after removing/rectifying any/all deficiencies of the M&P.
 - 10.5 Details of Proving-out Tests and methods of computation of performance values shall be in accordance with Technical Specification.
 - 10.6 The Contractor shall supervise and direct the operation during Proving-out Tests and shall take full responsibility in this regard.
 - 10.7 The Contractor shall provide and install all measuring instruments required for checking the performance which are not included among the permanent measuring instruments of the Unit/sub-units. Such instruments shall be provided by the Contractor for the duration of the Proving-out Tests.
 - 10.8 If, subject to provisions in Contract for reasons for which the Contractor is responsible, the performance values as per Contract Specification cannot be reached in whole or in part during the Proving-out Tests, the Contractor shall repeat the tests in whole in order to demonstrate the performances values not yet reached. Before repeating the tests, the Contractor shall at his own cost take any and all measures as may be needed in order that the performance values can be achieved.
 - 10.9 The observations and facts of each Proving-out tests shall be established and formulated between the Railway and the Contractor and shall be recorded.
 - 10.10 Subject to the provisions in the Contract, if during the test period an interruption or reduced performance should occur due to the reason solely attributable to the Railway, the test period shall be extended reasonably, at least by the duration of any such occurrence. Such time of interruption or reduced performance and the production achieved during this period shall be discarded in evaluating the tests.
 - 10.11 If, even with two repetitive tests the performance values are not achieved for reasons within the Contractor's responsibility, the Contractor shall undertake at his own cost such modification or replacement as are considered necessary to obtain the performance values as stipulated in Contract Specification and the responsibility to demonstrate successful Proving-out Tests shall continue to remain with the Contractor till so established.
 - 10.12 If, within three months, after several attempts of rectification one or several of the essential performance data can, in the opinion of the Railway, not be achieved and if such shortcomings are not offset by better performance and other essential data, then liquidated damages shall be levied up to a maximum of 5% of the accepted rate of concerned M&P items of schedule **F-1 chapter-24**.
 - 10.13 Should the performance values fall below rejection level then the Contractor shall be liable either to replace the plant or to pay damages to the Railway as may be determined solely by the Railway.
 - 10.14 For carrying out rectification work for achieving performance values, the Contractor shall do so without seriously hampering the normal operation.
 - 11.0 **Approvals:**
 - 11.1 Detailed Design & Drawings, Part Assembly drawings and Documents shall be submitted by the Contractor and shall be subject to the approval/review of the Railway. All changes from the agreed specifications/drawings shall be subject to the approval of the Railway.
 - 11.2 All sub-contracts as per **Clause 12** for design and engineering, manufacture, supplies and any other work/services covered under the Contract shall be subject to prior written approval of the Railway.
 - 11.3 While the Contractor shall make/execute/perform supplies, work and services in terms of the Contract, the Railway shall have the right to check and approve design, type, quality, quantity, materials and workmanship of any or all items of supplies, work and services where considered necessary by the Railway to ensure that supplies, work and services made/executed/ performed by the Contractor are in accordance with the provisions of this Contract.

- 11.4 The **Project Manager** of the Contractor who shall be overall in-charge of the Project at site shall be appointed /deputed in consultation with the Railway.
- 11.5 To enable the Railway to accord approval/review as **per Clause 11.1**, the Contractor shall submit back-up data/calculations /assumptions as may be required by the Railway.
- 11.6 Insurance Policies shall be subject to the approval of the Railway as per **clause 25.0**.
- 11.7 Where approval of the Railway is necessary or implied but is not specifically provided for elsewhere in this Contract, such approval shall also come within the purview of this schedule.
- 11.8 Approval by the Railway in terms of this schedule shall not relieve the Contractor of his obligations under this Contract.
- 11.9 **Foundation and detailed engineering Drawings for Machinery and Plants:**
- a) The contractor shall furnish 4 copies of foundation drawings, electrical cable layout drawings and other related diagrams indicating overall dimensions of foundation design details, including design calculation of Machinery and Plants to the Railways for approval. The foundation design should be based on bearing capacity of the soil which should be submitted along with design calculation. On approval of the drawings, the supplier shall execute and complete all the civil foundation **(as applicable unless otherwise specified)** work of Machinery and Plants and keep the site ready for erection and commissioning of the machine on receipt.
 - b) The contractor shall furnish 4 copies of detailed engineering drawing of all Machinery and Plants including electrical, electronics etc. to the Railways for approval. On approval of the drawings, the supplier shall execute and complete all work of Machinery and Plants for erection and commissioning of the machine on receipt.
 - c) The contractor shall furnish soft copy (PDF & AutoCAD) of all the drawing approved by the Railways in DVD.
 - d) On completion of contractual works, the contractor shall furnish four hard copies of all as built drawings including two hard copies on good quality of tracing paper and one soft copy (AutoCAD) of as built drawing along with relevant software at the time of handing over of Machinery and Plants.
- 11.10 **Manuals/Documents/Software's:**
- The contractor shall furnish 04 sets of operation and maintenance manuals along with trouble shooting guide and Parts catalogue of M&Ps and one copy of operating & application software with license key/dongle at the time of handing over of Machinery and Plants.
- 12.0 **Sub-Contracting:**
- 12.1 The Contractor shall not assign or sublet the contract or any part thereof or allow any person to become interested therein any manner whatsoever without the special permission in writing of the Railway.
- 12.2 The Contractor may sub-contract a portion of the Contract Work to third parties with the prior written approval of the Railway. The Contractor shall furnish full particulars about the proposed Sub-Contractor(s) and the details of the work to the Railway while seeking such approval.
- 12.3 THE RAILWAY shall give approval or shall refuse approval in writing within 15 days of receipt of request along with all supporting details as per **Clause 12.2**
- 12.4 Bought-out items, critical components, proprietary items and equipment manufactured and supplied by specialized manufacturers which the Contractor intends to incorporate in the Contract Work shall also come within the purview of the provision under **Clause 12.2**.
- 12.5 Unless otherwise specified approval of the Railway under **Clause 12.2** shall not be required in the case of materials bearing test certificates such as rolled steel materials, pipes or such other standard materials.

- 12.6 In case of sub-contracting the Contractor shall hire the services of manufacturer's erection/commissioning personnel for supervision of erection/commissioning, testing and commissioning of the equipment supplied by them. The sub- Contractor should also have necessary valid licenses of wireman / electrician / supervisor which shall be submitted for verification by the Railway.
- 12.7 The approval extended by the Railway to Sub-Contractors recommended by the Contractor shall not discharge the latter from his Contract obligations. The Contractor shall remain solely liable for any action, deficiency, and/or negligence on the part of his Sub-Contractors.
- 12.8 The Contractor shall submit un-priced copies of purchase orders with technical specifications included in all orders placed on Sub-Contractors.
- 12.9 In the event if certain obligations extended by a Sub-Contractor to the Contractor are extended beyond the guarantee period specified in the Contract, the Railway shall automatically be entitled to the benefit thereof.
- 12.10 In no event shall the Railway be deemed to have any Contract obligations whatsoever in respect of Contractor's, Sub-Contractors and/or title-holders of any sub-orders placed by him.
- 13.0 **Responsibility for Damage to Contractor's Materials:**
- a. The Railway Administration will not be responsible for any loss or damage to Contractor's materials, equipments, tools and plants due to fire, flood or any other cause(s) whatsoever.
 - b. The materials issued by the Railway to the Contractor for use in the works shall be treated as Contractor's materials for this purpose, and the Contractor(s) shall make good these materials in the event of any loss/ damage thereto.
 - c. Works finished but not taken over by the Railway shall be treated as Contractor's materials for this purpose, and the Contractor shall be responsible for making good any loss or damage thereto.
- 14.0 **Patents:**
- 14.1 If the performance of the Contract involves the use of a patent, trade mark, registered design, copy rights and/or industrial property rights of which the Contractor holds the title, the Contractor shall not be entitled to any license fee, royalty and/or compensation from the Railway outside the Contract price which shall be deemed to include such license fee, royalty and/or compensation.
- 14.2 Where the title holder of a patent, trade mark, registered design, copy rights and/or industrial property rights used is a third party, the Contractor shall be liable for settling with such party and paying any license fee, royalty and/or compensation thereon.
- 14.3 The Contractor shall submit to the Railway a certificate from the licensor attesting that the equipment supplied fully complies with their recommendations and the technology of the license granted.
- 14.4 In the event of any third party raising claim or bringing action against the Railway including but not limited to action for injunction in connection with third party's alleged rights affecting the equipment covered under the Contract or the use thereof, the Contractor agrees and undertakes:
- i) To defend and to assist the Railway in defending at the Contractor's cost against such third party's claim and/or actions and against any law suits of any kind initiated against the Railway.
 - ii) To indemnify, keep indemnified and hold harmless the Railway against all actions, claims, demands, costs, charges and expenses arising from or incurred by reason of any infringement of patent, trade mark, registered design, copy rights and/or industrial property rights by manufacture, sale or use of the equipment supplied by the Contractor whether or not the Railway is held liable for by any court judgment.

Provided, however, that:

- a) THE RAILWAY shall, as soon as reasonably possible notify the Contractor in writing of such third party's claims and/or actions and:
 - i) The Contractor shall at its own cost defend or assist the Railway in defending its rights against any such claims and/or actions; or
 - ii) If the Contractor defends the case, the Railway shall, assist the Contractor free of charge by providing all such information and documents as are available with the Railway, save and except that in case of production of any witness at the request or instance of the Contractor, the Contractor shall bear all costs and expenses required in this regard.
- b) THE RAILWAY shall not without the Contractor's consent (which shall not be unreasonably withheld) enter into any commitment or admit any fact capable of supporting third party's claims, unless the Railway shall release the Contractor of its liabilities and obligations.
- c) The Contractor shall at its own cost, without prejudice to the provisions of this Schedule, may either carry out such alterations or modifications of the equipment which are necessary to avoid the infringement without affecting the efficient operation of the unit to the satisfaction of the Railway or to procure a right to the unrestricted use of the infringing equipment by the Railway.

14.5 Nothing in this Schedule shall abrogate or abridge the Contractor's own liability for infringement or violation of patent, trade mark, registered design, copy rights and/or industrial property right of a third party, if such infringement or violation is proved before and sustained in court of law and the Contractor fails to take action in terms of provisions of **Clause 14.4**.

14.6 The rights and liabilities of the parties under this Schedule shall survive this Contract.

15.0 **Co-Operation with other Contractors:**

The Contractor shall co-operate with the Railway's other Contractors, if any, for any associated plant and freely extend all help. The Contractor shall adjust, if found necessary his work so as to co-ordinate with the work of other Contractors. No compensation for such co-operation / adjustment of work can be claimed from the Railway on any account.

16.0 **Waiver:**

- a. Non-enforcement by either party of any of the provisions of this Contract shall not operate or constitute as a waiver of the provision itself or any subsequent breach thereof.
- b. The validity of the Contract shall not be affected, should one or more of its stipulations be or become legally invalid and such stipulation is severable from and not fundamental to the obligations of either party to this Contract. In such a case, the parties shall negotiate in good faith to replace the invalid clause by an agreed stipulation which is in accordance with the applicable law and which shall be as close as possible to the parties' original intent.

17.0 **Language:**

All documents, instructions, catalogues, brochures pamphlets, design data, norms and calculations, drawings, operation, maintenance, trouble shooting and safety manuals, reports, labels, on deliveries and any other data shall be in English Language.

18.0 **Care of Work:**

From the commencement to the completion of work, the Contractor shall take full responsibility for the care of Plant and Equipment and for all temporary works and in case of any damage or loss to the Plant and Equipment or to any temporary works or to any surrounding property of the Railway from any cause whatsoever, the Contractor shall at his own cost replace or repair and make good the same.

19.0 **Restriction of Visitors:**

The Contractor shall not allow any visitors at site without the prior written approval of the Railway.

20.0 Possession Prior to Completion:

THE RAILWAY shall have the right to take possession or use any completed or partially completed work. Such possession or use shall not be deemed to be an acceptance of any work done not in accordance with the Contract.

21.0 Bought Out Items:

The tenderer shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the tenderer and proposed to be used, along with the manufacturer's name, brand model etc. The successful tenderer may be required to produce invoices to ensure genuineness of such products / verification by the Inspecting agency.

Test certificates of bought item should be provided by the supplier with proper identification at the time of inspection.

22.0 Deviations:

22.1 The tenderer shall certify that the offered Machinery and Plant (M&P) fully meets the specification. Various design features incorporated in the Machinery and Plant (M&P) to fulfill different technical performance requirements shall be fully explained in the offer.

However, minor deviations from these specifications which do not affect or in any way interfere with the stipulated performance standards or would result in improved safety/ reliability or would reduce recurring maintenance/operating cost of the Machinery and Plant (M&P) can be considered for acceptance. The tenderer in such eventuality shall clearly indicate the details of these deviations and their implications **as per Annexure- M of Chapter-6 of tender documents.**

22.2 All Deviations in Technical specification of Machinery and Plants (if any) should be clearly indicated in the deviation statement of clause 22.1 above. If the bidders fail to submit any deviations then it will be safely assumed by the Railways that there is no deviation and the bidder has agreed to comply with all the conditions of the **schedules.**

23.0 Warranty:

The following conditions regarding Maintenance and reliability shall also apply:-

23.1 Within the terms of the Warranty, the Contractor shall be liable for any defect/deficiency in design, material, manufacture, packing, transport, shipment, construction, erection, installation testing, commissioning, Proving-out tests, workmanship, any act of omission of the contractor, any defects/deficiencies not specifically mentioned & not attributable to Railways.

23.2 Warranty Period:

(a) For installation in newly constructed shop/depot/shed, warranty clause of M&P should be started from 24 months from issuance of PAT or 18 months from project completion whichever is later.

(b) For installation in existing shop/shed/depot area, warranty clauses of M&P should be started from 24 months from issuance of PAT.

23.3 Up to expiry of the Warranty period, the Contractor shall remain solely liable for compliance of his supplies with the Contract provisions and with the best trade and engineering practice. He shall be held to perform entirely at his expense any modification, adjustment and/or revision acknowledged to be required to meet the conditions of the Contract.

23.4 The Contractor shall also, at his expense, replace any part having defects rendering it unsuitable for the use for which intended or liable to reduce the operating life time thereof without the Railway having to identify the nature of such defect to which the defective facility might be exposed.

23.5 Where it is established that a defect is occasioned by a genuine error in design, the Contractor shall replace all identical components furnished within the compass of the Contract with components better suited to perform the same functions in the same conditions, even though such components may not have given rise to any failure.

- 23.6 Regarding any additional Spare parts, the Warranty period shall be 12 months after delivery.
- 23.7 If during the Warranty period some parts of the supplies are replaced owing to the defects/damages under the Warranty, the Warranty period for such replaced parts shall be 24 months/12 months (as per clause no.23.2) from the date of replacement unless otherwise agreed.
- 23.8 The tenderer shall ensure that in case a failure is reported by a consignee qualified service engineers shall visit the site within two days from the date of complaint on calendar day's basis.
- The period of two days after the failure report shall be treated as grace period, which will not count towards breakdown time for up to one failure per month and a maximum of 3 failures per quarter. In case the number of failure exceeds one failure per month or three during any quarter of warranty, grace period of only 1 day will be permissible for such additional failure. Complaints shall be lodged by Railway by fax phone, e-mail or per bearer at address given by the tenderer.
- 23.9 If the warranty period expires on a Saturday/ Sunday/ Holiday, it will be deemed to have been extended to the following working day.
- 23.10 If during the period of Warranty the entire plant should be unavailable for reasons ascribable to the Contractor or for performing a design modification to better adapt the facility of new technological progress, the period of Warranty covering the entire works shall be extended by all of the period of unavailability of the equipment.
- a) Upon detection of defects either by the Railway or by the Contractor and/or notification thereof in writing to the Contractor by the Railway, the Contractor shall immediately take appropriate or efficient measures to remove the defects at his cost by repair or replacement as may be approved by the Railway.
 - b) If the Contractor does not commence the rectification either by repair or replacement of such defects within 30 days from the date of notice by the Railway or does not complete the said rectification with reasonable diligence and within a reasonable time as may be mutually agreed, the Railway may, at its option, rectify the defects at the Contractor's expense. The Railway shall, in such a case, deduct from payment due to the Contractor the expenses incurred by the Railway for remedy of such defects without prejudice to the other rights of the Railway under this Contract.
 - c) In the case of defective parts not repairable at site but essential in the mean time for the use of the plant, the Contractor shall replace at site free of cost to the Railway the said defective parts, before the defective parts are removed to his works.
- If the spare parts are available with the Railway, the Contractor shall be allowed to use the same in replacing the defective parts, provided that the Contractor shall replace such parts within a reasonable time thereafter as may be required by the Railway.
- d) If an assembly/sub-assembly requires to be taken back to the manufacturer's premises for repairs/replacement either before commissioning or during warranty, the manufacturer or his agent would be required to submit an Indemnity Bond. In case the entire Plant/Equipment has to be taken back, a Bank Guarantee would have to be submitted. The Indemnity Bond/Bank Guarantee should be of adequate value so as to cover the cost of the assembly/sub-assembly/paid up cost of the Plant/Equipment.
 - e) If the Contractor, on account of the defects, repairs and/or replaces certain items by changing the design or materials, such change shall not reduce the performance of the unit.
- 23.11 If any drawings/documents supplied by the Contractor are found to be incorrect or incomplete within the period of Warranty, the Contractor shall correct or complete such drawings/documents at his cost within a reasonable time.
- 23.12 The issuance of any acceptance certificate/inspection certificate/ approval by the Railway shall in no way relieve the Contractor from the provisions of this contract.

- 23.13 Maximum permissible down time till it is restored back to the contractual output and accuracy levels, in any quarter of the year during the warranty period, shall be 150 hrs. In case the total breakdown period in any one of year during warranty period, exceeds 500 hrs., the Railways would be entitled to forfeit the payment deducted for warranty i.e 5% of the item cost as specified at clause no 4.3 (c).

To ensure this a record of breakdown in hours on quarterly basis should be maintained by the consignee. At the end of first and second year of warranty, these details of breakdown hours during warranty period should be advised to **Workshop Projects Organisation (WPO)** and firm as per performance appraisal report given in Annexure—**C(M)**. A copy of these should be sent to **Chief Mechanical Engineer & FA&CAO**, Workshop Projects Organisation, Patna. The firm will then request Workshop Projects Organisation for release of WBG annexing the performance appraisal report as per **Annexure-C(M)** and the breakdown details mentioned above.

If these details are not received in time, penal action to forfeit the payment withheld for warranty i.e 5% of the item cost as specified at clause no 4.3 (c), as per the reliability clause should be initiated by Workshop Projects Organisation, Patna. Besides, forfeiture of payment deduction for warranty, the adverse performance of the supplier would be noted for deciding their credentials.

24.0 Communications with Contractor(s):

Subject to and as otherwise provided in this contract, all notices as are required to be given shall be signed by the competent officer of the Railway for and on behalf of The President of India and all other actions shall be taken by the Engineer and/or his representative.

25.0 Insurance:

- 25.1 The Contractor shall be responsible and take a comprehensive Insurance Policy for "transit-cum-storage-cum-erection" in the joint name of the Railway and Contractor for value covering all risks and liabilities for all supplies on **FOR site basis**, storage at site up to erection, testing & commissioning and handing over of the Plant to the Railway as per terms of Contract. The Contractor shall also take insurance for Third Party Liability covering loss of human life (engineers and workmen not belonging to Contractor) and also covering the risks of damage of other's material/ equipment/ properties during execution of the Contract. However, the value of third party liability for compensation for loss of human life and damage of equipment/property shall be subject to the approval of the Railway. The Contractor shall produce the insurance policy and the receipts for the premium at the appropriate time.
- 25.2 The Contractor shall ensure that the insurance coverage is obtained to take care of future cost escalation and variation in taxes & duties during the tenure of the Contract. The Contractor shall, if necessary, also enhance and extend the insurance coverage till completion of the work and handing over of the unit.
The Insurance cover shall remain in full force up to the time the Machinery and Plant is accepted and Final Acceptance Test Certificates (FAT) is issued by the Engineer.
- 25.3 In order to adequately cover under comprehensive transit-cum- storage-cum-erection insurance, the Contractor shall fulfill the necessary requirement/obligations of the Insurance Company including provisions of adequate fire fighting facilities, watch & ward etc.
- 25.4 In all cases, the Contractor shall lodge the claims with the Underwriters and also get the claims settled. However, the Contractor shall proceed with the repairs and /or replacement of the equipment /components in their scope of supply without waiting for the settlement of the claims. In case of seizure of materials by concerned authorities, the Contractor shall arrange prompt release against bond, security or cash as required. The Railway will extend all assistance to the Contractor in such a case.
- 25.5 All the insurance claims pertaining to their scope shall be processed by the Contractor and the missing / damaged items shall be replaced / repaired by them without any extra cost to the Railway and without affecting the completion time.
- 25.6 The Contractor shall also arrange Accident Insurance Policy for his personnel deputed to site including a separate policy as per Workmen's Compensation Act.

The Accident Insurance policy shall be for payment of an ex-gratia amount of (INR) Rs. 1,00,000/- (Indian Rupees One lakh only) per head in case of fatal accident to the Contract labour engaged by him in addition to the Workmen's Compensation Insurance Policy. As and when a fatal accident takes place, along with the Workmen's Compensation, the Contractor is required to pay the ex-gratia amount within seven (7) days from the date of accident.

In case of any delay in paying the ex-gratia amount as above, the Railway has the right to pay such amount directly to the family of the deceased and recover the same from the Contractor's running/future bills.

- 25.7 The vehicles, mobile equipment and any other equipment (whether or not those are owned by them) deployed at site by the Contractor or his sub-Contractor shall be covered under Automobile Liability Insurance at Contractor's cost.

26.0 Indemnity:

- 26.1 The Contractor shall at all times indemnify and keep indemnified the Railway against all claims which may be made against the Railway in respect of any infringement of any rights protected by patent as per **Clause 14**. In this connection, the Railway shall pass on all claims made against him to the Contractor for settlement.
- 26.2 The Contractor assumes responsibility for and shall indemnify and save harmless the Railway from all liability, claims, costs, expenses, taxes and assessments including penalties, punitive damages, attorney's fees and court costs which are or may be required with respect to any breach of the Contractor's obligations under the Contract or for which the Contractor has assumed responsibility under the Contract including those imposed under any Contract, local or national law or laws, or in respect to all salaries, wages or other compensation of all persons employed by the Contractor or his Sub-Contractors or suppliers in connection with the performance of any work covered by the Contract. The Contractor shall execute, deliver and shall cause his Sub- Contractor and suppliers to execute and deliver, such other further instruments and to comply with all the requirements of such laws and regulation as may be necessary there-under to conform and effectuate the Contract and to protect the Railway at all times.
- 26.3 THE RAILWAY shall not be held responsible for any accident or damages incurred or claims arising there-from during the period of execution of work under the responsibility of the Contractor and putting into operation of the plant under the supervision of the Contractor in so far as the latter is responsible.
However, the Contractor shall be liable for such accidents as may be due to negligence on his part in accordance with Indian laws and regulations.
- 26.4 The contractor shall submit the **Indemnity Bond** as per the format given in **Annexure-F(M)** of special conditions of contract for Mechanical Works before supply of machines.

27.0 Service Facility in India and Technical Support:

- 27.1 The tenderer will clearly spell out in the offer the facilities available with him or his agent for providing adequate after-sales service in India during warranty period in the appropriate section of **Annexure 'C(M)'** of Special condition of contract for Mechanical Works. The complete details such as organization for after sales service, availability of technically competent engineers and warehousing facilities for spares should be clearly indicated. **Bidders not offering complete servicing/repair facilities in India to ensure quick response to maintenance/ servicing calls are not likely to be considered.**
- 27.2 After the warranty period, if any, the manufacturer or his agent shall agree to provide service supports for trouble shooting and obtaining spare parts. The manufacturer shall be obliged to provide spare parts required by the Purchasers for a period of 15 years from the date of delivery of the machine at the ultimate destination to safeguard against obsolescence.
- 27.3 Tenderer who are OEM, shall undertake to supply spare parts for a period of expected life of machine. Other tenderers shall submit undertaking from OEM for supply of spare parts for a period of expected life of the machine.

27.4 Tenderers shall indicate the list of spares required for maintenance of the machine beyond warranty period. Current cost of such spares and current service charges for the items of work of repair of machine shall also be indicated.

27.5 During warranty period, the supplier or his authorized agent shall attend for break down as soon as possible, but in no case later than 72 hours of receipt of intimation of the breakdown.

27.6 AMC/CAMC of Major M&Ps at Consignee end:

27.6.1 The Contractor shall be responsible for AMC/CAMC services for the supplied Machines/Equipments/Items as per Schedule F-1 either directly or through the OEM. An affidavit in this regard is required to be submitted along with the offer/GAD submission / approval towards facilitating required AMC/CAMC services along with spares support at the consignee location as per agreed terms and conditions with consignee, minimum upto 05 years including spare parts support as per Para 27.2. The AMC/CAMC should include complete responsibility for the bought out sub assemblies and components like CNC System, Diesel Engine, AC Unit, Software/Hardware support etc . Preventive maintenance shall preferably to be conducted on weekends/Holidays through mutual agreement with the consignee. The preventive maintenance regime offered must be aimed at achieving minimum 90% uptime of the plant excluding the plant downtime for preventive maintenance schedules.

27.6.2 AMC/CAMC shall be operated, managed and paid by the consignees indicated. A formal agreement is required for operating AMC/CAMC at consignee end. However, an indicate rate with broad terms and conditions towards AMC/CAMC support need to be provided alongwith Offer/GAD Submission/Approval, this rate should be within 5% of the machine/equipmemt/item value as per F-1 Schedule. Spare prices will be governed as per certified pricelist provided to railways time to time or as uploaded on firms website.

27.6.3 AMC/CAMC is not part of scope of supply (if not specifically part of the specification) being an optional requirement and not included in commercial evaluation criteria. Therefore, the option to award AMC/CAMC shall remain with the consignee after completion of warranty period. In case consignee wants to exercise the option of entering into AMC/CAMC after warranty, then the contractor will be bound to enter into AMC/CAMC either directly or through OEM. However, contractor/OEM will not have any claim towards such service support and railway/consignee will have rights towards getting such service support from open market, if desired.

27.6.4 Non-compliance of above at any stage i.e. either during the warranty period of the Machines/Equipments/Items as per Schedule F-1 or the statutory period assigned as per this Para towards AMC/CAMC support, contractor shall be liable for a penal action including forfeiture of the Performance Guarantee. In addition, the OEM shall also be liable for getting delisted from vendor directory of railways including/excluding cancellation of in hand/future orders for the same or any other Machines/Equipments/Items by the railways. Such provision may be incorporated in the sub-agreement by the contractor with the OEM for the supply of Machines/Equipments/Items as per Schedule F-1.

ANNEXURE-A(M)

JOINT RECEIPT INSPECTION NOTE

Date.....

Sub: Receipt of consignment for machine_____**Ref: ContractNo**_____

1.	Name of consignee/Railway	
2.	Machine name	
3.	Quantity	
4.	Name of supplier	
5.	Consignment of the machine received on	

It is certified that the consignment of the machine has been received complete and in good condition as per specification shown in the contract.

Tentative plan for installation and commissioning of the machine is as under:

1.	Date of clear site provided	
2.	Contract	
3.	Status of readiness of foundation:	
(a)	Already constructed on	
(b)	Under construction & likely date of its completion	
(c)	Construction yet to be started from and & likely date of its completion	
4.	Status of availability of electrical power, water and compressed air etc.	Available/Not-available
5.	Number of components to be proved out on the machine	
6.	Likely date for start of erection	
7.	Likely date for switch-on the machine	
8.	Likely date of completion of commissioning of the machine	

Remarks (if any):**Representative of firm****Designation****Representative of consignee****Designation****(Minimum Gazetted level)**

ANNEXURE-B(M)

JOINT COMMISSIONING NOTE

Date.....

Sub: Commissioning of (name of machine)_____

Ref: Contract No _____

1. Name of consignee/Railway
2. Machine name
3. Quantity
4. Name of supplier
5. Machine received on
6. The machine was operated from to All the leading parameters specified in technical specification schedules as well as approved drawing of the machine is found ok subjected to defects and deficiencies as mentioned in sl no 8.
7. The machine is being kept under one month observation to watch its performance.
8. Following minor deficiencies (if any) found during joint observation trials are to be attended/rectified by the firm during one month observation and before issuance of the PAT certificate:
 - a.
 - b.
 - c.

Representative of firm**Designation****Representative of consignee****Designation****(Minimum Gazetted level)**

ANNEXURE –C(M)**FORM FOR PERFORMANCE APPRAISAL ON COMPLETION OF WARRANTY PERIOD**

Date.....

To,
M/s.

1.	Contract Agreement No	
2.	Consignee/Railway	
3.	Name of supplier	
4.	Machine Name	
5.	Machine received on	
6.	Machine commissioned on	
7.	PAT issued on	
8.	PTC issued on	
9.	Warranty period expired on	
10.	Performance during warranty period:	
10(a)	Total number of breakdowns	
10(b)	Total downtime in number of days	
11(a)	Any warranty complaint pending on date	Yes/No
11(b)	If yes, then the date and nature of defect(s)	

12. In case, Reliability clause No.23 of the machine during warranty period is also given in Special Condition of contract for Mechanical Works, then following details of breakdown hours for preceding eight quarters may also be furnished

Quarter	Period		Breakdown hours
	From	To	
1			
To			
8			

Signature	
Name	
Designation	
	Office Stamp

Copy to:-

1. CME/Workshop Projects, Chamber Bhawan, J. C. Road, Patna-800001
2. FA&CAO/Workshop Projects, Chamber Bhawan, J. C. Road, Patna-800001

Note:

- a) This appraisal may please be sent immediately on completion of warranty period. If any extension of warranty period required, may please also be mentioned with details.
- b) Sr.Scale Officer having independent charge is also authorised to sign.

ANNEXURE –D(M)**PROFORMA OF PROVING-OUT TEST CERTIFICATE (PTC)**

No.....

Date:.....

M/s.....

.....

.....

Sub: Certificate for commissioning & prove out of machine

1. This is to certify that the machine as detailed below has been received in good condition along with all the standard and special/optional accessories and spares and same has been installed and commissioned:

- (a) Description of the machine :
- (b) Machine No :
- (c) Quantity :
- (d) Date of receipt of machine :
- (e) Date of commissioning :

2. Following items/documents received in full and good condition:

- (a) Maintenance spares :
- (b) Concomitant accessories :
- (c) Optional accessories :
- (d) Maintenance tools and tackles :
- (j) Data, Drawing and Manuals as per :
Technical Specifications of M&Ps.

3. Accessories/Spares not yet supplied and recoveries to be made on that account as per details given below:

Sr No	Description	Amount to be recovered

4. Training was imparted to the staff as per provisions made in the contract.
5. The proving-out test has been done to our satisfaction.
6. You have failed to fulfill the contractual obligations with regard to the following:
- a) _____
 - b) _____
7. The amount of recovery on account of non-supply of accessories and spares is as per details given above. Losses/damage on account of your failure to fulfill the contractual obligations will be recovered from your bills/Performance Guarantee Bond in terms of Para _____ of General Conditions of Contract. Bid Documents _____ governing the contract.

The issuance of proving-out certificate (PTC) proves only the technical acceptability and functioning of the machine on the date of issue of the Certificate. The issue of this PTC does not amount to waiver of any of the terms and conditions of the contract or delay in supply of drawings, machine or commissioning thereof and it does not absolve the supplier of its liability for any loss or damages suffered by the Railways due to the same.

Signature

Name

Designation

With Stamp

Copy to:-

1. CME/Workshop Projects, Chamber Bhawan, J. C. Road, Patna-800001
2. FA&CAO/ Workshop Projects, Chamber Bhawan, J. C. Road, Patna-800001

Note:-

- a) This certificate should be signed by an officer not below the rank of J. A. Grade.
- b) Separate PTC should be issued for each machine.

ANNEXURE –E(M)**FORMAT FOR SUBMISSION OF INFORMATIONS FOR EACH M&P**

1. We, M/s. _____, offer for _____, qty _____ nos. as per the description given in Schedule of Requirements.
2. We are furnishing clause by clause comments of technical specification (TS) of Machinery and Plants regarding acceptance of the Technical specifications as per format given below. If any clause/clauses are left blank / without comment, shall be treated as accepted.

S.No.	Clause no.	Description as per Technical Specification	Comments on clausedescription by Tenderer

Note:

In case tenderer offers internationally accepted alternative specifications for the items mentioned in **clause1.0 (f)**, complete details of alternative specification, may be enclosed (if applicable)

3. We are having following facilities available with us or our agent for providing adequate after-sales service in India during warranty period. Complete details of after sales service, availability of technically competent engineers and warehousing facilities for spares have been enclosed in the tender.
 - a) After sales service centers:
 - b) Availability of technically competent engineers;
 - c) Warehousing facilities for spares:
4. It is certified that we are having suitable facilities at our works for carrying out various performance tests on the sub-assembly/assembly/machine and these shall be made available to the inspecting authority.
5. We further submitted the following information about the offered machine as per the technical specification. We understand that any omission of any of the below mentioned information will render our offer incomplete to that extent.

S.N.	Information required	As per Clause No./Schedule	information
1	Information on schedule-I	Schedule-I	

5. * We hereby confirm that we are the OEM and undertake to supply spare parts for a period of expected life of machine

OR

- * We hereby confirm that we are not the OEM for bought out items, but undertaking from OEM for such items for supply of spare parts for a period of expected life of the machine to provide maintenance spares (as and when ordered) after the expiry of the warranty for 5 years including the maintenance spares required for the bought out sub-assemblies and parts.

(*strike out whichever is not applicable)

**Signature of the
Authorized representative of the bidder
With company stamp**

ANNEXURE – F(M)**PROFORMA OF IDEMNITY BOND FOR MACHNERY AND PLANTS**

1. Indemnity for Machinery and Plants as per Special Conditions of Contract for Mechanical Works under Agreement No.....dated: for the work“ ”

We (Name of Contractor)
hereby undertake that we shall hold at our Workshop at for and behalf of the President of India and in trust for him the stores/articles(mentioned in Technical Specifications, details to be given for quantity for each schedules) which may be and/or which has been made over to us, in connection with “.....“ against the contract agreement No.....
 Dated.....

2. We shall be and remain absolutely responsible for the safe custody and protection of the said stores and articles against all risks, whatsoever, till those and duly delivered to the President of India or to his representative as he may direct and as such do hereby indemnify the president of India against any loss and/or damage to the said stores and articles while in our possession/custody. The said stores and articles shall however be at all times, open to the inspection by officers who may be authored on that behalf by ministry of Railways or its nominee.
3. Should however, at any time any loss or damage to as aforesaid, occurs or a refund become otherwise due to the President of India, he or his representative shall be entitled to recover from us compensation for, and in respect of such loss or damage, if any, or the amount to be so refunded without prejudice to any other remedies which may be otherwise available to the said president of India by way of deduction from any sum due to/or any sum which at any time hereafter may become due to us under this or any other contract.
- 4 We hereby irrevocably agrees to indemnify the indemnified that in the event of the said machine not achieving the performance of Machinery and Plants, the indemnifier shall as may be deemed necessary repair the defective machine at site, free of cost, within a reasonable time specified by the indemnified.

In the event of any loss or damage as aforesaid, the assessment of such loss or damage and the assessment of the compensation therefore would be made by the President of India or his authorized nominee and the said assessment would be final and binding upon us.

Bidder's authorized signatory

With seal

Station:

Date:

DECLARATION FORM

For receiving materials from the Railways by the Firm.

"I/We hereby solemnly declare that the(Material) obtained is required for the purpose of Manufacturing.....(finished product) against Contract Agreement No..... dated.....The(material) will not be utilized for any other purposes or otherwise disposed of without the prior approval of the president of India/Railways or his nominee"

Note:-

This Performa is only for guidance and may be changed/amended at any stage at the discretion of Engineer. This is to be submitted on stamp paper of appropriate

Witness:

1.-----

Signature

Name

Designation

Address

2. -----

Signature

Name

Designation

Address

CHAPTER-21



Workshop Projects Organisation (Indian Railway)

E-tender No. 2021/WP/Mech/Anara/MEMU/WT-21(Open)

(Two Packet System)

NAME OF WORK:- Composite Work (Civil, Electrical & Mechanical) involving Construction of Industrial shed with Pre- Engineered Building (PEB), Sick line pit, Service building, Community Hall, Road, Overhead Tank, Electric Sub Station (ESS), Septic Tank, Drainage, Water Supply arrangement, Track works etc., Electrification and illumination works, Procurement and commissioning of specified Mechanical Machineries & Plant and other associated Civil, Mechanical, Electrical & Telecommunication works in connection with Development of infrastructure for integrated maintenance of MEMU, DEMU & other coaching stock in SER (phase-1) at Anara, South Eastern Railway.

TECHANICAL SPECIFICATIONS FOR MACHINERIES AND PLANT

(Appendix 'A' & ITEM NO- 1 TO 15)

Appendix-A**Specification No. - IM/MEMU/DEMU/Anara/WP/Mech/M&P/GS****GENERAL SPECIFICATION FOR SUPPLY OF M&P (AS APPLICABLE)**

General Technical Specifications for all M&P including Lubrication, Cooling, Hydraulic, Pneumatic and Electrical Systems, features of CNC controls etc. (as applicable). The condition/ features indicated in main specifications shall over-ride those mentioned anywhere else.

1.0 Important Notice:

- a) Tenderers are required to give comments/ compliance precise, specific and to the point. Bidder shall also give specific information wherever asked for. Deviations, if any, shall be clearly indicated with details and proper justification to avoid back reference.
- b) **Tenderers must offer all the specified concomitant accessories, as considered essential for commissioning and utilization of the machines and equipments.**
- c) The bidder will quote only for the make of sub-assemblies and equipment wherever specified. Other makes of sub-systems will normally not be acceptable. In case, some other make is quoted, specific reasons for the same including its features/advantages over specified makes must be brought out in the offer.
- d) In respect of safety standards and environmental standards relevant to the machine, it is mandatory for the machine manufacturer to ensure compliance with international (CE/ISO/DIN/JIS)/National Standards (IS) (where applicable) in their offer.
- e) **Offers are likely to be ignored in case of non-compliance of these instructions.**
- f) In case, any item is required in sets, please specify nos./ pieces per set.
- g) If a bidder feels that details provided in a clause/ para pertaining to any item or machine are inadequate/ incomplete, the bidder may furnish further information pertaining to that item/ machine, and upload the same along with his offer. However, decision of Railways shall be final regarding all such interpretations.

2.0 Machine Maintainability:

The machine shall be so designed as to require minimum possible maintenance and to give trouble free service. The machine / equipment should have the following features:

- a) All assemblies/ parts of the machine /equipment will be easily accessible for maintenance to the extent possible.
- b) The machines will not require major dis-assembly for checking and replacement of a particular part, especially for parts requiring periodical check up and replacement.
- c) The manufacturer must provide means of access e.g. stairs, ladders, cat walks etc. (as per requirement / design, wherever applicable) to allow access safely to all areas used for production, adjustments and maintenance operations.
- d) **Wear Compensation Adjustment:** The original built-in accuracy of the machines shall be capable of being maintained conveniently and economically by suitable adjustments for taking up wear on slides, bearings and lead screws etc. wherever required.

2.0 Safety features (as applicable)

- a) **Work area Lighting:** Machines should be provided with light (Halogen light/CFL/LED) to illuminate work area with minimum illumination level of 300 lux. Tube lights in electrical cabinets for maintenance purpose shall also be provided. Four colored signal lights displaying operational status of the machine and visible from a distance should be provided for CNC machines.
- b) **Noise Level:** The maximum noise should not exceed 85 dB. The measurement should

be carried out at a distance of 07 meter away from the periphery of the machine as per NMTBA noise measurement technique / ISO 3740-1980 / DIN 45635-16 / IS 10988. The noise level of the machine in dB should be clearly indicated in the offer along with relevant standards.

c) **Other Safety Features:**

- (i) Work area enclosure with transparent windows should be provided, wherever applicable and required.
 - (ii) The work area should be completely enclosed and interlocked so that no cutting operation in auto mode can take place as long as it is open except for motions in jog mode.
- d) The machine shall incorporate safety devices to provide protection to the operator and machine against all possible operational and machinery failures.
- e) Suitable interlocks shall be provided to prevent machine operations in the event of:
- (i) Faulty sequence of operation.
 - (ii) Fluctuation in supply voltage.
 - (iii) Resumption of power supply after power failure.
 - (iv) Non-positioning of safety guards, wherever moving guards are provided.
 - (v) Failure of hydraulic system (where applicable)
 - (vi) Failure of lubricating system (In case of automatic including drop in pressure lubrication)
- f) A fault or damage in the control circuit or interruption re-establishment after an interruption of fluctuation in whatever manner in the power supply to the machinery must not lead to dangerous situations in particular.
- (i) The machinery must not start unexpectedly.
 - (ii) The machinery must not be prevented from stopping if command has already been given.
 - (iii) No moving part of the machinery or piece held by the machinery shall fall or be ejected.
 - (iv) The protection devices must remain effective.
- g) The machine shall be fitted with an emergency stop device to enable actual or impending danger to be averted. This device must be:
- (i) Conveniently located.
 - (ii) Clearly identifiable.
 - (iii) Stop the machine as quickly as possible without causing additional hazards.
- h) The emergency stop must remain engaged. It should be possible to disengage it only by appropriate operation. Disengaging the control must not restart the machinery but only permit restarting.
- i) Safety features shall also include.
- (i) Safety device against overload for all mechanical and electric items to the extent possible.
 - (ii) Safety stops against over-running of slides.
- j) Guards and protection devices shall protect operators against risks related to moving transmission parts (such as pulleys, belts, gears, rack and pinion, shafts etc.) and moving parts directly involved in the process to the extent possible. These shall meet the following requirements: -
- (i) Be of robust construction
 - (ii) Not give rise to any additional risk

- (iii) Not be easy to bypass or render non-operational
 - (iv) Be located at an adequate distance from danger zone
 - (v) Cause minimum obstruction to the view of the production process.
 - (vi) Rigidly connected and not prone to rattling.
 - (vii) Enable essential work to be carried out without the guard or protection device having to be dismantled.
- k) A load meter shall be provided to indicate the actual load on the machine. The meter shall have a suitable mark to indicate the maximum load the machine can take.

3.0 Environment Conditions:

- a) The machines/ equipments are required to work in an ambient condition of temperature range of 0°C to 50°C and relative humidity of 98-100% and comparatively dusty atmosphere. All equipments/ machines should be designed to function effectively under these conditions.
- b) The electrical/electronic/CNC equipment should be tropicalized and also other sub-assemblies of the machine should be suitably designed to function efficiently under tropical conditions.
- c) All the enclosures of the electrical equipments should confirm to suitable standard (IP etc) to ensure all-weather proofing.
- d) The Electrical Control Cabinet shall be fitted with proper air cooling arrangement by means of heavy duty blowers, filters & heat dissipation system.

5.0 Special Features:

The bidder should clearly indicate the special features incorporated in the machine, if any, and also the advantages of the special features.

6.0 Scope of Supplies and Services

a) Concomitant Accessories:

- (i) The machine should be accompanied by all the concomitant accessories to make the respective machine/ equipment fully operational after installation.
- (ii) The scope of concomitant is specified in the respective specifications as applicable.

b) Optional Accessories:

The cost of optional accessories as specified in the technical specifications or is in the opinion of bidders can contribute to enhance productivity, better quality and maintainability should be quoted separately indicating all the cost elements.

c) Toolings:

- (i) The contractor shall quote for toolings as specified in the individual specifications.
- (ii) The tenderer should submit separately for each of the tooling items along with full details in regard to make, part number, source and expected annual consumption.

d) Scope shall also include the following:

Storage, handling, erection, testing, commissioning of all equipment and carry out demonstration of performance guarantee tests till issuance of **Final Acceptance Test Certificate (FAT)/ Prove-out Test Certificate (PTC)**.

7.0 Coolant System (Where Applicable)

- a) Suitable coolant system with pump, motor, tank, filter etc. shall be provided. The coolant pump shall be as per IS:2161-1962. The filter shall be of reusable type and indigenously available. If reusable filter cannot be offered the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be provided. Unit cost of machine will be inclusive of spares. Details of the coolant system shall be indicated.
- b) The supply of coolant shall be in ample volume. Provision to re-circulate the coolant shall be available. A chip and coolant tray shall be provided. The volume of coolant flow shall be indicated. It shall be adjustable.
- c) An enclosure shall be provided to prevent the coolant from splashing outside the machining zone. Details of enclosure shall be provided. Specific requirements of coolant system for grinding machines etc. shall be clearly indicated.

8.0 Lubrication System (Where Applicable)

- a) The machine shall be provided with an automatic lubricating system for ensuring delivery of adequate quantity of lubricant to areas requiring continuous lubrication. Suitable arrangements must be provided for indication of failure of the lubricating system.
- b) The system shall be provided with interlock to prevent machine operating/starting in the event of the failure lubrication system.
- c) Reusable filters capable of filtering chips, dust particles etc. shall be provided. Indicators for showing clogged condition of filters shall be available. The filters shall be indigenously available. If reusable filter cannot be offered the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be provided as spare. Unit cost of machine will be inclusive of spares. Details of the coolant system shall be indicated.
- d) Arrangement shall be provided to indicate failure of the lubricating system and protecting the machine.
 - (i) Periodicity of cleaning/replacement of filters
 - (ii) Periodicity of replenishing lubricating oil in the sump.
- e) The lubrication system shall be explained in the bid with a lubricating diagram.
- f) Lubrication and filter cleaning chart shall be displayed on a metal plate at a conspicuous location on the machine indicating :-
 - (i) Specific location of points on the machine to be oiled lubricated/greased.
 - (ii) Periodicity of lubrication of these points.
 - (iii) Filter to be cleaned.
 - (iv) Periodicity of cleaning filters.
 - (v) Periodicity of replenishing lubricating oil for the centralized system.
 - (vi) Any other similar relevant information.
- g) Points where manual lubrication is needed shall be separately indicated. Frequency of lubrication shall be also clearly mentioned.
- h) Lubricating oils used in the machine shall be available in India. Successful tenderer will be required to indicate brand names of approved oils manufactured by various Indian Oil Companies.
- i) First fill of lubricating oils used in the machine shall be provided with the machine. Details of lubricating system provided shall be indicated.

9.0 Pneumatic System (Where Applicable)

- a) The compressed air supply shall be sourced from the outlet connections provided on the columns as a part of that project. The pneumatic system of the machine should be designed accordingly. An alarm shall be provided for low air pressure.
- b) Suitable filter/moisture trap shall be provided by the contractor in the system of pneumatic air intake.
- d) The filter shall be reusable type and indigenously available. If reusable filter cannot be offered, the filter cartridge shall be easily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare. Unit cost of machine will be inclusive of spares. Details of the coolant system shall be indicated.
- c) Air pressure regulator, if necessary, shall be provided by the tenderer.
- d) The make of pneumatic control equipment shall be of reputed make. The makes shall be indicated.

10.0 Hydraulic System (Where Applicable)

- (i) The hydraulic power pack, reservoir, pumps, valves, gauges etc. shall be conveniently located to facilitate maintenance. The hydraulic power pack and all hydraulic elements shall be of compatible makes. Type, make and model no. of each hydraulic element shall be furnished. Only Rexroth/Vickers/Yuken/Mico-Bosch make hydraulic power pack shall be accepted.
- (ii) Hydraulic circuit must be equipped with the following safety and inspection equipments:
 - a. Pressure gauges at all place, where pressure has to be set up or inspected.
 - b. Safety valves for hydraulic circuit if relief valve does not fulfill this function.
 - c. Equipment for checking of temperature in the circuit or in the pump wherever necessary.
 - d. Arrangement to show if the filters (including those in the pump set) are choked and need cleaning. The filters shall be of reusable type and indigenously available. If reusable filter cannot be offered, the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare. Unit cost of machine will be inclusive of spares.
 - e. Alarm for low oil level.
- (iii) The sump aggregate shall have the following:
 - a. Oil level sight gauges or any other equipment showing the minimum and maximum oil levels in sump.
 - b. It shall be possible to drain the oil from the tank without disconnecting any pipes or other fittings.
 - c. Dust proof cover
 - d. Filters to prevent ingress of dust/dirt into the hydraulic system
 - e. Drainage connection to drain out the complete oil without disconnecting any pipe.
- (iv) The temperature of oil in hydraulic circuits shall not exceed 60 degrees C in any case. Suitable arrangement shall be incorporated to ensure that the oil is not overheated under local weather conditions at continuous normal working of the machine.
- (v) Facilities for bleeding of air in case of air lock shall be provided.
- (vi) The hydraulic reservoir, pump and allied equipment shall be suitably segregated from the machine in order to remove major source of heat.
- (vii) Hydraulic oils used on the machine shall be available in India. Successful tenderer will be required to indicate brand names of approved oils supplied by various Indian Oil Companies.
- (viii) First fill of hydraulic oils used on the machine shall be provided with the machine.
- (ix) A suitable maintenance free, chiller type heat exchanger of adequate capacity shall be provided to ensure that the hydraulic oil temperature does not exceed 50°C. Arrangement

shall be provided to automatically connect the hydraulic system to the heat exchanger if oil temperature exceeds 45°C. The details of system shall be furnished.

11.0 Power supply connection:

The Railway shall provide 415 V $\pm$ 10%, 50Hz $\pm$ 3% (mains) electrical supply single point in the shed for installation in existing sop/shed/depot area. **Similar provision for newly constructed shop/shed/depot area for composite work will be covered from Electrical BOQ.**

Further electrical work like cables, laying of power/electrical cables & earthing wires from mains to panel as well as within the machine, with supply of all materials shall also be carried out by the supplier for operation of the machine.

12.0 General Electric Specification

12.1 The provision of this General Specification shall apply, where ever relevant.

12.2 All equipments and material shall comply with appropriate Indian Standards (latest), International Standards or National Standards of the country of origin provided the latter are equivalent to or better than the former.

The tenderer shall indicate the Standards applicable. The following standards are applicable in particular. (Corresponding International Standards like ASA, NEMA, BIS, DIN etc. may also be quoted).

- a. IS: 325-1979 (latest) - Three phase induction motors (corresponding to IEC pub-34-1) (Latest).
- b. IS: 1248 (Latest) - Direct acting indicating analogue electrical measuring instruments and their accessories (corresponding to IEC Pub-51) (Latest).
- c. IS: 1231-1974 (Latest) - Dimensions of three phase induction motors (corresponding to IEC Pub-72-1) (Latest).
- d. IS: 1271-1985 (Latest) - Classification of insulation material for electrical machinery & apparatus in relation to their thermal stability in service (corresponding to IEC-Pub-85) (Latest).
- e. IS: 6875 (Latest) - Push Buttons and related control switches corresponding to IEC Pub/73) (Latest).
- f. IS: 375-1963 (Latest) - Marking and arrangement of switch gear, bus bars, main connection & auxiliary wiring.
- g. IS: 996-1979 (Latest) - Single phase small AC and universal electrical motors.
- h. IS: 1356 (Latest) - Electrical equipment of machine tools.
- i. IS: 2516 (Latest) - Circuit breakers (corresponding to IEC Pub-56) (Latest)

12.3 Unless specified in the main specification, the motors and starters shall be of the following type. Tenderer is, however, free to give alternative proposal along with justification, if in his view alternative proposal is warranted by site conditions. Types of Motor Type of Starter are as follows:

S/no	Type of motor	Type of starter
1	Any type of AC motor starting current of which does not exceed 75 amps	Direct on line
2	AC squirrel cage, induction motors, starting current of which is above 75 amps. if started direct on line	Star delta or Auto transformer type
3	AC slipring type motor	Resistance type air/fan Cooled

4	<i>AC synchronous or synchronous induction motor</i>	Suitable makers standard
5	<i>DC motor</i>	Resistance type/Thyristor type

- 12.4 The control gear for motors shall incorporate the following protection devices as concomitant accessories.
- No Voltage Protection** - No voltage protection shall be provided so that machine will not start up again by itself when, following an interruption the supply is restored.
 - Short Circuit Protection** - To protect against short circuits due to insulation failure of faulty connections, HRC fuses / MPCBs shall be provided for each motor. The rating of the fuse / MPCB shall be such as to take care of the over current due to motor starting.
 - Over Load Protection** - To prevent motors from overloading, overload protection / MPCB shall be provided separately for each motor. Three phase motors shall be protected by overload tripping devices on each phase.
 - Single Phasing Protection** - A separate current sensitive delayed action single phasing preventor / MPCB shall be provided for each motor separately. Overload protection shall not be treated as single phasing preventor.
- 12.5 Control equipment shall be mounted in separate drip proof enclosures. Control enclosures and compartments are to be so designed as to give adequate protection against ingress of dust, oil, coolant or chips. All control devices like contractors etc. shall be front mounted on a rigidly fabricated metal panel for ease of operation. All other electrics shall be installed that they are readily accessible when the doors and covers are opened. Hinged covers shall be interlocked with the machine tool control to prevent operation of the machine when cover is open.
- 12.6 The motor shall be totally enclosed with or without fan cooled frame. Screen protected drip proof type motor may be provided if it is mounted inside protective enclosures.
- 12.7 The electrical equipments shall comply with the requirement of Indian Electricity Act and Rules (latest).
- 12.8 All instruments shall be of the Industrial Grade "A" (IS-1248) switch board type the range of the instrument shall be such that the maximum load expected in the circuit shall produce a deflection of 60% to 80% of the full scale.
- 12.9 Two earthing terminals shall be provided on all electric motors including the control gear.
- 12.10 The supplier shall furnish 4 sets of complete electrical and electronic wiring diagrams in full details to enable the maintenance staff to locate faults in the circuits, 4 sets of part catalogues, maintenance manuals operating instructions with details of coils and windings, used in the equipment to facilitate repairs and maintenance should also be supplied.
- 12.11 For main motor class minimum "F" Class insulation shall be provided. If any other class of insulation is proposed, detailed justification for providing different class of insulation shall be given.
- 12.12 Motors shall be designed to withstand frequent starts, stops and reversals as demanded in the operation of the machine.
- 12.13 All motors shall be of the heavy-duty efficiency class-I or IE2, type equipped with sealed ball bearings and overload protection. Enclosures will be of either steel or cast iron. Overload protection is provided for motors to permit operation within their rating under all design load conditions.
- 12.14 Power Supply
- The machine shall be suitable for operation on 415 volts 3 phase 50 cycles AC 3 wire or 4 wire system with neutral solidly earthed. The supply voltage may vary up to $\pm 10\%$. The frequency may vary up to $\pm 3\%$. However, full rated power of the motor shall be available at the lower voltage. Firm should confirm satisfactory performance of the machine at incoming power supply in the range $415V \pm 10\%$ and $50HZ \pm 3\%$ frequency. The bidder

shall provide voltage stabilizer for machine if electrical motor power requirement is more than 30kW as specified below of required capacity.

- b. The voltage stabilizer, if required, shall conform to :
 - (i) Input Voltage - 320 to 460 volts 3 phase 4 wire supply.
 - (ii) Out put Voltage - 415 volts
 - (iii) Regulation - + 1% from No load to Full load.
 - (iv) Rate of correction - 20 volts per second per phase.
 - (v) Wave from distortion - NIL
 - (vi) Efficiency - Not less than 97%.
 - (vii) Winding and class of - Copper wire wound with "B" class of insulation or better insulation.
- c. In case of machines equipped with NC, Solid State, CNC, Thyristor controlled devices and other sophisticated electronic gadgets including microprocessors etc. which are susceptible to power line spikes and surges, a suitable voltage stabilizer and ultra isolation transformer of adequate capacity to cover for the entire electrical load of the machine shall be offered as a concomitant accessory conforming to Specification for voltage stabilizer as mentioned in clause above and isolation transformer to the parameters mentioned below.
 - (i) Transformer ratio - 1:1
 - (ii) Winding - Copper wire wound with "F" class insulation or Better.
 - (iii) Protection - To arrest spikes and surges to the order of 3 KV for 200-400 micro seconds duration
 - (iv) Common mode rejection ratio - 120 dB
 - (v) Isolation - Capacitance .005 Pf: resistance greater than 1000 Mega Ohms
- d. Voltage stabilizer shall be equipped with a protective relay to trip the AC power supply to the machine instantaneously with audio and visual indication to the operator. Settings of the protective relay for low and high voltage shall be 320 volts and 460 volts respectively.
- e. The panel of machine shall have digital energy meter if rating of machine is more than 10 KW.

- 12.15 The ambient temperature at the site at which the machine will be installed may vary from 0°C to 50°C over the year. The relative humidity may be as high as 100%. The atmosphere is expected to be dusty. The machines offered shall be suitably tropicalised to work under these atmospheric conditions without any adverse effect on their performance.

The temperature rise shall not reach such a value that there is a risk of injury to any insulating material or adjacent parts.

The drive shall be capable of operating at any one of the speed required independent of the load in accordance with the requirements of the machine.

13.0 Operational Controls

- 13.1 The operation of the machine shall be by push buttons or levers. The basic rules for the direction of operation of controls and the corresponding direction of movements of the machine tools shall be as per IS:2987-1985.
- 13.2 The control devices shall be
 - a) Clearly visible and identifiable.

- b) Ergonomically positioned for safe operation without hesitating or loss of time, and without ambiguity.

14.0 CNC System (Where applicable):

- a) The CNC control shall be with high processing speeds. It shall be based on the latest multi-processing/multi-tasking technology especially for welding operations.
- b) The CNC control shall ensure easy/ quick man-machine interface/ communication.
- ✓ Easy Programming.
 - ✓ Manual over ride feature.
 - ✓ Storage capability for Program with quick access to main and sub-programs.
 - ✓ Fixed cycle and sub-Program facility.
 - ✓ Manual data input with edit facility.
 - ✓ Interactive graphics with Program simulation and dry run capability.
 - ✓ DNC capability/linkup with RS 232/USB/LAN port for controlling production.
 - ✓ CAD/CAM capability including graphic simulation on monitor/colour Graphic control, if applicable.
 - ✓ Facilities for simultaneous programming.
 - ✓ Battery Backup for retaining memory during power shut- off/failure.
 - ✓ Complete self-diagnostic capability for ease in maintenance.
 - ✓ The off-line programming equipment with interface.
 - ✓ A voltage stabilizer with spike and surge filter and an ultra-isolation transformer shall be provided for protection of CNC system wherever indicated as Concomitant accessory in respective specifications.
- c) Adaptive feed control system should be provided.
- d) The control system (latest generation), AC servomotors, AC drives, feedback devices, PLC's and drive circuit should be of the same make as that of CNC control.
 - e) The control cabinet should be of IP 55 or better degree of protection. The electrical & electronic control cabinets & panels should be dust and vermin proof.
 - f) All electrical / electronic panels to be provided with adequate door locks.
 - g) All electrical & electronic panels including operator's panel should have sufficient illumination and power receptacles/plug points of 220 Volts, 5/15 Amp AC with on/off switch for maintenance purpose. All electrical adapters/receptacles, fittings, consumables etc. should be compatible with Indian equivalents.
 - h) The CNC and electrical control equipment cabinet for the machine should be provided with air conditioning equipment consisting of filter, fan, de-humidifier and temperature control. The air conditioning system should be equipped with environment friendly refrigerant.
 - i) All necessary back up data and program like NC, PLC, HMI and DP data/parameters, Fixed cycles and part programs, PLC program should be made available on PEN DRIVE of 16 GB capacity and ghost program should be made available on spare hard disk drive as fitted on the CNC Control.
 - j) Execution and PLC programs should be in F-EPROM so that power failure should not affect system execution and PLC program.
 - k) Ladder diagram/STL diagram with cross-reference listing of the PLC program should be displayed provided for ease in maintenance purpose. In case, this cannot be provided, the alternate documents/ means should be given to assist maintenance staff for troubleshooting.
 - l) Fanuc/ Siemens/Heidenhain/Allen Bradley unit of the country which supplies CNC system should enter in to repair & Service contract with Fanuc/ Siemens/ Heidenhain/Allen Bradley India for attending the defects.
 - m) There should be provision of password protection for operator name, component number and data log registration in CNC system, using PMC (programmable machining

controller).

16.0 Lighting (Where applicable):

- a) Integral lighting suitable for the operations concerned where its lack is likely to cause a risk despite ambient lighting of normal intensity shall be provided.
- b) The manufacturer must ensure that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects due to lighting provided by the manufacturer.
- c) Integral parts requiring frequent inspection and adjustment and maintenance areas must be provided with appropriate lighting.
- d) The machine lighting should be of low voltage so as to prevent any hazard to the operator.

17.0 Painting

The machine and its accessories shall be painted in Apple Green Colour No.281 to IS:5-1978,(if any specific colour code standardized by BIS is available, the same be given). The machine can also be painted in equivalent RAL/DIN/other International Standards. If there is a standard color scheme of the manufacturer, the same may also be considered if specified.

18.0 Following items are also included in contractor scope:-

- a) Consumables like first fill of lubricating oils etc for the initial operation of the equipment till handing over.
- b) Commissioning and start-up spares, Special tools & tackles, if required.
- c) All drawings/documents along with operation and maintenance manuals, spare parts manual and troubleshooting guides as per requirement mentioned elsewhere in the tender document.
- d) Getting approval of design and drawings including part assembly drawings and any design calculation related to the equipment from Railways.
- e) Design of foundation as well as flooring (if required) of sufficient thickness, suiting local soil conditions at the site.
- f) Construction of foundation as well as flooring (if required) of sufficient thickness suiting local soil conditions, for machine shall be completed by the bidder at the site provided by the Railway before receipt of the machine at their premises.
- g) Carrying out any modifications /deletions /addition /alternation in design /drawings /documents as required by client for proper execution of works at site till completion and handing over of the equipment to the purchaser should be brought to the notice of Railways.
- h) All **Civil work** including foundation (if any, **as applicable unless otherwise specified**) except laying, fixing & fitting of track inside the shed area for said equipment shall be in contractor scope. Payment of laying, fixing & fitting of track inside the shed area as per approved drawing would be governed by clause 2.0 (v) of Special condition of contract for Mechanical Works.
- i) The supplier shall demonstrate machine performance and prove out the claimed capability for successful commissioning at the consignee's works. The M&P shall be deemed to be "commissioned" at consignee premises on the date when it is tested and meets with the specified capabilities/functions according to the technical specifications.

In addition to above, in case of tooled-up M&P , the M&P shall be deemed to be "Commissioned" at consignee premises on the date when "prove out" components specified as per the relevant clause of technical specification have been successfully proved out meeting the productivity requirements of Technical specification.
- j) If an assembly/sub-assembly requires to be taken back to the manufacturer's premises for repair/replacement either before commissioning or during warranty, the manufacturer

or his agent would be required to submit BG of suitable amount. In case the entire machine has to be taken back, a Bank Guarantee for the cost of the machine would have to be submitted. The bank guarantee should be of adequate value so as to cover the cost of the assembly/sub-assembly/paid up cost of the machine.

- k) Trailing/flexible cables as required for the equipment shall be in bidder's scope.
- l) All types of cables, connections, conduits, circuit breakers etc. required for connecting power supply point to different parts of the machine/control cabinets, shall be the responsibility of the bidder. Requirement of grounding/earthing with required material shall also be incorporated by the bidder during construction of foundation.

3phase, 415V, 50Hz power supply shall be provided at one point at inside the shed as per Para 11.0 of these conditions. Further connection including supply, laying & termination of FRLS armored power cables and lighting shall be in Bidder's scope.

Electrical work like laying of power/electrical cables & earthing wires from mains to machine control panel as well as within the machine, with supply of all materials shall also be carried out by the supplier.

Power to the equipments and control panels shall be obtained by laying suitable size and rating cables in the trenches or other means from the designated distribution panels/Mains placed at different locations on the shop floor. All sundry erection material required for installation and connecting up of electrical equipment shall be included in the scope of supply.

The cables shall be laid as per the standard procedure and loops shall be provided as per the standard. Both ends of the cables shall be terminated with proper size cable glands. End terminals of correct size and rating shall be crimped on both ends of the cable cores. The power cables must be rated for 150% of the maximum load current at 55 deg. C ambient.

All non-current carrying metallic parts shall be double earthed as per IE rules. Separate earth pit for control and power circuits as per IS shall be in the contractor scope.

Control circuits shall be protected against over load and short circuit with miniature circuit breaker (MCB) of suitable rating.

Incoming supply to the control panel shall be directly connected to main molded case circuit breaker (MCCB) of sufficient rating having adjustable magnetic and thermal overload setting.

The power contactors rating shall be 1.5 times the rated full load current of the motor or next higher size as per standard.

Control panels shall be provided with illuminating lamp of sufficient wattage with supply voltage of 110 Volts AC.

Depending upon the application, the different voltages other than 415, 3 phase, 50 Hz AC shall be obtained through individual separate transformers units connected to 3-phase 415 volts A.C. supply.

The control panel shall have minimum one 5/15 amps switch and socket outlet of 220 volts AC for connecting soldering iron, hand lamps etc.

The location of the junction boxes shall be such that it is easily accessible during commissioning and troubleshooting.

Note:-

The cost of requirements explained in clause 18.0 above will be inclusive of the basic price of the machine.

19.0 Service Facility in India and Technical Support

The tenderer will clearly spell out in the offer the facilities available with him or his agent for providing adequate after-sales service in India during warranty period. The complete details such as organization for after sales service, availability of technically competent engineers and warehousing facilities for spares should be clearly indicated.

20.0 Technical Literature:

20.1 General:

One copy of the printed illustrative catalogue showing features of the machine and its elements and One (1) reproducible copy (e.g. tracing, ozalid, etc. of each drawing) shall be furnished. The contractor will also have to furnish following documentation in **English Language** only. One set of technical literature should cover the following details (where ever applicable):

- a. Spare parts catalogues(02sets) giving the part list no. of each component with exploded views and assembly drawings. For the bought out items, supplier shall furnish catalogue number and price list of their OEM's for such items and the address of the likely supplies.
- b. Installation, interfacing, operation and maintenance manuals (04 sets), inclusive of trouble shooting guide for CNC system, and power source. It should clearly guide the maintenance personnel for easy diagnosis of fault or any trouble in the machine and to rectify the same with minimum possible time. "Dos" and "Don'ts" should be clearly brought out in the manual for the smooth operation and avoiding any mishandling of any component.
- c. The manual shall also cover trouble-shooting tips of all the bought out items from the vendors, covering mechanical; Electrical/ Electronic; hydraulics, pneumatics etc.
- d. Electrical/electronic circuit diagram with component level details (04 sets).
- e. Soft copy of the Software Programme of all EPROMS used in CNC system along with ladder diagrams for the PLC systems wherever applicable.
- f. Soft and hard copies of PLC Program in ladder form with cross reference listing and PLC project file.
- g. Programming, Operator Guide, Diagnostic & Trouble shooting Guide and Start-up Guide for CNC Control System.
- h. License Software in CD along with key.
- i. Wiring diagram, in which length of wires must be mentioned, hard copies in A-2 size as well as soft copy in PDF format.
- j. Mechanical (part detailed drawings), hard copies in A-1 size as well as soft copy in PDF and AutoCAD format.
- k. Drawings of tooling & fixtures, hard copies in A-2 size as well as soft copy in PDF format.
- l. Pneumatic and hydraulics circuit diagrams & test charts (04 Sets).
- m. Recommended preventive maintenance schedule details for the machine.
- n. Lay out drawings in A-0 size, which clearly shows the position of all type of electrical components in machine.
- o. All drawing mentioned below should be supplied in PDF format:
 - ✓ Arrangement drawings & General assembly drawings
 - ✓ Electrical circuit diagrams
 - ✓ Hydraulic schematics
 - ✓ Lubrication schematics
 - ✓ Machine control diagram
 - ✓ Detail drawings of parts from local scope supply
 - ✓ Detail drawing of forging dies/fixtures etc
 - ✓ Operation and maintenance manuals.
 - ✓ List of spares and wearing parts.

Note: These documentations are required to be submitted along with the machine/equipment.

In all cases, GA drawing for each machine and the whole plant will be submitted by the firm. A nominated representative of the Railway shall either approve the GA drawings or if necessary, return them for correction(s), within two weeks.

21.0 Training

- a) As a broad principle, free training has to be given by the contractor through OEM/ authorized representative for all M&Ps at the site to the nominated personnel by Railway at the time of commissioning of the machine and later in operation and maintenance of each machine.
- b) Training by the firm shall be imparted in operation and maintenance of the machine and shall cover all mechanical, hydraulic, electrical & electronics equipments part programming. Normally the training (operation & maintenance) shall be of three working days minimum unless otherwise specified in respective technical specification of M&Ps.
- c) Contractor shall be required to prepare and submit a summary of the course contents for review and approval by Indian Railways.
- d) The supplier will be responsible for co-ordinating with the consignee to ensure that the training is imparted on the machine at its assembly and testing stage.

Note: All training should be imparted in English/Hindi only.

22.0 Bought Out Items:

- 22.1** The bidder shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the bidder and proposed to be used, along with the manufacturer's name, brand model etc. The successful bidder may be required to produce invoices to ensure genuineness of such products / verification by the Inspecting agency.

The bidder should clearly indicate that in case of components/sub assemblies taken from reputed companies such as Vickers, Rexroth, RITTAL, THK, and Shenburger etc., the parent company has already entered into contract with their Indian units/affiliates for undertakings repairs/after sales service during warranty and post warranty.

S/no	Description	Make
1	CNC & Drive Controller	Mitsubishi /HMT NUM /SIEMENS/FANUC / ABB/ Heidenhain/ Allen Bradley/ Cadem/ Dalem/ L&T (Yaskawa)
2	Motors	ABB/ CROMPTON/BBL / SIEMENS/ KIRLOSKAR /MARATHON /SEW EURODRIVE/ NORD/ NGEF/ Allen Bradley/ Schneider/ Fanuc/Hindustan Motors/ ROSSI
3	Cables	LAPP/SIEMENS /POLYCAB/ ICC/ UNIVERSAL/ Havells/ FINOLEX/ L&T/Alpha/Ajanta/Gloster/ Nicco/ Radient/ Mardia/ Incab/Plaza/ Anchor/ Roliflex
4	Control gears: proximity switches, contactors, relays, MCB, MCCB, MPCB, push buttons, selector switches, indication lamps, meters,	L&T/Siemens/BCH/ABB/Schneider/C&S/ AE/ HAVELLS/ Teknik/ Mecro/ Harting/ Kontakt/ Omron/OEN/Esbee/Rishabh /Electronic Switches/ Elap/Scanner/Balluf/Shubhadha
5	Connector	Harting/Kontakt/L&T/Omron/Indoelectric/Phoenix/ Elmax
6	Limit Switches	SPEED-O-CONTROL/CCE/ ELECTROMAG /C&S/ CMK ELECTRO POWER PVT LTD/Siemens/ BCH/ Teknik/ L&T/Euchener/Honeywell
7	Master controller	SPEED-O-CONTROL/CCE/ELECTROMAG /C&S

8	Resistors.	SPEED-O-CONTROL/ELECTROMAG/CCE/ C&S/ BCH
9	Control Panels	RITTAL/BCH/ SIEMENS with IP55protection
10	Pendent	Demag /Telemecanique /CMK Electro Power Private Limited,
11	VVVF Drive	ABB/L&T(Yasakawa)/SIEMENS/ Fanuc / ALLEN BRADLEY/ SCHNEIDER /MITSUBISHI ELECTRIC /DANFOSS/FUJI ELECTRICS
12	Electrical isolators	SIEMENS/L&T/BCH/C&S
13	Starter	Siemens, BCH,L&T
14	Sockets for hand lamps etc.	CROMPTON/BCH/REYROLL
15	Junction Box	RITTAL/BCH/ SIEMENS
16	Air conditioner for Control cabinet	RITTAL/Warner Finley/Kelvin/M&G/Wallia/Advance cooling /Sunbeam
17	Servo Controlled Voltage Stabilizer	Neel/Unity /Servomax/ Consul/ Aplab/ Neelkanth/Golden/Power Gaurd
18	Ultra Isolation Transformer	Neel/Unity /Servomax/ Consul/ Aplab/ Neelkanth/Golden/ Power Gaurd
19	Feed back Devices	Heidenhain /Balluf /Fagor /Sony /Siemens/ Fanuc/Kubler/ Hengsler/ Lika
20	PLC	Siemens/Messung/Hitachi/Mitsubishi/ Fanuc/ABB / Allenbradley / Schneider/L&T
21	Electromagnetic clutch	Vortex
22	Toolings	Sandvik/Kennametal-Widia/Taegu-Tec/Iscar
23	'O' Rings & rubber seals	Merlin/Parker/Busak/Hunger/Merkel/Soloseal/ Halite/ Walkersolo/ Seal Mart
24	Hydraulic pumps & valve	Yuken/Rexroth/Vickers/Mico Bosch/ Parker / Atos/Voith
25	Centralized lubrication system	Vogel/Cenlub/Rexroth/Dropco/Bijur Delimon
26	Ball screws	THK/INA/Rexroth/Star/Shenberger/NTN/Tsubaki/ Gamfier
27	Hydraulic system	Rexroth/Vickers/Yuken/Atos/Parker
28	Bearings	NBC/SKF/FAG/TIMKEN/KOYO/NTN
29	Pneumatic Control Equipment	Festo/Shavo Norgen/Shradder Scovil/Electro Pneumatics/Parker/SMC Pneumatics
30	Filters	Hydac/Hydroline/Parker/Rexroth/EPE,Germany/ Vickers/Purolator
31	Belts	Fenner/Hilton/Dunlop
32	Gear reducer	Elecon/Greaves/Shanthi/ZF/New/Allenbury/ Bongfilivali
33	Chains	T.I. Diamond/Rollon
34	Sprocket	Rollon/T.I. Diamond
35	Couplings	Fenner/Love Joy Inc., USA
36	Rubber sheets	Rubber Products Ltd.
37	Hydraulic oil air cooler type heat exchanger	Rittal/Werner finley/Pfamenberg
38	Chiller type heat Exchanger	WARKIN/ADVANCE COOLING/ FREEZTECH/ SPAN ASSOCIATES
39	Hydraulic Oil	IOCL/BPCL/HPCL/Castrol/ESSO
40	Hydraulic seamless tubes	Parker/Maharashtra seamless/Indian seamless/ Gandhi Speciale Tubes/ Sainest Tubes

41	Air circuit breaker	Siemens/L&T/Schneider/ABB
42	Cutting tools	SANDVIK/KENNAMETAL – WIDIA/ TAEGU-TEC/ ISCAR
43	Drills and Taps	Addison/Zenith(IT)/Universal
44	Thrustor brakes	SPEED-O-CONTROL/CCE/ELECTROMAG/GALVI
45	Wire Rope	USHA MARTIN/ BOMBAY WIRE ROPE/MAHADEV
46	Gear Box	SEW EURODRIVE/NORD/NU-TECK/DEMAG
47	Brake	PETHE/STROMAG
48	Hoist	DEMAG/ABUS/HERCULES

Note:-

Test certificates of bought item should be provided by the supplier with proper identification at the time of inspection. The tenderer should explicitly mention “not applicable” against the items indicated above, whichever is not applicable in the offered machine.

INDIAN RAILWAY
WORKSHOP PROJECTS ORGANISATION
TECHNICAL SPECIFICATIONS FOR MACHINERIES AND PLANT
(ITEM NO- 1 TO 15)
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2	Electric Overhead Travelling Crane (Cap.-25/7.5 Ton)	IM/MEMU/DEMU/Anara/WP/Mech/M&P/EOT Crane (25/7.5T)
3	Fork Lift Truck (Diesel operated cap.- 5000 kg solid wheels)	IM/MEMU/DEMU/Anara/WP/Mech /M&P /FLT(5T)
4	Battery operated four wheeled platform truck of 2 Ton capacity with battery charger	IM/MEMU/DEMU/Anara/WP/Mech /M&P /BOPT(2T)
5	Synchronized lifting jacks capacity 15T each (1 set = 5 jacks)	IM/MEMU/DEMU/Anara/WP/Mech/M&P/SLJ(15T)
6	Rail cum Road shunting vehicle	IM/MEMU/DEMU/Anara/WP/Mech/M&P/RRSV
7	Inverter Based MIG/MAG Synergic Pulse welding plant air cooled cap. 400 Amp	IM/MEMU/DEMU/Anara/WP/Mech /M&P /MIG- MAG(400A)
8	Multi Utility Vehicle	IM/MEMU/DEMU/Anara/WP/Mech /M&P /MUV
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12	Winch Electric operated Pulling Machine	IM/MEMU/DEMU/Anara/WP/Mech /M&P / PWM
13	Air compressor of capacity 500 CFM with air receiver and air drier along with compressed air pipe line with valves, clamps and other fittings	IM/MEMU/DEMU/Anara/WP/Mech/M&P /EAC(500CFM)
14	Hydrant system for quick watering arrangement	IM/MEMU/DEMU/Anara/ WP/Mech/M&P /QWA
15	Transportation and Restoration/ Renovation of Rolling Stock for displaying as Indian Railway Heritage at Anara project site	IM/MEMU/DEMU/Anara/ WP/Mech/M&P /Heritage

Specification no.IM/MEMU/DEMU/Anara/WP/Mech/M&P/ACWP

Item No. 01

SPECIFICATION FOR AUTOMATIC COACH WASHING PLANT**1.0 Scope of Supply:**

The scope of supply of **Automatic Coach Washing Plant** will include design, manufacturing, inspection, supply, erection, commissioning & proving-out test, packing, dispatch, transportation, safe delivery and handing over to Integrated maintenance shed of MEMU, DEMU and coaching stock at Anara, SER(Phase-I) as per parameters specified in Schedules – I to VI and putting into beneficial use of Automatic Coach Washing Plant with concomitant accessories.

- 1.1 The scope of supply shall include design, manufacturing, supply, installation, testing, commissioning and proving out of **01 no. Automatic Coach Washing Plant** on turn key basis.
- 1.2 One (01No.) - Automatic Coach Washing Plant and all accessories spares and supports structures.
- 1.3 All related material required for inspection, erection and commissioning of machine and connecting electrical equipments, cable laying and fixing accessories shall be included in the cost of basic machine.
- 1.4 Unit cost of machine will be inclusive of cost of spares and maintenance tools.
- 1.5 The details of the machine are given in schedule-I may vary since the machine has to be designed confirming actual requirement at site. Civil work including foundation (if any) for said machine shall be in contractor scope. The cost of such machine foundation is included with cost of machine.
- 1.6 Technical specifications of M&Ps are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works and General specification for supply of M&P (Appendix –A)** specified of Tender Document.

2.0 Purpose and Capability:

2.1 The plant should be capable of:

- i. Exterior cleaning of a train comprising of up to 24 EMU/DEMU/MEMU and other BG coaches. Cleaning shall be thorough to rid the coach exterior of all dust, dirt, grime and other deposits accumulated in train service to give the coach exterior a substantially clean look.
- ii. Cleaning the coach side walls with projecting window bars and turn-under of the coach. Cleaning shall be as per the operation sequence specified in specification (operation sequence).
- iii. Allowing a shunting train to pass through at normal shunting speed of about 5-8 kmph without getting switched-on in the automatic mode when the train is moved in a non-washing direction.
- iv. Working in normal Indian Railway environment with ambient temperatures up to 50 degree C and relative humidity up to 98%.
- v. The plant should be designed for continuous operation for 3 shifts of 8 hours each, per day.
- vi. The total water requirement per coach shall preferably be within 300 litres. The fresh water requirement per coach shall not exceed 20% of the total water requirement of one coach.
- vii. The quality of discharged water after treatment through the effluent treatment plant shall meet local pollution control board norms. It should be suitable for cleaning of EMU/DEMU/MEMU and other BG coaches.

- viii. A suitable alkaline detergent capable of effectively emulsifying dust, dirt and grime shall be used for the washing cycle.

The detergent shall be compatible to paint enamel to IS-8102 or PU paints as in IR coaches. The detergent must be available indigenously. Specification, pH value, brands and indigenous sources of supply of the detergent shall be indicated. Other standard brands should also be usable in the plant without affecting its health.

- ix. The total width of the support structures and stands along with cleaning implements etc. as part of coach washing plant installed on the Railway track shall not be more than 6.0 meters symmetrically about the central line of the track. An equipment room for housing pumps for pre-rinse, detergent spray & final rinse detergent concentrate & solution tank, dosimeter etc. is also to be constructed. The equipment room shall be located at a convenient location nearby the coach washing plant without causing any infringement to the schedule dimensions and safety parameters. The size of equipment room may be planned optimally.
- x. The supplier must necessarily visit the site to fully assimilate the requirements & submit detailed layout drawing as well as project report for their proposal.
- xi. The plant shall be capable of allowing trains to pass through the plant in either direction at a maximum speed of 25 km/h without the washing process taking place.
- xii. Sufficient safety should be provisioned to ensure safe working under overhead traction line.

2.2Sources:

Likely sources of manufacturers and suppliers are-

- (i) M/s ORIENTAL MANUFACTURERS,
P.C.C. Notified Area, Ranoli Station Road, Vadodara-391350 (Gujrat)
- (ii) M/s Nissan Clean India Pvt. Ltd.,
Plot No. 37-38, Shiv Bhoomi Industrial Estate, Kumbadthal Road,
KUBADTHAL, Ahmedabad, Gujrat - 382430
- (iii) M/s Inventa Cleantec Pvt. Ltd.,
D-176, Flatted Factories Complex, Near Okhla Railway Station,
New Delhi - 110020
- (iv) M/s Ultramax Hydrojet Pvt. Ltd., AC-31/4A, 6th Main Road,
SIDCO Industrial Estate, Thirumudivakkam, Chennai-6000044

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources. However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

3. Leading Parameters :

<u>S.N.</u>	<u>Major Parameters</u>	
i.	Train wash speed through plant	*Normal yard speed (3-8 kmph)
ii.	Fresh water requirement	Max. 20% of total water requirement for train wash
iii.	Pressure of spray at nozzle outlet at final stage	3 bar (minimum)
iv.	Total width of the support structures stands along with cleaning implements etc. installed on the railway track.	6.0 meters (Max.)
v.	Length of straight track between fouling marks	30 Mtrs. (Min.)

* It may not be feasible to achieve the speed below a certain limit due to technical constraints of locomotive etc. Designer of the plant may please take this into account while designing of plant to achieve cleaning quality.

3.1 Process parameter:

3.1.1 Wash Cycle: In this recirculating stage, work pieces are sprayed with a low concentration detergent solution (2-5% detergent in water) at **60°C to 80°C**. Sufficient Pressure at nozzle tip shall be produced for proper cleaning of Railway Bogies.
Range of Time: (20-25) minutes

3.1.2 Rinse Cycle: After wash cycle, heated water is used to remove detergent residue followed by application of rust inhibitor automatically. This cycle shall make use of fresh water with rust inhibitor additive The used water from this cycle is to be added to wash cycle tank. & drag out. Sufficient Pressure at nozzle tip shall be produced for proper rinsing of Railway Bogies. **Range of Time: (4-6) minutes. Water Temp.: 60°C to 80°C.**

3.1.3 Exhaust Cycle: This cycle shall involve withdrawal of steam from cabinet after completion of wash & rinse cycle before the opening of door.

3.2 Other parameters :

Power supply : 415 V $\pm$ 10%, 50 Hz. $\pm$ 3%

Power requirement : 250 kW (max.)

4. Operating Principle:

- 4.1 The Coach Washing Plant shall be designed to carry out automatic washing of the body sides & turn under of EMU/DEMU/MEMU and other coaches for Broad Gauge.
- 4.2 No fixed structure of the plant shall be installed within the specific structure gauge for Broad Gauge train of Indian Railways.
- 4.3 The plant shall be of drive-through type and operated in a single direction from one side to other. The entry and exit directions are marked on the drawing. The plant shall be designed to satisfactorily wash & clean the train running through the Plant under its own power at a very nominal speed.
- 4.4 The coach washing plant shall be designed for both automatic and manual mode. In automatic mode, the wash cycle shall be activated and stopped by the train movement through limit switches/sensors, which will act as entry /exit controls. In manual mode individual section can be activated/ deactivated. Ultrasonic devices, photo electric cells or other proven approved

means to enable the full length of train to complete the entire wash cycle. The limit switch/proximity switch/sensors etc which are required to be provided by OEM in the tracks for sensing of the movement of trains shall have enough passage for the movement of the rolling stocks having specified wheel profile.

- 4.5 The entire plant shall be stopped automatically if the set parameters of washing cycle like train speed brush RPM and flow as mentioned in this specification is violated or the train approaches at more than the specified speed of 3-8 Kmph. The plant shall automatically shut down after a pre-set time of 30 sec in the event of a train stopping inside the plant.
- 4.6 The following facilities/ operation by the control console are required at the Depot Control Center.
 - i. Auto enabling of train wash plant so that the plant is being activated by the presence of train for ensuring complete wash.
 - ii. Selective disabling of plant so that the train can pass through the plant in either direction at a maximum speed of 25 km/h without the Coach Washing Plant getting activated & being operational.
 - iii. Monitoring of details i.e. status/health, operating hours of the plant shall be monitored at control panel.
 - iv. No staff shall be required to man the plant, other than to clean and replenish the stocks of cleaning media.
- 4.7 Manual operation of the plant shall be allowed at the local control console, which shall be located at the wash area, for maintenance work. Provision shall be made to switch over to "manual" mode of operation, in which the various sequences shall be regulated by individual controls.
- 4.8 Machine brushes shall be contoured to the coach body sidewalls and turn under profile.
- 4.9 The plant and its accessories shall have necessary provisions for interlocking of entry and exit controls with the spray nozzles manifold so that the plant does not operate in the event of failure of the entry and exit controls.
- 4.10 The brushes shall automatically retract to their gauges in the event of any malfunction or activation of emergency stop buttons.
- 4.11 The pumps shall automatically shut down in the event of lack of water or detergent solution.

5. Productivity:

The end-to-end cycle time for cleaning a train for 24 EMU/DEMU/MEMU and other BG coaches shall not be more than 10 minutes. The elemental break-up of claimed cycle time from entry of train into the plant to exit from the plant shall be provided before supply.

6. Proving out test

6.1 Prove out at firm's premises

An inspection to verify conformance to specification shall be carried out at the manufacturer's works to the satisfaction of the appointed Railways inspector or inspecting agency. However, inspection at the manufacturer's premises shall not include demonstration of working of the complete plant, which shall be demonstrated during commissioning at the consignee's premises.

6.2 Prove out and Commissioning at consignee's works/premises:

The complete working and performance of the plant shall be demonstrated for a period of ten days or 1000 numbers of coach washes whichever is earlier and claimed productivity requirements. Commissioning certificate will be issued after successful prove out of the component (coach washing).

7. SCOPE OF SUPPLY.

- 7.1 The scope of supply shall include design, manufacture, supply, installation, testing, commissioning and proving out of **Fully Automatic Train Washing Plant along with Reverse Osmosis plant & ETP**. It includes all the concomitant accessories/ equipments as detailed in

the specification and other concomitant accessories/ equipment, which the manufacturer considers essential to make the plant fully operational, when installed and commissioned. It shall also include installation and commissioning of related equipment, training of personnel in operation and maintenance of machine and supply of technical documentation.

The Plant shall comprise the following equipment, which shall be provided by the supplier:

- Control Console at Depot Control Centre
- Local Control Panel
- Pre-wet Station - 1 No.
- Detergent Brush Station - 1 No.
- Water Brush Station - 1 No.
- Final Rinse Station - 1 No.
- Detergent Dosing Module - 1 No.
- Water Recycle Module - 1 No.
- Water Streak Removal Module - 1 No.
- Accessories such as sensing device/ switches, control gears and signage
- Under ground Water Tank
- Used water collecting tanks
- Wash pit (on which laying of track shall be carried out by the consignee)
- Drain points and pipes for effluents discharged to the Effluent Treatment Plant of the Depot.
- PMC during warranty period

7.2 CONCOMITANT ACCESSORIES:

Concomitant accessories to be supplied along with the plant –

- i. First fill of oils, lubricants, detergents and all other consumables required for initial commissioning of the plant. (Quantity of each item shall be indicated in the bid)
- ii. Operation & Maintenance tools - 1 set ,(schedule-IV)
- iii. Effluent treatment plant cum water recycling plant - 1 set
- iv. Water softening cum RO plant - 1 set
- v. Servo controlled voltage stabilizer suitable for the electrical requirements viz control system etc.
- vi. Ultra isolation transformer suitable for the electrical requirements viz control system etc.
- vii. Stand by DG Set 82.5 KVA - 01 No.
- viii. Any other accessory considered essential for the operation of the washing to meet the purpose and capability.

7.3 OPTIONAL ACCESSORIES:

Any other accessory which can improve the productivity, performance, reliability, efficiency, or enhance the capability of the machine as a whole or part thereof, should be quoted as optional accessory.

7.4 MAINTENANCE SPARES

Spares for two year nominal maintenance to be supplied along with plant. List of spares should be furnished.

8. BASIC DESIGN FEATURES

- 8.1 Material, structure, hardware, bearings and all other components used in the plant should be

of sufficient ruggedness & anticorrosive nature to last for minimum 20 years with negligible maintenance. Detailed specifications are as per Schedule – II.

8.2 Support Structure

The support structure shall be pre-fabricated cast slab foundation along with drainage arrangement to be utilized for quick installation of plant. The support structure shall be provided for carrying the cleaning implements for cleaning the coaches. The support structure shall be of **hot dip galvanized steel** sections and shall be rigid, robust and sturdy to withstand the operational forces as well as wind load at the site of installation. Constructional features of the structure shall be explained in the bid with a schematic diagram.

The Plant shall comprise the following equipment, which shall be provided by the supplier

- Control Console at Depot Control Centre
- Centre Local Control Console
- Pre-wet Station
- Detergent Brush Station
- Water Brush Station
- Final Rinse Station
- Water Recycle Module
- Detergent Dosing Module
- Water Streak Removal Module

8.3 Washing Process Station:

- The tenderer shall submit detail process flow of the complete system along with the reasons attributed to each step and additional measures taken in design for improving design to suit specified ambient conditions.
- The washing process of the plant shall be optimized, for maximum cleanliness of the coaches, with the parameters of the detergent composition, rotation of brush, spraying pressure and flow rate of each single process and water consumption.

The indicative flow rates of the washing stations are given below. Further optimization (considering the dusty weather condition as prevail in the city as per the location) will be preferred with advance design features without compromising on the cleaning quality.

▪ Pre-wetting	100 litre/min
▪ Detergent solution	100 litre/min
▪ Water brushing – first stage	150 litre/min
▪ Water brushing – second stage	200 litre/min
▪ Fresh/Soft water 1st rinsing	200 litre/min
▪ RO Water Final rinsing	100 litre/min

The supplier shall carry out all necessary work complete with tanks, pumps, pipes, valves, filters, meters and accessories as required in each station.

The supplier has to provide a water consumption meter of reputed make at water inlet line to the plant.

It is the sole responsibility of the supplier of the Automatic Coach Washing Plant to ensure that the chloride content in the spray water of pre wet station, detergent station, water brush station, first rinsing station & final rinsing station, of Automatic Coach Washing Plant shall not exceed 100ppm, 50ppm, 50ppm, 50ppm 25ppm respectively. The tenderers are, therefore, advised to carry out test of water sample at site.

8.4 Pre-wet Station

A pair of spray poles, one on each side, shall be provided for pre-wetting of the coach body surfaces of the coach. The pre-wetting shall be performed by spray nozzles to break down surface tension for even adherent of further washing medium.

The pre-wetting process shall adopt recycled water, which shall be supplied from the water recycle module. The lowest part of the nozzles of spraying poles shall be adjusted so that mist/water does not tickle down to under frame parts of the coach.

8.5 Detergent Station

At least 4 nos. of vertical flails/flairs /brushes with detergent spray arrangement shall be provided on each side of the coach. The last of the vertical brushes in the direction of coach wash shall be followed by RO water pressure water spray (minimum pressure 3 bar) for final rinsing of the entire coach side wall surface including the curved turn under portion of the coach side walls.

This station shall consist of at least 4 nos. of vertical flails/flairs /brushes with detergent spray arrangement shall be provided on each side of the coach with stainless steel spray poles, suited to cleaning the lateral faces of the trains, two sets of circular disc brushing units on each side to clean the above and below area of straight portion of the side wall, also one disc brush on each side to clean the turn under of coaches. Retractable type third disc brush to take care of all types AC/Non AC Coaches shall be provided. These brushes shall have motor driving from the top and by pneumatic/hydraulic cylinders operated brush into the lateral side of the coach. Each brush shall include an arrangement to spray water mixed detergent solution evenly on the coach surface. Drawings shall be provided in the technical offer for better understanding of the design. Any alternative of proven design may be submitted with detail justification elaborating advantages and past experience. The provision shall be made to vary the chemical application from 0.1 to 2.3 %

The supplier shall preferably use Indian eco-friendly detergent. In case of imported eco-friendly detergent, technical & purchase specification shall be provided.

The detergent solution shall not exceed a pH value of 9; so as to eliminate risks of detrimental chemical reactions. The detergent shall preferably be either chemically neutral with capability of emulsifying the adhering dirt, or slightly acidic with capability of loosening the adhering metal particles for easy removal.

8.6 Water Brush Station

Two pairs of vertical brushes, two on each side, shall be provided for water brushing on the coach body surfaces of the coach. Each brush shall be integrated with a spray pole with simultaneous operation. The water brushing process shall be divided into two stages. The first stage shall adopt recycled water while the second stage shall use treated/soft water supplied from the water tank.

These brushes shall have motors driving the brushes from the top. The brush rotor shall be controlled by pneumatically or hydraulically to ensure that the brush follows the contour of the train profile. The brush section lengths are profiled to suit the train outline. The two stages of water brush station shall be separated with appropriate distance such that the water sprayed at each stage can be individually collected by separate drain.

8.7 Final Rinse Station

Final rinsing shall be in two stages, first stage rinsing with soft water & second stage rinsing with R.O water. For first stage rinsing with minimum one set of spray pole and for second stage with one set of spray poles to be provided.

The final rinsing process shall be designed with the consideration of water streak removal. A portion or all of the water for final rinsing shall be supplied from the water streak removal module. The last of the vertical brushes in the direction of train wash shall be followed by RO water pressure water spray (minimum pressure 3 bar) for final rinsing of the entire coach side wall surface including the curved turn under portion of the coach side walls.

8.8 **Detergent Dosing Module**

The detergent-dosing module shall be equipped with tools to facilitate dosing of the detergent agent in the designed proportion controlled through PLC. Pump shall be of metering adjustable pumps.

The module shall be complete with necessary tank of minimum 400 Litres capacity, pumps, pipes, valves, meters and accessories. Stainless steel tanks with sufficient thick gauge walls shall be used for detergent storage.

8.9 **Water Streak Removal Module**

The water streak removal by providing blowers on both sides of the train, shall effectively eliminate the possibility of water streaks after final rinsing. Any alternative design to eliminate the possibility of water streaks after final rinsing may be explained in the offer with customer satisfactory reports. The adoption of the technique shall take into account the quality and ingredients of the water supply in location.

Filtration of water shall be done with Reverse Osmosis system for the final wash of train coaches in the Automatic Coach washing plant. The system shall be from reputed make only. The plant shall be designed after checking the water quality of the site. Treated water from R.O shall be collected in a separate suitable tank of 20000 litres or more capacity. The amount of water output from R.O plant for washing of coaches shall be sufficient enough to meet the plant capacity as per specification. Tenderer shall describe the entire process, supported by calculation. Before final rinsing process, total dissolved solids of water shall be less than 5 ppm.

The module shall be complete with all necessary tanks, pumps, pipes, valves, meters and accessories.

8.10 **Water Recycle Module**

The water recycle module shall be provided to minimize the water consumption of the train washing plant.

- (a) Fresh water from the main shall be used for R.O. Plant reservoir.
- (b) Used water from the first & final rinse station & second stage water brush station shall be collected after proper screening by underground reinforced concrete recycling tanks. The recycling of the water shall be fully treated as per the specification at Annexure– II. The final recycled water shall then be reused in the pre-wet station, first stage water brush station and fully treated water (soft water) from softener plant shall be used as make up water for detergent wash, for first rinse station and second water brush station and input to R.O plant. The input to softener plant shall be taken from the recycled water storage tank with a provision for make up by fresh water.
- (c) All water from the stations of pre-wetting, detergent spraying and first-stage water brushing shall be collected in a sump to discharge to the effluent treatment plant.

The module shall filter the used water to eliminate the possibility of clogging of spray nozzle at the respective stations.

The module shall be complete with all necessary tanks, pumps, pipes, valves, meters and accessories.

Sufficient care shall be taken to prevent rusting at the plant design itself. All Stainless Steel Equipments like, Tanks, Pipes, Splash Screens have to be of grade SS 316.

8.11 Water recycle Module using Filtration/ Adsorption / Aeration

The water recycle module shall be provided to minimize the water consumption of the Coach Washing Plant and ensure that recycled water does not contain sediments, etc., residue detergent and odour.

i. Particulars

The unit shall be designed to treat waste water coming from train washing. The aim is to recycle part of treated water and discharge the excess. The use of soft water should be limited to first rinsing and water brush section & detergent wash only.

Treatment shall include the following:

- Filtration through Quartzite or similar
- Adsorption through activated carbon
- Oxidization by air injection

The cleaning action is aimed at the destruction of:

- Suspended substances,
- Surface-active agents,
- Anaerobic bacteria, responsible for the formation of unpleasant odours

The excess water can be discharged in to the drainage system connected to the effluent treatment plant (ETP).

ii. Procedure Description

This will be in following stages.

Stage I

a. Removal of sludge

The water used during the train wash phases shall be collected in the underground tank where heavy solids, sand and slurry settle by gravity. The sludge removal from the tanks shall be easy and fully accessible. The procedure of sludge removal shall be simple and should be mechanized. Tender shall include details of the sludge removal system.

Stage II

b. Removal of suspended particles, oils, hydrocarbon and residue detergents & filtration of used water from stage I.

The water shall then be further processed for removal of free oils and hydrocarbons. After pre-treatment of sedimentation and degreasing, the water shall be processed for removal of suspended particles, oils and residue detergents. For this the water shall be taken to the filtering column by using a pump and then to the activated carbon filter and then collected to the underground tank, shall then be collected in a tank to remove/withheld surface-active agents & organic pollutants. The filters shall have facility of automatic back washing (preferably minimum once a day but frequency will decided as per the field trial) using fresh water.

Stage III

c. Removal of unpleasant odors from stage II

An oxidizing line shall be used by the accumulation tanks to ensure that no unpleasant odour arise, particularly during the hottest period of the year caused by the inevitable decomposition of the organic substances (e.g. surface active agents) contained in the wastewater.

Stage IV**d. Water softening plant.**

The water softening plant shall be used to reduce the hardness of the fresh water from mains. The level of hardness of the water from softener plant shall be less than 5 mg/L.

8.12 Control Console

The control console at the Depot Control Centre (DCC) shall be provided for normal automatic operation of the Plant and the local control console at the wash area for manual operation during maintenance work of the Plant.

The console of the Plant shall be fitted with PLC to safeguard and sequence all automatic processes and movements. The changes required in sequencing or timing of various operations shall be implementable through control panel HMI touch screen. Control of related and conflicting operation functions shall be interlocked to enable logical operation of wash cycle. The screen shall be selectable from menu and shall also provide diagnostic /faults messages. The control shall have the provision to revert back to a pre determined setting of the plant if there be any wrong setting by an operator.

The Supplier shall furnish complete details of flow chart sequencing ladder diagram etc developed for plant operation.

The consoles shall be provided with HMI touch screen display /pushbuttons switches for various operations as well as indicating lamps / meters for monitoring the operations in progress.

The consoles shall allow spare spaces for apparatus installation, such as intercom & telephone, in the future.

8.12.1 DCC Control Console

The DCC Control Console shall be provided with the following minimum control functions and monitoring functions.

▪ Main isolator	key switch on / off
▪ Console selection	DCC console / local console
▪ Washing plant mode	wash / no wash
▪ Detergent spray station	on / off
▪ Emergency stop button	turn to release
▪ Washing in process flashing amber light	
▪ Train passing by	complete graphic display showing the positioning of train while washing.
▪ Common major fault signal	flashing red light & E-stop
▪ Common minor fault signal	flashing yellow light for repair
▪ Lamp test button	pushbutton.

Local Control Console

A single control panel monitors (HMI) with predefined PLC programme shall be able to operate the wash plant. The operation is fully automatic but panel shall also allow manual override so that plant can be controlled from plant room. The local Control Console shall be provided with the following minimum control functions and monitoring functions.

▪ Console power	on / off
▪ Plant power	key switch on / off
▪ Plant operation	auto / manual
▪ Washing plant mode	wash / no wash
▪ Detergent level	low
▪ Individual washing process	on / off
▪ Emergency stop button	turn to release
▪ Status of individual process	flashing amber light
▪ Fault signal for each sub-assemblies	flashing red light
▪ Pressure gauge for each pump line	meter
▪ Lamp test button	pushbutton
▪ Supply failure (water, pneumatic system, electricity)	flashing red light

9. Signage

Signage shall be provided along the track of the washing plant to notice by train drivers regarding the operational status of the plant. The letters of the signage legends shall be of adequate size to be read at a distance of 25 m.

A single illuminated digital signage with legends shall be erected at the entrance end of the washing plant. The legends shall indicate following messages depending on operational status of the plant;

- "WASHER DISABLED: DEPOT SPEED" if the Plant is switched off,
- "DO NOT ENTER" if the Plant is engaged for a trains coming from exit end direction, or
- "TRAIN WASH: SPEED 8 km/h MAX." at all other times.

Similarly a single illuminated signage with legends shall be erected at the exit end of the washing plant. The legends shall indicate the following messages depending on operational status of the plant;

- "DO NOT ENTER" if the Plant is engaged for entry end trains, or
- "DEPOT SPEED" at all other times.

10. Connection to Water Tank :

A Storage Water tank (supply source of fresh water) to be constructed in a form of underground concrete pit with a capacity of approx. 30 cubic meter. The tank will be filled up in 24 hours at a pressure of about 3 bars from the water mains.

Sump pumps and pipes shall be provided by the Washing Plant Supplier to pump the fresh water from a water tank, which is located to wash area, for train washing process.

11. Wash Pit

The wash pit shall be designed by washing plant supplier with appropriate partitions, grating and drain valves for drainage of wastewater, the drainage of storm water and collection of recycle water. The wash pit shall be designed with reinforced concrete structure for the support of the Railway track running through the facility.

The wash pit will be constructed by the supplier.

12. Connection to Effluent Treatment Plant cum Water Recycling Plant

The effluents to be discharged from the Train Washing Plants will be drained to the Effluent Treatment Plant (ETP) of the Depot. **The ETP, which is part of this Contract, will be located 50m (approx.) from the washing plant.** The piping for such drainage will be provided by the other Suppliers.

All water from the stations of pre-wetting, detergent spraying and first-stage water using shall be discharged to the ETP.

13. STANDARD REQUIREMENTS**13.1 Spray nozzles**

13.1.1 The spray nozzles shall be arranged to wet the surfaces of the train to be washed with optimum efficiency, number of nozzles and flow rate of nozzles. The numbers of spray nozzle shall preferably be not less than 10 any per set of brushes for side washing.

13.1.2 The spray nozzles shall be made of stainless steel and enclosed within structural steel work to minimise the possibility of damage. All spray nozzles shall be of adjustable type. The spray nozzles shall emit wide-angle conical spray pattern, perpendicular to the area of sidewalls of the coaches being washed. The spray nozzles shall be set close enough to permit the overlapped spray cones for complete coverage of the surfaces to be washed. However these nozzles shall be installed in such a manner that these remain clear of the structure gauge. These nozzles shall be from reputed manufacturers only and shall give optimum performance without clogging & frequent requirement of cleaning. The source of supply shall be provided in spare parts catalogue.

13.2 Brushes

13.2.1 The brushes shall be mounted on crank arms, which shall protrude the brushes from home positions during brushing as well as retract them to home position after brushing, the device & the mechanism shall be describe in the offer. The protrusion shall prevent, by adjustable limit switches, any sturdy parts for encroaching the vehicle gauge under all conditions. The brushes shall reach the rotational speed prior to making contacts with the first coach. In the event of brush mechanism failure, the brushes shall be retracted from the operative positions. The characteristics of brushes (diameter, rotating speed, type of drive motor etc.) shall be indicated by the tenderer in the offer.

13.2.2 The supplier shall interface with consignee for exact profile of coaches to suitably design the brushes for side & turn under of coaches.

13.2.3 The bristles of the brushes shall be the composition of LDPE + LLDPE +1% anti UV, with individual section of .8mmX section. The working life of brushes shall be as per International Standards. The OEM shall describe the material. The materials shall be soft enough so that its does not make mark on the coaches.

13.2.4 The brush bristles shall be capable of ensuring proper friction against the sides of the coaches while remaining flexible and strong enough so as not to be torn out or cause damage to the rolling stock during passage of various exterior fittings which may slightly protrude beyond the lateral gauge of the coaches. The specified life of the brushes shall take into account the quality of water at work site and dust deposit in coaches of Indian Railway ambient conditions.

13.2.5 The fixing of brushes to the member shall be strong enough to withstand shearing forces generated during its operation, the arrangement of fixing shall be explained in the offer.

- 13.2.6 In order to limit water splashes and to reduce the transmitted noise of the Plant, splash screens shall be erected alongside the washing area with structural members providing enough re-enforcement against strong wind blowing winds to reduce water spillage and wastage. Separate enclosures shall be made for local controls and electrical panels. The life of the screen shall be same as that of other structural members of the plant. The tenderer shall mention the material composition and its life in the offer.
- 13.2.7 Minimum 10 brushes shall be provided for cleaning of side walls cleaning.
- 13.2.8 The speed of brush cylinder may be of the order of 180-200 RPM. But further optimization shall be done by the supplier to achieve better clean of train.
- 13.2.9 The minimum numbers of spray nozzle per set of brush shall be 10 nos. for side brushes.

13.3 Pump Work

All the pumping system for the processes of detergent spraying and final rinsing shall be provided with 100% redundancy. Failure of any one pump shall not deteriorate the performance of the process.

- i. The pumps shall be complete with alternate start-up control between on duty and on standby mode. In the event of one pump failure, another pump shall be set as duty pump. Indian equivalent of pump shall be advised. The pumps shall be metering adjustable pumps.
- ii. Pump capacity of each section normally shall not be less than the indicative requirement of water pressure and flow :
 - Pre-wetting pump 1.5 Kw
 - Detergent dosing pump 1.5 Kw
 - Water brushing – first stage pump 3.5 Kw
 - Water brushing – second stage pump 3.5 Kw
 - First rinsing pump 3.5 Kw
 - Final rinsing pump 1.5 Kw

13.4 Piping and Steelwork

- 13.4.1 All pipes for delivering the solutions from the detergent dosing module and the water streak removal module shall be of stainless steel tubes of SS316L of required schedule. All other pipes shall be stainless steel pipes & fasteners shall only be used to minimize corrosion of mechanical fixtures. The piping and control elements shall be arranged for ease of removal and replacement operations of one or more elements such as solenoid valves, pumps & etc. Piping shall be securely fixed so as to prevent transmission of vibrations to the entire installation.
- 13.4.2 Water pipes shall be properly positioned to avoid low points all along the length of the pipes. Drain points shall be provided at all low points of the pipes for periodic drainage. Plant shall be designed to avoid any scale formation after prolonged idling.

13.5 Electrical / Electronics Equipment

- 13.5.1 All control and regulation electronic and electrical devices, etc. shall be mounted in dust-proof switchboards of IP-55 protected for outdoor equipment and the switched board frame shall covered with enclosure For indoor equipment switch board shall be IP -65 protected. All electrical wiring shall be marked carefully in compliance with the electrical diagrams, and be properly protected against ingress of water.
- 13.5.2 The temperature inside the closed cubicles installed in open area may rise to more than 50 deg C during summers. Tender shall submit proposal containing the compatibility of the electronics /PLC etc. to withstand the temperature.
- 13.5.3 The control circuit shall be supplied with low voltage protection.

- 13.5.4 Protective and safety devices shall be provided such as circuit breakers, microprocessor based relays, single-phase protection.
- 13.5.5 The main isolating switch shall be able to be padlocked. The control panel door shall be mechanically interlocked with isolating switch.
- 13.5.6 All electrical apparatus and metal surfaces of the plant shall be connected to the earthing circuit consisting of a 25mm² bare copper cable/GI Strip inside the suitable cable trays which shall be provided for connection to the traction earth return system. The earthing circuit shall be looped.
- 13.5.7 Pushbuttons and indicating lights on the consoles shall be grouped by functions and identified clearly with legends.
- 13.5.8 All controls elements shall be wired in generously sized terminal blocks and panels well ventilated, carefully marked and easily accessible. All electrical equipments shall be suitably earthed as per relevant standard.
- 13.5.9 All glands to the panel shall be of double compression type.
- 13.5.10 Control panel shall be designed to accommodate ambient temperature and humidity conditions, by having heating cum air conditioning systems of reputed make.

13.6 Safety Provision

- 13.6.1 Emergency stop push buttons shall be provided to halt the operation of the brushes, with suitable warning signs in English, at a suitable height to allow easy access. The buttons shall be located at each side of the track in corrosion proof stainless steel/polycoachbonate enclosures, at each end of the wash, at rinse facilities and in the plant room.
- 13.6.2 Over-speed sensing device shall be provided to protect the coaches and the Plant against damage by retracting the brushes in the event that the trains over speed with the washing being in place. These shall be from reputed/ proven suppliers.
- 13.6.3 In the event of lack of water, the pumps of the corresponding stations shall be shut down and the corresponding brushes shall be retracted.
- 13.6.4 In the event of when a train stops within the plant during an automatic operation, the washing plant operation shall stop automatically after a pre-set time delay.
- 13.6.5 In the event of a failure of the activation system, the retraction devices fitted on all brush stations shall automatically return the brush swing arms into their cowls clear of the coach body sides.
- 13.6.6 Stainless steels guards shall be provided at all stations to guard against chemical solution or chemical polluted water from splashing off.
- 13.6.7 All parts of the Plant including the pipe supports shall have a minimum clearance of 1m from the live parts of OHE system and EMU current carrying component. The OHE will be raised to the maximum permissible service height throughout the wash area.
- 13.6.8 An alarm indication shall be provided in case of water flooding in underground sump to control wastage water by spilling.
- 13.6.9 All electrical wirings shall be terminated to junction boxes through proper size glands & no taping shall be permitted.

13.7 Maintenance Provision

- 13.7.1 The brushes shall be made in sections, each capable of being changed individually when life expired. The rotating member of the brush shall be fully secured with respect to safety of the trains and arrangement shall be explained in the offer.
- 13.7.2 Spray jets, brushes, brush drive gear and other equipment shall be accessible by lockable safety ladders that shall be provided to ensure routine inspection and maintenance. The interval of such maintenance should be seven days or more. Electrical overhead equipment or wiring should be accessible from these ladders.
- 13.7.3 Sufficient number of weatherproof LED lights shall be provided to enable full visibility to the train driver and during maintenance work to be carried out at dark.

- 13.7.4 All equipments that requires maintenance shall be designed in such a way so that it is readily accessible for maintenance. The plant equipment & piping layout shall not cause hindrance to the free movement of the maintainer/operator.

13.8 Material Protection

- 13.8.1 The Plant shall be protected against deterioration of the structure and base due to chemical contacts, site and operation conditions.
- 13.8.2 Piping or any metallic part of the Plant subject to chemical corrosion, shall be corrosion resistant for the service life of the washing plant.
- 13.8.3 Suitable enclosure shall be provided to safeguard the outdoor equipment from the ambient conditions.
- 13.8.4 Protection of all the steel structural elements shall be made by hot-dip galvanization.
- 13.8.5 All fixed elements of the Plant, all screws, nuts, bolts; clamps, etc. shall be of stainless steel.
- 13.8.6 The colours for the plant & equipments shall only be anti rusting epoxy painted where galvanization not possible .The finishing coats of painting shall meet the requirement as specified in general specifications of painting.

14. Operation Sequence (Indicative):

- 14.1 On entering the train in washing area, the train shall be sensed through photoelectric switches/proximity switches/magic eye system and the speed of the train shall be displayed in the control room. If it exceeds 8 kmph, a buzzer shall sound attracting the attention of the driver and at the same time a signal shall start flickering, which shall be visible to the drivers. The driver shall control the speed and move the train. The sensor shall be installed at a sufficient distance from the entry point to the plant for in-time correction action.
- 14.2 On entering the plant, the coaches shall be sprayed with recycled water for pre rinse.
- 14.3 The train shall then move into the detergent spray station where detergent solution of 1% concentration or higher shall be sprayed. The spraying of the detergent shall be copious enough to wet the entire surface thoroughly.
- 14.4 The train shall then move through some distance for allowing the detergent to react with the dirt and grime on the surface of coaches before the train moves into the area where the flails/brushes are located.
- 14.5 A series of vertical rotating brushes having flails/brushes shall come in contact with the surface of the coaches and rub the detergent against the surface. Some quantity of water shall also be sprayed just prior to the arrival at each of the flails/brushes to keep the surface wet. The vertical brushes shall cover the entire side of coach.
- 14.6 There shall be final brush station where a copious amount of water shall be sprayed just where a vertical brush comes in contract with the coach surface, so that the detergent, which had reacted with all the dirt and grime at earlier brush stations, shall be cleaned.
- 14.7 Train will now be passed through the stage of Eco friendly touch less chemical spray which will immediately react and remove all grime and dirt even from coach surface area unapproachable for brushes.
- 14.8 The train will now subjected to a pressure water rinse at a pressure not below 3 Bar in the form of fan jet spray, so that no shadow area of any fitment on the surface is left out from coverage.
- 14.9 The train shall finally come out of the plant and its exit shall be sensed by photoelectric switches/proximity switches/magic eye system which shall make the PLC to display appropriately, at the indication board as well as at control desk, the status of the plant for its readiness to admit the next train for washing.
- 14.10 Bidder may suggest alternative operation sequence to ensure improved Cleaning quality and productivity with low consumption of fresh water.

15. Effluent Treatment Plant cum Water Recycling Plant (as per schedule-V)

- 15.1 An effluent treatment plant of adequate capacity (to meet the productivity requirements) to handle all effluents of the coach washing shall be provided to ensure that the plant conforms to the pollution control laws in force at the site of installation. The effluent treatment plant shall segregate all dirt and other soluble compounds from the effluent and reclaim water, which shall be fit for pre-rinse, detergent washing and rinse cycles.
- 15.2 All the used water and detergent solution shall be drained into the effluent treatment plant. The capacity of ETP shall be kept so that fresh water to be added to the reclaimed water shall not be more than 20% of total water requirement for train wash.
- 15.3 The plant shall be provided with sludge drying bed at site.
- 15.4 It shall be possible to locate the effluent treatment plant up to a distance of 50m from the coach-washing site, in a pit or at ground level as per site requirements.
- 15.5 ETP design must be approved from statutory authorities. Its Discharge must qualify local statutory norm for ETP discharge, certified by competent agency and to be demonstrated during proving out period.

16. Cleaning Quality:

An objective method for assessing the quality of cleaning achieved shall be provided to ensure that the cleaned coach surface is free from all dirt. Details of the arrangement offered shall be furnished in the bid.

17. GENERAL ELECTRIC SPECIFICATION of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).**18. ATMOSPHERIC CONDITIONS**

- 18.1 The ambient temperature at the site at which the machine will be installed may vary from -4°C to +50°C over the year. The relative humidity may be as high as 98%. The atmosphere is expected to be dusty. The machines offered shall be suitably tropicalised to work under these atmospheric conditions without any adverse effect on their performance.
- 18.2 The temperature rise shall not reach such a value that there is a risk of injury to any insulating material or adjacent parts.
- 18.3 The drive shall be capable of operating at any one of the speed required independent of the load in accordance with the requirements of the machine.

19. CHECKS AND TESTS**19.1 In-manufacturer's-plant**

During manufacture, and especially prior to shipment, verifications and checks shall be carried out in order to ensure that the supply is in accordance with the technical specification and with the approved design documents. The Supplier shall provide for all checks of supplies on his sub-Supplier's premises, prior to delivery of these supplies to his workshops.

All quality checks shall be carried out, as required, during manufacture on the Supplier's or on the sub-Supplier's premises.

Operation of safety and protection devices shall also be checked.

These checks and tests shall also comprise:

- check of proper operation of the machines,
- check of insulation (in case of electrical machine),
- check of assembly work (welds, hardware etc.),
- check of travel speeds,
- check of various safety devices.

The entire supply shall be inspected by the inspecting agency at the supplier's premises before shipment to the site.

19.2 At-Site

- a) After delivery at site, the operational tests shall be carried out at the site in presence of consignee representative to confirm that the plant/equipment fulfills the requirements of the specifications. These shall include capability test related with train washing requirements prescribed in the specification.
 - b) The supplier shall check the workmanship and quality of entire installation including that of his vendors before offering the same to employer for inspection.
 - c) The commissioning shall be subjected to a series of practical tests.
 - d) Integration tests shall be carried out for the trial runs of the plant/equipment with the coaches in order to verify the satisfactory performance of the ACWP.
 - e) The supplier shall demonstrate the plant performance after successful commissioning at the consignee's works. Thereafter the consignee shall watch the machine performance for a period up to one month, before the final proving test certificate (PTC) is issued.
- The installation shall be subjected to a series of practical tests, during which the supplier according to the profile of the coaches will adjust the spray nozzles.
- The supplier shall supply sufficient quantity of the cleaning products required for the tests.
- The supplier shall store sufficient quantity of detergent /cleaning agent for coach wash for the plant.

20. GENERAL CHARACTERISTIC of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).**21. OPERATIONAL CONTROLS**

- 21.1 The operation of the machine shall be by push buttons or levers. The basic rules for the direction of operation of controls and the corresponding direction of movements of the machine tools shall be as per IS:2987-1985.
- 21.2 The control devices shall be
 - 21.2.1 Clearly visible and identifiable.
 - 21.2.2 Ergonomically positioned for safe operation without hesitating or loss of time, and without ambiguity.
- 21.3 CNC Controls (where applicable) – As per general requirements of CNC controls.

22. LIGHTING

- 22.1 Integral lighting suitable for the operations concerned where its lack is likely to cause a risk despite ambient lighting of normal intensity shall be provided.
- 22.2 The manufacturer must ensure that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects due to lighting provided by the manufacturer.
- 22.3 Integral parts requiring frequent inspection and adjustment and maintenance areas must be provided with appropriate lighting.
- 22.4 The machine lighting should be of low voltage so as to prevent any hazard to the operator.

23. MACHINE MAINTAINABILITY

- 23.1 The machine shall be so designed as to require minimum possible maintenance and to give trouble free service.
- 23.2 All assemblies/parts of the machine shall be easily accessible for maintenance.
- 23.3 The machine shall not require major dis-assembly for checking and replacement of a particular part, especially for parts requiring periodical check up and replacement.
- 23.4 The manufacturer must provide means of access e.g. stairs, ladders, cat walks etc. to allow access safety to all areas used for production, adjustments and maintenance operations.

24. WEAR COMPENSATION ADJUSTMENT

- 24.1 The original built in accuracy of the machine shall be capable of being maintained conveniently and economically by suitable adjustments for taking up wear on slides, bearings and load screws. The system of adjustments incorporated shall be explained in the offer.

25. COOLANT SYSTEM (WHERE APPLICABLE) of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).

26. **LUBRICATION SYSTEM (WHERE APPLICABLE)** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
27. **PNEUMATIC SYSTEM (WHERE APPLICABLE)** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
28. **HYDRAULIC SYSTEM (WHERE APPLICABLE)** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
29. **TECHNICAL LITERATURE** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
30. **INSPECTION AND TESTING AT MANUFACTURER'S WORKS:** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
40. **TRAINING** of the M&Ps are to be read and followed in unison with special condition of contract of Mechanical works.
41. **FOUNDATION & RELATED DRAWINGS** of the M&Ps are to be read and followed in unison with special condition of contract of Mechanical works.

42. RESPONSIBILITIES OF BIDDER

- 42.1 The bidder shall be responsible for-
 - i. Design of foundation as well as flooring (if required) of sufficient thickness, suiting local soil conditions at the site.
 - ii. Advise consignee in time regarding schedule for requirement of clear site for construction of foundation and other infrastructure, resources & facilities required.
 - iii. Construction of foundation as well as flooring (if required) of sufficient thickness suiting local soil conditions, for machine shall be completed by the bidder at the site provided by the consignee before receipt of the machine at their premises.
 - iv. Provision of all tools and equipment, technical and unskilled manpower, material handling accessories/ equipment and material for installation and commissioning.
 - v. Unloading of the machine on receipt (both imported and indigenous machine) and its movement to the site of installation including provision of road mobile crane.
 - vi. The bidder should ensure the proper earthing for the machine and its peripherals/accessories.
 - vii. The supplier shall have to construct a washable cemented apron on a running line in a railway yard on which the coach washing plant shall be installed. Length of apron towards the exit side shall be adequate so that all the water dripping after final rinsing is collected for recycling. Construction activities will have to be managed in consultation with the consignee.
 - viii. The site for installation of plant must be seen and studied in detail before supply.
 - ix. The drawing for the construction of washable cemented apron shall be provided by the supplier to the consignee for approval.
 - x. During the construction work, since the movement of rolling stock shall continue. It shall be the sole responsibility of the supplier to observe all safety precautions to ensure that no untoward incident occurs and that safety rules and procedures are followed without fail.
 - xi. One pump room with cemented flooring cum control cabin of adequate sizes to house the equipments built in bricks, mortar and RCC with control cabin shall be constructed by the supplier, and Equipment rooms shall house pumps. Detergent solution tanks and other tanks etc, and shall be constructed close to the plant as per the space availability at site. The layout of the equipments installed in the equipment room shall

be in such a way that the equipments are easily approachable for the operation and maintenance purpose. Also Supplier shall house ETP, DG set, hot water generating machines in fully ventilated shed in steel structure and asbestos sheet roofing totally enclosed with strong mild steel grills & gates with concrete foundation & cemented flooring.

- 42.2 The supplier shall demonstrate machine performance and prove out the claimed capability for successful commissioning at the consignee's works. The M&P shall be deemed to be "commissioned" at consignee premises on the date when it is tested and meets with the specified capabilities/functions according to the technical specifications. In addition to above, in case of tooled-up M&P, the M&P shall be deemed to be "Commissioned" at consignee premises on the date when "prove out" components specified as per the relevant clause of technical specification have been successfully proved out meeting the productivity requirements of Technical specification.
- 42.3 If an assembly/sub-assembly requires to be taken back to the manufacturer's premises for repair/replacement either before commissioning or during warranty, the manufacturer or his agent would be required to submit BG of suitable amount. In case the entire machine has to be taken back, a Bank Guarantee for the cost of the machine would have to be submitted. The bank guarantee should be of adequate value so as to cover the cost of the assembly/sub-assembly/paid up cost of the machine.

43. SERVICE FACILITY IN INDIA AND TECHNICAL SUPPORT

- 43.1 The tenderer will clearly spell out facilities available with him or his agent for providing adequate after-sales service in India during warranty period. The complete details such as organization for after sales service, availability of technically competent engineers and warehousing facilities for spares should be clearly indicated. Bidders not offering complete servicing/repair facilities in India to ensure quick response to maintenance/ servicing calls are not likely to be considered.
- 43.2 After the warranty period, if any, the manufacturer or his agent shall agree to provide service supports for trouble shooting and obtaining spare parts. The manufacturer shall be obliged to provide spare parts required by the Purchasers for a period of 15 years from the date of delivery of the machine at the ultimate destination to safeguard against obsolescence.
- 43.3 Tenderer who are OEM, shall undertake to supply spare parts for a period of expected life of machine. Other tenderers shall submit undertaking from OEM for supply of spare parts for a period of expected life of the machine.
- 43.4 During warranty period, the supplier or his authorized agent shall attend for break down as soon as possible, but in no case later than 72 hours of receipt of intimation of the breakdown.

44. BOUGHT OUT ITEMS

- 44.1 The bidder shall furnish along with the offer a list of all critical items/ subassemblies which are bought out by the bidder and proposed to be used, along with the manufacturer's name, brand model etc. The successful bidder may be required to produce invoices to ensure genuineness of such products / verification by the Inspecting agency.
- 44.2 The bidder should clearly indicate that in case of components/sub assemblies taken from reputed companies such as Vickers, Rexroth, RITTAL, THK, and Shenburger etc., the parent company has already entered into contract with their Indian units/affiliates for undertakings repairs/after sales service during warranty and post warranty.

S.No.	Sub-assembly	Make
1	CNC & Drive Controller	SIEMENS/FANUC/Heidenhain/Mitsubishi/HMT NUM
2	Hydraulic system	Rexroth/Vickers/Yuken/Atos/Parker

3	Air conditioner for Control cabinet	RITTAL/Warner Finley/Kelvin
4	Electrical Control Cabinet	RITTAL/ Siemens or of other reputed make with IP55 Protection level
5	Servo Controlled Voltage Stabilizer	Neel/Unity /Servomax/Consul/ Aplab/ Neelkanth
6	Ultra Isolation Transformer	Neel/Unity /Servomax/Consul/ Aplab/ Neelkanth
7	A.C. Motors	NGEF/BBL/ABB/KEC/Crompton/ Siemens/ Allen Bradley
8	Contactors	Siemens/BCH/ABB/Schneider/L&T
9	Limit switches	BCH/Siemens/L&T/Teknic/Euchener/Honeywell, USA
10	Push button	Teknic/Siemens/ Schneider/BCH
11	'O' Rings & rubber seals	Merlin/Parker/Busak/Hunger/Merkel/Soloseal/ Walkersolo/Halite
12	Pneumatic Control Equipment	Festo/Shavo Norgen/Shradder Scovil/Electro Pneumatics/Parker/SMC Pneumatics
13	Filters	Hydac/Hydroline/Parker/Rexroth/EPE, Germany/ Vickers/Purolator
14	Cable/wire	Siemens/Indramat/ Hubershnuer/ Finolex/ Havells
15	PLC	Siemens/Fanuc/Mitsubhishi/Messung/Hitachi/ABB/Allenbradley/Schneider
16	MCCB	Schneider/ABB/Siemens/L&T

Note: In case any other reputed make is offered, satisfactory justification for the same will have to be given in the offer.

45. COLOUR:

The machine and its accessories shall be painted in Apple Green Colour No.281 to IS:5-1978,(if any specific colour code standardized by BIS is available, the same be given). The machine can also be painted in equivalent RAL/DIN/other International Standards. If there is a standard color scheme of the manufacturer, the same can also be considered and may be specified.

46. SPECIAL FEATURES:

Special features incorporated in the machine, if any, shall be indicated separately in the bid clearly indicating the advantages.

47. DEVIATIONS of the M&Ps are to be read and followed in unison with special condition of contract of Mechanical works.

SCHEDULE- (I)

Specification No. : IM/MEMU/DEMU/Anara/WP/Mech/M&P/ACWP

Leading technical parameters shall be as per TS clauses no.3

Note:

1. If above clauses are found inadequate for furnishing all necessary information of the system offer, the Tenderer may append further information separately.
2. The tenderer must enclose performance certificates of the system of similar capacity.
3. Any better/ latest technical parameter may also be welcomed if accepted by Railway.
4. Tenderer should also furnish clause wise remarks on technical specifications.

Schedule-II

COACH PARAMETERS

S.N.	Description	Parameters
1	Coach Size (LxBxH)	24000 x 3300 x 4300mm (with specified tolerances)
2	Space between coaches	700 mm approx.
3	Height of window sill from rail	2974 mm (approx.)
4	Height of window	950 mm
5	Projection of window bars outside coach body	25mm
6	Length of train	24 Coaches
7	Paint specification	Enamel synthetic to IS-8102/PU or latest
8	Track Gauge	1676 mm
9	Axle Load	16 T (Max.)

Schedule - III

Specifications/Ratings of System Components

Note: Although the tenderer has to submit the details of proposed arrangement including itemized quantities of various assemblies/ sub-assemblies, sizes/ capacity/ rating & material specification etc., indicative specifications/ ratings of system component are as under:

S. No.	Components	
A.	Brushing Unit-	
	Main frame & General arrangement	The support structure shall be of hot dip galvanized steel sections and shall be rigid, robust and sturdy to withstand the operational forces as well as wind load at the site of installation. Flails/Brushes should be highly absorbent non-woven poly-propylene/nylon; secured firmly by bolting/ clamping on a suitable arrangement. The flails/ brushes shall have facility for adjustment for wear compensation.
	Brush frame & Screens	The structure shall be fitted with modular brush assemblies with rotor shafts of stainless steel. Flail/brush assemblies and spray stands shall be covered on three sides by transparent acrylic/ polycarbonate/ any other superior non corrosive material guards/ shrouds to obviate water sprays on to OHE and surrounding areas.
B.1	Detergent pumps	
	Type	Diaphragm type pump (Teflon or non corrosive diaphragm)
	Flow	55 lpm (min)
	Minimum Pressure	40 bar
B.2	Main water pump for pre-rinse & detergent application	
	Type	Centrifugal
	Water Flow	100 lpm
	Min. Pressure	2 bar
B.3	High pressure water pump for 1 st stage rinsing	
	Type	Centrifugal
	Water Flow	200 lpm
	Min. Pressure	20 bar
B. 4	Pressure water pump for final rinsing by RO water	
	Type	Centrifugal
	Water Flow	100 lpm
	Min. Pressure	3 bar
C	Pipe-lines	All fasteners, nozzle shall be of stainless steel. All structures shall be of hot dip GI steel as per BS-729 with minimum coating of 120µm. All water pipelines, Tanks except detergent tank shall be of ABS as per BS5391 part 1, class E or better, fittings as per BS5392 part-1. The contractor shall take prior approval of employer for the

	Nozzle banks	selection of pipe, size of pipes and make of pipe and tanks etc. No drilling of holes in the Structural steel will be permissible after galvanizing. The selection of stainless steel & structural steel shall be made by the contractor duly considering the quality of water available at site and ensure no corrosion on any structure during the life of the plant of 20 years.
	Nozzles	
	Low pressure nozzle	
	High pressure nozzle	
	Foaming nozzle	All GI steel used by the contractor shall be established to have adequate corrosion resistance against the water & detergent by means of suitable powder coating and it shall be painted with washable paint in such a way that no dirt or dust accumulate on the structure. The contractor shall test water to his satisfaction & shall submit the report during the detailed design stage. The entire stainless steel items which shall be provided by the contractor in the plant shall be of SS-316L. The thickness of stainless steel water tanks shall not be less than 3mm.
D	Electrical control panel	An automated centralized control panel with PLC for complete plant commanding all the pumps, brushing units and provided for all sensor controls as per the detailed requirement.
	Components	Motor starters
		Single phase preventor
		Meters (Volt and ammeter)
		Sensing devices
		Safety Supplier and relays
		Indicators
		Emergency alarm
		Overload relay
		Circuit breaker
		Fuses
		Main switches
		All components enclosed in a water proof powder coated panel
E	Electrical earthing arrangement	Earthing arrangements as per RDSO standards
F	Pump Room	Construction of pump room of adequate size but not more than 20 Sq. mtr. With RCC first class construction with provision of large glass windows and a cabling for operator
G	Apron and drainage arrangement	First class cemented apron, to take the load of a moving rake

Schedule - IV**List of Maintenance Tools**

S.N.	Tools	Qty.
1	"D" Spanner - One set - 6/7" to 20/22"	8 nos.
2	"D" Spanner - 24/26", 28/30"	2 nos.
3	Ring Spanner - 6/7" to 20/22" (8 nos.)	One set,
4	Ring Spanner - 21/23", 24/27"	02 nos.
5	Pipe wrench - 14"	One no.
6	Slide wrench - 2"	One no.
7	Cutter Pliers	One No.
8	Nose Pliers	One No
9	Allen key	One set
10	Hammer 750 gm	One no.
11	Screw Driver Set	One No.
12	Line tester and wire cutter	each one no.
13	Circlip plier, inner and outer	each one no.
14	Any other tool required for maintenance of the plant	

Schedule-V**EFFLUENT TREATMENT CUM WATER RECYCLING PLANT****1. MAJOR DESIGN PARAMETERS**

- i. Nature of Wastewater: Carriage Washing
 - ii. Capacity: 120,000 liters per day
2. The tenderer shall be responsible for supply, installation, testing and commissioning of 120 KLD capacity 'Effluent Treatment Cum Water Recycling Plant' as concomitant accessory along with the ACWP. The plant shall be complete with a central Electrical Power and Control Panel; fully pre/site wired and with all power and control cables to all pumps and equipments including all instrumentation and other controls.
3. **Treatment Objectives**
- Oil & Grease removal
 - pH Improvement
 - Collection cum Equalization
 - Chemical treatment of effluent, pH correction, precipitation of inorganic impurities, removal of colloidal & suspended impurities using Lime/Acid, FeSO₄ / Alum and Poly-electrolytes if required
 - Sedimentation of chemically reacted effluent for the separation of suspended impurities and precipitates prior to disposal.
 - The recyclable water from ETP should meet the requirements of plant for washing with recycled water.
4. **Standards for Treated & recycles Water:**
- pH-6.5 – 8.5
 - BOD – Less than 30 Mg/L
 - COD less than 100 Mg/L
 - S. Solids – less than 10 Mg/L
 - Oil & Grease - < 5Mg/L
5. The final effluent to be discharged must meet with the prevalent State Pollution Control Committee (SPCB) norms.

Schedule-VI

WATER SOFTENING CUM RO PLANT

The tenderer shall be responsible for supply, installation, testing and commissioning of minimum 30,000 Ltrs./ Day capacity 'Water Softening Plant' as concomitant accessory along with the ACWP. The plant shall be complete with a central Electrical Power and Control Panel, fully pre/site wired and with all power and control cables to all pumps and equipments including all instrumentation and other controls.

Standard for softened water:

pH - 6.5 - 7.5

Hardness - <5Mg/l

Specification No.- IM/MEMU/DEMU/Anara/WP/Mech/M&P/EOT Crane(25/7.5T)

Item No. 02

SPECIFICATION FOR ELECTRIC OVERHEAD TRAVELLING CRANE (Cap.-25/7.5 Ton)**1.0 Scope:**

The scope of supply of EOT Crane (Cap-25/7.5 Ton) will includes design, manufacturing, inspection, supply, erection, commissioning & Proving-Out Test, packing, dispatch, transportation, safe delivery as per parameters specified in **Schedule-I** with provision of Main Hoisting, Auxiliary Hoisting Machinery, VVVF drive and all accessories, tool box and supports along with lifting tackles/chain etc used in Indian Railways as per instructions and conditions of contract .

1.1 Likely sources of manufacturers and suppliers are-

- (i) *M/s Alpha services, Alwar Rajsthan (India)*
- (ii) *M/s Unique Industrial Handlers(P) Ltd, Nasik*
- (iii) *M/s Krane Components India Pvt Ltd, Thane*
- (iv) *AVON Cranes Pvt Ltd., Gurgaon*
- (v) *Reva Industries Ltd., Faridabad*
- (vi) *M/s Cranex Limited, Sahibabad (U.P), India*
- (vii) *M/s Mukand, Thane*
- (viii) *M/s Electromech, Pune*
- (ix) *M/s Armsel, Banglore*
- (x) *M/s SAFEX, Ahmedabad*

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources. However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

Mechanical Specifications:**2.0 General Description and Scope of Supply:**

- 2.1 Electric Overhead Traveling Cranes (Cap-25/7.5 Ton) with Main Hoisting, Auxiliary Hoisting Machinery and all accessories and supports and the operator's cabin and trolley in the shed. The scope also covers supply necessary spare for normal operation and maintenance for two years. Unit cost of machine will be inclusive of cost of spares as Schedule-III.
- 2.2 Down shop conductor system including supporting structure consisting of 4 wire (3 phase and one earth) 415 Volts 3 phase, 50 cycles, for long open run-way with isolation facilities. DSL should be capable for working of minimum two cranes simultaneously.
- 2.3 All related material required for inspection, erection and commissioning of crane and connecting electrical equipments with cable, cable laying and fixing accessories shall be included in the cost of basic EOT crane.

- 2.4 Tool boxes containing all tools & tackles (Mechanical) are required for the maintenance of the machine should be supplied along with the machine. Tools shall be supplied along with each cranes and shall be of MAKES TAPARIA or reputed ISI make. Unit cost of machine will be inclusive of cost of tool box.
- 2.5 Tool boxes containing all tools (Electrical) required for the maintenance of the machine should be supplied along with the machine. Tools shall be supplied along with each cranes and shall be of MEKASTER/TAPARIA or reputed ISI make. Unit cost of machine will be inclusive of cost of tool box.
- 2.6 Submission of GA Drawings and related drawings for approval to Railways by successful bidder.
- 2.7 **Concomitant Accessories:**
The concomitant accessories shall be conforming to **Schedule-I/specification**.
- 2.8 The Structural details of the EOT Crane are given in **Schedule-I** and has to be designed conforming to the respective locations. The structure details may vary slightly as per site conditions.
- 2.9 Technical specifications of M&Ps are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works and General specification for supply of M&P (Appendix –A)** specified of Tender Document.

3.0 Standard specification (Mechanical)

- 3.1 The Cranes shall be designed, manufactured, erected and tested as per the latest relevant IS specifications.
- 3.1.1 The cranes shall be complete in all respects. The tenderer shall furnish complete details regarding types, materials of construction, specifications and special features, if any for the main items.

Any variations from the specification contained in this tender shall be brought out with reasons for the same. Any variations involving lower standards of design performance and rating are not acceptable. The scope of supply shall include the following along with the necessary fittings and ancillaries:

- a) Bridge structure, with platform and hand railing.
- b) Track for cross travel and wheels for longitudinal and cross travels.
- c) Traveling mechanism for longitudinal and cross travels.
- d) Hoisting mechanism.
- e) Compact type motor and Gear box.
- f) Brake mechanism separating brackets and insulators.
- g) Trolleys, Service Platforms
- h) Cabin, Pendant and Radio Remote Control operation for all movements.
- i) Lifting Tackles with all accessories as specified in Leading Paramete
- j) Travelling motion brakes, limit switches.
- k) Brake mechanism separately for long travel, cross traverse and hoisting
- l) Crab
- m) Down shop conductor system with supporting structure.
- n) Earth Wire.
- o) Suitable buffers for longitudinal and cross traverse directions.
- p) Emergency Safety Stop.

- 3.1.2 Detailed specifications shall be furnished for any other items required / considered necessary.

4.0 **Basic Design Features (Mechanical):**

4.1 **General Mechanical Design**

4.1.1 The cranes shall be designed, manufactured, erected and tested generally in accordance with the following specifications:

- a. IS:3177-1999 (or latest) - Indian Standard Code of Practice for electric overhead travelling cranes.
- b. IS:807-2006 (or latest) - Indian Standard Code of Practice for design, manufacture, erection and testing (structural portion) of cranes and hoists.
- c. IS:800:2007 -(latest) – Indian Standard code of practice for General Construction in steel.

4.1.2 The design of the crane structure as well as all the component parts of the crane mechanism shall conform to class of duty indicated in Schedule-I. The class of duty is based on design parameters stipulated in IS:807-2006 (or latest).

4.1.3 The cranes shall be supplied complete in all respects. Unfamiliarity with, or ignorance of, local conditions, will not be accepted later as adequate reason for delays in commissioning by successful bidder.

4.2 **Purpose for Which Required**

4.2.1 Capability. The crane should be capable of :

- (i) Hoisting, i.e. lifting and lowering of all loads up to the maximum specified limits of load and distance at different specified speeds
- (ii) Traveling and traversing at specified speeds in both loaded and unloaded conditions.
- (iii) Working in the hot, humid and dusty atmosphere of Railway Workshops, Sheds and **Depots.**

4.3 **Atmospheric Conditions**

4.3.1 The ambient temperature at the site at which the crane will be installed, may vary from 0° C to 50° C over the year. The relative humidity may be as high as 100%. The atmosphere is expected to be dusty. The crane offered shall be suitably tropicalised to work under these ambient conditions without any adverse effect on its performance.

4.3.2 The equipments and the crane shall be suitably protected against damage from radiant heat and shall be rendered proof against ingress of dust and vermin.

4.4 **Rigidity, Control and Safety**

4.4.1 The crane should be rigid, robust and of sturdy construction.

4.4.2 Crane controls should be conveniently located. Various controls should be suitably interlocked to prevent accidental movement of the crane.

4.4.3 Suitable limit switches, for long and cross travel and for main hoists, should be provided to stop the crane and prevent over-travel of various moving parts of the crane.

4.4.4 Electrical interlocks should be so provided that the two operations of traversing and traveling can be performed simultaneously, but while hoisting it is not possible to undertake either traversing or traveling.

4.4.5 Suitable buffers should be provided to prevent over travel of the crane mechanism in both longitudinal and cross traverse directions.

4.4.6 Suitable guards or enclosures should be provided on the crane to prevent inadvertent contact with down shop leads, or any other exposed electrical conductors and cables.

4.4.7 Suitable isolation switches and stop buttons should be provided to isolate the electric supply for maintenance, or in the event of an emergency.

- 4.4.8 A safety hand railing of tubular construction should be provided on bridge footwalks, end carriages, staircases, trolley and at any other place where access has been provided. Railings should not be less than 1000 mm high with an intermediate member at a height of around 500mm.
- 4.4.9 Sheaves shall be provided with rigid guards to retain the wire ropes in the grooves..
- 4.4.10 All the electrical and mechanical equipment should be protected from the weather. All weather-proof covers should be easily removable. Details of protection provided should be indicated.
- 4.4.11 A suitable platform made out of robust angle iron section shall also be provided on the down shop lead side of the crane girder such that two men can sit and attend to the repairs on the down shop lead.
- 4.4.12 The cranes shall be suitable for operation in general Railway Workshop atmosphere.

5.0 Maintainability:

- 5.1 Safe accesses for maintenance and easy removal of all mechanical, electrical and structural components to carry out repair and maintenance must be ensured. All parts requiring replacement, inspection and lubrication should be easily accessible without the need of dismantling other equipment or structures. Arrangements for access to important components must include a cradle for inspection and maintenance of DSL, such cradle being conveniently accessible by step ladder attached to the gantry at one end of the bay.
- 5.2 All electrical cables should be so laid that they are not liable to damage and can be easily inspected and maintained. The cables should be weatherproof.
- 5.3 All components for cranes of identical capacity and duty shall be interchangeable unless otherwise required.
- 5.4 Fasteners for pedestal blocks, gear boxes, etc., should be easily removable from the top of the platform.
- 5.5 In order to have access to the operator's cabin, long travel drive, current collectors, trolleys, etc., full length chequered plate platforms along with railings should be provided alongside both bridge and gantry girders. Access to the cabin from the bridge girder platform should be via a staircase. Minimum width of such staircase should be 600mm. Foot walks should be of sufficient width to give at least 500mm clear passage at all points except between railing and bridge drive, where this clearance may be reduced to not less than 400mm.
- 5.6 Materials used for equipment and structural members should be free from cracks, blow holes, laminations, pitting etc. Except for areas where a superior grade of materials is required, steel used throughout shall be conforming to IS:2062 (latest) Grade 'B' quality. The supplier should submit material test certificates for structural steel and mechanical component such as couplings, gears, gear boxes, rope drums, brake drums, shafts, wheels etc.
- 5.7 Standardisation and unification shall be carried out to the maximum extent for the various sub-assemblies constituting the mechanism of various cranes. Units shall be designed such that they can be dismantled quickly without disturbing the installation of the neighboring units with which they are connected.

Units as a whole, such as wheel assembly gear box, brake, rope drum assembly, etc., shall be replaceable and interchangeable with other identical units. In design care shall be taken to see that spare parts inventory is kept low and up time of 95% will have to be guaranteed.

6.0 Structural Details:

- 6.1 The crane bridge should comprise of double girders of the plate box type.

- 6.2 In the main bridge girders, in addition to the required full length diaphragms, short diaphragms should be inserted wherever required to transmit the trolley wheel load to the web plates and to limit the maximum stress in the trolley rail to safe permissible limits. All diaphragms must bear against the top flange. Steel plates used for bridge girders and diaphragms should be Grade 'B' to IS: 2062(latest).
- 6.3 Connections in general should be as per Clause 26 of IS-800(latest). Black bolts should not be used in the main structure of the crane, only bright bolts with ground stems are permissible. Bolts used which are under shear forces should be fitted into reamed holes.
- 6.4 The bridge girders should be connected to the end carriages by large gusset plates. Ground tight fit bolts in reamed holes should be used for bolted connections.
- 6.5 The calculated strength of riveted joints, or joints made by High Strength Friction Grip (HSFG) bolts should not be less than calculated net strength of the member. The calculated strength of other bolted joints in structural members should not be less than the net strength of the member plus 25%.
- 6.6 The supplier should have sound infrastructural facilities, good working system and practice for fabrication and machining of various structural components of EOT cranes. Some of the important requirements are listed below:
- 6.6.1 Welding Supervisor shall have received formal training from recognized institutions having specialized courses for welding Supervisor.
- 6.6.2 Details of edge preparation for welding shall be in accordance with IS 9595-1980 (or latest) "Recommendation for Metal Arc welding of carbon steel and carbon manganese steels.
- 6.6.3 All welding shall be carried out under the overall supervision of a welding Engineer/Supervisor specially trained in welding. The welding engineer/supervisor shall prepare the welding procedure in accordance with IS 9595-1980 (or latest) "Recommendation for Metal Arc welding of Carbon and Carbon Manganese steels". In addition, the correct welding sequence should be followed for typical locations. The welding engineer/supervisor shall obtain design engineer's approval to the same. The welding Engineer/Supervisor shall also be responsible for actual implementation of the above mentioned approved welding procedure.
- 6.6.4 Automatic/Semi-Automatic submerged Arc/Gas shielding shall be carried out according to IS or other International Specification.
- 6.6.5 Welders engaged in fabrication should have passed welder approval tests in accordance with IS specification no. 7318 (part -I) "Approval tests for welders when welding procedure approval is not required-Part I fusion welding of steel"
- 6.6.6 All welding equipment and accessories should meet the requirements of the corresponding Indian Standard specification (or International Specifications where IS specification do not exist). The contractor shall be responsible for satisfying the Inspecting officer that all welding equipments and accessories being used meet these requirements.
- 6.6.7 Electrodes and wire flux combination used for fabrication should be from reputed makes of ESAB, Advani Orlikon, Philips and Modi.
- 6.6.8 Welding shall be performed in an approved and workman like manner. All welds shall be homogenous and show physical properties similar to those of parent metal. Finished welds shall be perfectly free from all defects such as porosity, burnt metal, inclusion etc. and shall present a smooth appearance.
- 6.6.9 When the welded joints are inspected no defects specially due to use of equipment and /or filler material shall be accepted. After welding the welded parts or assemblies should correspond to the dimensions required as mentioned in drawings.

6.7 All butt welds on structural members should be radiographically tested. All other welds should be subjected to Magnaflux or Dye Penetration Test.

6.8 The box girders should be so constructed as to eliminate any possibility of accumulation of water or oil inside them. Special care should be taken with cranes for outdoor use to eliminate depressed areas or openings where water may accumulate and lead to corrosion.

7.0 End Carriages

7.1 The crane bridge should be carried on end trolleys with double flanged solid forged wheels. The minimum end clearance on each side of the long travel wheels should be 10mm. The wheels should be mounted on fixed axle or suitable anti-friction spherical roller bearings which can be conveniently removed for maintenance.

7.2 End carriages should be designed to be strong enough to resist all stresses likely to be imposed upon them under varied service conditions, including collision with other cranes or stops. The length of the end carriages should be such that no other part of the crane is damaged in the event of a collision.

7.3 Suitable jacking pads should be provided on each end carriage for jacking up the crane while changing track wheels. These jacking pads should not interfere with replacement of track wheels.

7.4 End carriages should be fabricated from rolled steel sections or plates, welded together to form a box. Suitable stiffening diaphragms should be provided wherever required. The material used should be steel Grade 'B' quality conforming to IS:2062(latest). If more than two wheels are required, either compensating end carriage or suitable link and pin arrangement should be provided for connecting the two bogies.

7.5 The end carriages should be fitted with suitable safety stops to prevent the crane from falling more than 25mm in the event of breakage of track wheel, bogie or axle. These safety stops should not interfere with the removal of track wheels.

7.6 The wheel base shall not be less than one fifth of the span as per IS: 807.

7.7 The crane bridge should be carried on end trolleys with Double flanged solid forged wheels. With a smooth pass to the non-hardened zone shall be provided. The minimum tread clearance on each side of the wheels shall be 10mm for the LT wheels. The wheels shall be mounted on L- type antifriction bearings.

8.0 Bridge Rails (Trolley Runway Rails)

8.1 New standard rail shall be used as bridge rail and should be fastened by suitable clamps spaced not more than 1000mm apart, with welded alignment blocks between every two clamps such that the distance of a clamp from any adjacent alignment block is not more than 500mm. Rail stops riveted or bolted or welded should be provided to prevent creep in the longitudinal direction.

8.2 Solid square bar of appropriate steel which can be directly welded are also accepted as an alternative only for cranes upto 10 T capacity. For higher capacity cranes only new standard rail should be used. Bidder should indicate size of standard rails in the offer.

9.0 Trolley Frame

9.1 The trolley frame should be welded rolled steel box section, designed to transmit the load to the bridge rails without undue deflection. It should be made rigid by providing suitable diaphragms

- 9.2 The drum bearings and supports for upper sheaves should be located so as to equalize the load on the trolley wheels as nearly as possible.
- 9.3 The trolley wheels should be double flanged. The axle bearings should be of spherical roller type. The bearing housing should be designed for easy removal of wheels and bearings for maintenance.
- 9.4 The top of the trolley frame should be plated all over, either at the top or bottom, except for opening(s) required for the ropes to pass through. The opening in the trolley frame should be such as to keep the ropes at a safe distance from any part of the trolley frame or equipment, to prevent damage at any position of the bottom block.
- 9.5 All the mechanical and electrical equipment should be placed above the trolley top plate as far as practicable. For any parts placed below the trolley top plate, access for maintenance, repairs and replacement should be provided. Where the clearance between bottom member of trolley frame and the CT rail is over 25mm. the trolley should be fitted with substantial safety stops to prevent the trolley from falling more than 25mm in the event of breakage of track wheel, bogie or axle. These safety stops should not interfere with the removal of wheel.

10.0 Rail Wheels

- 10.1 The rail wheels shall be double-flanged with straight tread.
- 10.2 The wheels shall be of material C55 Mn75, and shall be solid forged and heat treated to have minimum hardness of 300 to 350 BHN on the tread and flanges to minimum depth of 10 mm.
- 10.3 The wheels should be shrink-fit on the axles, rather than being keyed on. Wheels diameter should be selected strictly as per IS:3177-99 (or latest).
- 10.4 Tapered tread wheels should have a tread width not less than the rail head width plus $\frac{3}{4}$ inch nor greater than head width plus $1\frac{1}{2}$ inches. Straight tread wheels should have the tread approximately $\frac{3}{4}$ inch to one inch wider than the rail head.

Thus a greater end clearance between the bridge end trucks and the building columns is required with tapered tread wheels than straight tread wheels to allow for end float.

- 10.5 Wheel assemblies may either of the fixed type axle (Pin and Keeper) or rotating type axle.

11.0 Operator's Cabin:

- 11.1 The operator's cabin should be sufficiently rigid metal frame construction and should be connected to the bridge girder by means of bolts or rivets in shear.
- 11.2 The cabin should be fixed type, built from rolled steel angles, plates and M.S. Sheets welded together. Unless otherwise specified it should be fitted at one end of the crane opposite the down shop lead side, and shall be so placed that the operator has an unobstructed view of the load and surroundings.
- 11.3 The cabin should have sufficient space for easy movement of the operator, with minimum dimensions of 1.5 m x 1.5 m. It should be of the open type.
- 11.4 The cabin floor should be extended to form a landing platform with a steel stairway to provide access to the foot-walk above.
- 11.5 The layout of controls should be such that the crane can be operated from a seated position. The controller handles should be conveniently located within easy reach of the operator.
- 11.6 Fully adjustable padded seat, rubber matting, suitable fan and CFL Tube arrangement should be provided inside the driver's cabin. One fire extinguisher for extinguishing any electrical fire should be provided in the operator's cabin.

12.0 Rope Drums

- 12.1 The rope drum shall be designed to withstand the compressive stresses caused by the wound on rope and the bending stress due to beam action of the drum.
- 12.2 Seamless Pipes will be an acceptable alternative. The steel used shall be to IS:2062-2011 or latest) quality. The rope drum shall be stress relieved after fabrication. T-joints shall be radiographically checked.
- 12.3 The drum shall be designed to take the entire length of the rope in a single layer. Free extra turns as specified in IS:3177:1999 shall also be provided. The drum shall be flanged at both ends with adequate collar size as per IS to avoid slipping of wire rope outside the drum.
- 12.4 Cranes shall be designed with number of rope falls varying with lifting capacity as per details given below:
Up to 10.0 tonnes - 4 falls, Up to 40.0 tonnes - 8 falls

13.0 Wire Ropes

Hoisting ropes, if of the conventional type, should be of 6x36 construction and made out of the best plough steel having tensile strength of 180 Kg/sq. mm. Ropes should be parallel right hand lay as per IS:2266-2002 (or latest).

14.0 Gearing

- 14.1 The gearing in all motions should be of suitable case-carburising low carbon alloy steels and should conform to relevant Indian/International standards. All gears and pinions must be made from forged blanks only. All gears should be hardened and profile ground for longer life and silent operation. The minimum surface hardness of pinions shall be between 50 to 60 HRC. The hardness of pinion shall be 2-3 HRC higher than hardness of gears.
- 14.2 At all stages only helical gears should be used, except in planetary gearboxes, which can be spur type.

15.0 Gear Boxes:

- 15.1 General: All gearboxes shall be of completely enclosed splash lubricated type. All gearboxes shall be of oil tight and sealed with compound or gasket. All gear shafts shall be supported in antifriction bearings mounted in the gearboxes. Gearboxes shall be cast, wrought or forged from low/medium carbon alloy steel and suitably heat-treated. The fabricated gear boxes shall be stress relieved before machining. The internal surfaces of the gearbox shall be painted with oil resisting paint. Gearboxes shall be provided with breather vents, easily accessible drain plugs, and a suitable oil level indicator such as a dipstick. Adequate radial clearances between the gearbox inner surface and outside diameter of the gears shall be ensured and clearance proposed to be provided shall be explained. The facial clearance between the inner surface of the gearbox and the face of the nearest gear/pinions shall be at least 10mm.
- 15.2 **MH/AH LT and CT Gearboxes:** The motors shall be foot mounted. The foot-mounted motors shall have split type gearboxes. These shall be of the conventional split type, designed to split horizontally at the shaft center line and fitted so that the top half can be removed for inspection and repair without disturbing the bottom half.

16.0 Drive Motors

- 16.1 The wheels of each end carriage should be driven by independent synchronized drive motors mounted near each end carriage.

- 16.2 A separate cross traverse motor should be used for cross traverse drive through a suitable gear box.

17.0 Operational safety

- 17.1 'ON' pushbutton shall be provided with lock and key arrangement to prevent operation of crane by unauthorized personnel.
- 17.2 A siren shall be provided in the cabin, which can be foot operated at the choice of the operator and in case of pendant, alarm shall be provided for any of the motions operated from the pendant. Fixed service lighting shall be installed to provide no more than adequate illumination of crane controls. A fan to be provided for efficient ventilation suitable for operation on 230V Ac single phase. The fan to be provided with suitable regulator.

18.0 Brakes

- 18.1 The hoisting, LT and CT motions shall be provided with fail safe Electro Hydraulic Thrustor brakes. For creep motion of hoist wherever this is specified an independent brake must be provided.
- 18.2 The maximum braking torque to arrest long travel and cross traverse motions should not be less than 100% of full load torque for each brake. For hoist motion, two brakes should be used and the braking torque for each brake should not be less than 125% of full load torque. One of the two hoist brakes shall be applied with a time lag of 3 seconds in relation to the first.
- 18.3 Double shoe brakes should be used for each drive. Brakes should be mounted on the input pinion shaft of all gear boxes. The brake shoe should be of hinged type. Brake levers should be forged and hinge pins should be provided with steel bushes at the bearing points.
- 18.4 Brake drums should be of forged or cast steel and should be completely machined. Brake drum diameter should be selected from preferred number series. Width of brake drum should be about 10mm more than the width of brake shoe on each side. The brake lining should be environmentally sound.

19.0 Couplings

- 19.1 Flexible coupling shall be used between the rope drum and hoist gear box, where the hub should not be integral with the output shaft, so as to avoid replacement of the whole shaft whenever there is wear and tear in the coupling.
- 19.2 Solid couplings should not be used.
- 19.3 All couplings shall be of medium carbon steel and shall be designed to suit the maximum torque that can be developed. Hardness of geared portion in the gear coupling shall be more than 250 BHN.

20.0 Rope Sheaves

- 20.1 All sheaves should be of cast/forged steel or Blackheart malleable iron castings. The equaliser sheave should be mounted above the trolley floor and should be easily accessible and removable from the trolley floor level. The equaliser sheave should be arranged to turn and swivel in order to maintain rope alignment under all circumstances. Sheave grooves should be smooth finished for getting increased rope life.

21.0 Bearings

- 21.1 The bearing makes will be **NBC, SKF, NORMA, NRB, NTN, Timken and FAG**. In view of widespread use of spurious and reconditioned bearings, tenderers should explain how it is proposed to ensure that only new and genuine bearings of acceptable make are procured and fitted. Preferably, tenderers should confirm that they will submit, to the inspection agency, invoices from OEMs' or their authorized representative as proof of the use of genuine material. For long and cross traverse wheels, spherical roller bearings shall be used.
- 21.2 Independent bearing housings on long shafts be split on the shaft center line to permit easy removal of the shaft. The bottom surface of all bearing pedestals should be machined, and should bear upon a machined surface.

22.0 Lifting Hook

- 22.1 Standard plain shank type trapezoidal section hooks should be used unless otherwise specified. These hooks should conform to the relevant Indian Standard Specifications IS: 15560 (latest), while the Ramshorn Hook (wherever specified) shall conform to the relevant Indian Standard Specification IS 5749 (latest).
- 22.2 Hooks should be mounted on grease lubricated anti-friction thrust bearings and a protective skirt should be fitted to prevent rotation of the hook. Proof load test as per Indian Standard Specification shall be conducted, either in-house or from a recognized test house. The certificate of proof load test with date of next due shall be furnished.

23.0 Buffers

Spring loaded or other suitable buffer should be fitted on the four corners of the crane also at the four ends of the bridge girders. Buffers should be rigidly bolted in place, preferably along the center line of the crane rail or trolley rail as the case may be. All buffers should have sufficient energy absorbing capacity to stop the bridge or trolley in either direction when traveling at a speed of at least 50% of the rated speed at full load. Bridge buffers should have a contact surface of not less than 125mm diameter.

24.0 Lubrication

The grease nipples should be located to facilitate regular greasing by the operator with standard equipment. Bottom blocks and pedestal bearings should have independent greasing points. A lubricating chart should be provided in the manual, indicating all lubrication points, the type of lubricants required and the recommended frequency of lubrication.

25.0 Dimensional Tolerances

- 25.1 The contractor should ensure that the crane manufactured and erected to take the tolerances specified below:

(i) Variation in Span	$\pm 6\text{mm}$
(ii) Diagonal on wheels	$\pm 5\text{mm}$
(iii) Long travel wheel alignment	$\pm 1\text{mm}$
(iv) Tilt of wheels or Balance Axle	$\pm 1\text{mm}/1000\text{mm}$ (Horizontal & Vertical)
(v) Trolley wheel gauge	$\pm 3\text{mm}$
(vi) Trolley track gauge	$\pm 3\text{mm}$
(vii) Difference in height between trolley rails [H] for different trolley track gauges	
shall be within the following limits 'S' (mm)	'H' (mm)
Upto 2500	4

2500 to 4500	6
Above 4500	8

- 25.2 **Crane Alignment:-**The alignment during crane assembly shall be checked by an optical method. The manufacturer should have necessary optical equipment at his works and shall ensure that the crane diagonals are checked by this equipment

General Electrical Specifications

26.0 Scope

- 26.1 The scope of supply relating to the electrical portion shall cover all items of electrical equipment commencing from down shop leads and main current collector gear on the crane. The crane electrics includes

- (a) Down Shop leads with supporting structure, including the DSL charging switch/isolator, Indicating lamps suitably coloured 'Red' Yellow and Blue' shall be provided on both the ends of the bay to indicate whether supply to DSL is 'ON'. DSL should be capable for working of two cranes simultaneously.
- (b) Power disconnecting switch on the crane bridge walkway immediately after the main current collector gear
- (c) Main current collection, Protective switch gear, Master controllers
- (d) Motors, Motor control panels
- (e) Resistors (wherever applicable)
- (f) Brakes
- (g) Power and control cables, Socket outlets, Limit switches
- (h) Lighting distribution panels, Lighting fixtures with lamps
- (i) Electrical wiring & Siren, Alarms.
- (j) Push buttons, Indicating lamps, Two step jockey switches or push buttons
- (k) Equipment earthing material.
- (l) Cross traverse flexible trailing unarmoured cables mounted on roller clamps, alternately drag link cable system of is also acceptable.
- (m) Dead Man's Handle , Anti collision device (wherever applicable), Emergency Stop.
- (n) AC variable frequency (VVVF) controls for all motions of the crane.
- (o) Anti collision device.

- 26.2 All sundry erection material required for installation and connecting up of electrical equipment with cable laying and fixing accessories shall be included in the scope of supply.

27.0 Standard Specification (Electrical)

All latest standards indicated in Annexure-F of IS: 3177-1999 shall be applicable in general.

28.0 Power Supply Conditions

- 28.1 Power shall be available at 415 volts, 3 phase, 50 Hz
- 28.2 The following voltages shall be used in the crane
- a) 415 $\pm$ 10% volts. 3 phase 50Hz $\pm$ 3%, A.C For drive motors.
 - b) 230 $\pm$ 10% volts. single phase 50Hz $\pm$ 3%, A.C For lighting
 - c) 24 volts $\pm$ 10%, single phase 50 Hz $\pm$ 3% A.C For hand lamp socket outlets

d) 110 volts $\pm$ 10% single phase 50Hz $\pm$ 3% A.C For control circuit.

4.9 Depending upon the application, the different voltages mentioned above other than 415, 3 phase, 50 Hz AC shall be obtained through individual separate transformers units connected to 3-phase 415 volts A.C. supply.

29.0 Down Shop Leads and Current Collection Gear

29.1 SPECIFICATION FOR SHROUDED BUS BAR CONDUCTOR

29.2 Insulated Shrouded Bus Bar Conductor shall be of M/s.INSUL-8 UK make or safe track brand of M/s.Sushil Engg. Corporation Mumbai or "Safeline" brand of M/s Stromag Engineers Limited, Mumbai or Silverline brand of M/s Sliverline Metal Engg Pvt Ltd., and shall conform to the following:

29.3 The conductor system shall be finger safe to IP-21 with necessary supporting technical evidence of same and the conductor and material shall be of suitable metal (Galvanised Iron upto 100Amps & copper above 100Amps) insulated by a high impact gloss finish VR 935/2 PVC compound which shall have a step/groove shrouded all along its length for effective moulding of the conductor system.

29.4 The conductor shall be in minimum 4 mtrs. length to be jointed with moulded joint of the same material as the conductor and these conductors shall be supported by way of a single piece moulding, four pole hanger with single bolt fixing.

29.5 The current collector arm should be aluminum die cast totally insulated and the connection cable shall be fully enclosed and double insulated within the collector arm with a proven performance supported by documentary evidence.

29.6 The Voltage drop in full length of DSL should not be more than 2%.

30.0 Motors

30.1 All crane motors should be totally enclosed fan cooled TEFC Squirrel cage type suitable for VVVF drive and designed for minimum 150 starts/hour and shall be of 6 or 4 pole type, suitable for crane duty. The motors shall be suitable for heavy duty crane hoisting service having cyclic duty factor not less than 60% for class IV cranes. The motors shall be suitable for 50 deg.C ambient temperature and $415 \pm 10\%$ V Ac, $50 \pm 3\%$ Hz, 3 phase, 3 wire AC supply, Enclosure IP55.

30.2 The winding shall be of copper wire specially insulated and impregnated to with stand moist tropical climate and insulation shall not be less than 'B',

30.3 The motor shall be of adequate power as per IS 3177-1999 (latest). Detailed motor power calculations shall be indicated. Derating factor for temperature and voltage variation if any shall be taken into consideration as per recommendations of the motor manufacturers. Technical details of motors along with control gear and electrical accessories shall be furnished.

30.4 Type and routine test chart of motor selected shall be submitted to the inspecting authority during inspection.

30.5 Forced cooling shall be arranged by mounting suitably continuously run fan on all the motors for all motions.

30.6 Horse Power:

30.6.1 The torque factor of longitudinal travel and cross traverse motors should be of the range of 1.3 to 1.5. Motor details including frame size should be indicated.

30.6.2 All motors should be provided with insulation class not less than 'B'. The maximum permissible winding temperatures measured by thermometer and resistance method shall not exceed 120 deg. C and 130 deg. C respectively

30.6.3 The pull out torque of the motors at rated voltage and frequency range shall be as per IS: 3177-1999 (latest)

31.0 Terminal Box:

The terminal box shall be provided on the top or front of the motor for easy accessibility. The cable sizes should be decided after considering derating due to grouping and ambient temperature of 50°C etc.

32.0 Crane control:

32.1 For Pendant Control Cranes:-

- a) Pendant push button control station will be used for long travel, cross travel and hoist motions, for switching ON and OFF the motor of a particular motion. The supply voltage to the pendant control shall be 110V AC which shall be obtained through a suitable transformer. Necessary flexible multicore cable with sufficient length shall be supplied to enable the crane to be operated from floor level. Pendant shall be moving type and the movement of pendant will be independent of trolley.
- b) On all the motions the circuit shall be so designed that brakes come into operation immediately in the event of tripping of motor main circuit breaker.
- c) The pendant control station shall be capable of withstanding rough handling without being damaged. The cover shall be firmly secured.
- d) The mass of the pendant shall be supported independently of the electric cable by means of wire rope/chain. If the pendant is of metal, it should be effectively earthed.
- e) On all pendant cranes safety means shall be provided to prevent inadvertent operation from floor while maintenance work is being carried out on the crane.
- f) Adequate guards shall be provided to prevent accidental contact of pendant ropes or holding wire rope/chain with cross traverse.
- g) Necessary flexible multicore cable with sufficient length shall be supplied to enable the crane to be operated from floor level.
- h) The pendant push buttons shall be spring return type i.e. they shall return to 'OFF' position through spring return on release. Pendant shall be moving type and the movement of pendant will be independent of trolley.

32.2 For Cabin Operated Cranes:-

32.2.1 For all the motions spring return jockey switches or push button shall be used.

32.2.2 Two step two direction jockey switches in case of cabin control shall be used for all the motion.

- a) The rest position of jockey shall conform to zero position or off position.
- b) During running the rest position, means de-acceleration to stop.
- c) Step one at preset minimum speed of up to 10% of the maximum speed.
- d) Second step speed gradually accelerates to maximum speed.

Should a speed between maximum and minimum is desired the operator shall return to step one and the same speed shall be maintained. With the above system stepless speed shall be obtained. Alternatively above features can be achieved by use of two push button control for each direction for all the motions.

Tenderers to indicate the details of the proposed arrangement.

32.2.3 On all motions the circuit shall be so designed that brakes come into operation immediately in the event of tripping of motor main circuit breaks.

32.2.4 All controllers shall be so designed that the contacts and terminal arrangements are readily accessible for inspection and maintenance purpose.

32.2.5 Each controller shall be fitted with

- (i) Necessary steps for the forward and reverse motion to give smooth and stepless acceleration between each position.
- ii) Auxiliary contacts to provide an interlock between the controller and circuit breaker, so that the circuit breaker cannot be closed unless the controller is in off position.
- iii) Auxiliary contacts to provide an interlock with the limit switches, so that when the travel exceeds the safety limits, the motor circuit will be broken and the motor can only be allowed to reverse.

32.2.6 Controller in off position shall open all supply lines of the respective motors.

32.2.7 AC variable frequency control (VVVF) of adequate capacity for all the motions of ABB/L&T(Yasakawa)/SIEMENS/ALLEN BRADLEY/SCHNEIDER/MITSUBISHI ELECTRIC /DANFOSS/FUJI ELECTRICS make shall only be used. Independent control for main hoist, Aux. Hoist, CT & LT shall be used by using independent variable voltage variable frequency drives. However common controller for both the motors of LT may be used. Tenderer shall submit necessary details of the offered model as well as make shall be submitted.

32.2.8 Bidders shall submit the layout scheme of the operators cabin showing the positions of various controls with respect to operators seat.

32.3 Radio remote control:

32.3.1 For Radio Remote Control operated EOT crane tenderers should quote in accordance with the following parameters :-

- a) The wireless control facility shall incorporate control of movements in all directions, with speeds identical to those provided for the cabin/pendant control.
- b) In the event of failure of Radio remote control the crane shall have the facility to operate by cabin and pendant control.
- c) The Radio remote control shall have a minimum operating range of 200 meters radius, be fail-safe and shall have all the safety features built in the system.
- d) The facilities to be provided shall incorporate but need not be limited to the operations features listed below :
 - i. Emergency stop.
 - ii. Emergency Alarm.
 - iii. Normal ON / OFF control.
 - iv. Micro / Normal speed switches.
 - v. Directional movement control switches.
 - vi. Radio / Normal control selection switch.
 - vii. Overall weight of equipment to be carried by operator not to exceed 2.5 kgs.

The system shall be so designed that in the event of its mal functioning it should be possible for the user to switch over to conventional cabin/pendant control through suitable bypass switch facility.

- e) The Radio remote control push button station shall be capable of withstanding impact load and shall be protected against repeated accidental fall from a height of minimum 2 meters.

- f) It shall be suitable to work in dusty atmosphere.
- g) Shall have Low battery indication.
- h) **License.**
 - It shall be the responsibility of the contractor to obtain frequency allocation and required permission and license on behalf of Railways from the license issuing authority.
 - The initial license fee i.e. 24 months from the date of commissioning and acceptance shall be borne by the contractor.
- i) Safety limits for all the moments shall be provided with proper arrangements.
- j) The crane shall be commissioned in all respect to work as per the production requirements.
- k) The equipment should incorporate all necessary interlocks to ensure safety under all conceivable operating conditions, including safeguards against independent operation while in tandem mode and vice-versa.
- l) The general scope of supply of Radio Remote Control equipment shall be as per clause 32.3.2. The leading parameters of the crane are as per relevant Schedule-I.

32.3.2 Scope of radio remote control:

- (a) Scope includes supply and installation of Radio Remote Control system suitable to operate each pair of cranes simultaneously, independently and in synchronization as per particulars given in relevant schedule.
- (b) The scope of supply shall consist of
 - (i) Radio Remote Control (04nos remote control for two sets of crane)
 - (ii) Transmitter-Joy stick type or Push button type.
 - (iii) Receiver.
 - (iv) Antenna and cable.
 - (v) Ni-Ah rechargeable batteries
 - (vi) Battery Charger (suitable to charge one set of batteries at a time).
- (c) The remote control UNITS shall have following features for following motion :-
 - (i) MAIN POWER ON / OFF
 - (ii) MAIN HOIST ONE SET
 - (iii) AUXILIARY HOIST ONE SET
 - (iv) LONG TRAVEL ONE SET
 - (v) CROSS TRAVEL ONE SET
 - (vi) EMERGENCY STOP ON / OFF CONTROL
- (d) Each transmitter shall not weigh more than 2.5 kg and shall be provided with a shoulder belt and shall be in IP65 enclosure.
- (e) The system shall be microprocessor based.
- (f) The system shall have self-diagnostic feature with LED display.
- (g) For ease of maintenance the cards should be easily replaceable type.
- (h) The transmitter shall have indication for low battery. The battery should not be get discharged, have longer life and before reaching discharge level it should give visual indication.

- (i) The system shall be suitable for operation of 335-336 M Hz or 865-866 M Hz frequency range with a provision of fine adjustment.
- (j) The range of operation should be adjustable from 0 to 100 meters.
- (k) Frequency of operation of the Remote Control Units shall be indicated in the offer.
- (l) Tenderer shall ensure adequate supply of spares and availability of maintenance support within country.
- (m) The tenderer shall be responsible for commissioning the above system.

33.0 Contactors:

- 33.1 All contactors shall be of AC 4 Class of duty with rating 50% higher than the full load current of the respective motors at the specified duty cycle. The directional contactors of all motions shall be suitably interlocked for correct sequence of operation. Electrical & mechanical life of the contactors shall be indicated. For AC 4 class of duty electrical life shall be minimum 2,00000 cycles of operations.
- 33.2 The contactors shall have high contact reliability with preferably double break parallel bridge contact.
- 33.3 Test certificates of the manufacturer shall be submitted in support of life and rating of the contactors.

34.0 Limit Switches

- 34.1 All hoist motions shall be provided with limit switches to prevent crane from over hoisting and over lowering. Any other limit switch viz. for slewing, skewing of crane etc. shall be provided if required.
- 34.2 An electromechanical device shall be provided to prevent overloading proportionate to speed. Tenderer to furnish the details.

35.0 Emergency Stop Push Buttons

- 35.1 Safety switches of sustained contact type shall be provided at each end of crane bridge so that under any emergency conditions, by operating anyone of the switches, the incoming circuit breaker is tripped thus cutting power to all motions. Further a mushroom head type of push button shall be provided in the operator's cabin in cabin operated crane so that the main incoming circuit breaker can be tripped under any emergency conditions by pressing the operating head. A pilot lamp incorporated in the control circuit shall glow when any of the switches is operated.
- 35.2 Pendant controls shall be provided with mushroom head type push button so that main incoming circuit breaker can be tripped under any emergency condition by pressing the push button.

36.0 Control Panel

- 36.1 All power and aux. contactors, individual overload relay shall be mounted in a sheet steel cubical with lockable hinged doors. Each motion shall have its individual Panel or common panel with separate compartment for each motion. Interiors of panel shall be dust and vermin proof and shall be fully weather proof type.
- 36.2 All the equipments shall be so mounted in panel as to enable its easy removal/replacement from the front.
- 36.3 The terminal strips shall be fixed inside the panel preferably in a horizontal manner leaving enough space underneath the strip for termination of cables in a convenient manner. Power and control terminals shall be segregated. Power terminals blocks shall be separated from

each other by means of replaceable insulated spacers. Terminal block shall have adequate clearance to avoid tracking.

- 36.4 All equipments inside the panel shall have permanent identification labels in accordance with circuit diagram as also the power and control terminals. Terminal blocks shall be of robust and of such construction as to preclude possibility of cable connections getting loose during vibration on crane.
- 36.5 The electrical clearance in air between all live parts of different polarity and voltage and between live parts and earth shall be not less than 75mm.
- 36.6 Contactor panels shall be well braced to the crane structure and each panel shall be provided with adequate number of lifting lugs.
- 36.7 The control system should preferably include operating hour meter for crane, Mechanical load sensing device, and motor over current protection system.

37.0 Lighting:

- 37.1 Lighting shall be provided in the Driver's cabin, staircases and areas where control panels, resistance and transformers shall be installed. Bulkhead fitting with dust proof covers shall be used for the above areas. Four numbers under slung lights on shock and anti-swing suspension shall be provided for uniform floor illumination. 400 watts High-pressure sodium vapour lamps or suitable LED lamps shall be used for floor lighting. Industrial toggle switches shall be used for lighting distribution Screw cap type holders shall be used for crane lighting.
- 37.2 The lighting distribution and metal clad switches incorporating cartridge fuses in every line of each circuit shall be provided in the Driver's cabin, for the following:-
 - a) Crane lighting including under slung lights;
 - b) Air circulating fans.

38.0 Socket Outlets:

Minimum of one socket outlets for hand lamps shall be provided at each driver's cabin, long travel side and in the area where control panel, resistors and transformers shall be installed. Hand lamps shall operate at 24 volts AC supply. Industrial type metal clad plug and socket which are easy to assemble and disassemble shall be provided.

39.0 Cabling:

- 39.1 All wiring for power, control, lighting etc. shall be carried out with 1.1 KV grade armoured cable except flexible cable where armoring shall not be provided. Power cables shall be minimum 4mm² copper. Control cable shall be minimum 2.5 mm² copper.
- 39.2 All cables shall be systematically laid on G.I. trays & fixed with adequate number of G.I. clamps. All cables shall be weather proof and Fire Retardant Low Smoke (FRLS)

40.0 Identification of Circuit Cables Etc.

Labels of permanent nature shall be provided on supports of all switches, fuses, contactors, relays etc., to facilitate identification of circuits and replacement. All panels, controllers, resistors etc. shall be properly marked for each motion. All power control cable, lighting and other cables shall be ferruled at both ends as per cables numbers indicated in the supplier's drawing. All equipment terminals shall also to be marked likewise.

41.0 Dead Man' Handle:

For cabin operated crane suitable dead man's handle shall be provided which will stop the crane movement in case the operator neglects proper handling. Pendant control shall have spring loaded push buttons to return to off position to stop the crane movements as soon as the operator releases the thumb pressure on the button.

42.0 Alarms:

Sufficient provision shall be made for alarm during the crane working. A foot operated alarm bell shall be provided to caution to the workers in cabin operated cranes. A continuous ringing bell shall be provided for all motions of the crane. In case of pendant operated crane, alarm shall be provided for any of the motions operated from the pendant. Details of alarm system provided shall be explained.

43.0 Circuit protective switch gear:

- 43.1 One moulded case circuit breaker (MCCB) and one main line contactor combination shall serve as main incoming protective device. The MCCB shall be fitted with short circuit and over current release, while the main line contactor shall be suitable for switching on the power and tripping the same under emergency condition. Both the MCCB and the contactors shall be rated to carry at least combined full load currents of two motions of the crane having largest power. The setting of the magnetic instantaneous short circuit release shall be of 300% to 800% of over load release setting.
- 43.2 The circuit breaker shall have adequate rupturing capacity to withstand and clear fault current for full load of the order of 30 KA.
- 43.3 The circuit breaker shall be located inside the driver's cabin or nearby in such a way that adequate clearance is provided as per I.E. rules.
- 43.4 The trip circuit of the main contactor shall be designed such that it will prevent the circuit breaker from being closed when the main contactor of any of the motions has failed to open, although the corresponding controller has been brought to OFF position. Other protective features as detailed under clause. (Limit Switches) and clause (Emergency stop push buttons) shall be incorporated in the trip circuit of the main contactor to fulfill required functions.
- 43.5 To indicate whether power and control sources are ON and whether any emergency switch has been operated suitably colored indication lamps shall be located on the operators seated control unit. The colouring should be in the material of lenses itself and not by painting the same. A suitable inscriptions plate to be provided.
- 43.6 For protection of each drive motor overloads, adjustable inverse time lag manually reset, oil dashpot type relays shall be provided for each motor. These relays shall be mounted in respective contactor panels and shall be set to trip the circuit of the motion controlled when current exceeds 200% of the normal value for more than 10 seconds.
- 43.7 Incoming supply to each motor shall be through individual triple pole MCCBs for the purpose of isolation and checking of control functions. These MCCBs shall be mounted in the respective control panels. Each motor feeder shall be protected with HRC fuses against short-circuit.
- 43.8 Isolating MCCBs fitted with HRC fuses shall also be provided for the following branch circuits:
 - i) Lighting and hand lamp socket outlets,
 - ii) Control circuits

- 43.9 Each control circuit's branch to every contactor panel shall be provided with facility for isolation and protection against short circuit and sustained light over loads by means of appropriately rated circuit breaker fuse unit.
- 43.10 All brake circuit s shall be protected against short circuits by means of circuit breaker with the short circuit release or a set of fuses inter connected with the control circuit of the motion in such a manner as to prevent energizing of the motor when the brake circuit is open or fuse is blown. Only grip type HRC fuses shall be used on the crane. The fuses should be provided with visible indication to show if they have blown.

44.0 Anti Collision Device:

Anti collision system of non contact type shall be provided to avoid cranes from colliding with each other. Suitable alarm indication shall be provided in the operator's cabin when cranes are close to each other. The anti-collision system must disable the long travel motion towards the direction of collision.

45.0. Technical Literature:

- 45.1 One copy of the printed illustrative catalogue showing features of the machine and its elements and One (1) reproducible copy (e.g. tracing, ozalid, etc. of each drawing) shall be furnished.
- 45.2 The successful bidder shall furnish, 4 copies of spare parts catalogue giving the part list number of each component and assembly drawings incorporating all final changes, maintenance manual, repair & trouble shooting guide, operation manual, P&I diagram along with part description, license Software in CD along with key, Schematic wiring, lubrication, and piping diagrams, with sequence of operation and all electrical circuit diagrams to the consignee. The bidder shall provide a list of literature that shall be supplied along with the machine. Technical literature shall be provided for the complete machine including imported and indigenous components/sub-assemblies.

Note: All manual and literature should be in English.

46.0 Painting

- 46.1 All part of the crane shall be thoroughly cleaned of all loose mill scales, rust of foreign matter as per Railway's requirement.
- 46.2 All parts inaccessible after assembly shall be painted before assembly.
- 46.3 All parts except motors, resistors, gears, thrusters etc., shall be painted with:
- (i) One coat of red oxide zinc chromate primer to IS: 2074 before dispatch from the Contractor's premises; one additional coat of the same primer shall be given at site after erection and testing.
 - (ii) Over the second primer coat two coat of finishing paints (ready mixed oil based paints) as per the relevant IS code shall be given, as per the colour scheme to be approved by the Engineer.
- 46.4 The interior of all gear box housings shall be painted with two coats of oil resisting enamel paint. All machine pads, bearing surface or structures or housings shall be painted with white lead.

47.0 Noise level:

Maximum noise levels should not exceed 85 db.

48.0 Training of staff:

The contractor shall train two Railway staff in the proper operation and two staff in proper maintenance of the crane at plant site after commissioning for a period of one week free of charge. He shall also supervise the correct operation of the cranes for a period of one month after the cranes are commissioned into use. This training shall include crane architecture, systematic methods for quick diagnosis of problems and quicker methods to solve them, domain knowledge and safety procedures to be followed while working with crane.

49.0 Inspection and testing at firms premises:

- 49.1 The contractor shall submit test certificates for all electrical equipment, cables, and all parts used in handling loads such as wire ropes, load hooks, etc.
- 49.2 The contractor shall submit material test certificates for structural steel and mechanical components such as couplings, gears, gearboxes, rope drums, brake drums, pulley, shafts, wheels, etc.
- 49.3 The crane shall be inspected and tested during every different stages of its manufacture starting from raw materials, till the completion of the crane, by the Engineer or his authorized representative at the contractor's premises as per the QAP approved. However, the purchaser or his authorized representative is free to institute any further checks also, if he so desires, and shall be in no way binding on the Purchaser.
- 49.4 The crane shall be tested in all respects in conformity with QAP in the presence of Railways or his duly authorized representative before dispatch from the contractor's premises. The manufacturer shall inform the Railway at least 4 weeks prior to the testing of the crane at manufacturer's works.
- 49.5 All electrical and mechanical equipment shall be tested in accordance with the appropriate Indian Standard at either the crane maker's or equipment manufacturer's works and test certificates provided if required by the Purchaser or his representative.
- 49.6 Railways reserves the right for surveillance inspection of firm after placement of order to assess the ongoing process of manufacturing and facilities available with them. In case the inspection team observes the deficiencies/ deterioration in infrastructure/manufacturing capability at the firm's premises, the action can be initiated as considered appropriate on merit.
- 49.7 The contractor shall provide, arrange all the facilities for conducting the test.

50.0 Erection and Commissioning

- 50.1 The contractor shall arrange erection and commissioning of the EOT Cranes. Adequate number of teams of technical experts will be made available so that erection and commissioning delays are eliminated. Such personnel will be required to be present immediately as soon as the EOT Crane has been received. The Contractor or his agent would be required to inspect the consignment at the consignee's end before unpacking is done and carry out a joint check of the receipt of components to avoid subsequent complaints regarding short shipment or transit damages. The contractor or his agent shall commission and prove out the machine successfully as per scheduled time frame.
- 50.2 Following items of work shall be performed by the contractor
 - (i) Checking of alignment of gantry rail at site. Any rectification required, will also be done.
 - (ii) Installing of the EOT Crane structure and associated machinery in position.

- (iii) Complete fitting and wiring of all electrical items
- (iv) Fixing of down shop leads with supporting structure
- (v) The EOT Crane performance shall be demonstrated after successful commissioning.
- (vi) Provision of ladder along with hand railing for going up the gantry rails.

50.3 In the interest of early commissioning, the supplier shall ensure minimum amount of assembly is required at site. Site welding and riveting shall be avoided as far as possible. The supplier, before proceeding with design details, shall satisfy himself about the site conditions so as to avoid any difficulty at the time of erection and also check the span of gantry rails.

50.4 All electrical and mechanical equipment shall be tested in accordance with the appropriate Indian Standard at either the EOT Crane maker's or equipment manufacturer's works and test certificates provided if required by the Purchaser or his representative.

51.0 Start-up and trial operation (commissioning) tests

51.1 The contractor shall carry out the start up trial operation test (commissioning tests) on receipt of authorization from the Engineer. The following tests are to be carried out by the contractor as part of the commissioning Tests:

- i. The strength of the insulation of the various items of electrical equipment, cabling and of the installation as a whole shall be tested with 500V meggers.
- ii. The earthing of the crane and control equipment shall be tested as per Indian Electricity Rules.
- iii. Verification of dimensional tolerance and crane clearances.
- iv. The satisfactory operation of each controller, switches contractor, relay and the other control device and in particular the correct operation of all limit switches.
- v. The correctness of all circuits, and interlocks and sequence of operations.
- vi. The satisfactory operation of all protective devices, long travel, cross travel and hoisting motions.
- vii. The operation of brakes on long travel, cross travel and hoisting motions
- viii. Inching control and creep speed as called for in the technical specifications.
- ix. Compliance of the electrical equipment with rating indicated in the specifications. Skewing of the crane during long travel and cross travel motions. Presence of vibrations and usual noise in operation.

51.2 The trials shall be carried out initially under no load condition, and on satisfactory completion of these, the trial shall be repeated for various loads until the full rated load and operating range are covered. During the trial operation, all necessary adjustments shall be made so as to ensure compliance with the operating characteristic for the complete equipment as stipulated in the Technical specifications.

52.0 Proving-Out Tests

52.1 After the satisfactory completion of the start up and trial operation test, the Engineer shall authorize the contractor to carry out the Proving-Out Test. The contractor shall establish to the satisfaction of the Engineer the performance of the crane with regard to the following:

- (i) The cranes shall be tested to lift and sustain a minimum test load of 125% of the working load when the load is located at the center of the span both at the contractor's works and at site.
- (ii) During the overload test, each motion in turn shall be maneuvered in both directions and the crane shall sustain the load under full control. The specified speeds need not be attained but the crane shall show itself capable and dealing with the overload without difficulty.
- (iii) **Deflection Test:-**The deflection of the bridge girders shall not exceed 1/1000 of span with the fully loaded trolley stationed at mid-span and the safe working load at rest. The measurement shall not be taken on the first application of load. The datum line for measuring the deflection should be obtained by placing the unloaded trolley on the extreme end of the crane span smaller book approach of the largest capacity hook.
- (iv) **Speed Test:-** All the motion of the crane shall be tested with rated load and the rated speed shall be attained within the tolerance limits specified in the technical specification.
- (v) Insulation Test shall be as per IS: 4137.
- (vi) The crane shall be capable of trouble free operation and work satisfactorily over a period one week, during which the crane shall be subjected to the normal work load in the shops in a complete shift during each of the days.

53.0 Following items are also included in contractor scope

- a) Consumables like first fill of lubricating oils etc for the initial operation of the equipment till handing over.
 - b) Commissioning and start-up spares, Special tools & tackles, if required.
 - c) All drawings/documents along with operation and maintenance manuals, spare parts manual and troubleshooting guides as per requirement mentioned elsewhere in the tender document.
 - d) Getting approval of design/drawings and any design calculation related to the equipment from Railways.
 - e) Trailing/flexible cables as required for the crane shall be in bidder's scope.
 - f) Carrying out any modifications /deletions /addition /alternation in design /drawings /documents as required by client for proper execution of works at site till completion and handing over of the equipment to the purchaser should be brought to the notice of Railways.
 - g) Consignee will provide only 415 V $\pm$ 10%, 3 phase 50 Hz $\pm$ 3% AC supply at a single point (mains). Further connection including supply, laying & termination of FRLS armored power cables and DSL charging switch/Isolator shall be in Bidder's scope.
 - h) Separate earth pit for control and power circuits as per IS shall be in the contractor scope.
- All Civil work including foundation (if any), gantry, rail on gantry, Hand railing and maintenance platform on both gantry end side, Provision of step ladder along with hand railing for going up the gantry rails etc for EOT Cranes shall be in contractor scope.
- (i) Special Feature:
 - a. Lighting shall be provided in the staircases and areas where control panels and resistors shall be installed. Bulk head fitting with dust proof covers shall only be used for the above areas. Four number under slung lights on shock absorbing

and anti swing suspension shall be provided for uniform floor illumination. High-pressure sodium vapour lamps shall be used for floor lighting. Screw cap type holder shall be used for crane lighting. Lighting transformers shall have 50% reserve capacity.

- b. The lighting distribution board and metal clad switches incorporating cartridge fuses in every line of each circuit shall be provided on the bridge. Push-button on pendant contactor on bridge shall be used for under-slung lighting.
- c. Repair cages shall be provided on the inside of the end carriages for attending to the current collectors as well as the corners of the crane (if required) for attending to LT wheels.

54.0 General:

Deviations, Warranty /Guarantee and Dispatch of the Machine from Manufacturer Works are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

55.0 Warranty:

Warranty of M&P is to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

56.0 Bought Out Items:

- 56.1 The bidder shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the bidder and proposed to be used, along with the manufacturer's name, brand model etc. The successful bidder may be required to produce invoices to ensure genuineness of such products / verification by the Inspecting agency.

SI no	Description	Make
1	Motors	ABB/ CROMPTON/BBL / SIEMENS/ KIRLOSKAR /MARATHON /SEW EURODRIVE/NORD
2	Cables	LAPP/SIEMENS /POLYCAB/FINOLEX/UNIVERSAL/ICC
3	Contactors	L&T/SCHNEIDER/C&S/SIEMENS/BCH
4	Time relays	SIEMENS/BCH/L&T/SCHNEIDER/C&S
5	Limit Switches	SPEED-O-CONTROL/CCE/ELECTROMAG/C&S/CMK ELECTRO POWER PVT LTD
6	Master controller	SPEED-O-CONTROL/CCE/ELECTROMAG/C&S
7	Overload relays	SIEMENS/ BCH/L&T/SCHNEIDER/C&S
8	Switch gears	L&T/SCHNEIDER/ C&S/SIEMENS/ HAVELLS/BCH/ ABB
9	Resistors.	SPEED-O-CONTROL/ELECTROMAG/CCE/C&S/BCH
10	Control Panels	RITTAL/BCH/ SIEMENS with IP55protection
11	Pendent	Demag/Telemecanique/CMK Electro Power Private Limited,
12	Thrustor brakes	SPEED-O-CONTROL/CCE/ELECTROMAG/GALVI
13	Electrical isolators	SIEMENS/L&T/BCH/C&S
14	VVVF Drive	ABB/L&T(Yasakawa)/SIEMENS/ALLEN BRADLEY/SCHNEIDER/MITSUBISHI ELECTRIC /DANFOSS/FUJI ELECTRICS
15	Bearings	NBC/SKF/FAG/TIMKEN
16	Wire Rope	USHA MARTIN/ BOMBAY WIRE ROPE/MAHADEV
17	Gear Box	SEW EURODRIVE/NORD/NU-TECK/DEMAG

18	Push Button	:	SIEMENS/SCHNEIDER/TEKNIC
19	Lifting Hook	:	EEK/JDT
20	Brake	:	PETHE/STROMAG
21	Hoist	:	DEMAG/ABUS/HERCULES
22	Meters	:	AE/L&T/ SCHNEIDER/ SIEMENS
23	Sockets for hand lamps etc.	:	CROMPTON/BCH/REYROLL
24	Indicating lamps	:	SIEMENS/TEKNIC/BCH
25	Safety Switches	:	SCHNEIDER/SIEMENS/BCH
26	Junction Box	:	RITTAL/BCH/ SIEMENS

Note:-

Test certificates of bought item should be provided by the supplier with proper identification at the time of inspection. The tenderer should explicitly mention “not applicable” against the items indicated above, whichever is not applicable in the offered machine.

SCHEDULE- (1)

Leading Parameters of EOT Crane 25/7.5T
(Supplied by consignee for guidance of manufacturer)

SLNO	Item/Parameter	Details		
A	General			
1	No. of Cranes required	01 no. Double girder EOT crane		
2	Duty or Class	Class-IV(Four)		
3	Location (Sub Shop name.) and Qty	Proposed sick line Cover shed	01 no.	
4	Shop Details	Shop Span	Crane is to Work	Bay Length
	span & bay length	20 mtr	Indoor	100 mtr (Approx.)
5	Safe working load in tonnes			
5.1	Main Hoist	25 Ton		
5.2	Auxiliary Hoist	7.5 Ton		
6	Crane Controls from	Cabin, Pendant & Remote		
B	Crane Performance:			
1	Operating Speeds (loaded) in m/min (speeds specified are only indicative and the supplier shall design the speeds suitable to VVVF drives so that they meet the workshop requirement)			
1.1	Main Hoist	4 m/min		By Cabin Control and also through pendant & Remote control
1.2	Auxiliary Hoist	8.0 m/min		
1.3	Long Travel	63 m/min		
1.4	Cross Travel	31.5 m/min		
1.5	VVVF drive (stepless speed for all motions)	VVVF Drive required		
1.6	Creep Speed of MH	0.40 m/min		
C	Electrical Details:			
1	Power Supply			
1.1	AC Supply	AC Supply Volts 415, 3phase, 50Hz, 4wire		
1.2	Neutral (Earth or Not)	Earthed		
2	Type of DSL required	Shrouded type		
3	Controls			
3.1	Control is to be operators cabin or hand operation	All the cranes shall be operated through pendant, cabin & Remote control with transmission and receiver set.		
4	Drive required	VVVF Drive (Stepless speed for all motions)		

SCHEDULE- (I)

SLNO	Item/Parameter	Details		
D	Operator Cabin:			
1	Type and Location			
1.1	Type of Cabin (Fixed or Moving)	Fixed		
1.2	Location of bridge, if fixed	End of Main Hoist		
2	Open or closed type	Closed (al weather type)		
E	Lifting Chain/Sling/Tackle			
1	Type of Hook and Lifting Tackles (Suitable for lifting of different types of Motor and Trailer coach used in Indian Railways.):			
1.1	Chains 2 legged slings (Qty: 02 nos.) for each crane	Cap- 7.5T, Length- 4 mtr with 'O' ring at one end and other hooks at other end.		
1.2	Chains 4 legged slings (Qty: 02 nos.) for each crane	Cap- 25T, Length- 4 mtr with 'O' ring at one end and other hooks at other end.		
1.3	Lifting Tackles (Qty: 01 set) for each crane	Suitable capacity of lifting tackles of different types of Motor and Trailer coach used in Indian Railways.		
F	Structural Details (also refer clause 6)			
1	Distance (Span) in meters between centerline of gantry track rails. Note: It is recommended that the span difference (a) shall not vary more than ±6mm. When the Span does not satisfy this requirement, the maximum and minimum span for which the crane had to be designed shall be specified by the purchaser	Shop	Span	Bay Length
		Proposed sick line Cover shed	19 mtr (Approx.)	100 mtr (Approx.)
2	Side clearance- Distance from centers of Gantry/Track Rails to nearest side obstruction.			
2.1	Top of gantry Rail (or bottom flange of I-beam) to lowest overhead obstruction	C	Min. 2.50 mtr or approval by Railway	
2.2	Top of gantry rail (or bottom flange of I-beam) to floor level	D	approval by Railway	
3	Gantry/Track Rail			
3.1	Size and weight/unit length	100 CR Rail/60 CR Rail/80 CR rail / 52kg/m (IRS)or approval by Railway		
4	Drop of Hook below floor level			
4.1	Drop of Hook below floor level	MH	500 mm	
4.2	Drop of Hook below floor level	AH	500 mm	
5	Lift of Hook above floor level			
5.1	Lift of Hook above floor level	MH	7200mm(Approx.) or prior approval by Railway	
5.2	Lift of Hook above floor level	AH	7300mm(Approx.) or prior approval by Railway	

5.3	Centre distance between hooks MH & AH	R	800 mm (Approx.)
5.4	Side clearance from centre line of gantry rail/I-beam to nearest side obstruction	A 1	350 mm
5.5	Side clearance from centre line of gantry rail/I-beam to nearest side obstruction	A 2	350mm
5.6	Vertical clearance from floor level to lowest structural member of crane	K	To suit the design of the crane as per site condition.
5.7	Vertical clearance from floor level to bottom of cabin	L	To suit the design of the crane as per site condition.
6	Other Requirements	Two numbers of flood-lights shall be provided. Built in jacks shall be provided for trolley and end carriages	
7	Type of Hook Required (Standard Single Hook or Ram shorn type)	To suit the design of the crane as per actual requirement.	

Note:

1. Details including drawings of lifting tackle, slings, chains have to be submitted before supply for approval.
2. Supplier shall have to provide related drawings/diagrams(Civil, Mechanical & Electrical), electrical load etc.
3. Necessary tooling and gauges shall have to be supplied with the machine.
4. If above clauses are found inadequate for furnishing all necessary information of the crane offer, the tenderer may append further information separately.
5. Tenderer should also furnish clause wise remarks on technical specification.
6. All equipment's shall be protected from rain, heat and water.
7. As the shed is to be constructed, the details given in schedule-I are based on General arrangement plan of shed & data provided by engineering department. Hence, minor changes in these dimensions are possible and it will be provided at the time of approval of GA drawings of the crane as submitted by the OEM.

SCHEDULE – (II)**Information to be Supplied By The Tenderer**

Capacity (Tonnes) :

Operated :

EOT Crane (Outdoor/Indoor) :

SIno	Description	Remarks
1	Specification of the crane offered	
1.1	class of duty :	
1.2	capacity in tones :	
1.3	span in meters :	
2	Is it the Tenderers intention if awarded the contract, to comply fully and in all respects with purchaser's specification covering the work? if not, he shall state exceptions in details :	
3	Time in which Tenderers will agree to deliver or complete all work covered by these specifications. :	
4	Break up weights of the crane as mentioned below should be furnished:	
4.1	Total weight of crane including electrical equipment :	
4.2	Total weight of trolley, including electrical equipment :	
4.3	Weight of each bridge girder assembled and ready for erection with and without mechanical and electrical equipment :	
4.4	Weight of each end carriage assembled and ready for erection :	
4.5	Weight of operator's cabin together with all equipments mounted in it. :	
5	Type and class of crane and its mechanism :	
6	Safe working load in tones:	
6.1	Main Hoist :	
6.2	Auxiliary Hoist :	
7	Maximum speed with max. workload (MPM):	
7.1	Main Hoist :	
7.2	Auxiliary Hoist :	
7.3	Creep Speed of main hoist :	
7.4	Long travel :	
7.5	Cross traverse :	

- 8 Speed steps and speed range in meter/min. at various steps:
 - 8.1 Hoist Motion :
 - 8.2 Cross traverse :
 - 8.3 Long Travel :
- 9 Rope size and construction details:
 - 9.1 Main Hoist :
 - 9.2 Auxiliary Hoist :
- 10 Number of rope falls supporting the load:
 - 10.1 Main Hoist :
 - 10.2 Auxiliary Hoist :
- 11 Diameter of drum:
 - 11.1 Main Hoist :
 - 11.2 Auxiliary Hoist :
- 12 Material of drum :
- 13 Material of gear box :
- 14 Material and Hardness of gears (Indicate specifications) :
- 15 Material of sheaves :
- 16 Diameter of sheaves :
 - 16.1 Main Hoist :
 - 16.2 Auxiliary Hoist :
- 17 Brakes, type make and size (MH/AH) :
- 18 Make and type of bearings :
- 19 Type of hook and its specification :
- 20 Trolley :
 - 20.1 Wheel span :
 - 20.2 Wheel base :
 - 20.3 C.T. Wheel Diameter, material and hardness :
 - 20.4 Maximum wheel load :
 - 20.5 Material of gear box :

- 20.6 Material and hardness of gears (indicate specifications) :
- 20.7 Make, type and size of brake :
- 20.8 Make and type of bearings
- 20.9 Size of trolley runway rail
- 21 Bridge
- 21.1 Wheel base :
- 21.2 L. T. wheel Diameter, material and hardness :
- 21.3 No. of wheels on each end of crane :
- 21.4 Maximum wheel load ;
- 21.5 Material of gear box ;
- 21.6 Material and hardness of gears. (Indicate specifications) ;
- 21.7 Make, type and size of brakes :
- 21.8 Make and type of bearings. ;
- 21.9 Clear width of each foot walk :
- 22 STRUCTURAL Details :
- 22.1 Centre to centre of gantry/track rail span (S) meters :
- 22.2 Lift of Hook above floor level (Exclusive of travel required to operate limit switch) :
- 22.3 Drop of Hook below floor level :
- 22.4 Nearest position of hook to centre line of gantry rail
- (a) Main hoist :
- cabin end (E) meters :
- other end (F) meters :
- (b) Auxiliary Hoist :
- cabin end (E) meters :
- other end (F) meters :
- 22.5 Type of main girder Design drawings showing overall dimensions, Size of each section and location and depth of diaphragms should be submitted for the girders. :
- 23 Particulars of safety devices :
- 24 General arrangement drawing showing to scale elevation, cross section and plan which shall indicate the :

following information

- (a) Clearance diagram of crane
- (b) Construction of bridge structure
- (c) Hook approaches
- (d) Wheel base
- (e) Wheel loads
- (f) Wheel diameter
- (g) Outer buffer dimension

Drawing should be offered along with the offer. Drawing No. should be indicated

- 25 Detailed wheel diameter calculation for long travel and cross traverse wheels :
- 26 Other information offered along with the tender. :

Note:

1. If above clauses are found inadequate for furnishing all necessary information of the crane offer, the Tenderer may append further information separately.
2. Tenderer should also furnish clause wise remarks on technical specifications.
3. Bidders should furnish information on Schedule-II & Schedule-III. In case of any discrepancy in the information submitted against Schedule-II and III and that furnished in clause wise comments, the information submitted against schedule-II & III shall over-ride that against the clauses.

SCHEDULE – (III)**Electrical Details of Cranes**

Shop :
 Workshops :
 Railways :

The under mentioned electrical details should be furnished for each motor separate along with the offer. The particulars indicated below should be offered for each motor/control separately.

SIno	Description	Remarks
01	Motors :	
1.1	Manufacturer's Name :	
1.2	Type and degree of enclosure :	
1.3	Type of duty :	
1.4	Rating-continuous/intermittent :	
1.5	Output (KW/BHP) :	
1.6	AC Voltage across phases & frequency :	
1.7	Speed in RPM :	
1.8	Class of Insulation of stator :	
1.9	Frame size :	
1.10	Normal full load current :	
1.11	Starting current :	
1.12	Motor type :	
1.13	Temperature rise of windings & other parts allowed above ambient temp. of 50°C :	
1.14	Cyclic duration factor :	
1.15	Max. starts per hour for which motor is suitable :	
1.16	Class of duty (S1,S2,S3,S4 Etc.) :	
1.17	Ambient temp. for which motor is suitable :	
1.18	Voltage range for which motor is suitable :	

- 1.19 Motor horse power calculations :
- 1.20 Efficiency at :
- (a) full load :
- (b) 3/4 load :
- (c) 1/2 load :
- Power Factor at :
- 1.21 :
- (a) full load :
- (b) 3/4 load :
- (c) 1/2 load :
- 1.22 Type of drive :
- 2 **CONTROL GEAR** :
- 2.1 Rating of AC 4 Contactors with minimum 2,00,000 cycles of operation :
- 2.2 Are the following provided for each motor. :
- (a) Short circuits protection by HRC fuses. :
- (b) No volt trip :
- (c) Overload trip :
- (d) Instantaneous trip current sensitive single phasing preventer. :
- 3 Standard specifications to which the motor control gear and its ancillary offered conform to :
- 4 Any other special feature :

Schedule-'III'**List of Maintenance Spares for each Crane**

S.N.	Description	Particulars
1.	Fixed and moving contact tips for contactors	1 no. of each size
2.	For Contactors coils	1 set consisting of 3 nos. of each size.
3.	Limit switches	1 set of MH (1 no. Rotary + 1 no. gravity) 1 set of CT (1 no.) 1 set of LT (1 no.)
4.	Current collectors	2 sets (08 nos.)
5.	MCBs/MCCBs	1 set of each size
6.	Thrustor	1 of each size
7.	Brake liners with Rivets	1 pair of each size (4 pair)
8.	Main spring for thrustor brakes used on crane	1 of each size (4 nos.)
9.	Brake shoes complete with lining	1 pair of each size (2 pair)
10.	Oil seal for gear cases	1 for each size of gear box and geared coupling on the crane-4 nos.
11.	Spare cards for VVVF drive for all drives viz. MH,AH,LT & CT	1 no. each
12.	A set comprising of 2 nos. each long travel and cross travel motion wheel in assembled condition with axle bearings	1 set of 2 nos. each-2 nos. CT & 2 nos. LT

Note: One set of above spares is required with each crane.

Schedule 'IV'**LIST OF TOOLS**

S.N.	Description	Quantity
1.	Tool box	1 no.
2.	D/E Spanner required sizes	1 set
3.	Grease gun	1 set
4.	Oil cane	1 no.
5.	Screw driver of required sizes	1 set
6.	Nose Plier	1 no.
7.	Insulated Plier	1 no.
8.	Hammer 2 lbs	1 no.
9.	Allen Key required sizes	1 set
10.	Hydraulic Jack	1 no.
11.	Multimeter	1 no.
12.	Bearing puller 3 leg, screw type	1 no.
13.	Measuring Tape 20 mtrs.	1 no.
14.	Sprit level	1 no.

Note: one set of above maintenance tools required with each Crane.

Specification No.- IM/MEMU/DEMU/Anara/WP/Mech/M&P/FLT(5T)

Item No. 03

SPECIFICATION FOR FORKLIFT TRUCK (DIESEL OPERATED, CAP-5000 Kg, SOLID WHEELS)**1.0 Scope**

The specification covers the design, manufacture, supply, erection and commissioning and proving out 5 Ton cap. Fork Lift with all accessories at user end as per instructions and conditions of contract.

1.1 Sources:

Likely sources of manufacturers and suppliers are-

- i. M/s Jost Engg Comp. Ltd, Thane,
- ii. M/s Godrej & Boyce Mfg Co. Ltd. Mumbai
- iii. M/s Voltas/Kion India, Pune

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources. However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

2.0 General Description and Scope of Supply

- 2.1. 5 Tonnes capacity Diesel Engine operated Industrial Forklift Truck of 5000 kg capacity at 600 mm load center and fitted with 5Ton Fork. The scope also covers supply necessary spare for normal operation and maintenance for two years Unit cost of machine will be inclusive of cost of spares.
- 2.2. All related material required for inspection, erection and commissioning of Forklift Truck and fixing accessories shall be included in the cost of basic Forklift Truck.
- 2.3. Tool boxes containing all tools required for the maintenance of the machine should be supplied along with the machine. Unit cost of machine will be inclusive of cost of tool box.
- 2.4. Submission of Catalogues, specification and related drawings for approval to Railways by successful bidder.
- 2.5. The Forklift truck shall be designed, manufactured, erected and tested as per the latest relevant IS specifications.
- 2.6. The bidder's attention is drawn to the **Special Conditions of Contract for Mechanical Works and General specification for supply of M&P (Appendix-A)** specified in the Tender Document.

3.0 Basic design features**3.1 Purpose and capability**

- 3.1.1 The forklift should be capable to lift and transport materials and handling loads as per capacity indicated on continuous basis in the Depot premises.
- 3.1.2 It should be capable of traveling at specified speeds under both loaded and unloaded conditions.
- 3.1.3 Forklifts structures should be designed to accommodate their efficient and safe movement.

- 3.1.4 Dimensions of the fork truck, including overall width and mast width, must be optimum so as to be able to maneuver in congested work areas.

3.2 Mast Carriage & Forks

- 3.2.1 The mast should be high strength and low deflection and capable of accommodating of central loads.
- 3.2.2 The mast should be driven hydraulically, and operated by hydraulic cylinders.
- 3.2.3 The frame should be rugged compact or monocoque frame construction with integral fuel and hydraulic tanks.
- 3.2.4 The driver's overhead guard should protect the driver from falling objects and have excellent upward visibility.
- 3.2.5 The frame should be fabricated from heavy steel plates ensuring excellent rigidity and strength.
- 3.2.6 Tilting of the mast should be controlled by a counter balanced valve to prevent the mast from over running in the forward direction while carrying and tilting the load.

3.3 Engine

The Fork Lift Truck (FLT) should have a 4 Stroke, 4-cylinder water cooled diesel engine with heavy duty dry type air cleaner, dual fuel filter and lubrication oil filter.

3.4 Hydraulic system

Hydraulic system should have reservoir, pump, directional control valves, cylinders and full flow filtration system with bypass protection, suction strainer and replaceable return line filter, Pressure relief, tilt lock and flow control valves for safety.

3.5 Electrical System:

- a) Individual Fuse may be provided for the following Electrical item and suitable identification shall be marked for the same.
 - i) Main Fuse for Battery.
 - ii) Self-starting motor.
 - iii) Indicator light.
 - iv) Front focus light.
 - v) Reverse horn.
 - vi) Reverse focus light.
 - vii) Main horn.
- b) Ignition key and horn switch shall be provided to avoid entry of rain water.
- c) Battery compartment shall be provided on the Anti vibration mounting arrangement to safe guard from heavy jolt and jerk.
- d) The FRP engine hood arrangement shall have adequate strength and clearance to avoid contact on the Battery terminals.
- e) Suitable rubber cap shall be provided for self-starter motor terminals and battery terminals.
- f) Side indicators shall be provided. The indicators shall be protected by suitable guard.
- g) Ignition keys 3 nos. shall be supplied.
- h) Self-starter motor shall be preferably to LUCAS TVS etc make.
- i) Electrical schematic diagram shall be supplied along with instruction manual.
- j) Automatic reverse indications with audible reverse horn to be provided.

3.6 Brake Unit:

The wheel brakes on drive wheels should be of self adjusting hydraulic service brakes. Additional hand operated parking brakes also to be provided for safety.

3.7 Instrumentation and controls:

Instrument panel should have provision of fuel, oil pressure, water temperature, ammeter and engine hour meter gauges ergonomically located for better operator's view. All the gauges should be illuminated for night driving. All control levers, switches and pedals should be located ergonomically enhancing operator comfort.

4.0 Ergonomic Features:

The fork lift truck (FLT) should have the following ergonomic features:

- i) Spacious operator cell with adequate leg room.
- ii) Adjustable driver's seat for comfortable driving.
- iii) Soft touch accelerator and brake pedal for fatigue-free operation.
- iv) Clear View Mast for excellent forward and upward visibility.
- v) Low position cowl and ergonomically placed controls.

5.0 Concomitant Accessories:

All concomitant accessories that are required to make the FLT fully operational on commissioning shall be supplied including the following.

- a) First fill of hydraulic oil, (adequate to last till handing over).
- b) First fill of fuel oil as per tank capacity.
- c) Commissioning and start-up spares
- d) One set of service tools required for all normal maintenance activities including grease gun for lubrication.
- e) Spark Arrester.
- f) Fork extensions.
- g) Safety seat belt.
- h) Standard tool kit.
- i) Fire extinguisher, 1 no.
- j) Reversing hooter alarm.
- k) Rear View mirror.
- l) Lights – Head, Tail and signal.
- m) Canopy – Tarpaulin cover
- n) Towing coupler
- o) Special tools & tackles, if required.

6.0 Technical Literature

Two sets of maintenance manual, workshop manual and spare parts manual of Forklift truck and Engine shall be supplied along with each FLT. All manual and literature should be in English.

7.0 Training of staff

Technical experts of the manufacturer will fully and adequately train operators and maintenance staff nominated by the consignee during commissioning. They shall also provide training in operation and maintenance at their training centre (10 man days i.e. two persons x 5 man days each). This training shall include Forklift architecture, systematic methods for quick diagnosis of problems and quicker methods to solve them, domain knowledge and safety procedures to be followed while working with Forklift.

8.0 Pre-Qualification

The machine offered shall be of preferred make otherwise with prior approval of Railways. The manufacturer must have maintenance infrastructure in West Bengal state to provide adequate after sale technical support. Details of such dealers/authorised workshops must be submitted with the offer. Tenderers shall furnish the make and model of the machine offered along with full technical literature. Details of customers to whom they have supplied similar or equivalent type of forklift truck in India must be submitted.

9.0 Inspection and testing at firms premises:

- 9.1 Pre-shipment inspection shall be carried out by the Railways or authorized representative at the firm's premises before dispatching the forklift trucks, as per approved QAP to ensure quality of the equipment.
- 9.2 A load (initially under no load condition, and on satisfactory completion of these, the trial shall be repeated for various loads until the full rated load and operating range are covered) and functional test (Turning radius, Lifting and Lowering speeds, Gradability checked with 3 ton load and Travelling Speed) must be carried out at the manufacturer's works. Performance of the machine shall be demonstrated to the satisfaction of Railways/authorized representatives.
- 9.3 The Quality Assurance Programme (QAP) will be submitted by the suppliers for approval from Railways.
- 9.4 The contractor shall provide, arrange all the facilities for conducting the test.
- 9.5 All Test certificates of Forklift Truck should be provided by the supplier with proper identification at the time of inspection.

10.0 Erection and Commissioning, Start-up & trial operation and Prove out tests:

- 10.1 The contractor shall carry out the start up trial operation test (commissioning tests) on receipt of authorization from the Engineer.
- 10.2 The trials shall be carried out initially under no load condition, and on satisfactory completion of these, the trial shall be repeated for various loads until the full rated load and operating range are covered.
- 10.3 During the trial operation, all necessary adjustments shall be made so as to ensure compliance with the operating characteristic for the complete equipment as stipulated in the Technical specifications.
- 10.4 The Forklift Truck shall be capable of trouble free operation and work satisfactorily over a period one week, during which the Forklift Truck shall be subjected to the normal work load in the shops in a complete shift during each of the days.
- 10.5 The contractor or his agent shall commission and prove out the equipment successfully as per relevant clauses.
- 10.6 Following items of work shall be performed by the contractor

- (i) Lifting and lowering.
- (ii) Backward and forward tilting.
- (ii) load and functional test

11.0 General:

Deviations, Structural Material, Dispatch of the Machine from Manufacturer Works of the machine are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

12.0 Warranty:

Warranty of M&P is to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

SCHEDULE- (I)**Leading Parameters of Diesel Operated Forklift of 5T capacity**

(Supplied by consignee for guidance of manufacturer)

S.N.	Item/Parameter	Details
1	Capacity	5000 kg
2	Load Centre	600 mm
3	Engine	4 Stroke, 4 Cylinder, Water Cooled Diesel Engine with Heavy duty air filter of latest version
4	Steering	Power Steering
5	Travelling speed	15 km/hr (approx.)
6	Brakes:	
6.1	Service Brakes	Foot operated-Hydraulic
6.2	Parking Brakes	Mechanical
7	Mast	Two Stage Clear View Mast
8	Maximum Fork Height	3600 mm (Approx.)
9	Minimum Ground Clearance	140mm (Approx)
11	Tilt Angle	Forward: 6/10 ° Backward: 6/6 °
12	No. of speeds	Forward: 2, Reverse: 2
13	Turning radius	3250(approx.)
14	Lifting and Lowering Speeds of Mast	400 mm/sec. (minimum)
15	Driver's Seat	Should be stronger to provide comfort to the Driver and Should have arrangement for adjusting.
16	Fork length	1000 mm-1200 mm (approx.)
17	Tyre	Solid cushion tyre
18	Safety items	Electric Horn and Reverse Horn

Note:

1. Performance certificate of above said Machine already supplied shall be furnished.
2. Any better/ latest technical parameter may also be welcomed if accepted by Railway.
3. If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
4. Tenderer should also furnish clausewise remarks on technical specifications.

Specification No.- IM/MEMU/DEMU/Anara/WP/Mech /M&P/BOPT(2T)

Item No. 04

SPECIFICATION FOR BATTERY OPERATED FOUR WHEELED PLATFORM TRUCK, OF 2 TON CAPACITY WITH BATTERY CHARGER

1.0 Scope

The specification covers the design, manufacture, supply, erection and commissioning and proving out of Battery operated platform truck Capacity- 2Ton with all accessories at user end as per instructions and conditions of contract.

1.1 Sources:

Likely sources of manufacturers and suppliers are-

- (i) M/s Jost Engg Comp. Ltd, Thane,
- (ii) M/s Godrej & Boyce Mfg Co. Ltd. Mumbai
- (iii) M/s Voltas, Pune
- (iv) M/s ACE, Faridabad

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources. However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

2.0 General Description and Scope of Supply:

- 2.1 2 Tonnes capacity Platform Truck (Battery Operated) with all accessories, spares etc.
- 2.2 All related material required for inspection, erection and commissioning of Platform Truck (Battery Operated) and fixing accessories shall be included in the cost of basic Platform Truck (Battery Operated).
- 2.3 Tool boxes containing all tools (Electrical and Mechanical) required for the maintenance of the machine should be supplied along with the machine. Tools shall be supplied in two different tool boxes, with individual pocket for each item and shall be of MEKASTER/TAPARIA or reputed ISI make. Unit cost of machine will be inclusive of cost of tool box.
- 2.4 Necessary information regarding the conditions under which the Platform truck is to be used, together with other particulars necessary for manufacture and commissioning of the Platform truck, are given in Schedule-I. Sub mission of Catalogues, specification and related drawings for approval to Railways by successful bidder.
- 2.5 The Platform Truck (Battery Operated) shall be designed, manufactured, erected and tested as per the latest relevant IS specifications.
- 2.7 Technical specifications of M&Ps are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works and General specification for supply of M&P (Appendix –A)** specified of Tender Document.

3.0 Job Requirement and Capability:

- 3.1 The Battery operated Platform Truck should have the following capabilities:

- a) The equipment should be capable for Collection of released batteries from coaches and placed on platform and transport and unload the same at the Battery shop for inspection and recharging.
- b) The equipment shall be capable for collection and transportation of recharged and new batteries from battery shop to the shop floor for fitment on coaches.
- c) The equipment shall also be capable of collection and transportation of materials with in the Workshop and also from stores.

4.0 **Salient Features:**

- a) It should have heavy duty & robust frame.
- b) It should be pollution free, silent in operation and easy to drive.
- c) It should be designed for minimum maintenance and trouble free service.
- d) Platform should be constructed from steel plate in two parts for easy servicing of motor and transmission unit.
- e) Suspension arrangement should be provided on both the axles of leaf springs and shock absorber on the rear axle.
- f) Battery discharge indicator and emergency power cut off switch should be provided for safety purpose.
- g) One Battery charger should be provided for the 36V, 299/300 AH traction battery and 230V 1-Ø main supply for 2T and 48V, 299/300 AH traction battery and 230V 1-Ø main supply for 4T.
- h) The platform truck should be automotive type steering gear unit giving comfortable maneuverability.
- i) The platform trucks should be easily accessible control switches providing better operational excellence.
- j) It should be fail free operations resulting into long life of the equipment.
- k) The truck should be provided with revolving lights, reverse buzzer, side indicators, side flaps etc.

5.0 **General Description:**

- 5.1 Battery operated Industrial Platform Truck of 2000 kg capacity.
- 5.2 **Charger:** The truck should be supplied with high frequency constant current charger of suitable rating as a standard.
- 5.3 **Wheels:** Solid rubber tyres are provided on both front and rear axle for operating over a variety of surface conditions. The steel rim bonded rubber provides adequate resilience.
- 5.4 **Brakes:** Internally expanding foot operated hydraulic brakes on rear wheels ensures smooth braking. Parking brake is actuated by hand operated lever on the left hand side of the operator's seat.
- 5.5 **Safety:** The parking brake enables vehicle to park on slopes without any kind of movement. The emergency power cut-off switch isolates the battery from the control panel to prevent any situation in emergency. Safety accessories like revolving / flashing lights, reverse buzzer, side indicators, can also be supplied with the truck.
- 5.6 **Suspensions:** The suspension should be through leaf springs and shock absorbers on both the axles.
- 5.7 **Steering:** Steering mechanism (on left side) consists of automotive steering gear unit. The entire unit should be suitably inclined towards operators seat for comfortable drive.

- 5.8 **Control Panel:** The control panel should be provided with conveniently located simple controls such as ON-OFF key switch, forward and reverse switch, emergency power cut-off switch, battery discharge indicators (LED-type), Battery level indicator with hour meter display.
- 5.9 **Operator Area:** Comfortable seat with back rest ergonomically positioned over battery cover with easy reach to steering wheel and optimum leg-space for operating the accelerator and brakes. The control switches on the panel are easily visible and accessible.
- 5.10 **Front Axle:** Front axle comprises of robustly constructed, central axle and stub axle with king pin assembly. The front axle connected to the main chassis through the suspension system.
- 6.0 Technical Specifications**
- 6.1 Description: Battery operated four wheeler platform truck with suspension, front & rear shock absorbers, brakes and traction battery with battery charger.

6.2 Technical Requirements

The platform truck shall be complete with –

- (i) Prime mover – battery, battery charger, driver's seat, horn (electric), lights.
 - (ii) Battery shall conform to IS 5154 with Amendment No. 1 & 2 or latest.
 - (iii) The chassis shall be made of steel channels welded to cross members and shall be robust in design to withstand shocks. All materials used and equipment offered should conform to IS: 6305 (Pt.I & II), IS: 7496 & IS: 7553 to the extent possible.
 - (iv) One set of tools.
 - (v) Chequered plate properly fitted.
 - (vi) Service brakes as well as parking brakes shall conform to IS: 9701.
- 6.3 The Tenderer will submit manufacturer's test certificate for (i) battery, (ii) motor and (iii) battery charger at the time of inspection.

7.0 General Specifications (Electrical):

- 7.1 Direct acting electrical indicating instruments shall confirm to International standards.
- 7.2 Batteries shall confirm to International Standards.
- 7.3 Complete wiring diagrams, schematics, spare parts catalogues, maintenance manuals, operating instructions and details of coils and windings used in the equipment to facilitate repairs and maintenance is to be furnished.

8.0 Technical Literature

Four sets of maintenance manual, workshop manual and spare parts manual shall be supplied along with each Battery operated platform truck.

Note: All manual and literature should be in English.

9.0 Training of staff

Technical experts of the manufacturer will fully and adequately train operators and maintenance staff nominated by the consignee during commissioning. They shall also provide training in operation and maintenance at site. This training shall include Platform Truck architecture,

systematic methods for quick diagnosis of problems and quicker methods to solve them, domain knowledge and safety procedures to be followed while working with Platform truck.

10.0 Inspection and testing at firms premises:

- 10.1 A load (initially under no load condition, and on satisfactory completion of these, the trial shall be repeated for various loads until the full rated load and operating range are covered) and functional test (Turning radius, Gradiblity checked with load and Travelling Speed) must be carried out at the manufacturer's works. Performance of the machine shall be demonstrated to the satisfaction of Railways/authorized representatives.
- 10.2 The tenderer shall submit Quality Assurance Plan being followed at the manufacturer's works for ensuring quality of the products offered. In case, the firm is ISO certified, a copy of valid certificate may also be enclosed with the offer. The Quality Assurance Programme (QAP) will be submitted by the suppliers for approval from Railways.
- 10.3 The Platform Truck shall be inspected and tested by the Engineer or his authorized representative at the contractor's premises as per the QAP approved. However, the purchaser or his authorized representative is free to institute any further checks also, if he so desires, and shall be in no way binding on the Purchaser
- 10.4 Manufacturers must have suitable facilities at their works for carrying out various performance tests on the sub-assembly/assembly/machine. The tenderer shall clearly confirm that all facilities exist and shall be made available to the inspecting authority.
- 10.5 Railways reserves the right for surveillance inspection of firm after placement of order to assess the ongoing process of manufacturing and facilities available with them. In case the inspection team observes the deficiencies/ deterioration in infrastructure/manufacturing capability at the firm's premises, the action can be initiated as considered appropriate on merit.
- 10.6 The contractor shall provide, arrange all the facilities for conducting the test.
- 10.7 All Test certificates of Platform Truck should be provided by the supplier with proper identification at the time of inspection.

11.0 Erection and Commissioning:

- 11.1 The contractor shall arrange erection and commissioning of the Platform Truck. Adequate number of teams of technical experts will be made available so that erection and commissioning delays are eliminated. Such personnel will be required to be present immediately as soon as the Platform Truck has been received. The Contractor or his agent would be required to inspect the consignment at the consignee's end before unpacking is done and carry out a joint check of the receipt of components to avoid subsequent complaints regarding short shipment or transit damages.
 - 11.1.1 The contractor or his agent shall commission and prove out the equipment successfully as per scheduled time frame
- 11.2 Following items of work shall be performed by the contractor
 - a. load and functional test
 - b. Turning radius,
 - c. Gradiblity checked with load

d.Travelling Speed

12.0 Following items are also included in bidder's scope:

- I. Consumables like first fill of lubricating oils etc for the initial operation of the equipment till handing over.
- II. Commissioning materials.
- III. Special tools & tackles, if required.
- IV. Spare parts for Two years trouble free operation and maintenance.
- V. All drawings/documents along with operation and maintenance manuals, spare parts manual and troubleshooting guides as per requirement mentioned elsewhere in the tender document.
- VI. Carrying out any modifications /deletions /addition /alternation in Make/Model/design /drawings /documents as required by client for proper execution of works at site till completion and handing over of the equipment to the purchaser should be brought to the notice of Railways.

13.0 Dispatch of the Machine from Manufacturer Works:

The supplier should normally dispatch the machine only after the site is ready for installation and commissioning of the machine on arrival.

14.0 General:

Deviations, Structural Material, Dispatch of the Machine from Manufacturer Works of the machine are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

15.0 Warranty:

Warranty of M&P is to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

SCHEDULE- (I)**LEADING PARAMETERS OF BATTERY OPERATED PLATFORM TRUCK, CAP. 2T**

S.N.	Items/Parameters		Details
1.	No of Platform truck	:	01
2.	Capacity	:	2000kgs
3.	Platform Size	:	1850mm x 1400mm (approx.)
4.	Platform Height	:	655mm (approx.)
5.	Towing height	:	610mm (approx.)
6.	Overall height	:	1585mm (approx.)
7.	Overall length	:	3200mm (approx.)
8.	Minimum Ground Clearance	:	250mm (approx.)
9.	Speed	:	8 -10km/hr
10.	Wheels Type	:	4 wheels, Solid rubber Non-skid type
11.	Wheels Size (Front and Rear)	:	φ535 mm x 127 mm
12.	Wheel Base	:	1830 mm (approx.)
13.	Track width Rear/Front	:	1080(Approx.)
14.	Turning Radius	:	3250mm approx
15.	Gradient performance a) Laden b) Unladen	:	7% (Approx.) 10%(Approx.)
16.	Traveling speed a) Laden b) Unladen	:	6 to 7 km/hr approx 9 to 10 km/hr approx
17.	Brakes	:	Hydraulic service brake and manual hand brake
18.	Battery voltage, nominal capacity. (Make and Model of the Battery supplied shall be specified in the offer)	:	36V/299Ah
19.	Battery Charger (Single phase-Automatic type)	:	36V/40A or suitable
20.	Sound level at driver end	:	85db

21	Steering	:	Standard Automobile Type
22	Battery Compartment (WxL)	:	450 x 945 Approx.
23	Type of Operation	:	Seated
24	Type of transmission	:	To the Rear wheels through fully enclosed sprung differential axle.
25	Gear Box speed controller i) No of speeds forward ii) No of speeds reverse	:	3 Speed 3 Speed
26	Controls		
(a)	ON-OFF key switch		Yes
(b)	Emergency power cut-off switch		Yes
(c)	Forward and Reverse switch		Yes
(d)	Battery discharge indicators		LED type
(e)	Battery level indicator with hour meter display		Yes

Note:

1. Performance certificate of above said Machine already supplied shall be furnished.
2. Any better/ latest technical parameter may also be welcomed if accepted by Railway.
3. If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
4. Tenderer should also furnish clausewise remarks on technical specifications.

Specification No.- IM/MEMU/DEMU/Anara/WP/Mech /M&P/SLJ(15T)

Item No. 05

**SPECIFICATION FOR ELECTRICALLY OPERATED
SYNCHRONISED LIFTING JACKS 15 TON (1 SET = 5 JACKS)**

1.0 Scope

The specifications covers the supply shall include design, supply, manufacturing, installation, testing, commissioning and proving out of 15 Ton Electrically Operated Synchronized Screw Jacks for lifting and lowering of coaches with all accessories, spares etc as per instructions and conditions of contract. It shall also include installation and commissioning of related equipment, training of personnel in operation and maintenance of machine and supply of technical documentation.

1.1 Sources:

Likely sources of manufacturers and suppliers are-

- i. M/s Marwaha Mfg. Co., New Delhi
- ii. M/s Hydropack (I) Pvt Ltd, Belgaum, Karnataka
- iii. Metal Engineering & Treatment co pvt ltd, Kolkata
- iv. M/s Navyug Industries - Delhi
- v. Jamalpur Jacks, Jamalpur

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources. However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

2.0 General Description and Scope of Supply

- 2.1 15 Tonnes capacity Electrically Operated Synchronised Screw Jacks with all accessories. Each set of Jack comprising (4no + 1no spare) = 5 numbers of jacks. The specification covers the design, manufacture, supply, installation, testing and commissioning of Electrically Operated Synchronised Screw Jacks. The supply shall include all equipment and concomitant accessories as detailed in the specification, and any other equipment which the manufacturer considers essential to make the jacks fully operational when installed and connected to a power source.
- 2.2 All related material required for inspection, erection and commissioning of Electrically Operated Synchronised Screw Jacks and connecting electrical equipments with cable, cable laying and fixing accessories shall be included in the cost of basic Jacks.
- 2.3 A tool box containing all tools (Electrical and Mechanical) required for the maintenance of the Electrically Operated Synchronised Screw Jacks should be supplied with Screw Jacks. Unit cost of machine will be inclusive of cost of tool box.
- 2.4 Necessary information regarding the conditions under which the Electrically Operated Synchronised Screw Jacks is to be used, together with other particulars necessary for manufacture and commissioning of the Screw Jacks, are given in Schedule-I. Sub mission of Catalogues, specification and related drawings for approval to Railways by successful bidder.
- 2.5 The Electrically Operated Synchronised Screw Jacks shall be designed, manufactured, erected and tested as per the latest relevant IS specifications.

- 2.6 Technical specifications of M&Ps are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works and General specification for supply of M&P (Appendix –A)** specified of Tender Document.

3.0 Job Requirement and Capability

- 3.1 The Electrically Operated Synchronised Screw Jacks should have the following capabilities:

- d) The Synchronized Lifting Jack along is required for lifting and lowering of coaches of Indian Railway.
- e) The screw jacks shall be capable of lifting and lowering of MEMU and all types of coaches for inspection and maintenance.
- f) Each jack shall have the capacity to lift the load specified at Schedule-I, and four such jacks plus one spare shall make one complete set.
- g) It shall be possible to operate the jacks individually, in pairs, or all 4 together in synchronisation for lifting and lowering, and sustaining functions from a central control panel which itself shall be portable. The accuracy of synchronisation, when operated in pairs or in fours, shall be within $\pm 5\text{mm}$.
- h) Each jack shall be capable of lifting and sustaining the proof load at any point between the maximum and minimum heights **specified in Schedule-I**.
- i) Each jack shall be tested at 1.25 times the proof load.
- j) The equipment shall be required to work in tropical conditions under ambient conditions of temperature ranging from 0 to 50°C, relative humidity of upto 100% and comparatively dusty shop atmosphere. All equipments should be designed to function efficiently under these conditions.

4.0 Concomitant Accessories

The scope of supply shall include the following concomitant accessories that are required to make the equipment fully operational on installation. The cost of such accessories shall be included in the basic price of the machine. .

- 4.1 First fill of oil/grease with sufficient quantity of lubricants for initial commissioning of the equipment.
- 4.2 One set of tools for maintenance of the equipment. The list of tools shall be furnished in the offer.
- 4.3 Removable metallic tray 1 no. of adequate size shall be provided for collection of excessive/leaking oil and grease. The oil and grease collected in the tray will manually be disposed off during service.
- 4.4 Electrical Power Distribution from source (Estimated Quantity):
 - 4.4.1 All PVC flexible copper cables of adequate ratings required to connect electrical control cabinet, terminal box, jacks, etc. (sizes of cables to be furnished).
 - 4.4.2 Supply, erection and installation of 150 watt LED high bay industrial luminaries fitting having Al alloy housing and natural air flow cooling system with IP 65 protection, over-voltage, overload, over temperature protection and other required safety features – 6 nos.

- 4.4.3 Supply, erection and installation of 115 watt LED high bay industrial luminaries fitting having Al alloy housing and natural air flow cooling system with IP 65 protection, over-voltage, overload, over temperature protection and other required safety features – 4 nos.
- 4.4.4 Supply, erection and installation of 2x18 Watt LED Tubelight fitting box type 4 FEET LENGTH with 2 nos. T8 LED 18 W Tube light of 2100 lumen output, integrated inbuilt electronic driver Complete LED BATTEN 2x18 – 6 nos.
- 4.1.5 Load gauges to be provided on control panel for indication of load distribution on each jack separately.
- 4.1.6 The load screw, both above and below the carriage, shall be protected by telescopic bellows cover.
- 4.1.7 The scope also covers supply necessary spare for normal operation and maintenance for two years Unit cost of machine will be inclusive of cost of spares.

5.0 Any other Accessories

Any other accessories which, in the opinion of the bidders, can contribute to higher productivity rates should be quoted for separately explaining the advantages and limitations. The prices of above items should be included in the basic cost.

6.0 Basic Design Features

6.1 Design.

- 6.1.1 The general characteristics of the equipment shall be as per Schedule-I attached, to the extent that these clauses are applicable.
- 6.1.2 The design of the jacks shall be such that the load screw shall be subjected to tensile and torsional stresses only, while lifting and supporting loads.
- 6.1.3 The design of the jacks shall be based on sound engineering practices and shall be adequate to ensure safety of operation at all times.
- 6.1.4 Jacks shall automatically go into locked position in case of power failure, failure of any components or faulty operation, to ensure safety. Arrangement for manual over-ride shall also be provided so that each jack can be operated individually, if required.
- 6.1.5 Jacks shall be provided with retractable steel wheels of adequate strength, mounted in such a manner that when the claw Carriage is moved upwards under load, the wheels are automatically raised and the base of the jack sits firmly on the floor. Similarly, when the claw is lowered and the jack is released, the wheels shall automatically be lowered to rest on the floor so that the base of the jack is raised to provide the specified ground clearance **(Wherever Applicable)**.
 - 6.1.5.1 The base shall be provided with three wheels- two fixed wheels on the claw side and one swiveling wheel on the other side to enable movement .The weight of the jack shall be transferred to the wheels through hydraulic system making use of a manually operated hydraulic pump to enable movement of the jack. The jack shall get lifted vertically by simultaneous flow of hydraulic medium to all the cylinders/actuators of the wheels. One manually operated valve shall be provided to transfer the weight of the jack on the base frame, in case the jack is operated with its weight on the wheels. This valve shall operate as soon as the jack gets loaded. The details on this safety feature shall be furnished. **(Wherever Applicable)**.

- 6.1.6 The tenderer shall also indicate details of the safety devices provided in case of failure of load nut threads during operation.
- 6.1.7 Drawings indicating supporting details of the load screw, connection between load screw and the worm wheel, and the mechanism to protect load screw from transverse loading, shall be submitted. The offer shall also include interlocking arrangement to ensure stoppage of all the jacks in case of failure of any one while operating in synchronised mode. Details of lifting head design which contribute to avoidance of slipping during operation, shall necessarily be furnished.
- 6.1.8 Care must be taken during design to ensure safety of operation at all times. All moving parts shall, where practicable, be fitted with adequate safety guards.
- 6.1.9 A factor of safety of 5 minimum shall be built into the design. The actual factor of safety shall be indicated.

6.2 Jack Frame

- 6.2.1 The Jack frame shall be of robust design and preferably is a fabricated steel structure and shall be capable of withstanding an overload of 25%.
- 6.2.2 The steel used shall conform to IS: 2062. All welded joints shall be checked for weld defects and stress relieved. The welding shall conform to IS:816 or 823, as the case may be. A cross-sectional drawing shall be submitted, clearly showing the various stiffeners provided for structural strength.
- 6.2.3 The frame assembly shall basically consist of a base plate and two main upright columns, with adequate rigidity and strength for stability at all positions of load screw and projection arms and their attachments. The uprights shall be perpendicular to the base of jack frame to ensure verticality on the level cement floor
- 6.2.4 The upright column shall be fully machined hardened and ground for smooth movement of the carriage. The surface finish and the hardness should be indicated in the offer.
- 6.2.5 The load shall be transmitted to the floor through the base plate.

6.3 Lifting Arm and Carriage

- 6.3.1 The fixed lifting arm and carriage shall be a fabricated steel structure.
- 6.3.2 The carriage shall be mounted on suitable carbon/alloy steel rollers fitted with self-lubricating antifriction bearings.
- 6.3.3 The carriage rollers shall be engaged on hardened and ground upright column for smooth and wearless movement of carriage. Hardness of rollers shall be mentioned.
- 6.3.4 The design of the mounted rollers shall be such that wear does not adversely affect the alignment of the load nut with the screw.
- 6.3.5 The vertical downward load on the lifting arm shall be countered by a set of rollers mounted on the carriage against upward frame. The arrangement should be clearly described with the help of drawings.
- 6.3.6 The moving carriage shall be of rigid construction, provided with machined housings accurately bored to receive the load bearing lifting nut trunnion in relationship to the roller axles.
- 6.3.7 The claw portion getting engaged with the coach body shall be manufactured from the suitable steel with knurled surface for ensuring sufficient friction for holding.

6.3.8 The lifting claw shall be capable of moving with reference to jack frame by manual operation through hand wheel, rack and pinion arrangement. The details on this may be explained **(Wherever Applicable)**.

6.3.9 The contact with the coach body shall be sensed through micro switch provided in the lifting claw and interlocked with electric so that all the jacks shall be operated in simultaneous mode on getting the feedback from this sensing device so that claws are in contact with the coach body.

6.4 Load Nut and Screw

6.4.1 The load screw shall be suspended from the top of the jack frame, so as always to be under tension to eliminate the risk of buckling.

6.4.2 The load screw shall be of medium carbon alloy steel having either single start buttress or saw tooth thread (in accordance with IS: 4696 (latest)). The screw shall be manufactured through thread milling process for thread formation. The material specification, procedure for heat treatment and inspection of screw at various stages should be fully explained.

6.4.2.1 The screw rod shall be ultrasonically tested. The test shall be witnessed by the inspecting authority.

6.4.3 The upper end of the screw shall be supported by a ball thrust bearing having a spherical seated housing and held in position by a retaining nut suitably clamped at the top, and self-aligning ball bearing at the bottom.

6.4.4 The load carrying lifting nut, which shall be single piece for easy removal for inspection and shall be of bronze, and shall incorporate a flange to transmit the load to the housing forming the trunnion block.

6.4.5 The lifting nut trunnion block shall be capable of swivelling in the moving carriage headstock.

6.4.6 A safety steel nut shall be provided as a safety device underneath the load nut to prevent any accidental falling of load. The arrangement provided to prevent rotation of the safety nut with respect to the load nut, and its wear compensation, shall be clearly described with a sectional drawing.

6.5 Drive Motor and Transmission

6.5.1 A motorised transmission arrangement shall be provided to allow push button control of rotating vertical screws for lifting speeds as specified in **Schedule -I**.

6.5.2 A standard totally enclosed, oil-immersed reduction gear system shall be provided for transmission. The reduction gear box preferably shall be one of the following makes only:- Nord, SEW, Elecon, Greaves, Shanti Gears, New Allenbury or Flender.

6.5.3 The tenderer should explain in full detail with the help of assembly drawing the transmission arrangement and reduction gear system in the offer. The tenderer should explain the external and internal configuration of the gear box, the number of reduction stages and the types of gears used. The bidder shall also offer an arrangement to drive the load screw on manual mode in case of power failure. Each jack shall be provided with suitable ratchet spanner and extension spindle for the purpose.

6.5.4 The load screw shall be self-sustaining in operation under proof load conditions, irrespective of application of the motor brake.

6.5.5 The drive assembly should have a suitable integrated disc brake.

- 6.5.6 The tenderer shall submit detailed motor power calculations duly taking into account the efficiencies of the screw/nut, gear box, chain/V Belt drive, thrust bearing and motor. The basis on which the figures of various efficiencies are based must be explained through detailed calculations where necessary or reference to standard published data.
- 6.5.6.1 The HP of the motors shall be computed taking into account ambient temperature of 50 deg. C and voltage fluctuation of $\pm 10\%$. For calculating motor power derating factors for both these operating conditions should be taken as per manufacturers catalogues.
- 6.5.7 Calculations for screw rod, nut diameters and screw rod, nut stress calculations must be submitted. The permissible stress of the materials used must be indicated.
- 6.5.8 The ball/roller bearings used in the manufacture of screw jacks shall be of reputed makes SKF/FAG/NORMA/NTN only. The make of bearings offered shall be indicated. The successful tenderer should submit inspection certificates from the manufacturer, foreign or indigenous.

6.6 Mobile Control Panel & Electrical System

- 6.6.1 The mobile control panel shall be operated at a control voltage of 110 V, and shall be provided with, but not necessarily limited to, the following equipments :
- Pilot light indicators to show whether the mains supply is 'ON' or 'OFF' for each Jack separately.
 - 2 limit switches for each jack.
 - One number main rotary switch.
 - Voltmeter for incoming power supply with selector switches
 - Jack ON/OFF selector switch for each jack.
 - Control panel ON/OFF switch.
- 6.6.2 Each Jack shall be provided with a push-button station for initial adjustment of the lifting claw and the central control panel shall be mounted on wheels for group or sub-group operation. Inter-connection cable with plug and sockets both for power and control circuits shall be provided for inter-connection between central control panel and each individual jack. The set of 4 jacks shall be placed at the 4 lifting points of the coach to be lifted.
- 6.6.3 The control console shall comprise a cabinet mounted on three or four (i.e. two fixed and one or two swivel) oil resistant neoprene (or equal) tyred wheels, of 150mm minimum diameter, and have a pram type handle at the swivel wheel end for maneuvering purposes. The two fixed wheels shall be fitted with foot operated brakes. The operating face of the console shall be approximately 800 mm above floor level. The panel shall have IP-44 enclosure.
- 6.6.4 The system shall be suitable for 415V $\pm 10\%$ volts, 3-phase, 50 cycle $\pm 3\%$ AC supply. The starter shall be provided with suitable Circuit Breaker of adequate capacity for motor control applications.
- 6.6.5 The control panel shall be equipped with the following:-
- Triple-pole load break heavy duty main circuit isolating switch.
 - One double-pole quick break miniature circuit breaker (MCB) for the control circuit.
 - Thermal overload alongwith built in single phasing preventor for each motor and HRC fuses for total short-circuit protection of the system. The circuit should be foolproof so that

all the motors will be immediately stopped as and when any motor is overloaded and an indication of the same will be available by observing the Trip-Indication Signal Lamp.

- d) HRC fuses for control circuits.
- e) Triple-pole air-break contactors Direct on line suitable for AC3 duty for hoisting and lowering.
- f) Selector switch/push button/master switch.
- g) Indicating lamps for power supply 'ON'/'OFF'.
- h) Overload trip indicating lamp for each drive.
- i) Emergency stop.
- j) Ammeter for each jack motor

6.7 Operation of the Equipment

6.7.1 Any one or all or any combination of two or four jacks shall be capable of being operated by selection of independent switches as well as master control switch on the control panel, with pilot lamps to indicate the status of each function.

6.7.2 Before commencing lifting operations, the jacks are to be maneuvered as follows:

The jacks shall be positioned correctly to engage with the vehicle to be lifted. Individual jacks shall then be operated until all load lifting arms are just engaged. The jacks should then to be operated on synchronization mode by master controller

6.7.3 A linear scale graduated in mm. preferably should also be provided on the upright column to facilitate checking of relative heights during operation. Correction of errors shall be achieved by selection or otherwise of any jack or jacks for movement in either direction.

6.7.4 Each jack shall be fitted with upper and lower electrical limit switches of the self resetting type.

6.7.5 Each jack shall be capable of being maneuvered easily and safely in any direction by one person. The arrangement provided shall be clearly explained with the help of drawings.

6.7.6 Each lifting jack shall be provided with an emergency switch for monitoring the wear of lifting nut. In new conditions, the clearance between main nut and follow-up nut shall be 3.6 mm to 4.2 mm. In case of clearance falling below 1mm because of wear of main nut as well as in the case of main nut breaking, this switch shall operate and cut off the complete equipment.

6.8 Lubrication

6.8.1 The jacks shall be provided with a suitable lubricating system to supply lubricant to each lubrication point. Details of the lubricating system offered shall be described along with a diagram.

7.0 Safety:

Machine shall be incorporated with all safety features/safety devices for complete protection of operator & machine from all possible operational failures.

8.0 Technical literature

8.1 One copy of the printed illustrative catalogue showing features of the each type of jacks and its elements must be furnished.

8.2. The successful tenderer will have to furnish, for each set 4 copies of spare parts catalogue giving the part list number of each component and also the catalogue number of sub Vendor for the bought out parts, assembly drawings of major assemblies, maintenance manual,

trouble shooting guide, operation manual of the jacks and all electrical circuit diagrams. The bidder shall provide a list of literature that shall be supplied along with the jacks.

The technical literature shall be provided for the complete jacks including imported and indigenously purchase components/sub-assemblies.

Note: All manual and literature should be in English.

9.0 Training of staff:

Technical experts of the manufacturer will fully and adequately trained operators and maintenance staff nominated by the consignee during commissioning. This training shall include architecture, systematic methods for quick diagnosis of problems and quicker methods to solve those, domain knowledge and safety procedures to be followed while working. They shall also provide training in operation and maintenance at their training centre (6 man days i.e. two persons x 3 man days each). This training shall be free of cost.

10.0 Inspection and testing at firms premises:

- 10.1 The contractor shall submit test certificates for all electrical equipment, cables, and all parts used in handling loads.
- 10.2 The Screw Jack shall be inspected and tested during every different stages of its manufacture starting from raw materials, till the completion of the Screw Jack, by the Engineer or his authorized representative at the contractor's premises as per the QAP approved. However, the purchaser or his authorized representative is free to institute any further checks also, if he so desires, and shall be in no way binding on the Purchaser.
- 10.3 The Screw Jack shall be tested in all respects in conformity with QAP in the presence of Railways or his duly authorized representative before dispatch from the contractor's premises. The manufacturer shall inform the Railway at least 4 weeks prior to the testing of the Screw Jack at manufacturer's works.
- 10.4 All electrical and mechanical equipment shall be tested in accordance with the appropriate Indian Standard at either the Screw Jack maker's or equipment manufacturer's works and test certificates provided if required by the Purchaser or his representative.
- 10.5 The contractor shall provide, arrange all the facilities for conducting the test.
- 10.6 A load test must be carried out at the manufacturer's works for each jack at 1.25 times the proof load. Rigidity of the jacks must be demonstrated to the satisfaction of the appointed inspector/inspecting agency.
- 10.7 Manufacturers must have suitable facilities at their works for carrying out various performance tests on the jacks. The tenderer should clearly confirm all facilities exist and shall be made available to the inspecting authority.
- 10.8 A sample inspection chart for inspecting the jacks should be supplied. The inspection charts should indicate all the tests that are carried during the jacks manufacture.

11.0 Erection and Commissioning:

- 11.1 The contractor shall arrange erection and commissioning of the Screw Jack. Adequate number of teams of technical experts will be made available so that erection and commissioning delays are eliminated. Such personnel will be required to be present immediately as soon as the Screw Jack has been received. The Contractor or his agent would be required to inspect the consignment at the consignee's end before unpacking is done and

carry out a joint check of the receipt of components to avoid subsequent complaints regarding short shipment or transit damages.

11.2 Following items of work shall be performed by the contractor

- a. Installing of the Screw Jack structure and associated machinery in position.
- b. Complete fitting and wiring of all electrical items
- c. The Screw Jack performance shall be demonstrated after successful commissioning.

11.3 The contractor shall arrange the rolling stock equal to the weight or equivalent at which jacks are to be proved out at their end within seven days of receipt of jack at site.

12.0 Start-up and trail operation (commissioning) and Proving-out tests:

12.1 The contractor shall carry out the start up trial operation test (commissioning tests) on receipt of authorization from the Engineer.

12.2 During the trail operation, all necessary adjustments shall be made so as to ensure compliance with the operating characteristic for the complete equipment as stipulated in the Technical specifications.

12.3 The Screw Jack shall be capable of trouble free operation and work satisfactorily over a period one week, during which the Srew Jack shall be subjected to the normal work load in the shops in a complete shift during each of the days.

12.4 After the satisfactory completion of the start up and trial operation test, the Engineer shall authorize the contractor to carry out the proving-out tests. The contractor shall establish to the satisfaction of the Engineer the performance of the Screw Jack with regard to the following:

- (i) The Screw Jack shall be tested to lift and sustain a minimum test load of 125% of the working load when the load is located at the center of the span both at the contactor's works and at site.
- (ii) The jacks performance shall be demonstrated by the contractor or his agent at consignee's works. Thereafter the jacks performance shall be watched by the consignee for a period of 30 days (each working day having 2 shifts of 8 hrs) before the final proving test certificate is issued.
- (iii) **Speed Test:-** All the motion of the Screw Jack shall be tested with rated load and the rated speed shall be attained within the tolerance limits as per relevant IS.

13.0 Following items are also included in bidder's scope:

- (i) Commissioning and start-up spares.
- (ii) Special tools & tackles, if required.
- (iii) The scope covers supply necessary spare for normal operation and maintenance for two years on two shift basis.
- (iv) All drawings/documents along with operation and maintenance manuals, spare parts manual and troubleshooting guides as per requirement mentioned elsewhere in the tender document.
- (v) Getting approval of Make/Model/design/drawings and any design calculation related to the equipment from Railways.
- (vi) Trailing/flexible cables as required for the Screw jack shall be in bidder's scope.

- (vii) Carrying out any modifications /deletions /addition /alternation in Make/Model/design /drawings /documents as required by client for proper execution of works at site till completion and handing over of the equipment to the purchaser should be brought to the notice of Railways.
- (viii) All Civil work including foundation (if any) for screw jack shall be in contractor scope.
- (ix) All types of cables, connections, conduits, circuit breakers etc. required for connecting power supply point to different parts of the machine/control cabinets, shall be the responsibility of the bidder. Requirement of grounding/earthing with required material shall also be incorporated by the bidder during construction of foundation.
 - a. All non-current carrying metallic parts shall be double earthed as per IE rules. Separate earth pit for control and power circuits as per IS shall be in the contractor scope
 - b. All wiring for power, control, lighting etc. shall be carried out with 1.1 KV grade armoured cable except flexible cable where armoring shall not be provided. Power cables shall be minimum 4mm² copper. Control cable shall be minimum 1.5 mm² copper. The control and power cables shall be ferruled at both ends of the cable.
 - c. Depending upon the application, the different voltages other than 415, 3 phase, 50 Hz AC shall be obtained through individual separate transformers units connected to 3-phase 415 volts A.C. supply.

14.0 General:

Deviations, Structural Material, Dispatch of the Machine from Manufacturer Works of the machine are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works and General specification of M&Ps (Appendix-A)** specified in Tender Document.

15.0 Warranty:

Warranty of M&P is to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

16.0 Performance and Reference:

- 16.1 The tenderer should provide satisfactory evidence, acceptable to the purchaser, to show that he is a licensed manufacturer with adequate plant and manufacturing capacity, and has a Quality Assurance Plan designed to ensure in-house control of consistent quality standards.
- 16.2 He should also furnish a statement giving a list of items as per his offer and/or similar, supplied by him during the last 3 years, along with purchasers names and addresses, order nos. dates of supply vis-a-vis delivery periods as per contract, and evidence regarding their performance.

17.0 Special Features:

Special features incorporated into the screw jack, if any, shall be indicated separately by the tenderer, clearly indicating the advantages of these features. Where these have already been described against earlier clauses of this specifications, the list of such clause-wise remarks should be indicated this clause.

18.0 Service Facility in India and Technical Support

The tenderer will clearly spell out in the offer the facilities available with him or his agent for providing adequate after-sales service in India during warranty period. The complete details

such as organization for after sales service, availability of technically competent engineers and warehousing facilities for spares should be clearly indicated.

19.0 Bought Out Items:

The bidder shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the bidder and proposed to be used, along with the manufacturer's name, brand model etc. The successful bidder may be required to produce invoices to ensure genuineness of such products / verification by the Inspecting agency.

Sno	Description	Make
1	Motors	: ABB/ CROMPTON/BBL / SIEMENS/ KIRLOSKAR /MARATHON /SEW EURODRIVE/NORD
2	Cables	: LAPP/SIEMENS /POLYCAB/FINOLEX/UNIVERSAL/ICC
3	Contactors	: L&T/SCHNEIDER/C&S/SIEMENS/BCH
4	Limit Switches	: SPEED-O-CONTROL/CCE/ELECTROMAG/C&S/CMK ELECTRO POWER PVT LTD
5	Overload relays	: SIEMENS/ BCH/L&T/SCHNEIDER/C&S
6	Switch gears	: L&T/SCHNEIDER/ C&S/SIEMENS/ HAVELLS/BCH/ ABB
7	Control Panels	: RITTAL/BCH/ SIEMENS with IP55protection
8	Bearings	: NBC/SKF/FAG/TIMKEN
9	Gear Box	: Nord, SEW, Elecon, Greaves, Shanti Gears, New Allenbury or Flender
10	Push Button	: SIEMENS/SCHNEIDER/TEKNIC
11	Brake	: PETHE/STROMAG
12	Meters	: AE/L&T/ SCHNEIDER/ SIEMENS
13	Sockets for hand lamps etc.	: CROMPTON/BCH/REYROLL
14	Indicating lamps	: SIEMENS/TEKNIC/BCH
15	Safety Switches	: SCHNEIDER/SIEMENS/BCH
16	Junction Box	: RITTAL/BCH/ SIEMENS

Note:-

Test certificates of bought item should be provided by the supplier with proper identification at the time of inspection. The tenderer should explicitly mention "not applicable" against the items indicated above, whichever is not applicable in the offered machine.

SCHEDULE- (I)

Leading Parameters of Electrically operated synchronized Lifting jack
(Supplied by consignee for guidance of manufacturer)

SLNO	Item	Parameter/Details
1.	Duty classification	: Class 2 Portable
2.	Load capacity of each jack	: 15T
3.	Total Quantity of Jacks (4jacks which can works simultaneously plus 1 jack as spare= total 5 jacks)	: 1sets (1 Set consisting of 4 Nos. + 1no Spare)
4.	Total lift of claw (Min.)	: 1570 mm
5.	Maximum claw height from ground level	: 2200 mm (min.) subjected to prior approval of Railway
6.	Minimum claw height from ground level	: 600 mm (approx)
7.	Dimension of lifting head	: 300 x 200 mm
8.	Ground clearance when resting on wheel	: 20 mm
9.	Hoisting speed	: 200 mm/min.
10	Motor power	: 5 KW
11	Other Requirements	
11.1	The claw shall be movable type, the dimensions for movement shall be got approved from the consignee at the time of GA drawing approval.	
11.2	The dimensions of claw projection from face of column should be got approved from consignee at the time of GA drawing approval, based on requirement	

Note:

1. No deviation will be permitted against item 1, 2, 3 & 10 other dimensions are approximate and minor variation are permitted.
2. Supplier shall have to provide related drawings/diagrams (Civil if any, Mechanical,& Electrical etc), electrical load & electricity
3. If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
4. Tenderer should also furnish clause wise remarks on technical specifications.
5. Performance certificate of above said Machine already supplied shall be furnished.
6. Any better/ latest technical parameter may also be welcomed if accepted by Railway.

Specification no. IM/MEMU/DEMU/Anara/WP/Mech/M&P/RRSV Item No. 06

SPECIFICATION FOR RAIL CUM ROAD SHUNTING VEHICLE

1.0 Scope

The specification covers supply, installation, testing and commissioning of Battery Operated Rail cum Road shunting vehicle for on Track Shunting of MEMU Coaches (Trailer Coach & Motor Coach) and other BG coaches at Integrated maintenance shed of MEMU, DEMU and coaching stock, Anara, SER(Phase-I).

1.1 Sources:

Likely sources of manufacturers and suppliers are-

- (i) M/s HY T Engineering Co. Pvt Ltd, Pune
- (ii) M/s BEMO, Netherland.

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources(if provided). However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

1.2 Purpose and Capability

Battery Operated Rail cum Road shunting vehicle capable for on Track Shunting of Railway's MEMU, DEMU and other BG coaches.

2.0 General Design Features :

The following key features shall be provided:

- a) The Battery Operated Rail cum Road shunting vehicle shall meet the broad technical parameters of operation and Railway Vehicles having :
 - (i) Track gauge : 1676 mm,
 - (ii) vehicle weight up to : 135 Tones,
 - (iii) Draw bar pull force : 15 KN (min.),
 - (iv) Safe speed of steplessly variable from 0 to 2 km/h (approx.) when loaded and 0 to 4 km/h (approx.) when solo,
 - (v) Towing capacity: 120 Ton (min.) at gradient from 0 to 2.5 per 1000,
 - (v) Curve radius of 90m including turnouts & crossings,
 - (vi) Wheel base: 1800 mm (approx.)
 - (vii) Guiding wheels: 4 pcs Steel flanged wheels
 - (viii) Battery capacity : Sufficient for travelling at least 20 kms under unloaded condition or Travelling at least 9 km under fully loaded condition on single charging basis straight and flat track.
 - (ix) Battery charger: Suitable capacity for above batteries.
 - (x) Power supply 3Phase, 415V $\pm$ 10%, 50 Hz $\pm$ 3% with neutral for battery charging.

- (xi) Design as per standard schedule of dimension.
 - (xii) Hydraulic Braking, foot paddle operating to be operated from Driver seat.
- b) The Scope Covers Complete Battery Operated Road Cum Rail Shunting Vehicle along with the following standard accessories and items required to make it fully functional.
- (i) First fill of oils and lubricants- 01 set for each vehicle
 - (ii) On Board battery charger – One No.
 - (iii) A set of maintenance tools - One Set.
 - (iv) Electrical cables for connecting battery charger to electrical power source – 1 lot.
 - (v) Coupler suitable for Wagons/coaches of Indian Railway -1 No.
 - (vi) Remote control for Vehicle opération- 1 No.
- c) For Vehicle's movement on road or rail, Vehicle shall be equipped with traction wheels, each equipped with individual variable speed AC motor. These traction wheels shall be of Polyurethane for higher co-efficient of friction. Each traction wheels shall have individual steering mechanism with individual variable speed AC motor. It shall be able to make 360 deg. rotation about its own axis. Travelling speed of Vehicle shall be infinitely variable within the speed limit.
- d) In addition to traction wheels, Vehicle shall be equipped with retractable flanged steel wheels for guiding the Vehicle during its rail mode operation. Wheels shall be lowered during rail mode and shall run safe and comfortable in turnouts and crossings. These wheels shall be mounted on suitable bearing arrangement for durable performance. These wheels shall be retracted up by hydraulic cylinders during road mode of operation.
- e) Super structure shall be torsionally rigid box structured frame made out of mild steel plates as per IS 2062.
- f) Battery Operated Road Cum Rail Shunting Vehicle shall be equipped with PLC controls from Siemens / Allen Bradley / Parker/Fanuc of latest design. All the controls of vehicle shall operate through the PLC system. PLC shall be equipped with remote diagnostic feature.
- g) Vehicle shall be equipped with hydraulic system for the retraction of flanged wheels. Hydraulic system shall be equipped with necessary safety equipment's. Hydraulic system shall be mounted within superstructure.
- h) Battery and Battery Charger :
- An on-board charging station for battery recharging shall be provided on the tractor. Charger shall be compatible with the input supply voltage 360 to 440V, TPN (5 pin 3 P+N+E), 47.5 to 51.5 Hz. The contractor shall provide necessary cabling and

connections to a power supply isolator provided by designated contractor in the depot. Recharging period of a fully discharged battery shall be less than 10 hours.

- The vehicle shall be equipped with centralised water topping up facility.
 - Battery shall have sufficient capacity for travelling at least 20 Kms under no-load condition or for travelling at least 9 Km under fully-loaded condition on single charging basis straight and flat track conditions. Battery shall have the life time up to 1500 charging cycles and shall be commercially available in India.
Details of the battery capacity, voltage, type etc shall be submitted.
 - The followings protection shall be included in the working of Battery Operated Rail cum Road Vehicle (RRM) mentioned below:-
 - i. Alarm/ indication for low battery voltage.
 - ii. Protection against low oil level in hydraulic system.
 - iii. Protection against over current of drive motor.
 - iv. Provision of auto parking brake.
 - v. Provision of dead man switch.
 - vi. No traction with parking brakes on.
 - i) Radio remote controlled operator pendant shall be equipped with necessary switches / buttons for selecting direction, speed control, steering control, horn, flanged wheel up/down, emergency Switch, Speedometer, Indication for mode of operation (rail/road & remote /manual), Other standard indications etc. The remote control shall operate from maximum distance of 200 meters in open field conditions.
 - j) Vehicle shall be equipped with electrically controlled breaking. In addition, manually releasable, failsafe spring applied parking brake shall also be provided.
 - k) The followings protection shall be included in the working of Battery Operated Road Cum Rail Shunting Vehicle as mentioned below:-
 - (i) Low battery voltage alarm.
 - (ii) Low oil level in hydraulic system alarm.
 - (iii) Over current of drive motor alarm.
 - (iv) Provision of auto parking brake.
 - (v) Provision of dead man switch.
 - (vi) No traction with parking brakes on.
 - l) Operate on rail tracks as well as roads: maximum mode changeover time from rail to road is 2 minutes.
 - m) The Vehicle shall be painted in Golden Yellow shed No. 356 to IS:5-2007.
- *License- It shall be the responsibility of the contractor to obtain frequency allocation and required permission and license on behalf of Railways from the license issuing

authority. The initial license fee i.e. One year from the date of commissioning and acceptance shall be borne by the contractor.

n) **Coupling :**

- i) A suitable coupler shall be provided at both end of the tractor for coupling the railcars (MEMU, DEMU & all types of Indian Railway Coaches). A suitable to match Rolling stock couplers shall be provided on each side of the Battery Operated Rail cum Road Vehicle (RRM) for coupling rail cars from both ends.
- ii) The coupler shall be designed for pulling, pushing rated loads.
- iii) Automatic Couplers height shall be adjustable by hydraulic mechanism from driver desk as well as from remote control or manually after the tractor has stopped. It shall be possible to position the coupler head at the same height as that of car.
- iv) The Rail cum Road Vehicle (RRM) shall have the MR (Main reservoir) and BP (Brake pressure) pipe connection which shall be compatible for connection with train, BP pipe for synchronised braking.
- o) Technical specifications of M&Ps are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works and General specification of M&Ps (Appendix-A)** specified in Tender Document.

3. **Safety:**

Equipment shall be incorporated with all safety features/safety devices for complete protection of operator & equipment from all possible operational failures.

4. **Concomitant Accessories:**

Machine should be accompanied by the all concomitant accessories, and their cost should be included in the basic price of the machine.

Any other concomitant accessories required to make the machine/equipment fully operational on installation when connected to mains power source.

5. **Spares:**

The supplier should supply spares for at least 02 years.

6. **Installation and Commissioning:**

- 6.1 Joint check :- The contractor/supplier would be required to carry out a joint check at the consignee's end, along with the consignee, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages. It is necessary that this joint inspection be done immediately on receipt of the machine by consignee to avoid commissioning delays due to shortages/transit damages.
- 6.2 The contractor/supplier or his agent will commission the machine/equipment.
- 6.3 The machine/equipment performance shall be demonstrated by the contractor or his agent after successful commissioning at the workshop site and prove out the claimed capability, to

the satisfaction of consignee. After such successful demonstration, the consignee shall take over and watch the machine/equipment performance before the final acceptance certificate is issued.

- 6.4 Provision of all tools and equipment, technical and unskilled manpower, material handling equipment and all materials for installation and commissioning by contractor/supplier.
- 6.5 Loading/unloading of the equipment on receipt and its movement to the site of installation by contractor/supplier.

7. Warranty

The contractor shall give warranty of equipment including the bought out equipments for a period of at least 24 months from the date of commissioning. If any warranty claim is lodged for any defective equipment, the warranty period shall stand extended for a period, for which the plant remains under break-down due to such defects. The responsibility of arranging warranty from the OEM's during the warranty period shall be of the contractor.

8. Training

- 8.1 The contractor shall fully and adequately train the staff nominated by Railways free of cost in the proper operation and maintenance of the machine/equipment at site during commissioning of the machine/equipment.
- 8.2 The training for maintenance of the equipment will include troubleshooting and repair of the machine and accessories. The training to be imparted will cover all mechanical / electrical / electronic equipment / part programming.

9. Technical Literature

The contractor shall supply four sets of technical literature preferably in English/Hindi language, which shall comprise of all the user and maintenance manuals supplied by OEM's of different equipment used in the plant and a separate user and maintenance manual for the complete system prepared by the contractor/supplier.

10. Proving Test

The vehicle performance shall be demonstrated by the contractor or his agent for a period of two shift of 8 hrs during commissioning at the consignee's works. After such successful commissioning the machine performance shall be watched for a period of 01 (One) month.

11. Inspection of Equipment

Inspection should be carried out by Railways or Authorized representative of Railways.

Schedule-I**Leading Parameters of Battery Operated Rail cum Road shunting vehicle**

(Supplied by consignee for guidance of manufacturer)

1	Type	Rail cum road vehicle
2	Service weight	5 t +/- 10%
3	Max wheel load	Approx. 1.25T
4	Gauge	1676 mm / 1435 mm
5	Max. Speed	V1 loaded 0 – 2 km/hr V2 solo 0 – 4 km/hr
6	Max. tract. effort	15 kN at wheel rim at adhesion $\mu = 0.5$ in dry (0.3 in wet)
7	Towing capacity	135T locomotive / other rolling stock at gradient from 0-2.5 per 1000.
8	Wheelbase	1880 mm
9	Width	2300 (2420) mm / 2060 (2180) mm
10	Height	max 1420 (1560mm including antenna) mm for visibility
11	Total length (without couplers)	3080 mm
12	For Up railing	approx. 3.5m x 3.5m
13	Guiding wheels	4 Nos. Steel flanged wheel, profile according to IR. CSL – 3040 or UIC 510, dia. 330mm
14	Traction / steering wheels	4 Nos. Vulkolan / Polyurethane dia. 304 x 140 mm
15	Steering	4-wheel: -crab side way, -perpendicular, -circular, -360 degrees rotating on own axle
16	Battery capacity	80V, 460Ah waterless, with electrolyte mixing for less maintenance
17	Battery charger	Charging time max 10 hours, 415V, 3 Phase + earth, fused at 16A
18	E-system	24 V PLC Iqan
19	Safety Integrity Level	SIL 3

Note:

1. Performance certificate of above said Machine already supplied shall be furnished.
2. Any better/ latest technical parameter may also be welcomed if accepted by Railway.
3. If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
4. Tenderer should also furnish clausewise remarks on technical specifications.

Specification No.- IM/MEMU/DEMU/Anara/WP/Mech/M&P/MIG-MAG (400A) Item No. 07

SPECIFICATION FOR INVERTER BASED MIG/MAG SYNERGIC PULSE WELDING PLANT (400A)

1.0 Scope

The scope of supply of MIG/MAG Synergic Pulse Welding Plant-400 amps will include design, manufacturing, inspection, packing, dispatch, transportation, safe & complete supply, erection, commissioning, Proving-Out Test and handing over as per parameters specified in technical specification. It includes all the concomitant accessories/equipments/works as detailed in the specification and other accessories, which the manufacturer considers essential to make the machine fully operational, when installed, commissioned and connected to power source and other utilities.

1.1 Sources:

Likely sources of manufacturers and suppliers are-

- (i) M/s Kemppi India Pvt. Ltd., Chennai a subsidiary of M/s Kemppi Oy Finland;
- (ii) M/s Migatronik A/S, Denmark;
- (iii) M/s EWM AG-Muendersbach Germany;
- (iv) M/s Lincoln Electric Co.(india) Pvt. Ltd., Kancheepuram;
- (v) M/s Fronius India Ltd, Pune;
- (vi) M/s Ador Welding Ltd, Pune.

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources(if provided). However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

2.0 General Description and Scope of Supply:

- 2.1 Specification covers supply, installation, testing, commissioning of MIG/MAG Synergic Pulse Welding Plant-400 Amps (minimum). The supply shall include all cables, cable laying, earthing and all fixing accessories, standard accessories, which are essential to make the MIG/MAG Synergic Pulse Welding Plant-400 Amps fully operational.
- 2.2 All related material required for inspection, erection and commissioning of Machine and connecting electrical equipments with cable, cable laying and fixing accessories shall be included in the cost of basic Machine.
- 2.4 Tool boxes containing all tools (Electrical and Mechanical) required for the maintenance of the machine should be supplied along with the machine. Tools shall be supplied in two different tool boxes, with individual pocket for each item and shall be of MEKASTER/TAPARIA or reputed ISI make. Unit cost of machine will be inclusive of cost of tool box.
- 2.5 Submission of GA Drawings/related drawings, Make-Model & QAP for approval to Railways by successful bidder.
- 2.6 Civil work including foundation (if any) for said machine shall be in contractor scope. The cost of machine foundation will be inclusive of cost of machine.
- 2.7 The bidder's attention is drawn to the **Special Conditions of Contract for Mechanical Works** and **General specification of M&Ps (Appendix-A)** specified in Tender Document.

3.0 Purpose and Capability:

- 3.1 The welding machine shall be constant potential type with control unit / panel complete including burn back control, crater fill, wire feed speed control, gas control with gas saving device and with infinitely variable pulse control synchronization of the wire feed speed with current pulse. Also it should be capable to work in normal MIG/MAG, Synergic MIG and Synergic Pulsed MIG / Two Pulsed MIG mode. Necessary diagnostic software for fault recognition and analysis should be pre-loaded in the welding machine.
- 3.2 The welding set should be capable of MIG/MAG, pulse MIG synergic pulse MIG welding and Manual Metal Arc (MMA) welding for welding of sheet metal of different thicknesses.
- 3.3 All position high speed and high deposition welding.
- 3.4 The welding plant confirming to IS:7931 Pt.II or latest is required for fabrication/repair of roof, under frame, bogies, side panels and other sub-assemblies of all metal, fabricated Railway Coaches/Wagons, all types bogies and for general purpose welding work.
- 3.5 The plant should be capable of complete welding Low alloy high Tensile steel, mild steel, stainless steel, MIG welding aluminium and light alloy. The machine shall be capable of heavy-duty weld upto 50mm MS plate and should be capable of withstanding intensive use of 16 hours per day in two shifts of 8 hours each.
- 3.6 The plant shall be capable of working up-to an ambient temperature of 50°C and 100% relative humidity.

4.0 Basic Design Feature:**4.1 Features**

- 4.1.1 The machine shall be capable of continuous working, and shall be operated normally in two shifts per day (each shift is of 8.0 Hrs.). The machine shall be suitable particularly for heavy-duty industrial work.
- 4.1.2 Rigidity and general characteristics of the machine shall be as per relevant clause.
- 4.1.3 All Steel Structures and housings should be surface treated to prevent corrosion and painted.
- 4.1.4 Suitable industry standard safety of the operator and maintenance personnel should be built in into the design.
- 4.1.5 It should be possible to easily transport the entire equipment set from one place to another. Lifting Lugs to be provided for lifting with the help of cranes etc.
- 4.1.6 All parts of the equipments should be capable of working in hot dusty and humid environment. They should work continuously at the rated capacity upto a temperatures of 50 degree Celsius and Relative Humidity upto 100%.
- 4.1.7 The unit shall incorporate the following safety features:
 - a) The main transformer and IGBT/MOSFET should be protected from over loading and overheating.
 - b) In case of failure of cooling system, the plant should stop automatically.
 - c) All the sub-assemblies shall have provision for earthing.
 - d) The control circuit shall be protected by properly rated fuses.
 - e) The unit shall be protected against excessive current.

4.2 Specific Characteristic:

- 4.2.1 The welding machine is required for fabrication of different sub-assemblies of Indian Railways Coaches & Locomotives. The machine shall be capable of complete joint penetration welds, assured bead shape, root, penetration and controlled heat input during welding. The machine shall be capable of heavy duty cycle mentioned in S. No. (c) of major parameters of power source of Schedule-I and should be capable of withstanding intensive use for 2 shifts.
- 4.2.2 All equipments and material shall comply with appropriate International Standards (latest) or National Standards of the country of origin provided the latter are equivalent to or better than the former. For items for which Indian Standards are not published, the International Standards shall be acceptable. The tenderer shall indicate the Standards applicable. Preferably the machines should conform to the following International standards or its equivalent:

EN 60974-1	-	Safety requirements for arc welding equipment
IEC 60974-1	-	Part 1 Welding Power Source
EN 50199	-	Electromagnetic Compatibility (EMC)
IEC / EN 60974-5	-	Welding Power Source – Part 5: Wire Feeders
IEC/EN 60974-7	-	Welding Power Source – Part 7: Welding Torches
IEC / EN 60974-10	-	Welding Power Source - Part 10: Electromagnetic Compatibility (EMC) Requirements.

4.3 Welding Power Source:

- 4.3.1 The welding power source should have constant potential characteristic. The power source should have crater fill and burn back control feature. It should be capable of operating at maximum continuous welding current at 10 minute duty cycle at 40 degree Celsius (as per Schedule-I) without over-heating. It should be suitable for MIG/MAG, Synergic MIG/MAG, Synergic Pulsed MIG welding and two pulse for aluminum welding.
- 4.3.2 The welding power source shall be suitable for working on 415V $\pm 10\%$, 50Hz $\pm 3\%$, and should be protected against overload and single phasing.
- 4.3.3 The power source should be completely digital microprocessor controlled IGBT/MOSFET based inverter of latest generation and should have step-less control of current and voltage. The frequency of inversion should be above 20 kHz. The communication from power source to peripheral devices like wire feed drive unit etc. must take place via appropriate data bus.
- 4.3.4. A step-less regulation shall be provided for accurate selection of wire feeder speed (for welding current) and a separate knob for welding voltage control, in normal MIG/MAG operation. The Function Panel should have step-less regulation of welding power (welding current & welding voltage controls simultaneously) in Synergic MIG operation. The function panel should also have facility for Arc Length control and welding dynamics control, etc.
- 4.3.5 The minimum standard of enclosure for the power source shall be drip proof and should conform to IP23 or better.
- 4.3.6 The power source should be provided with cooling fan for effective forced draft cooling. An automatic device should be provided which switches off the welding set output to a safe level in the event of inadequate airflow.

- 4.3.7 The power source should be systematically arranged in housing. The power source unit should rest over a well designed trolley for ease of maneuverability along with wire feeder and cylinder.
- 4.3.8 A separate control transformer to provide low voltage to the wire feed control and PCB's shall be incorporated in the power source.
- 4.3.9 The power source have power factor not less than 0.90 without use of capacitor bank.
- 4.3.10 A triple pole terminal block/contactors of sufficient rating should be provided inside the welding set for main incoming supply.
- 4.3.11 All control fuses are to be provided inside the welding set to avoid pilferage.
- 4.3.12 High sensitive fast acting VDRs or latest and better equipment should to be provided for the protection of PCBs.
- 4.3.13 All control PCBs are to be arranged systematically so that they can be removed and refixed easily without affecting / disturbing any other parts and wiring.
- 4.3.14 The wire feeder/power source should have preferably following digital displays & controls with keyboard for program selection & precise welding parameter adjustment.
- a) **Controls & display**
 - i) Welding current
 - ii) Wire feed speed
 - iii) Welding voltage
 - iv) Weld mode /Program no
 - v) Memory Channels
 - b) **Start parameters**
 - i) Gas pre flow time
 - ii) Hot start /Creep speed
 - c) **End Parameters**
 - i) Crater current and Voltage
 - ii) Burnback time
 - iii) Gas post flow time
 - iv) Arc length/Trim
 - d) **Display**
 - i) Welding material group
 - ii) Wire size /sheet thickness
 - iii) Last welded data
- 4.3.15 The welding set should be automatically switched off preferably with error display if the following occurs. .
- a) Power source is overheated
 - b) Wire feed motor is overloaded
 - c) One phase of 3-phase has fallen out
- In addition, the power source should have different error signals for different faults, which should reduce the fault rectification time.

- 4.3.16 The power source shall be capable of infinitely variable pulse synchronization control of the wire feed speed with the control pulse.
- 4.3.17 Suitable port(s) compatible with PC/Laptop should be provided to upload and download different welding programs as well as for down loading of welding data.
- 4.3.18 The power source should be pre-programmed for various thicknesses of jobs/filler wire sizes. It should have the facility to store different programs in the memory and it should be possible to retrieve the programs from the panel.
- 4.3.19 The machine should have at least 60 pre-programmed Synergic Curves for MIG/MAG as well as Pulsed MIG processes in the memory and should also have at least 10 empty memory slots for adding new or customized programs.
- 4.3.20 Facility to maintain arc length constant even if wire stick out changes due to uneven hand movement

4.4 Wire Feed Unit:

- 4.4.1 The wire feed unit should be light in weight and portable in design to feed hard, soft and cored filler wires, for MIG/MAG, Synergic MIG and Synergic Pulse MIG welding.
- 4.4.2 It should have 4 Roll Drive system with all powered and grooved feed rolls so as to have minimum slippage and maximum efficiency and positive wire feeding. The feed roller and gear wheel should be made of **Hardened Steel** material and should be adequately insulated. It should be with one wire feed motor fitted with tachogenerator. All the rolls should be geared. The wire feeder motor should have digital speed feed back system to maintain desired speed at the time of welding.
- 4.4.3 The drive unit shall have provision for easy replacement of electrode wire and for change of electrode wire size. The drive roll pressure shall be adjustable and a quick release device shall be fitted. The drive unit should preferably have auto-threading facility to reduce time for re-loading new filler wire spool.
- 4.4.4 The wire feed motor shall have provision for varying the filler wire feed speed. It should be continuously rated and suitably protected.
- 4.4.5 The wire feed motor shall be easily removable for maintenance purposes.
- 4.4.6 The drive reel shall be insulated from earth and easily detachable. A suitable means of braking should be provided for preventing over-run of the filler wire.
- 4.4.7 The feed rollers for various sizes of wires should be provided along with the machine for accommodating different sizes of wires. Suitable thumbnut to adjust pressure and to replace feed rollers should be provided. The wire feed motor should have closed loop speed feed back system to maintain the constant preset speed.
- 4.4.8 The welding cable and gas hose between power source and wire feed unit should be provided. All cables and pipes should be inserted in a flexible, heat resistant hose/sleeve to avoid any damage to cables. The 3-phase power cable should also be provided.
- 4.4.9 Complete circuit diagrams for the power source as well as wire feed unit should be provided explaining the different control features etc. Coloured catalogue of equipment and accessories should be provided.
- 4.4.10 Presetting of soft arc start should be available i.e. during starting wire feed speed should be adjusted at lower speed than welding speed. In addition, the hot start and crater filling facility should also be available.
- 4.4.11 The wire feeder should have the wire inching and Gas test facility.

- 4.4.12 The wire feeder should have the 2T/4T facility for torch operation.
- 4.4.13 There should be provision for setting limits for maximum and minimum wire feed speed to prevent exceeding the set welding parameters as specified in WPS.
- 4.4.14 Protective cover of adequate strength, to prevent entering of spatter inside the wire feeder unit during welding, should be provided on the wire feeder. It should be able to withstand industrial use.

4.5 Welding Gun:

- 4.5.1 The Welding Gun should have minimum 5.0 meter cable length. The Welding Gun must be Air-cooled type of same make as the power source and of proven design. The model and make of the welding gun should be furnished.
- 4.5.2 The gun shall be so designed that welding can be carried out with minimum effort by the operator and shall permit satisfactory feed at the specified range of wires when used with the wire feed unit.
- 4.5.3 The handles shall be constructed of or encased in insulating materials or it shall be insulated from the live parts.
- 4.5.4 The construction of handles shall be such that no dirt can lodge in joints, holes or other devices, which is likely to cause danger of electric shock. The connection between the hose cable and the handle should preferably be through a ball joint enabling easy rotation and twisting of the torch handle during positional welding.
- 4.5.5 All exposed metal parts with the exception of the contact tip shall be insulated from current carrying parts.
- 4.5.6 The terminals for electrical connection shall be of adequate size so as to allow connections of cables of an appropriate rating without being over heated under normal conditions of use.
- 4.5.7 The risk of damage due to continuous flexing of cables and hoses at the point of entry to the gun shall be kept to a minimum, preferably through ball joint.
- 4.5.8 The welding gun parts shall be adequately rated to prevent excessive temperature rise.
- 4.5.9 The gun shall be able to direct an adequate flow of shielding gas under all conditions of welding for which the gun is designed.
- 4.5.10 The shielding gas to the gun shall be controlled by suitable means.
- 4.5.11 The gas nozzles shall be readily replaceable and shall be made so as to remain as free from spatter as far as possible.
- 4.5.12 All parts affected by change of wire size such as liner and contact tip/wire feeder rollers shall have the correct dimensions for trouble-free wire feed and shall be permanently identifiable for size and type of wire.
- 4.5.13 The voltage to earth of gun-mounted controls shall not exceed 100V DC or 60V AC RMS.
- 4.5.14 The welding gun should have swan neck of 60 degree and a provision to change to 45 degree neck.
- 4.5.15 The welding gun should be provided with EURO connection (with flexible gold coated connecting pins of control cables).
- 4.5.16 The micro/fully enclosed type switch in the handle shall be sufficiently sturdy and of higher capacity to withstand frequent operations.
- 4.5.17 The controls and parts needing regular maintenance shall be replaceable.

4.6 Programming

- a) The machine should have standard inbuilt program for Synergic Curves for MIG/MAG as well as Pulsed MIG processes for steel, stainless steel, aluminium of different sheet thickness/filler wire diameters and shielding gas combinations.
- b) Optimum pulse parameters should be available from the machine automatically in the pulse mode, so that manual setting of pulse parameters are not required.
- c) The machine should also have provision for adding new or customized programs as may be required for welding of any particular steel, stainless steel or aluminium, with the help of programming tool.
- d) The Welding Procedure Specification to be prepared and provided by the equipment manufacturer based on the chemistry of the metal intended to weld, provided by the user. Suitable means should be available to update or to have a back up of all programs.

5.0 Concomitant Accessories:

Each machine shall be accompanied by the following concomitant accessories whose cost shall be included in the basic price of the machine. However, the cost of each of the following concomitant accessories should also be given separately in the offer.

5.1 Welding gun with accessories.

5.2 Set of suitable control cables, welding cables and work return cable with earth clamp etc. for connecting the power source and wire feed unit- each set consisting of the following:-

- (i) One set of welding cable of nominal cross sectional area of 70 sq mm with tinned annealed high conductivity copper wires and with HOFR covering, conforming to IS: 9857 or latest, with sockets of appropriate dimensions crimped on both the sides for connecting the power source to the work, through return current clamp ('earthing' clamp) of rated current of 400 Amp, conforming to IS: 2641 or latest. The length of this cable with return current clamp shall be 10 meters (minimum).
- (ii) PVC insulated and sheathed multi core flexible wire of suitable size with high conductivity copper wires conforming to IS: 694 or latest, for transmitting the functions like wire feed in inch mode, command from torch switch, supply to wire feed motor and for any other function(s), duly connected on wire feed unit and provided with plug on the power source side.
- (iii) Nylon reinforced PVC hose of size 6.4 mm ID, connected to wire feed unit, using work drive clip and with quick release type nipple on the power source side.

The above three items shall be of 10 meters length (minimum) to enable to keep the wire feed unit at least 10 meters away from the power source. These cables and hose shall be tied together using non-removable, self-lockable, nylon (grade 6.6) ties at interval of about 0.75 meter. Copper cables, multi core control cables and gas hose should be inserted in a heat/wear resistant outer sheath to prevent damage while in use.

- 5.3 Argon & CO₂ mixed Gas regulator with flow meter and gauges for indicating cylinder pressure and flow rate.
- 5.4 Flexible cable for connecting power source to main supply.
- 5.5 Auto darkening helmet suitable for DIN 11 & DIN 13 shades.
- 5.6 Any other accessory/equipment, which the manufacturer considers essential to make the machine fully operational, when installed, commissioned and connected to power source to

give the specified output/productivity must also be included in the scope of supply and the cost of such accessories should be included in cost of any other accessories.

6.0 Foundation & Related Drawings (where applicable)

- 6.1 The supplier shall first submit 01 copy of General Arrangement drawings (GA drawings), foundation drawings and related diagrams (mechanical & electrical) giving gross weight, overall dimensions, foundation details, electrical load and circuitry, for approval to railway. After getting approval from railway, the supplier shall supply directly to railway 3 copies of approved GA foundation drawings and related diagrams of machine.
- 6.2 The railway shall either approve the GA drawings or if necessary return them to the supplier/contractor for correction.

7.0 Proving Out Test:-

- 7.1 The successful tenderer shall guarantee the workmanship, material and satisfactory operation of all individual and collective items of the equipment offered.
- 7.2 The guarantee for performance shall cover Individual items, systems for their accuracy as well as for the integrated operation of the machine and its ancillaries as a whole.
- 7.3 The equipment shall be put into trial for proving performance guarantee parameters after continuously working for 10 days.

8.0 After-Sales-Service:

The supplier shall offer maintenance support including calibration for the machine in the form of Annual Maintenance Contract after satisfactory completion of above warranty period at mutually agreed terms.

9.0 General:

Deviations, Warranty /Guarantee and Dispatch of the Machine from Manufacturer Works are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** and **General specification for supply of M&P** specified in the Tender Document.

10.0 Warranty:

Warranty of M&P is to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

SCHEDULE-I

Leading Parameters of MIG/MAG Synergic Pulse Welding Plant-400 Amp:

1.1 Major parameters:

Power Source		
(a)	Power Source Type	: Digitally controlled IGBT/MOSFET Inverter (latest generation) based, Heavy-duty constant potential type power source for MIG/MAG, Synergic MIG, Synergic Pulse/Double Pulse MIG welding applications.
(b)	Input power supply	: 415V $\pm$ 10%, 3 phase, 50 Hz $\pm$ 3%, 3/4 wire system.
(c)	Max. DC Current rating at 10 min./40° C. cycle time.	: 60% duty cycle - 400 Amp. (Min.) 100% duty cycle - 360 Amp (Min.)
(d)	Class of Insulation	"H" Class
Wire feed unit		
(a)	Type of drive	: 4-roll filler wire drive mechanism for the wire feeder. All 4 Feed rolls should be geared and grooved and should be adapted to all wire sizes.
(b)	Wire diameters sizes	: 0.8mm to 1.6mm
(c)	Wire feed speed range	: 1.0 to 22 m/min. (minimum) or better.
Welding Gun:		
(a)	Type of cooling	: Forced Air -cooled.
(b)	Wire diameters sizes	: 0.8 mm to 1.6 mm
(c)	Current rating	: 400 Amps. at 60% duty cycle with Argon and CO ₂ mix Gas at 10 min/40° C.
(d)	Max. Ambient temperature to which ratings apply.	: 40 degree C.

1.2 Other Parameters:

Power Source		
(a)	Open circuit voltage	: 65 -80 Volts
(b)	Output Current Range	: 15A – 450A
(c)	Welding Voltage Range	: 10V – 42V DC.
(d)	Power factor (without capacitors)	: Not less than 0.90
(e)	Burn back times	: 0.05 to 0.5 second.
(f)	Standard of enclosure	: Drip proof and confirming to IP23 or better.
Wire Feed Unit:		
(a)	Wire feed speed control	: Microprocessor digitally controlled with feed back system.
Welding Gun:		
(a)	Cable construction	: Integrated type duly armored.
(b)	Torch switch	: Fully enclosed type switches suitable for 2T/4T working.
(c)	Inter connection cable	: The inter connection cable should consist of power cable (to carry 450 Amps.) gas hose (to carry shielding gas) & Electrical Control Cable.

Note:

1. Performance certificate of above said Machine already supplied shall be furnished.
2. Any better/ latest technical parameter may also be welcomed if accepted by Railway.
3. If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
4. Tenderer should also furnish clausewise remarks on technical specifications.

Specification No.- IM/MEMU/DEMU/Anara/WP/Mech/M&P/MUV/Item No. 08**SPECIFICATION FOR MULTI UTILITY VEHICLE****1.0 Scope:**

The specifications covers the supply and guarantee of performance **of Multi Utility Vehicle** with all accessories, spares etc and shall be supplied at Integrated maintenance shed of MEMU, DEMU and coaching stock, Anara, SER(Phase-I) as per instructions and conditions of contract. It shall also include installation and commissioning of related equipment, training of personnel in operation and maintenance of machine and supply of technical documentation.

1.1 Suppliers:

Likely sources of manufacturers and suppliers are-

- (1) *TATA Motors Ltd., Mumbai*
- (2) *Mahindra & Mahindra Ltd., Mumbai*
- (3) *Maruti Suzuki*
- (4) *Chevrolet*

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources(if provided). However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

1.2 Basic Cost of this items shall be inclusive all taxes, insurance, accessories etc. i.e. On Road Price of vehicle.**2.0 General Description and Scope of Supply:**

- 2.1 Utility vehicle as per schedule—I with all accessories, spares etc.
- 2.2 All related material required for inspection, erection and commissioning of Utility vehicle (Diesel Operated) and fixing accessories shall be included in the cost of basic Utility Vehicle.
- 2.3 A tool box containing all tools required for the maintenance of the Utility Vehicle should be supplied as per enclosed list at **Schedule-II**.
- 2.4 Necessary information regarding the conditions under which the Utility Vehicle is to be used, together with other particulars necessary for manufacture and commissioning of the item, are given in Schedule-I. Submission of Catalogues, specification and related drawings for approval to Railways by successful bidder.
- 2.5 The Utility Vehicle (Diesel Operated) shall be designed, manufactured, erected and tested as per the latest relevant IS specifications.
- 2.7 The bidder's attention is drawn to the **Special Conditions of Contract for Mechanical Works and General specification of M&Ps (Appendix-A) specified in Tender Document.**

3.0 Technical Literature

Four sets of maintenance manual, workshop manual and spare parts manual shall be supplied along with each Utility Vehicle.

Note: *All manual and literature should be in English.*

4.0 Warranty /Guarantee

Warranty of M&P is to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

5.0 Maintenance Tools:

Maintenance Tools as per **Schedule-II**.

6.0 Inspection and testing at firms premises:

- 6.1 A load (initially under no load condition, and on satisfactory completion of these, the trial shall be repeated for various loads until the full rated load and operating range are covered) and functional test (Turning radius, Gradability checked with load and Travelling Speed) must be carried out at the manufacturer's works. Performance of the machine shall be demonstrated to the satisfaction of Railways/authorized representatives.
- 6.2 The tenderer shall submit Quality Assurance Plan being followed at the manufacturer's works for ensuring quality of the products offered. In case, the firm is ISO certified, a copy of valid certificate may also be enclosed with the offer. The Quality Assurance Programme (QAP) will be submitted by the suppliers for approval from Railways.
- 6.3 The Utility Vehicle shall be inspected and tested by the Engineer or his authorized representative at the contractor's premises as per the QAP approved. However, the purchaser or his authorized representative is free to institute any further checks also, if he so desires, and shall be in no way binding on the Purchaser
- 6.4 The Utility Vehicle shall be tested in all respects in conformity with QAP in the presence of Railways or his duly authorized representative before dispatch from the contractor's premises.
- 6.5 Manufacturers must have suitable facilities at their works for carrying out various performance tests on the sub-assembly/assembly/machine. The tenderer shall clearly confirm that all facilities exist and shall be made available to the inspecting authority.
- 6.6 A Sample Inspection Chart for inspecting the equipment shall be supplied along with the bid. The inspection chart should indicate all the tests that are carried out during the machine manufacture and also the tests to be offered to inspecting agency. The standard to which this inspection chart conforms should be clearly indicated. Against each test, acceptable limit/ range of values shall be indicated.
- 6.7 Railways reserves the right for surveillance inspection of firm after placement of order to assess the ongoing process of manufacturing and facilities available with them. In case the inspection team observes the deficiencies/ deterioration in infrastructure/manufacturing capability at the firm's premises, the action can be initiated as considered appropriate on merit.
- 6.8 The contractor shall provide, arrange all the facilities for conducting the test.

- 6.9 All Test certificates of Utility Vehicle should be provided by the supplier with proper identification at the time of inspection.

7.0 Erection and Commissioning:

- 7.1 The contractor shall arrange erection and commissioning of the Utility Vehicle. Adequate number of teams of technical experts will be made available so that erection and commissioning delays are eliminated. Such personnel will be required to be present immediately as soon as the Utility Vehicle has been received. The Contractor or his agent would be required to inspect the consignment at the consignee's end before unpacking is done and carry out a joint check of the receipt of components to avoid subsequent complaints regarding short shipment or transit damages.

- 7.1.1 The contractor or his agent shall commission and prove out the equipment successfully as per scheduled time frame

- 7.2 Following items of work shall be performed by the contractor

- (i) load and functional test
- e. Turning radius,
- f. Gradability checked with load
- g. Travelling Speed

8.0 Service Facility in India and Technical Support

- 8.1 The tenderer will clearly spell out in the offer the facilities available with him or his agent for providing adequate after-sales service in India during warranty period. The complete details such as organization for after sales service, availability of technically competent engineers and warehousing facilities for spares should be clearly indicated. Bidders not offering complete servicing/repair facilities in India to ensure quick response to maintenance/ servicing calls are not likely to be considered.

9.0 Following items are also included in bidder's scope:

- (i) Consumables like first fill of lubricating oils etc for the initial operation of the equipment till handing over.
- (ii) Commissioning and start-up spares.
- (iii) Special tools & tackles, if required.
- (iv) Recommended spare parts for Two years trouble free operation and maintenance.
- (v) All drawings/documents along with operation and maintenance manuals, spare parts manual and troubleshooting guides as per requirement mentioned elsewhere in the tender document.
- (vi) Getting approval of Make/Model/design/drawings and any design calculation related to the equipment from Railways.
- (vii) Carrying out any modifications /deletions /addition /alternation in Make/Model/design /drawings /documents as required by client for proper execution of works at site till completion and handing over of the equipment to the purchaser should be brought to the notice of Railways.

10. Dispatch of the Machine from Manufacturer Works:

The supplier should normally dispatch the items only after the site is ready for commissioning of the machine on arrival.

SCHEDULE- (I)**LEADING PARAMETERS OF MULTI UTILITY VEHICLE**

S.N.	Items/Parameters	:	Details
1	Engine& Transmission		
1.1	Type	:	Diesel Engine
1.2	Displacement (cc)	:	2000 (Approx)
1.3	Max. Power	:	78 bhp @ 3800 rpm (Approx.)
1.4	Max. Torque	:	176nm@1400-2600 (Approx.)
1.5	Top Speed	:	140 Kmph (Approx.)
1.6	Acceleration (0-100 kmph)	:	20 second
1.7	Turning Radius	:	5.6 mtrs.
1.8	No. of cylinders	:	4
1.9	Drive type	:	5- FWD, 1- Rear
1.10	Turbo Charger	:	Yes
1.11	Valves per cylinder	:	4
1.12	Gear Box	:	5 speed
1.13	Steering	:	Power steering
2.0	Capacity	:	
2.1	Seating Capacity	:	7
2.2	No. of door	:	5
2.3	Length	:	4400 mm (min.)
2.4	Width	:	1600 mm (min.)
2.5	Height	:	1700 mm (min.)
2.6	Ground clearance	:	180 mm (Approx)
2.7	Wheel base	:	2600 mm (min.)
2.8	Kerb weight	:	1600 kg
2.9	Fuel tank capacity	:	50 ltrs. (min.)

2.10	Cargo volume	:	190 litre (min.)
2.11	Tyre size	:	205/65 R15 or latest
2.12	Tyre type	:	Tubeless, Radial
2.13	Wheel size	:	15 inch
3.0	Comfort		
3.1	Air conditioner	:	Yes
3.2	Remote fuel lid opener	:	Yes
3.3	Accessory Power outlet	:	Yes
3.4	Transmission Type	:	Manual
3.5	Low fuel warning light	:	Yes
3.6	Rear reading lamp	:	Yes
3.7	Rear seat headrest	:	Yes
3.8	Vanity mirror	:	Yes
4.0	Brakes		
4.1	Front Brake Type	:	Disc
4.2	Rear Brake Type	:	Drum

SCHEDULE – (II)**LIST OF MAINTENANCE TOOLS**

S. No.	Description	Qty
01.	Mechanical Tool box. Detail list of tools shall be furnished.	1Set with each MUV
02.	Electrical tool box. Detail list of tools shall be furnished.	1Set with each MUV

Note:

1. Performance certificate of above said Machine already supplied shall be furnished.
2. Any better/ latest technical parameter may also be welcomed if accepted by Railway.
3. If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
4. Tenderer should also furnish clausewise remarks on technical specifications.

Specification No.- IM/MEMU/DEMU/Anara/WP/Mech/M&P/HPJCM

Item No. 09

SPECIFICATION FOR HIGH PRESSURE HOT WATER/STEAM JET CLEANING MACHINE (MOBILE)

1.0 Description:

The scope of supply shall include design, manufacturing, supply, installation, testing, commissioning and proving of 01 set High Pressure Hot Water/ Steam Jet Cleaning Machine as per parameters specified in **Schedule-I**. It includes all the concomitant accessories/equipments/works as detailed in the specification and other accessories, which the manufacturer considers essential to make the machine fully operational. It shall also include installation and commissioning of related equipment, training of personnel in operation and maintenance of machine and supply of technical documentation.

1.1 Sources:

Likely sources of manufacturers and suppliers are-

- (i) *M/s Santoni electro co pvt., New Delhi*
- (ii) *M/s Lokapal Industries, New Delhi*
- (iii) *M/s Inventa cleantech, Noida, UP*
- (iv) *M/s UT pumps & systems pvt ltd., Faridabad, Haryana*

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources(if provided). However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

2.0 Purpose & capability:

- 2.1 Mobile High pressure Hot Water/Steam jet cleaning machine is required to cleaning Bogies, Roller bearing and its components of Indian Railway Coaches. Plant should capable of thoroughly cleaning dust, dirt, mud, oil, grease, and other deposits accumulated during service. Equipment shall be suitable for severe workshop working condition of temperature ranging from 0 to 50° C and relative humidity upto 100%.
- 2.2 It should be capable for 7 days / 3-shifts working in a week, minimum six hours continuous workings in eight hour shift.
- 2.3 It should be designed for high reliability and ease of maintenance.

3.0 Scope of supply:

- 3.1 Specification covers supply, installation, testing, commissioning of High Pressure Hot Water/ Steam Jet Cleaning Machine with portable automatic trolley system. The supply shall include all cables, earthing and all fixing accessories, standard accessories, which are essential to make the High Pressure Hot Water/ Steam Jet Cleaning Machine fully operational.
- 3.2 The supply shall include all concomitant accessories/equipments and other equipments, which the manufacturer considers essential to make the equipment fully operational when installed and connected to shop power source and water source.

- 3.3 Provision of all spares required for commissioning of the equipment and its efficient operation until final acceptance after demonstration of satisfactory performance.
- 3.4 Unit cost of machine will be inclusive of cost of spares as mentioned in schedule-II , other additional spares, and maintenance tools as mentioned in schedule-III. Concomitant accessories as specified in Schedule-I/specification.
- 3.5 All equipment shall be complete with the approved Safety device. The offer shall include all the safety items usually furnished with elements of machinery.
- 3.6 The bidder's attention is drawn to the **Special Conditions of Contract for Mechanical Works and General specification of M&Ps (Appendix-A) specified in Tender Document.**

4.0 Specific Characteristics:

- 4.1 Required length of hose with pressure jet gun able to sustain 130 bar pressure and temperature upto 130°C and give trouble free service.
- 4.2 The pistol type trigger operated guns shall be light weight, portable, easy to handle by single operator without causing and fatigue.
- 4.3 All equipment, pipes and fitting must be as per national or international standard and manufactured by reputed company.
- 4.4 The pump should run at any set pressure in between 25 to 115 bar pressure and temperature ambient to 130°C precisely. The pump should be variable flow compatible to get desire steam/hot water flow and pressure.
- 4.5 All relevant components surface shall be cleaned so to be free of rust and then painted, except mechanical matting surfaces, with two coat of red oxide primer as per IS : 2074.
- 4.6 The relevant components of machine and accessories shall be painted with rust preventive aluminum paint as per IS:13183.

5.0 Safety:

The machine and accessories shall ensure safety of the equipment and operator at all times. The following safety features shall necessarily be provided.

- a) For faulty sequence of operation.
- b) Machine shall automatically shut down in the event of lack of water.
- c) Burner protection device (low water cut off) to protect against low water or no water flow.
- d) Safety valves.
- e) Power ON/OFF indicator.
- f) Thermal cut out to protect motor in case of Over/Under voltage and overload protection.
- g) Single phase preventer etc.

- h) Triple safety unit which automatic switches off the fan unit, fuel pump and solenoid valve.

6.0 Concomitant Accessories:

Plant shall be supplied with all concomitant accessories and their cost shall be included in the basic price of machine.

7.0 Installation:

- 7.1 The contractor shall arrange erection and commissioning of the machine. Adequate number of teams of technical experts will be made available so that erection and commissioning delays are eliminated. Such personnel will be required to be present immediately as soon as the machine has been received. The Contractor or his agent would be required to inspect the consignment at the consignee's end before unpacking is done and carry out a joint check of the receipt of components to avoid subsequent complaints regarding short shipment or transit damages.
- 7.2 The contractor or his agent shall commission and prove out the machine successfully as per scheduled time frame
- 7.3 Following items of work shall be performed by the contractor
- a. Complete fitting and wiring of all electrical items
 - b. The machine performance shall be demonstrated after successful commissioning.

8.0 Proving Out Test:

- 9.1 The successful tenderer shall guarantee the workmanship, material and satisfactory operation of all individual and collective items of the equipment offered.
- 9.2 The guarantee for performance shall cover Individual items, systems for their accuracy as well as for the integrated operation of the machine and its ancillaries as a whole.
- 9.3 The equipment shall be put into trial for proving performance guarantee parameters after continuously working for 30 days.

9.0 Technical literature:

The successful tenderer shall have to furnish four copies of maintenance manual, trouble shooting guide, operational manual of the equipment, safety manual and spare parts catalogue.

10.0 Training:

During commissioning of the machine, technical experts of the manufacturer will fully and adequately train 4 nominated staff by Railways for 5 days at free of cost at consignee site.

11.0 Warranty:

Warranty/guarantee is to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

12.0 After-Sales-Service:

The supplier shall offer maintenance support including calibration for the machine in the form of Annual Maintenance Contract after satisfactory completion of above warranty period at mutually agreed terms.

13.0 Deviation:

Deviations, warranty/guarantee, Dispatch of the Machine from Manufacturer Works of the machine are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works and General specification of M&Ps (Appendix-A)** specified in Tender Document.

14.0 Following items are also included in contractor scope:

14.1 Commissioning and start-up spares.

14.2 Special tools & tackles, if required.

14.3 Recommended spare parts for Two years trouble free operation and maintenance as per schedule-II.

14.4 All drawings/documents along with operation and maintenance manuals, spare parts manual and troubleshooting guides as per requirement mentioned elsewhere in the tender document.

14.5 Getting approval of Make/Model/design/drawings and any design calculation related to the equipment from Railways.

14.6 Carrying out any modifications /deletions /addition /alternation in Make/Model/design /drawings /documents as required by client for proper execution of works at site till completion and handing over of the equipment to the purchaser should be brought to the notice of Railways.

14.7 All sundry erection material required for installation and connecting up of electrical equipment shall be included in the scope of supply.

15.0 Dispatch of the Machine from Manufacturer Works:

The supplier should normally dispatch the machine only after the site is ready for installation and commissioning of the machine on arrival.

16.0 Bought Out Items:

The bidder shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the bidder and proposed to be used, along with the manufacturer's name, brand model etc. The successful bidder may be required to produce invoices to ensure genuineness of such products / verification by the Inspecting agency.

SCHEDULE- (I)Leading Parameters of High Pressure Hot Water/ Steam Jet Cleaning Machine:

(Supplied by consignee for guidance of manufacturer)

Description	
High pressure reciprocating connecting rod type, Positive displacement Triplex ceramic Plunger Pump , single pipe diesel pump with inbuilt diesel filter. The pump and motor mounted on wheel trolley (for easy movement) with accessories.	
	Positive return mechanism, Three ceramic Pistons with high wear resistance and long life.
PUMP	
Pump RPM	1200- 1500, Directly coupled with motor
Operating pressure	50 to 350 Kg/cm ² (Infinitely adjustable)
Discharge (water flow rate)	1000 to 1300 Liters/Hrs.
Steam jet	580 to 650 Liters/Hour
Plunger	High Pressure Triplex Plunger
Maximum Operating pressure	25 – 115 Bar
Water Temperature	Adjustable to 150 ^o C
MOTORS	Confirming to IS 325, 4722 & NEK-IEC 60034-1.
DRIVE MOTOR	
Electrical Supply	5(± 10%) Volt AC, 3-phase, 50 Hz ± 3%,
Type	TEFC
Electric load/Drive motor	15.5 KW or more
High efficiency, long life, concentric type, high heat transfer, weld free mini boiler tubes should be made up of CS Seamless pipes and cover/Body of SS/Aluminum to avoid scale formation.	
Outlet water temperature controller	Outlet water temperature controlled through thermostat.
Fuel tank capacity	40 to 50 Litres
Detergent Tank capacity	18 to 22 liters
High pressure gun Note: Trigger Gun must have specific arrangement to draw sand along with spray water for abrasive action on surface to be cleaned	High pressure Trigger operated light weight gun (500 mm long approx.) , High pressure Nozzle : 1 no.
High tensile steel reinforced synthetics rubber (Nitrile) High Pressure Hose (Make – Dunlop or Maxwell or Gates) SAE 100 R2 of 10 meters long with end fittings capable to withstand pressure of 150 bar. Make : Dunlop, Maxwell , Gates only	02 Nos.
Water connection Coupling,	1 set
Pressure Gauge	Glycerin filled
Cover	Unit must be provided with cover
Trolley chassis and frame	Made of steel, fitted with wheels for easy movement.

SCHEDULE – (II)**Spares for Mobile High pressure Hot Water/Steam jet cleaning machine**

S. No	Description of Items	Qty/Nos.
1	T.C. Nozzel	1 no.
2.	Fuse with holder	1 no each type
3.	Motors	1 no. of each type
4.	Electrical control gears (push buttons, selector switches, contactors, relays, MCBs, MCCBs, MPCBs, Illumination lamps, Emergency switch, meters)	2 no. of each type

SCHEDULE – (III)**List of Maintenance Tools**

S. No.	Description	Qty
1.	Tool kit with required tools for operation and maintenance	1 Set

Note:

1. Performance certificate of above said Machine already supplied shall be furnished.
2. Any better/ latest technical parameter may also be welcomed if accepted by Railway.
3. If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
4. Tenderer should also furnish clausewise remarks on technical specifications.

Specification No.- IM/MEMU/DEMU/ANARA/WP/Mech/M&P/Ladder Item No. 10**SPECIFICATION FOR LADDER****1.0 Description:**

Aluminum Ladders with wide steps (heavy duty) (16FT) are required at Anara, SER. The scope will include inspection, supply, erection & commissioning and handing over to user end as per technical specification.

1.1 Sources: With prior approval of Railway before execution.

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources(if provided). However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

2.0 General Description and Scope of Supply:

2.1 Specification covers supply, installation and commissioning of **Aluminum Ladder with wide steps (heavy duty) (16FT)**. The supply shall include all fixing accessories, standard accessories, which are essential to make the Equipments fully operational.

2.2 Technical specifications of M&Ps are to be read and followed in unison with Special Conditions of Contract for Mechanical Works and General specification for supply of M&P specified in the Tender Document.

3.0 Technical data :

S.N.	Description	Parameter
1.	Length of ladder	16 FT (approx.)
2.	Mass of complete set of avalanche rod (8 rods, Knobs and point (two)) Max. grams	856 gms.
3.	Indian standard for Avalanche Rods for mountaineering	IS:11616 Latest
4.	Main part of Avalanche rod:	Main tube, rods, Knob, Cone and Cone Piercing
5.	Dimensions of all parts of Avalanche Rod,	conforming to IS 11616 latest
6.	Material for Lug	IS 733 latest
7.	Material for Aluminium pipe	IS 738 latest
8.	Material for Steel hexagonal Nut	IS 4431 latest
9.	Material for Cone	IS 733 latest
10.	Material for Aluminium Nut	IS 733 latest
11.	Material for Flexible wire to IS 1835 latest	Steel wire rope (7X7) made from 0.3 mm diameter galvanized steel wire tensile designation 1770
12.	Material for Semi-threaded wire holder	IS 4170 latest

13	Material for Semi-threaded nut	IS 4431 latest
14	Material for Wire Holder IS 4170 latest	IS 4170 latest
15	Material for Rivet	IS 740 latest
16	Material for ROD	IS :1673 latest
17	No. of avalanche rods in avalanche rod (nos)	8
18	Length of each rod in avalanche rod (mm)	500 mm
19	Main tube	internally Threaded on one side and a plug, suitably welded on other side to fit in the successive rods
20	Steps	Should be able to withstand above 100 kg of active load
21	Step gap	Standard, 300 mm (approx.)
22	Fitted with rubber shoes and caps should be provided to prevent scratches on the floor and wall respectively.	
20	Diagram	
		

4. Safety features:

The equipment should be incorporated with all safety devices so as to provide complete protection to the operator and the equipment itself from all possible failures.

5. Warranty:

Warranty period shall be minimum 12 months from the date of successful commissioning.

6. Technical literature:

- 6.1 One copy of the printed illustrative catalogue showing features of the machine and its elements shall be furnished.
- 6.2 The successful bidder shall furnish, 4 copies of spare parts catalogue giving the part list number of each component and assembly drawings, maintenance manual, trouble shooting guide, operation manual and all electrical circuit diagrams to the consignee. The bidder shall provide a list of literature that shall be supplied along with the machine. Technical literature shall be provided for the complete machine including imported and indigenous components/sub-assemblies.

7. Installation and commissioning:

- 7.1 **Joint check :-** The tenderer would be required to carry out a joint check at the consignee's end, along with the consignee, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages. It is necessary that this joint inspection be done immediately on receipt of the machine by consignee to avoid commissioning delays due to shortages/transit damages.
- 7.2 The contractor/supplier or his agent will commission the equipment on **TURN KEY BASIS**.
- 7.3 The equipment performance shall be demonstrated by the contractor or his agent after successful commissioning at the workshop site and prove out the claimed capability, to the satisfaction of consignee. After such successful demonstration, the consignee shall take over and watch the machine performance before the final acceptance certificate is issued.
- 7.4 Provision of all tools and equipment, technical and unskilled manpower, material handling equipment and all materials for installation and commissioning by contractor/supplier.
- 7.5 Loading/unloading of the equipment on receipt and its movement to the site of installation by contractor/supplier.

8. Inspection and Testing:

Inspection should be carried out by Railways/Authorized representative of Railways. Manufacturer must have suitable facilities at their works for carrying out various performance tests on the machine.

SCHEDULE- (I)

Specification No. : IM/MEMU/DEMU/ANARA/WP/Mech/M&P/Ladder

Leading Parameters of Ladder

Leading technical parameters shall be as per TS clauses no. 3

Note:

- 1. Performance certificate of above said Machine already supplied shall be furnished.
- 2. Any better/ latest technical parameter may also be welcomed if accepted by Railway.
- 3. If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
- 4. Tenderer should also furnish clausewise remarks on technical specifications.

Specification No.- IM/MEMU/DEMU/ANARA/WP/Mech/M&P/Pickup Van Item No.11
SPECIFICATION FOR Pick up Van

1.0 Scope:

The specification covers the supply and guarantee of performance of Pick up Van with all accessories at Anara, SER, as per instructions and conditions of contract.

1.1 Suppliers:

Likely sources of manufacturers and suppliers are-

- (i) *M/s Eicher, New Delhi*
- (ii) *M/s TATA Motors Ltd., New Delhi*
- (iii) *M/s Ashok Leyland, Chennai*
- (iv) *M/s ISUZU , Chennai.*

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources(if provided). However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

2.0 General Description and Scope of Supply:

- 2.1 Pick up Van shall be supplied in all respects. The scope also covers supply necessary spare for normal operation and maintenance for two years Unit cost of equipment will be inclusive of cost of spares.
- 2.2 Tool boxes containing all tools required for the maintenance of the equipment should be supplied along with the equipment. Unit cost of equipment will be inclusive of cost of tool box.
- 2.3 Unit cost of Pick up Van (i.e On Road cost) will be inclusive of all taxes and documentation.
- 2.4 Submission of Catalogues, specification and related drawings for approval to Railways by successful bidder.
- 2.5 The Pick up Van shall be designed, manufactured, erected and tested as per the latest relevant IS specifications.
- 2.6 The bidder's attention is drawn to the **Special Conditions of Contract for Mechanical Works and General specification of M&Ps (Appendix-A) specified in Tender Document.**

3.0 Job Requirement and Basic Design Features:

- 3.1 The Pick up Van will be required for transportation of general goods by Railway. The indicative design features are given below. Tenderer may quote for equivalent design of suitable make. He must specify the OEM in his tender. The manufacturer must have adequate after sales network in Uttar Pradesh.
- 3.2 The Pick up Van should be designed to meet heavy duty demands of transporting and stacking of railway material of different shapes and sizes under severe workshop conditions which may involve uneven compacted road surfaces.
- 3.3 The controls shall be ergonomically designed and located at convenient positions for easy operation.
- 3.4 The Pick up Van should be fully counter-balanced and should be stable at maximum specified grades both when stationary and mobile, under all load conditions.

- 3.5 The Pick up Van should incorporate all safety devices so as to provide complete protection to the operator and the Pick up Van from all possible failures. Besides, it must incorporate, but not be limited to the following features:
- a) Protection against engine heat and engine exhaust coming directly on to the operator and obstructing his vision causing inconvenience.
 - b) Hand brakes for parking even on maximum specified gradient.
- 3.6 Maximum operator visibility in all directions under all operating conditions should be ensured.
- 3.7 Body: Standard body design (steel) with single cabin and low side walls is to be supplied.
- 3.8 The fuel tanks should be easily accessible for periodical cleaning. The cleaning process should be simple.
- 3.9 The fuel tank capacity should be minimum 60 litres.

4.0 Accessories

- a) Rear view mirrors to be provided at suitable location.
- b) Lights (Head light, Parking, Reverse light, Brake light, Indicator)
- c) Horns, wipers etc.
- d) Gauges for fuel, water temperature, pressure (lubrication & hydraulic system)
- e) Exhaust gas purifier
- f) Tool kit containing of special tools required for maintenance purpose.

5.0 General Specifications (Electrical);

- 5.1 Direct acting electrical indicating instruments shall confirm to International standards.
- 5.2 Lead acid batteries shall confirm to International Standards.

6.0 Colour:

Cabin & Body:-Golden Yellow/Brown/White

7.0 Technical Literature:

The successful tenderer shall supply Instruction, Operation, Spare parts, trouble shooting manual and all mechanical, electrical and hydraulic circuitry drawings with equipment in two copies of each.

Note: All manual and literature should be in English.

8.0 Training of staff:

Technical experts of the manufacturer will fully and adequately trained operators and maintenance staff nominated by the consignee during commissioning. This training shall include Pick up Van architecture, systematic methods for quick diagnosis of problems and quicker methods to solve them, domain knowledge and safety procedures to be followed while working with Diesel truck.

9.0 Inspection and testing at firms premises:

- 9.1 Pre-Inspection shall be carried out by the Railways or authorized representative at the firm's premises before dispatching the Pick up Van, to ensure quality of the equipment.
- 9.2 A load and functional test (Turning radius, speeds, Gradiblity checked) must be carried out at the manufacturer's works. Performance of the equipment shall be demonstrated to the satisfaction of Railways/authorized representatives.

10.0 Start-up and trail operation (commissioning) and proving-out tests:

- 10.1 The contractor shall carry out the start up trial operation test (commissioning tests) on receipt of authorization from the Engineer.
- 10.2 During the trail operation, all necessary adjustments shall be made so as to ensure compliance with the operating characteristic for the complete equipment as stipulated in the Technical specifications.
- 10.3 The Pick up Van shall be capable of trouble free operation and work satisfactorily over a period one week, during which the Pick up Van shall be subjected to the normal work load in the shops in a complete shift during each of the days.
- 10.4 The contractor or his agent shall commission and prove out the equipment successfully as per scheduled time frame. The Following items of work shall be performed by the contractor
- (i) load and functional test (Turning radius, speeds, Gradiblity)

11.0 Following items are also included in bidder's scope:

- I. Consumables like first fill of lubricating oils etc for the initial operation of the equipment till handing over.
- II. Commissioning and start-up spares, Special tools & tackles, if required
- III. All drawings/documents along with operation and maintenance manuals, spare parts manual and troubleshooting guides as per requirement mentioned elsewhere in the tender document.
- IV. Getting approval of Make/Model/design/drawings and any design calculation related to the equipment from Railways.
- V. Registration, insurance, pollution certificate for the Pick up Van in the name of Railway shall be in bidder's scope.
- VI. Carrying out any modifications /deletions /addition /alternation in Make/Model/design /drawings /documents as required by client till completion and handing over of the equipment to the purchaser should be brought to the notice of Railways.

12.0 General:

Deviations, Warranty/Guarantee, Dispatch of the equipment from Manufacturer Works of the equipment are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

13.0 Warranty:

Warranty of M&P is to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

SCHEDULE- (I)

TECHNICAL SPECIFICATIONS No. IM/MEMU/DEMU/ANARA/WP/Mech/M&P/Pickup Van

Leading Parameters of Pick up Van

SLNO	Item/Parameter	Details
1	Engine	
(a)	Type	: Garbage Tipper
(b)	Type of fuel	: Diesel
(c)	Fuel consumption (Ltr/Hr)	: 18.5 approx.
(d)	Max. Engine power BHP (BHP @ rpm)	: 55 - 62 approx.
(e)	Max Engine Torque (N-M @rpm)	: 200- 250 approx.
(f)	Main engine Aspiration	: Turbocharged intercooled
(g)	No. of cylinder in main engine	: 4 Nos.
2	Fuel tank capacity	: 60 Liter (approx.)
3	Ground clearance (mm)	: 170 mm (approx.)
4	Kerb weight (Kg.)	: 2200 Kg. (approx.)
5	Gross vehicle weight (Kg.)	: 4450 Kg. (approx.)
6	Turning radius	: 5950 mm (min.)
7	Tipper container capacity	: 4.2 cubic metres (approx.)
8	Size wheel	: 15 inch
9	Body plate thickness	: 2 mm (min.)
10	Main frame thickness	: 4 mm (min.)
11	Tipper container material	: Mild steel
12	Thickness of sheet from tipper collector container made	: 2 mm (min.)
13	Dumping height	: 900 mm (approx.)
14	Wheel base	: 2900 – 3200 mm (approx.)
15	No. of Axle	: 2 Nos.
16	Type of front axle and suspension system	: Semi elliptical leaf without roll bar
17	Type of rear axle and suspension system	: Semi elliptical leaf without roll bar
18	No. of speed /Forward gears & Rear gears	: 5 & 1
19	Length of chassis	: 2533 mm (approx.)

SLNO	Item/Parameter		Details
20.	Width of chassis	:	1905 mm (approx.)
21.	Height of chassis (mm)	:	450 mm (approx.)
22.	Size of front tyres	:	7x16-12 PR
23.	Size of Rear tyres	:	7x16-12PR
24.	Tipper body pivot length	:	2500 mm (approx.)
25.	Tipper body length	:	2500 mm (approx.)
26.	Tipper body height	:	900 mm (approx.)
27.	Overall height of Tipper from ground	:	1350 mm (approx.)

Note:

1. If above clauses are found inadequate for furnishing all necessary information of the offer, the Tenderer may append further information separately.
2. Tenderer should also furnish clause wise remarks on technical specifications.
3. A variation of $\pm 10\%$ in the ranges indicated above will be acceptable.
4. The Pick up Van should meet the pollution standards as prescribed by Pollution Control Board Authority at Uttar Pradesh.
5. Performance certificate of above said Machine already supplied shall be furnished.
6. Any better/ latest technical parameter may also be welcomed if accepted by Railway.

SPECIFICATION FOR WINCH ELECTRIC OPERATED PULLING MACHINE

1.0 Description:

The Winch Electric operated Pulling Machine- Qty. 02 (Two) nos. shall be supplied under this scope. Each machine shall be capable for pulling up to the 8nos. empty Indian Railway MEMU/DEMU/ICF/LHB coaches i.e. up to 200T on total weight Coaches on rail (Loaded /Empty) as per this technical specification.

1.1 Sources:

Likely sources of manufacturers and suppliers are-

- (i) M/s OM Prem Engineering Works Kanpur,
- (ii) Heavy Electro Works Pvt. Ltd, Kanpur
- (iii) M/s RUBY International India, Ghaziabad,
- (iv) M/s PULLMAN ENGG. CO. Pvt. Ltd, Kolkata,

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources (if provided). However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

1.0 General Description and Scope of Supply:

- 1.1 Specification covers supply, installation, testing and commissioning of Winch Electric operated Pulling Machine on turnkey basis. The supply shall include wire, cables, Connectors, all fixing accessories, standard accessories, which are essential to make the pulling operation safely up to the specified load.
- 1.2 All related material required for inspection, erection and commissioning of Machine and connecting electrical equipments with cable, cable laying and fixing accessories shall be included in the cost of basic Machine.
- 1.3 Provision of all spares required for commissioning of the equipment and its efficient operation until final acceptance after demonstration of satisfactory performance.
- 1.4 Submission of GA Drawings and related drawings (if applicable) for approval to Railways by successful bidder.
- 1.5 All equipment shall be complete with the approved Safety device. The offer shall include all the safety items usually furnished with elements of machinery.
- 1.6 The firms must be manufactures of / authorized agent of OEM for Pulling Winch Machine. Performance report of last 3 years is required for supplies made to Railways and / or other sectors.
- 1.7 Pulling Winch Machine shall be compact and ergonomic.
- 1.8 The two year's maintenance spares required shall also be included with the basic cost of machine.
- 1.9 Technical specifications of M&Ps are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works and General specification for supply of M&P** (Appendix-A) specified in the Tender Document.

2.0 Purpose & capability:

- 2.1 The equipment is required for pulling the wagons on rail.
- 2.2 The equipment shall be capable of working effectively in Non A.C. environment with temperature up to 50 degree centigrade & RH up to 95%.

3.0 Basic Design feature and technical data:

- 3.1 Each machine shall be capable for pulling up to the 8nos. empty Indian Railway MEMU/DEMU/ICF/LHB coaches i.e. up to 200T on total weight Coaches on rail (Loaded /Empty).
- 3.2 Motor Rating- 7.5 Hp 415 Volts, 3Phase of Kirloskar Siemens NGEF/Crompton/BBL/Alstom make confirming to ISS:325 having class 'F' insulation and IP55 protection fitted with electromagnetic brake.
- 3.3 Power supply- 415+/-6%, 50Hz +/- 3%, 3 Phase AC supply
- 3.4 Starter- Direct on line type starter mounted on the winch body.
- 3.5 Body – M.S fabricated duly mounted with gear drive and fitted with a tubular handle for manual towing. Body should be mounted on solid rubber wheels to make it portable.
- 3.6 Fabrication- The rope drum and gear arrangement shall be mounted on two vertical plates of the winch frame. Besides suitable stiffener plates shall be provided on the winch frame to make it a rigid box section.
- 3.7 Speed reduction- By means of V belt drive and open spur gears.
- 3.8 Rope speed on top layer (pulling speed)- 5-6m/Min. approx.
- 3.9 Wire rope dia-16mm dia, 6x36 const. 1770KN as per IS-2266
- 3.10 Rope length -80 mtrs. In 3 to 4 layers with eye hook at one end and other side of the rope shall be wound on the ungrooved rope drum fitted in the winch.
- 3.11 Braking- Suitable electric magnetic disc brake shall be fitted at the back end of the motor for stopping the motion immediately on power cut.

4.0 Safety

Equipment shall be incorporated with all safety features/safety devices for complete protection of operator & equipment from all possible operational failures.

5.0 Concomitant accessories

Pulling winch shall be supplied with the following concomitant accessories.

- i. 10 mtrs long power feeding cable (copper) with cable clad plug shall be supplied for power connection.
- ii. Two nos. pin suitable for fixing of winch and return pulley shall be supplied.
- iii. One number return pulley for reversing the direction of movement shall also be provided.
- iv. Any other consumable item which is essential for commissioning of Pulling winch machine should also be supplied.

Cost of all concomitant accessories are included in the basic price of equipment.

6.0 Optional accessories

Any optional accessories, which in the opinion of the tenderer can contribute to higher production rate, better precision or quality level should be quoted separately and shall not be included with the basic price of the equipment.

7.0 Inspection

Inspection as per approved QAP shall be carried out at firm remises by authorized representative of Railway before dispatch of material.

8.0 Installation & Commissioning:

8.1 The contractor or his agent shall install & commission the equipment on **TURN KEY**.

8.2 The equipment shall be commissioned by firm's engineers at consignee's end.

9.0 Warranty

As per Special Conditions of contract for Mechanical works.

10.0 Technical literature

The successful tenderer shall have to furnish four copies of G.A drawing, maintenance manual, trouble shooting guide, operational manual of the equipment, all electrical circuit diagrams and spare parts catalogue, giving the part list number of each component with exploded views and assembly drawings.

11.0 Training

During commissioning of equipment, technical experts of the manufacturer, will fully and adequately train four operators/maintenance staff, nominated by the consignee at free of cost for a period of 02 days.

12.0 Proving Out Test:-

12.1 The successful tenderer shall ensure the workmanship, material and satisfactory operation of all individual and collective items of the equipment offered.

12.2 The performance shall cover Individual items, systems for their accuracy as well as for the integrated operation of the machine and its ancillaries as a whole.

12.3 The equipment shall be put into trial for proving out parameters after continuously working for 30 days.

13.0 General:

Deviations, Warranty /Guarantee and Dispatch of the Machine from Manufacturer Works are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works and General specification of M&Ps (Appendix-A)** specified in Tender Document.

SCHEDULE- (I)

Specification No. : IM/MEMU/DEMU/ANARA/WP/Mech/M&P/PWM

Leading Parameters of Winch Electric operated Pulling Machine:

Leading technical parameters shall be as per TS clauses no.3

Note:

1. Performance certificate of Winch Electric operated Pulling Machine already supplied shall be enclosed along with offer.
2. Any better/ latest technical parameter may also be welcomed if accepted by Railway.
3. If above clauses are found inadequate for furnishing all necessary information of the test bench offer, the Tenderer may append further information separately.
4. Tenderer should also furnish clause wise remarks on technical specifications.

Spec no. IM/MEMU/DEMU/Anara/WP/Mech/M&P/EAC(500CFM)

Item No. 13

**SPECIFICATION FOR ELECTRIC DRIVEN ROTARY SCREW TYPE AIR COMPRESSOR
(500 CFM) WITH COMPRESSED AIR PIPE LINE WITH VALVES, CLAMPS AND OTHER FITTINGS**

(A) ELECTRIC DRIVEN ROTARY SCREW TYPE AIR COMPRESSOR (500 CFM)

1.0 Scope:

The scope of supply of electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors will include design, manufacturing, inspection, supply, erection, commissioning & Proving-Out Test, packing, dispatch, transportation, safe delivery and handing over to user as per parameters specified in **Schedule-IA**. It includes all the concomitant accessories/equipments/works as detailed in the specification and other accessories, which the manufacturer considers essential to make the machine fully operational, when installed, commissioned and connected to power source and other utilities.

1.2 Sources:

Likely sources of manufacturers and suppliers are-

- (i) M/s Kirloskar Pneumatic Co. Ltd, Pune,
- (ii) M/s Elgi Equipments, Coimbatore,
- (iii) M/s Atlas Copco (P) Ltd, Pune

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources(if provided). However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

1.3 The compressed air plant shall be capable of:-

- a) Continuous round the clock working to supply completely oil free and moisture free air at full rated capacity and pressure.
- b) Sustained working at low noise level.
- c) Free Air Delivery of the compressed air will be 500 CFM $\pm$ 30 CFM.

2.0 General Description:

- 2.1 The plant shall comprise of electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors each of which shall have a rated capacity of 500 CFM $\pm$ 30 CFM free air delivery on wet basis at a working pressure of 10 Kgs/cm².
- 2.2 The compressor shall be capable of working in normal Indian Railways workshop environment with maximum ambient temperature up to 50°C and maximum relative humidity up to 100%.
- 2.3 The compressor shall be capable to perform the requirements of ISO: 1217 (latest) for packaged compressors.

- 2.4 All related erection material required for inspection and commissioning of electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors and connecting electrical equipments with cables, cable laying and fixing accessories shall be included in the cost of basic electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors.
- 2.5 Tool boxes containing all tools (Electrical and Mechanical) required for the maintenance of the machine should be supplied along with the machine. Tools shall be supplied in two different tool boxes, with individual pocket for each item and shall be of MEKASTER/TAPARIA or reputed ISI make. Unit cost of machine will be inclusive of cost of tool box.
- 2.6 Submission of GA Drawings and related drawings for approval to Railways by successful bidder.
- 2.7 All type of civil work [including foundation, (if required any)] for the erection of said machine shall be in contractor scope. The cost of machine foundation will be inclusive of cost of machine.
- 2.8 Technical specifications of M&Ps are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** and **General specification for supply of M&P (Appendix-A)** specified in the Tender Document.

2.9 Concomitant Accessories:

The following Concomitant Accessories should accompany along with the air compressor. Unit cost of machine will be inclusive of concomitant accessories

- (a) Vertical Air receiver of 3 m³ capacity conforming to IS: 2825 and IS: 7938 with all mountings-01 no.
 - (b) Seamless air piping of suitable bore between Compressor and air receiver including sockets, NRV, Tee/elbow joints, isolating valves etc.-50 M or actual requirement at site
 - (c) First Fill of oils and lubricants (quantity of each item to be indicated in the bid), Rates of each item to be quoted along with total cost of all items required.-First fill
 - (d) Electrical cables to connect compressor panel to supply distribution board – 50 M or actual requirement at site
 - (e) Set of maintenance spares/consumables (including filters, separators, etc. but excluding oils and lubricants required for scheduled maintenance during warranty, assuming triple shift operation six days a week. Details (description and quantity of each) along with their rates shall be quoted.-01 set
 - (f) Compatible Servo Controlled voltage stabilizer-01 no.
Note: i. Servo Controlled voltage stabilizer should be preferably from indigenous make such as NEEL/SERVOMAX/CONSUL/APLAB.
 ii. Firm should give break up of electrical load of the air compressor and peripheries and clearly bring out the capacity of voltage stabilizer.
 - (g) Compatible Refrigerated Air drier for air compressors-01 no.
- 2.9.1 Any other equipment required to make the compressor fully functional at site shall be listed under concomitant accessories.

3.0 Layout:

- 3.1 Space for air compressor room will be provided by Railway. In case the contractor is of the view that the space available is inadequate for the equipment being proposed, he should indicate his requirement clearly.
- 3.2 The size/capacity of the different pipes and ancillary fittings such as valves etc shall also be indicated clearly by the contractor in the drawing. Pipeline layout shall also show location of supports.
- 3.3 Foundation details should be shown in a separate drawing.
- 3.4 Cable layout i.e. cable routing showing details of cable supports, number of cables etc. should also be furnished.
- 3.5 The contractor shall submit a properly dimensioned drawing indicating the layout of their equipment in consonance with the general schematic detailed in compressor room layout
- 3.6 The contractor shall also submit P&I diagram along with part description.

4.0 Performance Standards to be followed:

- 4.1 The electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors shall be designed, manufactured, erected and tested as per the latest relevant IS specifications.
- 4.2 Free air delivery (FAD), working pressure, power and specific energy consumption shall be as per ISO: 1217 (i.e. taking into account all losses) at the point of discharge.
- 4.3 The FAD will be measured at the discharge terminal point of the compressor package in accordance with the CAG/PNEUROP PN2CPTC2 Test Code (Annex C to ISO 1217).
- 4.4 The FAD is to be given in terms of ACFM where ACFM is actual cubic feet per minute at inlet conditions
- 4.5 The electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors shall be complete in all respects. The offer shall include the following items. Any variation from the specifications contained in this tender shall be brought out with reasons for the same. Any variation involving lower standards of design, performance and rating shall not be acceptable.

(a) Compressor including air intake filter and, air control valves, other valves, and in line filters.

(b) Air receiver with safety valves, pressure gauge, inlet and discharge connections

(c) Air dryers - 1 No.

(d) Piping upto battery limits.

(e) Seamless air piping of suitable bore between Compressor, air drier and air receiver including sockets, NRV, Tee/elbow joints, isolating valves etc.

(f) First fill of oils and lubricants.

(g) Electrical cables to connect compressor panel to supply distribution board.

- (h) All Civil work including foundation work and support for pipe line for electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors shall be in contractor's scope.

5.0 Rigidity, Control and Safety

- 5.1 The machine shall be robust, rigid and of sturdy construction. It shall be designed to meet heavy duty demands of various operations on the machine under normal Workshop environment for such machines. It shall be free for vibrations even when working at full capacity.
- 5.2 All machine castings shall be made of close grained high grade cast iron like Mechanite or equivalent materials meeting IS-210 Standards to ensure durability and rigidity. The casting shall be thermal stress relieved to ensure stability and continued accuracy..
- 5.3 All machine fabrications of critical load bearing assemblies like beds, columns etc. shall be adequately strengthened and stress relieved.
- 5.4 Change in ambient temperature shall not affect the performance of the machine.
- 5.5 There shall be no change in the performance of the machine either on switching on the machine or after continuous running.
- 5.6 There shall be no resonant vibrations throughout the working range of the machine at all load levels.

6.0 Basic Design Features (Mechanical):

6.1 Specific Characteristics

6.1.1 General Features:

- a) The leading parameters of the compressor shall be as at **Schedule-IA**.
- b) The compressor shall be microprocessor-based machine of rugged/ robust construction, shock proof and user friendly to operate.
- c) The equipment should be enclosed type, compact and with modular construction. It should be designed to provide easy access for maintenance and operation on-site.
- d) The equipment should be suitably designed to meet with the Indian climatic conditions during transportation, assembly and operation.

6.1.2 Component Details:

a) Air Intake Filters:

Suitable air intake filter, capable of filtering airborne particles up to 2-3 microns and maintenance user friendly with respect to cleaning and replacement. Suitable indication/ feature shall be provided in case of choking/ servicing due. The filter shall possess high separation efficiency, good accumulation capacity, low air resistance and be mechanically strong. The filter elements shall be capable of being easily cleaned for re-use. The method and criterion for cleaning of filter elements shall be clearly specified by the contractor in his design.

b) **Oil Filters:**

Filtration capacity of 25 microns and maintenance friendly with respect to cleaning and replacement. Suitable indication/ feature shall be provided in case of choking/ servicing due.

c) **Air-Oil Separator:**

Multi stage oil separation to ensure oil carry over less than 2 – 3 ppm oil, Pressure drop in the separator shall not exceed 0.2 kg/cm². It should be maintenance user friendly with respect to cleaning and replacement.

6.1.3 **Valves**

a) Suction and delivery valves shall be of high durability and suitable to screw compressors. The details of the safety arrangement shall be spelt out in the offer. The valves shall be easily accessible for maintenance. Special design features of the valves shall also be furnished in the design.

b) In addition to the above, other valves as considered necessary by the manufacturer for efficient, continuous and safe working of the compressor shall be provided. Function of these valves shall be explained in details.

6.1.4 **Controls**

6.1.4.1 Microprocessor based centralized control panel, automatic electronic control, alpha- numeric display, actuation of alarms & trips through pressure & temperature transmitters, ergonomically designed and within easy reach of the operator with the following features:

I. Data read out display	Working pressure, operating temperature, sump pressure, no. of motor starts, operating hours, service information and status data during shut downs & emergency stops.
II. Setting of Operating parameters	Working pressure (Full load / No load), warning levels, service levels.
III. Fault Diagnostics	Automatic indication of faults and shut down in case of high air-end discharge temperature, low unloaded sump pressure, starter fault, main motor overload, fan motor overload, reverse rotation or any other specific reason.
IV. Automatic part load operation controls	to ensure proportionately lower power consumption under part load working conditions.

6.1.5 **Bearings:** Only SKF/FAG/NORMA/NTN/KOYO/NBC/NSK/ TIMKIN acceptable makes.

6.1.6 **Cabling & Tubing:** Provision of following: -

- a) Instruments tubing from measuring points to gauge panel.
- b) Unloader piping from suction valves to Unloader.
- c) Power cabling between starter and motor neatly lay out through cable trays with fixing clamps.

- d) Control cabling between various instruments and starter-cum-control panel duly terminated properly lay through ducts/cable trays with fixing clamps.

6.1.7 Air Drier

- a) Refrigeration type, packaged, self-contained fully automatic air drier capable of handling free air delivery at the operating pressure as specified in Schedule-I along with automatic drainage arrangement and a DRO to indicate dew point, which shall be 50° C at standard design ambient conditions. Pressure drop in the drier shall not exceed 0.5 Kg./cm².
- b) If stand alone refrigerated air dryers are offered instead of integrated units then the acceptable make of the same will be limited to Sabro/ Dominick Hunter/ Bry Air/ Purifair/ Shalcot/ Ultrafilter/ Gem only.

c) Dryer Capability

The dryer shall receive oil free compressed air from the air receiver via an inline filter at specified pressure and flow. It shall deliver completely moisture-free air with minimum pressure loss and at a constant dew point.

6.1.8 Air Receiver

The air receiver shall be built and tested in accordance with IS: 7938 and IS: 2825. It shall be of the vertical cylindrical, all welded design. The air receiver shall be supplied complete with self-supporting mounting arrangement, man hole, safety valve, pressure gauge, automatic drain trap, tapping and connection for air control regulation and inlet and discharge connections. Details of anti-corrosion protection provided on the inside and outside of the air receiver shall be furnished.

6.1.9 Insulation

The water separator, interconnected piping shall be insulated with polyurethane foam or equivalent durable material.

6.1.10 Wear Compensation Adjustment:

The original built in accuracy of the machine shall be capable of being maintained conveniently and economically by suitable adjustments for taking up wear on slides, bearings and load screws. The system of adjustments incorporated shall be explained in the offer.

7.0 Standard specification (Electrical) to be followed:

- 7.1 The equipments and materials shall conform to relevant Indian Standard Specifications, latest Indian Electricity Rules and Regulations as regards safety requirements, earthing and other essential provisions specified therein.
- 7.2 The equipment shall be designed and selected to facilitate inspection, cleaning, replacement and repair, and for use where continuity of operation and safety are first considerations.

7.3 Earthing

All the electrical equipments shall be connected by means of two earthing terminals. The equipment in turn shall be made electrically continuous by providing jumpers over riveted or bolted joints. Equipments fed by flexible cables shall be earthed by means of spare core provided in the flexible cable. Earthing shall be carried out as per relevant IS standards and codes.

7.4 Relays and Contactors:

- a) All electrical relays and contactors shall operate on 110 V AC. Conversion transformers for 110 V AC of adequate capacity shall be in the scope of supply. Mounting of relays and contactors in an enclosed panel shall be such that they are easily accessible for maintenance.
- b) Relays/Contactors of preferred makes alone, conforming to relevant Indian Standards shall be employed.

7.5 Wiring: Panel wiring and cabling from control panel to various motors and other associated equipments, incomer cable shall be provided.

Incoming supply to the control panel shall be directly connected to main molded case circuit breaker (MCCB) of sufficient rating having adjustable magnetic and thermal overload setting.

7.6 Equipments:

All equipment should be of preferred makes. Contractor shall furnish the type and make of the equipments proposed to be supplied along with necessary technical particulars for the same.

8.0 Operational Controls:**8.1** The operation of the machine shall be by push buttons. The basic rules for the direction of operation of controls and the corresponding direction of movements of the machine tools shall be as per IS: 2987-1985.**8.2** The control devices shall be

- a) Clearly visible and identifiable.
- b) Ergonomically positioned for safe operation without hesitating or loss of time, and without ambiguity

8.3 CNC/PLC Controls (where applicable):- The general requirements of CNC/PLC controls shall be submitted. Technical details including make and model should be furnished.**9.0 Noise level**

Noise level of the compressor with canopy during operation shall not exceed 85 +/-5 dB at a distance of 7m when measured as per IS 11446-1985 or ISO 2151-1972 in free field condition. The actual noise level shall be indicated.

10.0 Inspection and testing at firms premises:**10.1** The contractor shall submit test certificates for all mechanical, electrical equipment, cables, filter, valves etc.**10.2** The manufacturer should demonstrate the load test conforming to requirements of ISO-1217 (latest on the offered Elect. Driven Air Compressor) at the manufacturer's works. Rigidity of the machine must be demonstrated to the satisfaction of the appointed Inspector or Inspecting Agency. The tenderer should furnish the actual load test scheme**11.3** The demonstration/inspection of the compressor shall also be carried out to verify the power consumption at manufacturer's premises for a period of at least 8 working hours for one compressor at full rated capacities are attained**10.4** The contractor shall submit material test certificates for structural steel and mechanical components such as couplings, filter, valves, controls etc.

- 10.5 The equipments shall be tested in all respects in conformity with QAP in the presence of Railways or his duly authorized representative before dispatch from the contractor's premises. The manufacturer shall inform the Railway at least 4 weeks prior to the testing of the Electric Driven Rotary Screw Type Air Compressor at manufacturer's works.
- 10.6 All electrical and mechanical equipment shall be tested in accordance with the appropriate Indian Standard at either the Electric Driven Rotary Screw Type Air Compressor maker's or equipment manufacturer's works and test certificates provided if required by the Purchaser or his representative.
- 10.7 Railways reserves the right for surveillance inspection of firm after placement of order to assess the ongoing process of manufacturing and facilities available with them. In case the inspection team observes the deficiencies/ deterioration in infrastructure/manufacturing capability at the firm's premises, the action can be initiated as considered appropriate on merit.
- 10.8 The contractor shall provide, arrange all the facilities for conducting the test.

11.0 Erection and Commissioning

- 11.1 The contractor shall arrange erection and commissioning of the electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors. Adequate number of teams of technical experts will be made available so that erection and commissioning delays are eliminated. Such personnel will be required to be present immediately as soon as the electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors has been received. The Contractor or his agent would be required to inspect the consignment at the consignee's end before unpacking is done and carry out a joint check of the receipt of components to avoid subsequent complaints regarding short shipment or transit damages.
- 11.1.1 The contractor or his agent shall commission and prove out the machine successfully as per scheduled time frame
- 11.2 Following items of work shall be performed by the contractor
- h. Installing of the electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors structure and associated machinery in position.
 - i. Complete fitting and wiring of all electrical items
 - j. Commissioning of the equipment. The electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors performance shall be demonstrated after successful commissioning.
- 11.3 In the interest of early commissioning, the supplier shall ensure minimum amount of assembly is necessary at site. Site welding and riveting shall be avoided as far as possible. The supplier, before proceeding with design details, shall satisfy himself about the site conditions so as avoid any difficulty at the time of erection.
- 11.4 The electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors shall be inspected and tested during different stages of its manufacture, starting from raw-materials till the completion of the electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors, by the Purchaser or his authorized

representative at the supplier's or his sub supplier's works. The Quality Assurance Programme (QAP) will be submitted by the suppliers for approval from Railways. However, the purchaser or his authorised representative is free to institute any further checks also, if he so desires, and shall be in no way bidding on the Purchaser.

- 11.5 All electrical and mechanical equipment shall be tested in accordance with the appropriate Indian Standard at either the electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors maker's or equipment manufacturer's works and test certificates provided if required by the Purchaser or his representative.

12.0 Start-up and trial operation (commissioning) tests

- 12.1 The contractor shall carry out the start up trial operation test (commissioning tests) on receipt of authorization from the Engineer. The following tests are to be carried out by the contractor as part of the commissioning Tests:

- (i) The contractor his authorized agent shall demonstrate the air compressor performance after successful commissioning at the respective consignee's works for a period of two 8 hrs. shifts. Thereafter the consignee shall watch the machine performance for a period of one month or minimum 100 hrs. of operation, whichever is later before final proving-out test certificate is issued.
- (ii) The strength of the insulation of the various items of electrical equipment, cabling and of the installation as a whole shall be tested with 500V meggers.
- (iii) The earthing of the equipment shall be tested as per Indian Electricity Rules.
- (iv) Verification of dimensional tolerance and clearances.
- (v) The satisfactory operation of each controller, switches contractor, relay and the other control device and in particular the correct operation of all limit switches.
- (vi) The correctness of all circuits, and interlocks and sequence of operations.
- (vii) The satisfactory operation of all protective devises.
- (viii) Compliances of the electrical equipment with the time rating indicated in the specifications.

- 12.2 The trials shall be carried out initially under no load condition, and on satisfactory compliance of this, the trail shall be repeated for various loads until the full rated load and operating range are covered.

- 12.3 During the trail operation, all necessary adjustments shall be made so as to ensure compliance with the operating characteristic for the complete equipment as stipulated in the Technical specifications.

13.0 Ancillaries

- 13.1 The ancillaries such as non-return valves, in line filters, moisture separators etc. shall be of preferred make. The contractor shall obtain prior approval from the Railway for these makes before he commences work.
- 13.2 The contractor has to ensure that the different items are fully compatible with the requirements of the entire system.

13.3 Information to be furnished by Contractor

The tenderer shall confirm that all clauses of these specifications will be fulfilled. He shall furnish full particulars against each of the items indicated in **Schedule I** along with GA drawing.

13.4 Lubrication

Contractor shall furnish detailed specifications of the recommended lubricants, their brand names and the quantity required for one year consumption.

14.0 Proving-out Tests**14.1 Performance Tests**

The contractor shall submit a copy of the manufacturers Type Test Report (in accordance with IS: 1217 for the design of compressor to be supplied.

14.2 Proving-out Test

14.2.1 Routine tests shall be carried out on each compressor (as per IS: 1217) at the manufacturer's works in the presence of Railway's authorized representative, to establish the capability for the following guarantee parameters –

- a) Free Air delivery
- b) Shaft in-put at full load and delivery pressure
- c) Specific power consumption at full load.
- d) Moisture content

14.2.2 Permissible variations from the guaranteed values shall not exceed -3%, +3% and –4% for free air delivery, shaft input and specific power consumption respectively.

14.2.3 If the contractor fails to demonstrate the guaranteed performance figures indicated in clause 4 above, the Railways shall permit the contractor to carry out necessary modifications and repairs and to repeat the routine test at his works.

14.2.4 After satisfactory completion of the trial operation test and proper sequence control at site, the contractor shall establish to the satisfaction of the Railway, the performance of the compressed air plant as below:-

The compressors and dryers shall be capable of trouble free operation and work satisfactorily over a continuous period of one week, during which they shall be subjected to the normal demand from the shops in a complete shift during each of the days.

14.2.5 Routine tests shall also be carried out on compressor (as per IS: 1217) at the manufacturer premises in the presence of Railway's authorized representative, to establish the capability for the following parameters –

- a) Free Air delivery
- b) Shaft in-put at full load and delivery pressure
- c) Specific power consumption at full load.
- d) Moisture content

15.0 Bought Out Items:

15.1 The tenderer shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the tenderer and proposed to be used, along with the manufacturer's name, brand model etc. The successful tenderer may be required to

produce invoices to ensure genuineness of such products / verification by the Inspecting agency.

- 15.2 The tenderer should clearly indicate that in case of components/sub assemblies taken from reputed companies such as Vickers, Rexroth, RITTAL, THK, and Shenburger etc., the parent company has already entered into contract with their Indian units/affiliates for undertakings repairs/after sales service during warranty and post warranty.

S. No.	Sub-assembly	Make
1.	Microprocessor & Drive Controller	SIEMENS/FANUC/Heidenhain/MISTUBISHI or OEM make
2.	Hydraulic system	Rexroth/Vickers/Yuken/Parker/Eaton
3.	Feed back devices	Heidenhain, Fagor, Siemens, Fanuc
4.	Ball screws	THK/INA/Tsubaki/Rexroth/Steinmeyerstar/Gamfior/Schenburger /Shuton.
5.	Spindle Bearings	FAG/SKF/Timken/NTN/KOYO
6.	Lubrication System	Cenlub/Dropco/Vogel/ Rexroth
7.	Electrical Control Cabinet	RITTAL/ Siemens/BCH or of other reputed make IP55 Protection level
8.	Servo Controlled Voltage Stabilizer	Neel/Servomax/Consul/Aplab
9.	Bearings	SKF/FAG/NBC/Timken
10.	Electromagnetic clutch	Vortex/Ghatge Patil
11.	A.C. Motors	NGEF/BBL/ABB/KEC/Crompton/SIEMENS
12.	Brake motors	Siemens/KEC/Crompton/NGEF/BBL
13.	D.C. Motor	KEC/Siemens/Crompton/NGEF/BBL
14.	Contactors	Siemens/BCH/ABB/Lakshmi
15.	Limit switches	BCH/Siemens/L&T
16.	Push button	Teknic/Siemens
17.	'O' Rings & rubber seals	Merlin/Parker/Busak/Hunger
18.	Pneumatic Control Equipment	Festo/Shavo Norgen/Shradder Scovil/Electro Pneumatics/Luthra
19.	Control gears	L&T/Siemens/BCH/ABB/Shneider
20.	Filters	Hydac, Hydroline
21.	Cable/wire	Finolex
22.	Gear reducer	Elecon/Greaves/Shanthi/ZF/New Allenbury
23.	AC Drive	Fanuc/Siemens
24.	AC servo motor	Fanuc/Siemens
25.	DC drive	Siemens, KEC
26.	PLC	Siemens/Messung/Hitachi/Mitsubishi
27.	Couplings	Fenner/Love Joy Inc., USA/Flex Couplings, Pune
28.	Air circuit breaker	Siemens/L&T

Note: (i) In case any other reputed make is offered, satisfactory justification with credentials for the same will have to be given in the offer.

(ii) The tenderer should explicitly mention “not applicable” against the items indicated above, whichever is not applicable in the offered machine.

16.0 Commissioning Spares

The contractor shall ensure availability of sufficient quantity of commissioning spares required for proper erection and commissioning of the equipment until final acceptance following demonstration of proving-out test.

17.0 General:

Deviations, Warranty /Guarantee and Dispatch of the Machine from Manufacturer Works are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

18.0 Warranty:

Warranty of M&P is to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

SCHEDULE- I (A)

Leading parameters Electric Driven Rotary Screw Type Air Compressor (500 CFM) (Supplied by consignee for guidance of manufacturer)

1	Free air delivery	500 CFM $\pm$ 30 CFM
2	Maximum Working Air pressure	10 Kgs/cm ²
3	Dust protection	Heavy duty suction filter
4	Input Supply	415 V $\pm$ 10%, 3 Φ , 50Hz $\pm$ 3%
5	Noise Level (Max.)	85 $\pm$ 5 dB at a distance of 7m in free field condition

Note:

- Free air delivery (FAD), working pressure, power and specific energy consumption shall be as per ISO: 1217 (i.e. taking into account all losses) at the point of discharge of after cooler and moisture separator.
- The FAD will be measured at the discharge terminal point of the compressor package in accordance with the CAG/PNEUROP PN2CPTC2 Test Code (Annex C to ISO 1217).
- The FAD is to be given in terms of ACFM where ACFM is actual cubic feet per minute at inlet conditions
- Performance certificate of above said Machine already supplied shall be furnished.
- Any better/ latest technical parameter may also be welcomed if accepted by Railway.
- If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
- Tenderer should also furnish clausewise remarks on technical specifications.

(B) TECHNICAL SPECIFICATION OF COMPRESSED AIR PIPELINE**1. Scope:**

The specification cover supply, erection, testing and commissioning of compressed air pipeline complete with valves, filter cum moisture separators, flanges, flow meter and other misc. fittings in the shop and its connection from the main supply of compressors.

2. Objective:

The objective is to set up a complete system that will be capable to supply the compressed air pressure up to 10 Kg/cm² to various consuming points to cater the essential load within the relevant shops/Shed.

3. Description of the System:

- 3.1 All fittings, materials and equipments supplied for laying and anchoring of pipes, valves, joints and seals etc shall comply with all applicable statutes, regulations and safety codes. The equipment shall conform to latest applicable Indian/British/USA standards. Where the above standards are in conflict with the stipulations of these specifications, these specifications supersede them. All supplies and workmanship for erection and installation of the system shall be as per sound engineering practices and of the highest standards.
- 3.2 The pipeline will be generally laid in overhead position throughout the workshop, at the height stipulated normally along structures already designed/built inside the shop covered areas. The anchoring brackets, fixtures etc are to be fabricated to suit the arrangements. Where it is necessary to lay the pipeline in open spaces the contractor will have to design, fabricate and erect suitable supports complete with pipe clamping arrangements for the pipeline depending upon the sizes, weights etc. but without infringing any equipment/structures. The structures should be designed for wind and other loads as per IS: 875.
- 3.4 Wherever pipelines or structures cross the rail tracks/roads, the structures are to be designed so as to give a clear minimum height of 6160 mm from top of rail level/road to the lowest point of the overhead pipelines. Also the horizontal distance between the centers of the track to the nearest edge of the structure should be at a minimum distance of 2745 mm.
- 3.5 The span of support structures should be so designed that the pipe joints will not come under stress due to bending of pipes due to their own weight. Where longer spans are inevitable owing to any structural obstructions the pipe line is to be supported through tie rods from the adjoining supports of such long spans.
- 3.6 The necessary brackets for supporting the pipe lines on columns will be provided by the contractor. Wherever the pipes are outside these areas, necessary support structures along with brackets have to be also provided by the contractor.
- 3.7 Where pipe lines are to be laid across the bay of a shop where EOT cranes are proposed to work, the alignment of the pipe line in such a bay has to be led above the EOT crane and again lowered to standard alignment.
- 3.8 The length of each section of pipeline between two flanged joints should normally be of a maximum of 4 standard commercial lengths. The intermediate joints shall be electrically welded. Both ends of such sections should be fitted with steel flanges. All welding by electric arc process shall be as per IS: 823 or equivalent and all gas welding process shall be as per IS: 1323 or equivalent. All welding works shall be carried out by qualified welders and the contractor shall produce proof of tests of welders. All filler materials, edge preparation, post weld treatment etc shall be as per relevant Indian Standard or equivalent. The contractor shall clearly mention in his design the codes and standards to be adopted by him in carrying out the work.

- 3.9 The nominal bore diameters of pipes at different sections as well their elevations are indicated on the general lay out drawing. These are indicative and contractor may give his own design.
- 3.10 Flanges used shall be of screwed boss type and shall be forged or machined from plates of sufficient thickness and the steel used shall conform to specifications IS: 2004 or latest.
- 3.11 Thickness of the flanges, boss, threading, PCD of bolt holes and the size as well as the number of holes shall be as per IS: 6392.
- 3.12 The flange faces are to be machined and grooved and flanges are to be mounted on pipes duly screwed as per specification IS: 6392. Joints shall be assembled with the inside of all pipes and fittings smooth, clean and free from burrs, blisters, scale, welding slag, sand and dirt. The inside edges of pipes and tubing shall be reamed after cutting to remove burrs.
- 3.13 Gaskets used at the flange joints shall be of compressed asbestos jointing materials of reliable and reputed makes conforming to IS: 2712 and the thickness of the jointing at any location shall not be more than 1.6 mm.
- 3.14 At no point, reduction of sizes of pipes shall be done by sudden step down. In the event of such necessity, a special reducing socket of sufficient length to IS 1239-Part II shall be used.
- 3.15 2 Nos. of indicating type flow meters shall be provided immediately after the isolating valves of the main header so that the volume of air passing through each grid can be regulated to suit the needs.
- 3.16 The system shall be provided with all necessary piping, fittings, isolating and stop valves, filter cum moisture separators, loops fitted with condensator, down take pipes, extensions, connections and misc. fittings. The air pipeline shall generally run over the head position throughout inside shop at height stipulated normally along the structure / column and shall be clamped on support bracket to be fixed on the column / beam girder etc. Outside shop, the pipelines shall be clamped on brackets carried on support structures without infringing any equipment / structure suitable for wind and other load as per IS: 875. The support structure should be fabricated from standard steel section conforming to IS: 226 latest version.
- 3.17 The down take shall be taken from the main distribution pipeline through a return u-bend mounted upward. The down take connections shall be running vertically along the structure and terminated with female screw ends in sufficient nos. to meet the requirement.
- 3.18 The system shall be fitted with all safety guard and safety features stipulated by statutory board and other regulatory system in force from time to time and executed as per relevant Indian / International standards.
- 3.19 The work is to be carried out on turnkey basis where in complete responsibilities rest with contractors for complete design, supply, erection, testing and of all material and equipment for the system and proving of performance to the complete satisfaction of Railways.
- 3.19 Pipe up to nominal bore diameter of 80 NB GI pipe shall conform to IS: 1239 (Part-I) latest version.
- 3.21 All down take pipes are to be provided with collector tubes with a valve to drain out moisture at appropriate height.
- 3.22 The bottom end of the collector tube shall be flanged and bolted for enabling the cleaning of tubes.
- 3.22 All down takes should be fitted with a cross Tee for taking terminal connections and where no service units are provided they should be dummied with suitable plugs.

4. **Tenderers Satisfaction About Requirements.**

- 4.1 The tenderer shall satisfy himself about the requirement through study of the site condition, the layout drawings and other relevant drawings available in Workshop projects Office.
- 4.2 Tenderer is advised to visit MEMU maintenance sheds of Indian Railways in his own interest for detailed understanding of application and requirement of compressed air pipeline system.
- 4.3 If the contractor feels that information furnished is any way inadequate to meet the requirement specified, he shall bring out the area of such deficiency with complete working sheet

- 5. **The successful tenderer shall have to supply the material as per the schedule of work.** Tenderer may also quote separately any item left in the schedule of material and found essential in the opinion of tenderers for successful installation and commissioning of compressed air pipe line.

6. **Proving Out Tests**

- 6.1 Entire pipeline, accessories, fittings etc. after erection in the field are to be field tested for performance.
- 6.2 All welded joints shall be subjected to hand hammer test while under test pressure. The welded joints should be tested radiographically. Defects revealed by the above tests shall be repaired or defective parts shall be replaced and the system retested as above. Test pressure shall be maintained until the entire section under test has been examined for leaks defects revealed shall be rectified and the sections retested. The system regardless of construction shall be capable of withstanding without failure leakage or permanent distortion at internal pneumatic test pressure equal to 110% of the working pressure. Pneumatic tests shall be performed with compressed air with soap suds applied at all joints or points where leakage may occur. Defects revealed by the test shall be repaired or defective parts shall be replaced and the system retested. Purging of pipelines will be done with air for 30 meters or till all dirt, scales and foreign matter are purged out in sections.
- 6.3 The leakage losses should not exceed 3% of the total capacity of the measuring compressor.
- 6.4 The pipe line dimensions have been designed for higher capacity than required; hence the pressure drop between the compressor house to the farthest point shall not exceed 0.3 bars due to leaks or faulty laying or excessive resistance due to inferior quality of pipes fittings and workmanship.
- 6.5 The contractor shall arrange to provide for the duration of the tests all such instruments and gauges as would be necessary for conducting the tests and hence include the cost therefore for such services in the charges for erection.
- 6.6 All instruments used for tests shall be calibrated by an approval independent or National Laboratory.
- 6.7 Should the result of the tests of the system performance fall short of the required standards prescribed, the contractor shall bear all expenses for improving the performance of the system by necessary rectification/replacement of equipment/materials and carryout another acceptance test.
- 6.8 The farthest point of supply shall be taken to determine the leakage loss. In case the total leakage exceeds a maximum of 5%, the works shall be redone at the risk and cost of the contractor.
- 6.9 The pressure loss due to leakage as measured at the farthest limit of supply of the shop/shed shall not exceed 0.3 bars. In case the pressure drop exceeds 0.6 bars (i.e. 0.3 bars over and above the maximum specified), the works will be redone at the risk of the contractor.

- 6.10 Contractor shall supply necessary catalogues, design, drawings, specifications etc for the accessories, over head structures. The contractor must also clearly specify any deviation from technical specification on particular items. General statements like “equipments shall be manufactured as per IS standard and your specification” will not be acceptable.

SCHEDULE – I (B)**LEADING PARAMETERS**

Contractor shall be responsible for successful commissioning of compressed air pipelines systems with compressors in integration

Item No.	Item description	Unit	Qty.
1.0	Procure, Install and Commission of compressed air pipe line with valves, clamps and other fittings	Set	1
1.1	80 NB GI Pipe (IS:1239, Part-I) Heavy class (C class) including cutting, threading, welding etc. bends, elbow, reducers, nut bolts, washers, with one coat of primer and two coats of synthetic enamel paint of approved make and shade (Make: TATA/JINDAL/SURYA/ ZENITH, C class Above Ground)	Meter	350
1.2	25 NB GI Pipe (IS:1239, Part-I) Heavy class (C class) including cutting, threading, welding etc. bends, elbow, reducers, nut bolts, washers, with one coat of primer and two coats of synthetic enamel paint of approved make and shade	Meter	92
1.3	CI Ball Valve suitable for 15 Kg/sq cm, complete in all respect, 80 mm dia nominal bore, Make: AUDCO,LEADER/SANT/VEESON	Nos.	5
1.4	Forged Brass Ball valve with hard chrome plated ball valve suitable for 15 Kg/sq.cm, complete in all respects, 25 mm dia nominal bore, Make: AIRPIPE/ KITZ/PARKER	Nos.	20
1.5	Support Clamp 80mm- AIRPIPE, ARCON, KAESER	Nos.	42
1.6	Support Clamp 25mm- AIRPIPE, ARCON, KAESER	Nos.	120
1.7	TEE Bolt M8 X 50mm	Nos.	168
1.8	Mounting Bracket 300mm-AIRPIPE, ARCON, KAESER	Nos.	42
1.9	Branching Reducer 80mm X 25 mm	Nos.	20

Note: (i) The payment shall be made on the basis of actual quantities executed under various item(s) and the accepted rates thereof, and not on the quantities mentioned in the above Schedule-I.

- (ii) Before fitting, pipelines may be got tested at required pressure (operating pressure x factor of safety). Contractor should facilitate necessary testing as per engineer's requirement.**

**SPECIFICATION FOR CAMTECH DESIGN OF HYDRANT SYSTEM FOR QUICK WATERING
ARRANGEMENT FACILITIES**

1.0 Description:

The scope of supply shall include design, supply, installation, testing, commissioning and proving out of **HYDRANT SYSTEM FOR QUICK WATERING ARRANGEMENT** and parameters specified in technical specification. It includes all the concomitant accessories/equipments/works as detailed in the specification and other accessories, which the manufacturer considers essential to make the machine fully operational, when installed, commissioned and connected to power source and other utilities as per instructions and conditions of contract. It shall also include installation and commissioning of related equipment, supply of spares, training of personnel in operation and maintenance of machine and supply of technical documentation.

2.0 Likely sources of manufacturers & supplier :

- (i) M/s MECO TECHNOLOGIES Pvt. Ltd. Kolkata,
- (ii) M/s SAIRAM CONSTRUCTIONS, Chittor, Andhrapradesh
- (iii) M/s DRONKAR AND BROTHERS, Indore, MP
- (iv) M/s NISSAN CLEAN India Pvt. Ltd. , Ahmedabad, Gujrat

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources(if provided). However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

- 2.1 **The system** with all accessories spares etc.
- 2.2 All related material required for inspection, erection and commissioning of the equipment and fixing accessories shall be included in the cost of basic machine.
- 2.3 Tool boxes containing all tools (Electrical and Mechanical) required for the maintenance of the machine should be supplied along with the machine. Tools shall be supplied in two different tool boxes, with individual pocket for each item and shall be of MEKASTER/TAPARIA or reputed ISI make. Unit cost of machine will be inclusive of cost of tool box.
- 2.4 Necessary information regarding the conditions under which the machine is to be used, together with other particulars necessary for manufacture and commissioning of the equipment, are given in Schedule-I. Sub mission of Catalogues, specification and related drawings for approval to Railways by successful bidder.
- 2.5 The system shall be designed, manufactured, erected and tested as per the latest relevant IS specifications.
- 2.6 The bidder's attention is drawn to the **Special Conditions of Contract for Mechanical Works and General specification of M&Ps (Appendix-A) specified in Tender Document.**

3.0 Scope of Supply:

The scope includes Design, Supply, and erection and commissioning of Water distribution system Manual/SCADA control consisting of suction and delivery piping, flow and Energy meters, pressure gauges, pressure transducers, Electrical actuate valves, Bi-pass valves, and

other accessories complete to provide Watering arrangement in Pit line at Anara MEMU/Coaching SHED.

- a. Laying of hydrant pipe line on pit line with proper clamping & fastening arrangement of delivery pipes with brackets as per standard design approved.
- b. Generate water operation APP which should be installed in PC & mobiles so that can be operated from anywhere from platform as per field requirement. System faults must be reflected through this APP so that operational safety is ensured.
- c. Suitable hose pipes and nozzles for watering MEMU Cars/Coaches.
- d. System should facilitate full rake as well as part rake watering.
- e. System should be operable in quick watering as well as normal watering mode both.

General requirements:

- (i) All materials shall be new and best quality conforming to specifications and subject to the approval of WPO.
- (ii) All equipment shall be of the best available make manufactured by reputed firms or specified makes.
- (iii) All equipment shall be installed on suitable foundations, true to level and in a neat workmanlike manner.
- (iv) Equipment shall be so installed as to provide sufficient clearance between the end walls and between equipment to equipment.
- (v) Piping from pump house/supply line should be done as per the site conditions without affecting other work. Piping within the pump house shall be so done as to prevent any obstruction in the movement within the pump house. In case of connection from supply line, proper connection to be insured with minimum pressure loss.
- (vi) Each pumping set shall be provided with a sluice Valve/butterfly valve on the suction and delivery side and a dual plate type return valve on the delivery side.
- (vii) All delivery headers/hanging pipes within the pump house shall be floor supported.
- (viii) Location for the Booster pumping arrangement will be decided by WPO and the drawing will be provided in time.
- (ix) Booster pump arrangement design must be capable of watering entire 24 coach length train in 5 minutes.
- (x) Proper back pressure arrangement should be provided to the system for the safety of the entire system of pipe line.
- (xi) The entire system should as far as possible consume minimum Electrical power supply. Pumps and other all accessories should be of reputed Brand/Make with ISO certification.
- (xii) The implementation of quick watering system must be done taking guideline from CAMTECH report as well as guidelines from WPO/Local authorities.
- (xiii) The salient feature of the recommended watering system of 'CAMTECH' are as under:
Water flow from 200 m³/hr to 600 m³/hr.
- (xiv) Design and drawing will have to be developed to meet the requirement and get approval of WPO before supply of all pumps and accessories. Required design calculations with factor of safety considerations etc must be submitted at the time of approval. However such approval will not indemnify the contractor towards establishing the field performance.
- (xv) **Safety Gear** - The Contractor should supply all personal protective gears to his staff for the purpose of carrying out the work. The Contractor shall remain fully responsible for ensuring safety and in case of any accident, shall bear the cost of all damages to his/her/their equipment & men and also damages to the Railway.
- (xvi) The Contractor should ensure all Fire Prevention measures and any Damage if occurred due to Contractor will be recovered as per norms.

Basic Principle:

Flow requirement is varying from 200 m³/hr. minimum to 600m³/hr. maximum as per CAMTECH report but it is necessary to maintain constant pressure for feeding water to coaches while considering the following points.

- a) Optimum power consumption.
- b) No wastage of water.
- c) Minimum manual interface.
- d) Flexibility of operation on D.G set.
- e) Flexibility of operation in auto and manual mode.

One single large pumping unit is not suitable for the requirement instead of it multiple pumps parallel with speed control to optimize the power consumption in proportion of flow and complete control of system and automation will be based on header pressure and line pressure sensed by pressure transducers fitted on appropriate location.

The work shall be carried out on turnkey basis such that the parameters to be maintained in the system are:

- (i) 3Kg/Cm² Pressure is to be maintained in all the pipe lines at any point of time during coach watering.
- (ii) Approx. 25920 litres fed to each rake (formation) or as much required.

Improvement to the en-route watering system must be based on the report on standardization of En- route coach watering system issued by CAMTECH vide letter No. CAMTECH/2008/M/C/1.0(Revised) October 2008 with latest corrections.

System comprises of the following major components: -

S N	Title	Purpose	Advantages
1	On/Off valves	To allow/disallow the liquid to pass-thru.	Can be controlled via PLC (On/Off position) hence response time increases, wastage of water decreases etc.
2	Flow meters	Quantitative measure of liquid passed	The information of how much water is consumed by each train is known. This increases the accuracy of the system.
3	VFD	To control the speed of the pump motor	The pump speed is varied as per our process pressure. This helps us to achieve the aim of the project, power consumed by pumps can be reduced, pump longevity etc.
4	PLC system	For automating the process	In Automation system Accuracy & Response of the system can be increased also the wastage of resources like water & power can be minimized.
5	SCADA, Web Servers	For remote access of the data	The authorized user can access the data at any place at ease.
6	2" LCD Monitors	For viewing the process graphically on line.	For Visual clarity

The Recommended list of materials to be used for the system are detailed in schedule-I.

All the above system is detailed as schedule-I is based on CAMTECH report; however any minor variation or change in Design or working of proposed system can be done based on actual site requirements with prior approval of WPO. If any small works are to be done, it should be done free of cost duly informing to the Railway supervisor concerned.

4.0 WATERING INSTALLATION SPECIFICATION:

A. PIPING WORK Designing of pipe line :

Total piping must be divided in three segments,

- I. Piping from over head tank to pump house.
- II. Piping within Pump House, common manifold and Header.
- III. Feeder Pipe line from pump house to track and main distribution line along the track.
(* Required provision of space in pump house 4mx5m , foundation support for Hydrant Pipeline as per approved design, Digging & back filling of pipeline if required will be covered from Civil BOQ.).

Size of all above piping is dependent on required parameters as per Annexure. Piping materials:

a. MS pipe should be 'B' class duly fabricated with all fittings must be red oxide coated and finally

enamel painted in suitable colours.

b. GI pipe should be 'B' class flanged joint.

c. Piping measurement:

- i. Suction and delivery headers for each pumping system shall be measured as per linear meter of finished length and shall include all items as given in Annexure 1 to 7. Painting also shall be measured as per linear meter.
- ii. G.I. pipes between various equipment's shall be measured per linear meter of the finished length and shall include all fittings, flanges, joints, clamps for fixing to walls or hangers and testing. Flanges shall include 3 mm thick insertion rubber gasket, nuts, bolts and testing.
- iii. Vibration eliminators, "Y" strainers, butterfly valves, slim non return valves shall be measured by numbers and shall include all items as given in the Bill of Quantities and specifications.
- iv. Check all clamps, supports and hangers provided for the pipes.

Fill up pipes with water and apply hydrostatic pressure to the system as given in the relevant section of the specifications. If any leakage is found, rectify the same and retest the pipes.

B. PUMPS AND MOTORS PUMPS:

S.N.	Description	Technical specification
1.	Pump make	Kirloskar Brothers Ltd./CRI/KSB/Jyoti
2.	Type	Centrifugal/INLine
3.	Flow rate	180 to 200 m ³ /hr
4.	Head	28 to 35 m
5.	Nozzle orientation	Side
6.	Size	As per manufacture
7.	Suction head	Flooded (Positive suction)
8.	Recommended Pipe size	Suction 150/200 mm depending as per duty
9.	Recommended Pipe size	Suction 150/200 mm depending as per duty
10.	Sp. Gravity	Water Sp. Gr. 1
11.	Efficiency of Pump	75% (+/- 3%)
12.	BKW	24.13 KW
13.	Recommended Primer mover	30 Kw/1450/2900 rpm.
14.	Shut off head	As per Pump manufacturer
15.	Pump casing	Cast iron C.I. IS 210 GR 260
16.	Impeller	Bronze IS 318 GR2/SS
17.	Casing –wear Ring	Bronze/SS
18.	Shaft sleeve	Bronze/SS
19.	Sealing	Mech. Seal
20.	Other part of Pump material	As per manufacturer

(i) Water booster Pump system for water supply:

The packaged water booster pump system shall be a standard product of a single pump manufacturer. The manufacturer of the packaged pump system shall also be the manufacturer of the pumps. "one of a kind" packaged (assembled) pump system shall be considered equal.

The packaged water booster pump system shall use advanced variable frequency drive and dedicated electronic pump controller to maintain a constant water pressure of 3 to 3.4 Bar to a maximum flow of 540 to 600 Cum /hr. Max supply pressure shall be 3 Bar (Positive Pressure).

(ii) Pump-Motor Sets for Hydro Booster:

The packaged pump system shall have 2 nos. identical pumps . The duty point of each pump shall be 180 to 200 Cum/hr @ 35 to 28 meters TDH. The pump minimum B.E.P. shall be 70 %. Each pump motor rating shall be 30 KW and suitable for 3 phase, 415 volts. The pumps shall be of the inline Horizontal / Vertical , Single / multi stage , centrifugal design. The pump suction/discharge

chamber (base) shall be in CI with Painting, primer facing etc on CI parts. Motor stool and pump shaft coupling shall be constructed of cast iron.

MOC of pumps should be body of Cast Iron, Impeller of bronze (LTB-2 Grade)/SS., Shaft of carbon steel, MECH. Seal fitted, MS fabricated base frame to align complete set, said common skid in this specification and coupling should be such that repairing can be done without disturbing MOTOR.

(iii) Horizontal Split Case Centrifugal Pumps:

- a. The contractor shall furnish and install pumps as outlined on the equipment schedule and described in these specifications.
- b. Pumps shall be of a single stage double suction horizontal split case centrifugal pump(s) or equal, designed to deliver the scheduled flow rate (in LPS), the specified total dynamic head (in m), at the scheduled efficiency and scheduled speed (RPM).
- c. To ensure maximum efficient throughout the operating range, the proposed pumps duty point shall be as closed as possible to the pump BEP.
- d. The efficiency curves of the proposed pumps shall have broad brands characteristic.
- e. To ensure cavitations free operation, each pump's NPSH requirement must be low enough to permit stable, continuous operation at 120% or greater of best efficiency point.
- f. Each Pump shall be factory tested hydrostatically as per HI standards.
- g. It shall then be thoroughly cleaned and painted with at least one layer of primer and follow with finishing coats prior to shipment.

(iv) Pumps Installation:

- a. Pump and motor shall be pre-aligned at the factory by the manufacturer. The contractor shall realign the pump and motor at site before start up.
- b. Alignment limits shall be according to the standards of the Hydraulic Institute or manufacturer recommendation and shall be carried out with laser alignment tools or dial gauges.
- c. Site realignment shall be carried out after grouting of base, connection of piping; system and pump casing completely bleed and filled with pumping fluid.
- d. If pump sets are installed on inertia base, it shall be properly leveled by adjusting the vibration isolation dampers below the inertia block.
- e. The contractor shall ensure that the pumps foundation/inertia blocks are accurately sized; the pump set seating face shall be properly leveled. Pump set shall be properly installed and bolted in position by anchor bolts.
- f. Piping connected to the pumps flanges must be properly aligned, free of stresses and forces.
- g. The contractor shall ensure that pumps submitted will meet the design flow, head and efficiencies as outlined in the equipment schedule.

(v) ELECTRICAL MOTOR :

Description	Tech. Specification
Manufacturer	KBL/ABB/Siemens
Type	3-phase TEFC SCR Induction Motor, High efficiency.
Voltage	415V ($\pm 10\%$)
Type	Squirrel cage(SER)
Frequency	50 $\pm 5\%$ Hz.
Combined Variation	$\pm 10\%$ (Absolute SUM)
Rating	Continuous.
Insulation	Class "F" with class "B" Tem rise.
Ambient	50°C
Temp.Rise	70°C

Degree of Protection	IP 55
Frame size	As per Manufacture.
FL RPM	1475/2900
Efficiency	FL 92 ³ / ₄ Load 92 ¹ / ₂ Load 90.
Power factor	FL 0.89 ³ / ₄ Load 0.86 ¹ / ₂ Load 0.78

(I) Motor & Variable frequency drive:

The motors shall be TEFC type, class F insulation, 4 pole, efficiency class "Eff -2", should be a NEMA standard motor. Drive-end motor bearings shall be designed to absorb thrust and shall be adequately sized to ensure long motor life. The variable frequency drive enclosure shall include dry-contact fault-output relay contacts along with analog and digital inputs. The motor shall detect/protect itself against under voltage, over voltage, excessive temperature, and set-point signal fault.

(II) Motors:

- a. All motors shall be of a type constructed to relevant Indian Standard.
- b. Motors shall be selected to obtain the most suitable drive for the specified equipment, as recommended by the equipment manufacturers. Squirrel cage induction motors are preferred. Motors shall generally be three phase. Motors 1 KW or less may be single phase.
- c. Ratings shall be based on continuous duty in the prescribed environment or an ambient temperature of 43 degree C whichever is the more demanding.
- d. Motors in all cases shall be entirely suitable for the duty. A margin of not less than 10% shall be provided between the continuous rating of the motors (without overloading) and the maximum power absorbed by the item of equipment (as installed) under its most arduous operating condition, taking account of the characteristics of the driving machine. All motors up to 30 KW shall have full load efficiency of not less than 85% and power factor of not less than 85. Motors of rating greater than 30 KW shall have full load efficiency of not less than 90% and power factor of not less than 0.85.
- e. Winding insulation and general construction of the motor casing, terminal block etc. shall be to Class F, allowing 80 degree C temperature rise above ambient, unless otherwise specified.
- f. All motors shall have an isolating switch adjacent to and within sight of the motor. The switch shall be such that all conductors to the motor are isolated in one operation.
- g. Motors up to and including 3.7 KW shall be fitted with ball bearings at both ends. Larger motors shall be fitted with roller or deep groove ball bearings. Motors operating with vertical shafts shall be equipped with bearings designed to counter unbalanced end thrust. Except where noted, motors shall have a synchronous speed not exceeding 1500 rpm.
- h. All motors rated at 22 KW or more shall be fitted with thermostats or other sealed temperature sensitive devices embedded in the windings and suitable for connection to motor protection control circuits.
- i. Terminal blocks enclosed in cast iron or aluminium boxes shall be provided for all wiring. Connections to motors. The blocks shall be arranged to enable easy access for maintenance.
- j. Motors shall be mounted on a common bed plate with the driven machine wherever possible. The whole assembly shall be supported on vibration isolating material or springs to eliminate the transmission of noise and vibration into the structure. All holding down bolts required shall be supplied and fixed by this Contractor.
- k. Motors rated in excess of 5.5KW shall be supplied with anti-condensation heaters, controlled such that the heater is only 'ON' when the motor is 'OFF'.
- l. The drive selected for any machine shall be the type recommended by the Manufacturer of the driven machine and subject to approval. All drives shall be fitted with safety guards.

- m. For multi-winding motors there shall be no way that the motor isolating switch can be operated whereby any winding may be energized whilst another winding is isolated.
- n. Terminal boxes shall be of such dimensions as will ensure access to the terminals and allow room for the supply leads.
- o. Each box shall be fitted with normal bottom or top cable entry. With exception of motors with ratings less than 1 KW, all boxes shall be capable of being turned to a further 3 positions, 90 degrees apart without affecting the terminal base or terminals. Standardize frame sizes for all applications so that the minimum practical number of motors need be carried as spares. Ensure that motors of different frame sizes spared by a single motor be provided with adaptor plates, oversize couplings, oversize terminal boxes, standard keyways etc to
- p. facilitate replacement.
- q. Motors of a particular type or application shall be of the same manufacturer.
- r. Motors above 7.5 KW shall be provided with suitably sized tinned brass cable sockets. The type of cable terminations shall be as shown on the drawings. Three phase motors shall be fitted with separate earthing terminals.
- s. On all motors over 25 kg in weight, lifting eyes or lugs shall be supplied.

Unless specified otherwise, enclosures for motors shall be as follows:

Hazardous areas	:Flame proof
External	:TEFC – Tropical
In forced air flow	:TE non-fan cooled or TEFC
Areas subject hosing	:Hose proof
All other areas	:TEFC.

- t. All motors shall be provided with name plates. Motors shall have a maximum SPL of 85db (A) at 1 meter.
- u. Overloads and thermostat protection shall not be provided for smoke exhaust fan motors or stair pressurization fan motors which operate only under a fire alarm condition and are essential for fire and smoke control.
- v. Motors for fans having a dual function, e.g. smoke spil/return air fans, which are essential for fire and smoke control, shall be protected as specified above. However, such protection shall be overridden in a fire alarm condition.
- w. Protection for supply air fan motors shall be provided as indicated above and shall remain in circuit at all times.

C. OTHER ACCESSORIES :

Description	Tech. Specification
Base Plate	M.S. Fabrication with drip tray arrangements on common skid mounting
Coupling Guard	M.S. Fabricated
Coupling	Love Joy Tyre
Set of Foundation Bolts	Fabricated./KOR
Strainer	Fabricated/KOR
Valves	As per site requirement
Sluice Valve	KBL/KSB/Leader/L&T/KOR NRV
KBL/KSB/Leader/L&T/KOR Butterfly Valve	KBL/KSB/L&T/KOR
Electrically operated Valves	KBL/SAM/Leader/L&T/Imported
Pressure gauge and piping	Standard
Flow Meter	NOVA Control/ABB

I. VALVES

- i. Cast Iron Rising spindle Sluice valve: They shall be provided on delivery side, Size as per recommendation of pump manufacturer CIDF type. Valves should work for clear water having turbidity to 5000 ppm and temp ambient. Sluice valve shall be confirming to BS: 5155/IS 13095 with latest amendments. The tentative size of sluice valve shall be as per manufacturer recommendation or designed by contractor as per delivery pipe size. It shall be double flanged type PN 1.0 and PN 1.6. The valves shall withstand seat test pressure of 10 kg/cm² and body test pressure of 15 kg/cm². Duration of test shall be as per table- 3 of IS 13095-1991. Contractors shall provide test certificate for each valve.

Materials for construction of valve.

S.N	Component	Material	IS referred	Grade
1.	Body	Cast Iron	IS 210-1978	FG 200 Min
2.	Body wedge Ring	Leaded tin Bronze	IS 318 Gr LTB2	
3.	Stem	Stainless steel	AISI 410/304	
4.	Stem Nut	Leaded tin Bronze	IS 318 LTBr2	
5.	Shaft bearings	SLEEVE		
6.	Internal fasteners	As per manufacturer recommendation		
7.	External Bolting	As per manufacturer recommendation.	—	—

Marking

ISI/ B.S. Certification mark

- The manufacture's name or trade marks
- Nominal pressure of valve
- Size of valve
- Heat cost number

ii. Non return check valves

They shall be provided delivery side of each pump and size as per recommendation of pump manufacturer. The valve shall be designed in such a manner to effect non slam closure. The valve must be energy efficient with low pressure drop across the valve. To substantiate this CV values and pressure drop.

Material of construction

Body	Cast iron
Disc with hinge pin	Cast iron
Sealing	Nitrile "O" ring
Bypass	valve
Make	KSB/Kirloskar/,Audco /KOR
Working pressure	2 10 AND 16 kg / cm
Body & seat Pressure	As per IS Code

Marking

IS/B.S. Certification marks

- Manufacturer's name
- trade mark
- Nominal pressure
- Size of valve

iii. Cast Iron Butterfly valve :

They shall be provided on suction side, Size as per recommendation of pump manufacturer sandwich type. Valves should work for clear water heaving turbidity to 5000 ppm and temp ambient. Butterfly valve shall be confirming to BS: 5155/IS 13095 with latest amendments. The tentative size of Butterfly valve shall be as per manufacturer recommendation or designed by contractor as per delivery pipe size. It shall be sandwich type PN 1.0 The valves shall with stand seat test pressure of 10 kg/cm² and body test pressure of 15 kg/cm²

Duration of test shall be as per table-3 of IS 13095-1991. Contractors shall provide test certificate for each valve.

Materials for construction of valve

S.No.	Component	Material	IS referred	Grade
1	Body	Cast Iron	IS 210-1978	FG 200 Min
2	Disc	SG Iron		
3	Stem	Stainless Steel	AISI 410/304	
4	Stem Nut	Leaded tin Bronze	IS 318 LTB ₂	
5	Shaft bearing	Not required		
6	Internal fasteners	As per manufacturer recommendation		
7	External Bolting	As per manufacturer recommendation		

Acceptable make: Kirloskar, KOR, KSB, L&T Aduco. /KOR

Marking

ISI/B.S. Certification mark

•The manufacture' name or trademarks

•Nominal pressure of valve

•Size of valve

iv. Stainless Steel Ball valve

They shall be of two piece assembly design having SS Ball and SS body having seat Ring of PTFE.

Materials for construction of valve

S.No	Component	Material	IS referred	Grade
1	Body	SS	AISI 410	CF 8
2	Disc	SS	AISI 410	CF 8
3	Stem	Stainless Steel	AISI 410/304	
4	Stem Nut	SS		
5	Seat Ring	PPTe		
6	Internal fasteners	As per manufacturer		
7	External Bolting	As per manufacturer	--	--

Acceptable make - Kirloskar, KOR, KSB, L&T Aduco.

Marking

ISI/B.S. Certification mark.

The manufacture' name or trademarks.

Nominal pressure of valve.

II. STRAINERS:

i. Basket strainer:

They shall be provided on suction side, Size as per recommendation of pump manufacturer T type having both side flanged ends, should work for clear water heaving turbidity to 5000 ppm and temp ambient. Strainer shall be confirming to BS: 5154/IS 13090 with latest amendments. The size of Strainer shall be as per manufacturer recommendation or designed by contractor as per suction pipe size. The Strainer shall with stand test pressure of 6 kg/cm² and. Contractors shall provide test certificate for each Strainer.

Material of construction – body M.S. Fabricated and strainer bucket of S.S./Bronze SIZE -From 100 mm to 400 mm.

ii. Y strainer:

They shall be provided on suction side, Size as per recommendation of pump manufacturer Y type having both side flanged ends, should work for clear water heaving turbidity to 2000 ppm and temp ambient. Strainer shall be confirming to BS: 5154/IS 13090 with latest amendments. The size of Strainer shall be as per manufacturer recommendation or designed by

contractor as per suction pipe size. The Strainer shall withstand test pressure of 6 kg/cm² and Contractors shall provide test certificate for each Strainer.

Material of construction –

body Cast iron and

strainer of S.S./ Brass.

SIZE - from 80 mm to 100 mm.

D. CONTAINER OF PUMPING SYSTEM:

- M .S. Container delivery to site a complete plant room facility pre-packaged steel enclosure ready to install at site packaged pump house.
- Main structure of MS formed sections, sides of steel corrugated sheets, base of C and I sections, flooring of chequered plates.
- Two piece doors on at least three sides for maintenance and placement of equipments.
- Pallet truck as well as crane lifting arrangements whether proof enclosure.
- Thermal insulated walls with PU and FRP sheets
- Facility of drainage leakage through PVC TUBES
- Container with natural ventilation at lower and upper parts as well as with mechanical forced ventilation.
- Painting with antirust and final coat of whether proof epoxy paint.
- Provisions of flange joints of inlet outlet pipelines and stuffing box for cable entries.
- It should capable to handle the weight approx 6000 to 7000 kg with less vibration.
- Separate partition for control panel with cooling arrangement, if system required air condition then air conditioner to be provide for control panel chamber.
- Container should have proper lighting inside and outside as per specified by railway department with proper cooling arrangement.

E. SCADA AND PLC SYSTEMS:

A dedicated pump logic controller shall be a Multi pump controller or approved equal. The controller shall have a large graphical display with VGA 240 X 320 pixels. The logic controller shall be modular in design and should be expandable based on the system requirement. The controller should have following minimum communication ports:

- Ethernet port for remote connectivity.
- Service port.
- IO port for system expandability.

The controller shall operate the pumps to maintain the required system pressure while using minimum energy.

As flow demand begins, one of the pumps will start at low speed. As demand increases, the pump will speed up until it reaches full RPM. At this point the second pump will start. The speed of the first pump will vary until it builds up required system pressure. This sequence will continue for additional pumps. Pumps will changeover automatically to maintain the system pressure depending on demand, time, and fault.

When flow demand is zero, the system shall shut off. If the system runs continuously, the lead pump shall alternate every 24 hrs. If the system includes an optional standby pump, the controller shall exercise the standby pump as a part of the system and equally run the pump as other pumps in the system. The controller shall accept a low-suction pressure or other suction fault input to shut

down/protect the system. Means should be provided for friction loss compensation for increased consumption rate. Booster set should incorporate following "Power saving features" as standard. Selection of 3 basis set points for pressure relative to time. Pipe compensation i.e., Change of set point depending on water consumption mpulsory change of staring of sequence i.e., equal operating time for pump, both for frequency control and ON/OFF regulation. Inputs and outputs for external communication. A small sized pressure tank (as per the BOQ) to provide for reducing Impact of water hammer. Diaphragm pressure tank shall be in MS construction, suitable for 10 bar pressure rating. The tank should have an interchangeable membrane with tiered membrane design and with built – in pressure gauge. The functions of the controller should incorporate the following features. Ethernet connectivity for remote monitoring and control. Graphical view of the system with status indication of the complete system.

- Trouble free step by step installation wizard.
- Open loop control.
- On/Off operation at low flow.
- Automatic cascade control of pumps.
- Selection of switching sequences, automatic pump change and pump priority.
- Manual operation.
- Analog set point influence.
- Friction loss compensation.
- Set point adjustment.
- The remote control functions should have the following features.
- Control and monitoring of the system from remote location on Ethernet.
- Remote system On/Off –Hardwired Interface.
- Switching of individual pumps.
- Remote common alarm – Hardwired interface.
- Individual pump status through potential free contacts.
- The monitoring functions will have the following features.
- Pressure Loop.
- Pre pressure.
- Motor protection.
- Water shortage monitoring.
- Data of VFD through RS – 485 (Modbus protocol).

I. PROGRAMMABLE FUNCTIONS:

The display shall be menu driven for status indication, Operation, alarm and settings. System functions shall be programmable through the display. These programmable menu functions/ settings and information shall include, but not be limited to :

- Large graphical display with overview of the system including key measuring points.
- Backlight display.
- Menu bar for easy navigation.
- System information and status.
- Control functions.
- PI control setting.
- Setting of alternative set points.
- Setting of primary sensor.
- Setting of Redundant primary sensor.
- Automatic pump alterations.
- Automatic cascade control of pumps.
- Set point adjustment and control.
- Pump priority.

- Standby pump designation.
- Friction loss compensation (set point).
- System pressure set point.
- Actual system pressure.
- System faults.
- High and low discharge pressure shut-down limit.
- Analog input for remote set-point control.
- Digital input for remote stop/start.
- Data communication for remote control.

II. LOG AND STATISTICS:

The system shall be capable of obtaining and logging the valid operation data and statistics such as System performance, Energy consumption, Water consumption, Alarm and Warning Log etc.

III. CONTROL CABINET:

The controller shall be mounted in a control cabinet of CRCA Sheet Metal construction with an IP 20 enclosure of suitable rating (or specified optional cabinet) with the keypad and display screen mounted through the outer door. In addition to the electronic pump controller, the control cabinet shall include circuit breakers for each pump and the control circuit and control relays for alarm functions.

- Control cabinet shall include the following, but not be limited to:
- Motor protection
- Dry run protection
- Bus communication
- Display with VGA 240 X 320 pixels
- Pump Fault Lights – A Red light for fault indications Visual Alarm
- Manual Operation

The entire packaged pumping system shall be mounted on a Hot Dipped Galvanized MS or SS fabricated skid. The control cabinet shall be mounted in one of the following ways depending on the size of the cabinet.

On a Hot Dipped GI MS fabricated control cabinet stand attached to the system skid. On a Hot Dipped GI MS fabricated skid, separate from the main system skid. Floor mounted control cabinet with plinth. Delivery manifold shall include a pressure gauge pressure sensor. The suction manifold shall have as standard a pressure switch, and pressure gauge. The pump performance curve shall comply with the tolerance standard according to ISO 9906

5.0 ELECTRICAL INSTALLATION:

A. GENERAL:

The Contractor staffs, who are working with Electrical works in this contract, should possess valid competency certificate. This section covers the general requirements for electrical work to be installed under this specification. The Contractor shall supply and install all electric wiring, switchgear etc., necessary for the complete, safe and satisfactory operation of the plant covered by the Specification. All electrical wiring and cables shall be properly tagged to the satisfaction of the Consultant / E-I-C. All equipment provided shall be 'tropicalized', i.e. designed for use in conditions up to 50°C ambient air temperature and 100% relative humidity. All equipment, materials, workmanship and fittings shall comply with the appropriate Indian Standard or Code of Practice as listed in the relevant paragraphs of this Section, or any approved equivalent international standards.

B. ELECTRICAL SUPPLY:

The electricity supply shall be 415/240 Volts, 50 Hz, 3 phases, 4 wires. All equipment shall be designed to operate with a + 10% voltage tolerance without a loss of rated output. All equipment shall be connected to ensure that the phases are balanced, to the requirements of the local supply authority.

C. SWITCH BOARD AND SWITCH BOARD EQUIPMENT:**i. Motor Control Panel:**

Control panels shall be self-contained, suitable for the location indicated and an operating environment of 50 degree C, built up of enclosed compartments conforming to form 3B as per BS 5486 Part-I : 1990 and IEC 439-1 to preclude fault transference between sections of the switchboard. Control panels shall be arranged for the maximum safety of personnel. All power wiring and busbars shall be fully enclosed with isolating and insulating barriers and interlocks provided to ensure maximum safeguards. All switches shall be lockable in both of the 'OFF' or 'ON' positions. Control panel shall be of the floor standing, type tested modular design, totally enclosed "dead front" type, consisting of dished front panels and doors built up on an approved substantial mild steel angle or channel frame with no cross- struts, and shall be fitted with removable rear and end panels held in position with six fixing points.

All panels and doors shall be constructed of best quality, dead-flat CRCA MS sheet not less than 2 mm thick. Neat cut-outs shall be provided in dished panels to allow the exposure of circuit breaker escutcheons and toggles, and switch operating handles and indicators only. The edges of all outlets and drilled holes shall be burr free. Doors shall be stiffened and provided with metal based neoprene gaskets and concealed nonferrous door hinges. Door handles shall be chrome plated and incorporate a barrel type locking mechanism and shaft adjustment for increasing sealing pressure.

All switches/MCCB shall be provided with mechanical interlocks to prevent any positive access to any equipment inside the cubicle when the switch is in the 'ON' position. Dished panels shall be stiffened and held in place with chrome plated castle head nuts attached to fixed studs of not less than 10mm nominal diameter. All fixing hardware shall be cadmium plated. The removable rear panels shall be provided with a pair of handles for easy fixing/removal of the panels. Provision shall be made for lifting cubicle switchboards. Eye bolts shall not be used when subjected to shear stresses. Adequate provision and space shall be provided for bending and connecting cables, which shall be separated from switchboard busbars.

All internal small wiring shall be PVC insulated, neatly, bunched and run on supporting cleats or in trunking, colour coded and labelled or sleeved for identification. All switch-board small wiring is to terminate on labeled terminal boards or strips to which external connections are made. Insulators, including busbar supports, shall be non-hygroscopic and non- deteriorating. The use of fibrous materials, linseed oil, varnish, "Presspalin", etc is prohibited.

Low voltage switchboards shall be constructed to withstand a system fault level of 25 KA at 415 volts for 1 second. Low voltage switchboards shall be designed to comply IS: 13947:1993. Type test certificates, issued by a reputed and independent testing authority such as CPRI certifying the circuit breaker, busbar and its enclosure shall be submitted for review. Ventilating water-proof louvers are to be provided on the sides and back and are to be of approved design with internal dust baffles.

Where ventilating fans are installed, a low level, filtered air intake shall be provided. The filter shall be removable from outside the switchboard. Current transformers shall be mounted without reduction of busbars or connections and arranged for ease of removal.

ii. Wall Mounted Panel:

Wall mounted panels with an appropriate rating and number of circuits shall be provided to supply power to plant located throughout the building. Panel enclosures are to be fabricated from CRCA sheet metal of minimum 2 mm thickness and finished in enamel of a colour to the approval of the

Architect. Inside the enclosure door, a circuit chart indicating the number of ways, location of equipment, loading and protection rating shall be fixed.

All wiring terminations, busbars, and live parts within the panel board shall be adequately shrouded and an insulating front shield of minimum 1.6mm thickness shall be provided to completely screen the unit's interior. Only the operating dolly and insulated surround shall project through the shield. The units are to be provided with sufficient wiring ways for outgoing circuits at both the top and bottom of the board. Space for future ways shall be provided.

iii. Busbars:

All busbars shall be made of hard drawn high conductivity aluminium. Conductor conforming to grade 91E of IS 5082-1981, making and arrangement of the busbars, connections and auxiliary wiring shall be to relevant Indian Standard. Bus bars shall be insulated with heat shrunk PVC sleaving of 1.1 KV grade and Bus bar joints shall be provided with clip on shrouds. Busbars shall be adequately rated and supported by porcelain or moulded insulators spaced at suitable intervals, the complete assembly being capable of withstanding the maximum mechanical stress to which it may be subjected under fault conditions. Full size neutral bars shall be provided.

Busbars shall be so arranged that all conductors can be brought onto the bars without undue bending. Conductors between the busbars and MCCBs or isolators are to be high conductivity aluminium bar having a current rating of not less than that of the switches to which they are connected. The conductors are to be insulated with PVC sheathing and colour coded for phase identification. Removable bolted links shall be provided for the accommodation of current transformers for metering and protection facilities without affecting the mechanical and electrical properties of the busbars as a whole.

iv. Moulded Case Circuit Breakers (MCCBs):

All moulded case circuit breakers shall conform to IS: 13947-1993, and be of approved manufacturer throughout the project. The body and base of the units are to be moulded and the units are to be sealed after assembly.

The load handling contacts are to be silver/tungsten and the contacts and operating mechanism so designed as to give a wiping action both at make and break. The breaker operating mechanism is to be of the trip-free type so designed to prevent the load handling contacts from closing on a fault.

The toggle handle shall open and close all poles of a multiple circuit breaker simultaneously. A fault on one pole shall open all poles. The MCCBs shall have the fault level rated as per schedule of quantities. Circuit protection against overload and fault conditions is to be provided by means of a thermal magnetic device designed to give thermal operation on overload and magnetic operation under fault conditions. The position of the breaker operating dolly is to be clearly indicated for 'ON' and 'OFF'. MCCBs shall be suitable for use at temperatures of 50 C Ambient.

v. Miniature Circuit Breaker:

Single pole or triple pole miniature circuit breakers (MCB) are to be used for sub-circuit protection. All MCBs shall conform to IS: 8828- 1996. The body and base of the units are to be moulded bakelite or similar material and the units are to be sealed after assembly. The load handling contacts are to be silver/ tungsten, and the contacts and operating mechanism shall be so designed as to give a wiping action both at make and break. The breaker operating mechanism is to be the trip free type. A thermal-magnetic time tripping mechanism is to be included for circuit protection against overload and short circuit. Short circuit level of MCBs shall not be less than 10 KA. Tripping characteristics of MCBs shall be able to discriminate with upstream breakers.

vi. Isolators:

All isolators whether mounted in a cubicle type switchboard or separately mounted shall be heavy duty type conforming to the requirements of IS : 13947-1993. All contacts are to be fully shrouded and are to have a breaking capacity on manual operation as required by British

Standards. Operation of switches shall be independent of the operator's control, with a quick make/quick break action. The links for switch are to be high rupturing capacity.

The category of duty of the main switchboard, sub main switches and cable tee-offs shall be as indicated in the schedules. Switches and isolators mounted in cubicle type switch-boards are to be enclosed in separate sheet metal compartments, and mechanical interlocks are to be provided between the cubicle doors and the switch operating mechanisms, so arranged that the cubicle door may not be opened with the switch in the 'ON' position. Similarly it shall not be possible to close the switch with the cubicle door open, except that provision shall be made within the cubicle for authorized persons to defeat the mechanical interlock for test purposes, and close the switch with the door in the open position. The 'ON' and 'OFF' positions of all switches and isolators shall be clearly indicated by a mechanical flag indicator or similar device. In TPN switch units, bolted neutral links are to be fitted. For single pole and neutral switches and isolating switches, the neutral conductor is to be taken through a bolted link.

vii. Contactors:

Contactors or control relays are to be single or triple pole, conforming to IS :13947- 1993 (part IV Section 3). The rating shall be as noted on the drawing but in any case, shall not be less than 10A or the rating of the circuit, whichever is the greater. All ratings shall be "continuous" and all contacts shall be silver plated. Contactor coils shall operate from the supply provided.

viii. Measuring Instruments and Protection Relays:

All ammeters and voltmeters for use in conjunction with switch-gear are to be of the moving iron pattern to comply with relevant Indian Standard. Unless otherwise specified, all meters are to be 96mm dial square flush pattern with quadrant scales. Ammeters with scale deflections greater than 100A installed in the Switch Board shall indicate all phase and neutral currents. All ammeters shall have a continuous overload capability of 120% of the upper limit of the scale for two hours. Each ammeter shall be provided with an adjustable red index pointer to indicate the normal full load current. Ammeters shall be provided for motors of 5.5KW or larger and they shall be capable of starting current and shall have a compressed overload scale for this purpose. Motor current reading shall be provided on one phase only. Voltmeters shall be of accuracy Class 2 and have expanded scales.

Voltmeters shall be connected to the incoming side of the power supply through 6 ampere MCB's. Mechanical zero adjustment shall be provided for voltmeters and ammeters by means of a screw slot at the face of the meters.

Energy and maximum demand meters shall be installed as specified. Energy meters shall provide a direct, single, digital reading, without the need to apply multiplication factors. Earth fault and over current protection relays shall be as specified in the drawings. Current transformers for measurement and protection shall be of ring pattern, clamped on readily removable, bolted copper links with accessible terminals. Selector switches of the rotary type shall be provided to enable all phase currents and all phase and phase to neutral voltages to be read.

Instrument MCB shall be mounted on the panel adjacent to their associated instruments. All instrument and indicating lamp wiring behind hinged front panels shall be protected by clear acrylic sheets. The arrangement, scale deflections and ratios of all instruments and relays shall be approved prior to assembly of the associated switchboard.

ix. Labelling:

All items of equipment on the switchboard shall be labeled to indicate function with black Traffolyte labels and white engraved lettering securely fixed with chrome plated screws. Lettering shall be at least 10mm high. Labels to all switches, isolators and the like shall indicate the supply and cable details. All labels shall be approved prior to engraving. The use of adhesive labels will not be permitted. All electrical equipment not mounted on the switchboard shall also be labeled as specified above.

x. Time Delays.

Time delays shall be provided to prevent the simultaneous starting of any two motors above 3.5 kW and to prevent short cycling of automatically controlled motors.

xi. Control Switches.

All control switches shall be of the rotary type of approved manufacturer. Each control switch shall be panel mounted and engraved to clearly indicate the equipment controlled or function of the switch.

xii. Indicating Lamps:

Indicating lamps shall be individual flush mounted units. Lamps shall have chromium plated and polished solid brass body and ring with metallic threaded section and shall be circular in shape of approximately 22 mm diameter. Indicating lamps shall be of 240/110 V and rated to withstand not less than 20% continuous over voltage.

Lamps shall be well ventilated and the design shall permit removal of lamp glasses and bulbs from the front of the unit without the need of any special tool. A push button lamp test facility shall be provided for all switchboards.

Indicating lamps shall be colour coded as follows:

Green- Motor stopped, circuit breaker OFF
 Amber-Supply available
 White- Valve open, circuit breaker auto trip
 Red- Motor running, circuit breaker ON
 Blue- Valve closed
 Control circuit shall be of 240V supply

xiii. Push Button Switches:

Push button switches shall comply with and be tested and certified to relevant Indian standard. Electrical rating shall be 500V AC or 250 V DC as appropriate. Push buttons for alarm duty shall be minimum of 2 amp rated Push buttons for control duty shall be 10 amp rated. Push buttons shall be individual flush mounted units with metallic chromium plated and polished solid brass body and ring, circular in shape and approximately 20mm diameter.

Unless specified otherwise, push buttons shall be colour coded as follows :

Green	-	Start motor
White	-	Open valve
Red	-	Stop motor
Blue	-	Closed valve
Black	-	Reset
protection/alarm, lamp test Yellow	-	Except alarm

xiv. Earth System:

All metal work associated with the switchboard installation not forming part of a phase or neutral circuit shall be bonded together and shall be solidly and effectively earthed through the system provided by the Main Electrical Contractor. Continuous earth bus suitable to withstand prospective short circuit current shall be provided. Hinged doors shall be connected to earth through adequately sized flexible braids. It shall be the responsibility of this Contractor to ensure that adequate means of earthing are provided.

xv. Cabling:

A cabling zone clear of busbars, switch and circuit breaker chambers shall be provided in such a manner to give minimum difficulty in connecting sub-main cables entering the switchboard for connection to switch units or circuit breakers. The cabling zone shall be fully

isolated from any live metal part so that future cabling and alterations can be carried out in complete safety without the necessity of shutting down the complete switchboard.

xvi. Terminal Blocks:

Terminal blocks for control wiring shall be rated not less than 20 amp and shall clamp the wire securely between two plates secured by a captive screw. Terminal blocks shall have easily removable copper links to short circuit adjacent terminals or shall be fitted with suitable holders where required. Pinch screw type terminal blocks will not be acceptable. Cables having the same number shall be terminated at adjacent terminals and connected by means of cable links at the terminal block. The incoming cable cores shall be terminated at the lower or outer side of the block, and the outgoing cable cores at the upper or inner side of the terminal block, and cable links on any free side. Terminal blocks at different voltage, shall be segregated into groups, distinctively labeled and provided with permanent rigid barriers. Terminals in groups shall have separate non-combustible transparent plastic covers. 100% spare terminals shall be provided on each terminal block.

xvii. Wiring Diagrams:

Prepare construction layouts and functional wiring diagrams of all switchboards, which shall be reviewed prior to commencement of any work thereon. The wiring diagrams shall show control circuits separate from main circuits and shall indicate the size of each conductor and the colour, number and/or terminal connection designation of each control conductor. Switchboard drawings shall include a schedule of all equipment mounted therein, including make, model, and where applicable, fuse rating and set point of all variable adjusters. Circuit diagrams shall be mounted near the switchboard in an approved location and shall be covered with either glass or clear Perspex sheet not less than 3mm thick.

xviii. General Requirements:

The Contractor shall ensure that the switchboards ordered can be accommodated (together with the control cubicles) in the space provided. A rubber insulating mat shall be placed in front of the switchboard for its entire length.

D. PVC INSULATED ARMoured COPPER CABLE:

Cables of this type are to be 1100 volt grade complying to IS-1554-1998 with each conductor of the same cross sectional area. PVC insulated and colour coded cores shall be sheathed with PVC which shall serve as a bedding for galvanized strip armouring. The armouring shall be covered with an outer PVC sheath. Cables shall be terminated in a gland fitted with an armour clamp. The gland body shall be provided with an internal conical seating to receive the armour wires ensuring that the armour wires are tightly clamped between the armour cone and conical armour seating. The minimum bending radius for power cables shall be twelve times the overall cable diameter. When cables are run on a wall they shall be cleated at distances not exceeding 1 meter.

E. PVC INSULATED ALUMINIUM CABLES:

PVC insulated aluminium cables shall comply with IS:1554-1988 (Part I). Cables are to be 1100 volt grade depending on size.

i. Wiring:

The current carrying capacity is to be in accordance with IEE Wiring Regulations and is to be limited by the allowable voltage drop. All wiring shall be carried out on the loop-in system. For conduit wiring systems, wiring shall be drawn into the conduits after the whole of the conduit installation has been completed. No joints or connectors will be allowed in any such cables, except that connectors may be used in accessible positions within lighting fittings or device outlet boxes. All cables shall be colour coded consistently over their entire length. Red, yellow and blue shall be used for phase conductor and black and green for neutral and earth respectively.

The maximum number of cables that may be accommodated in a given size of conduit, cable tray, trunking is not to exceed the number given in the Indian Standard. Where wiring penetrates fire walls, then these shall be sealed using fire retardant pillows packed tightly on both sides of the penetration. Internal fire barriers within trunking shall also be provided. All fire retardant materials used shall be to the approval of the Architect and local authorities. Floor penetrations for cable risers shall be made weatherproof progressively during construction to minimize damage due to the weather. Where wiring penetrates vapor barriers, adequate air tight seals shall be provided.

Wiring shall enter the low temperature area via conduit and the conduit itself shall be sealed internally to provide an airtight barrier within the conduit. All wiring associated with equipment necessary for fire and smoke control shall be provided.

ii. Conduit:

All conduits shall be heavy gauge galvanized/black enamelled ERW steel complying with relevant Indian Standard. No conduits shall be less than 25 mm nominal diameter. Conduit shall be concealed in concrete as construction proceeds, and so arranged as to drain naturally to outlet boxes. Prior to laying this, Contractor shall check with the Contractor responsible for the building work that conduits of the sizes proposed will not affect the structural integrity of the concrete. Sealing caps shall be placed on all conduits before concrete pouring commences to ensure no water enters the conduit. Expansion couplings shall be fitted at all building expansion joints. Surface conduits shall in no circumstances be fixed to floor slabs.

All conduit systems are to be installed fully in accordance with the requirements of the IEE Regulations. All conduits shall be swabbed through to clean out all dirt, burrs and moisture. All sets and bends in conduit runs are to be formed on site with bending machines. Distortion of conduits due to bending is not acceptable. Runs between draw-in boxes are not to have more than two right angle bends or their equivalent and the length of such runs shall be limited to 12 m to permit easy drawing-in of cables. Flexible conduit shall be used for final connections to equipment subject to vibration. The conduit shall be watertight with the provision of separate earth wire enclosed for earth continuity. All flexible steel conduit shall be PVC sheathed. The contractor shall make good any damage to the finish of all conduits including threads cut at site, by painting damaged areas with two coats of aluminium primer paint.

Supply for review prior to installation conduit layout drawings for the entire installation. The approved set shall be kept up to date on site and on completion, three sets of record drawings shall be provided for record purposes.

iii. Conduit Boxes:

All conduit junction boxes are to be malleable iron (surface mounted) or mild steel (concealed) and of standard pattern. Standard pattern boxes are to be used with conduits up to and including 25 mm diameter. Rectangular pattern boxes are to be used for conduits of 25 mm diameter and larger. For the drawing-in of cables, standard pattern through boxes are to be used. All conduit boxes are to be galvanized finish.

Adaptor boxes are to be of galvanized zinc passivated mild steel not less than 3 mm thick. Boxes are to be not less than 5 mm deep and of such dimensions as will enable the largest size cable for which the conduit run is suitable to be drawn in without excessive bending of the cables. Covers of approved material with fixing screws are to be provided. All boxes are to be drilled for holes according to the conduit entries required.

All conduit entries to adaptor boxes, outlet boxes and switchgears are to be made with couplings and hexagonal male bushes. The protective coating of the boxes shall be heavy both inside and outside.

iv. Cable Trunking:

Metal trunking shall comply with BS 4678 and shall be manufactured in minimum lengths of 2 m from 2 mm thick zinc sprayed sheet steel finished with rust resisting primer and sprayed overall grey enamel. Covers are to be held in place by screws. Trunking shall be terminated with end flanges bolted directly to switch or distribution boards. Connecting pieces are to be used and bolted with cadmium plated mushroom head steel screws, nuts and shake-proof washers. Each joint is to have a copper link to ensure electrical continuity. Conduit entries to trunking shall be made with couplings and brass make bushes. Knockouts will not be required and trunkings may be drilled on site.

Trunkings shall not contain more cable than allowed by the space factors described in the IEE Regulations.

Each joint shall have a copper bond bolted to each adjacent trunking to ensure electrical continuity. All frayed and sharp edges shall be removed from trunking before installation. Conduit entry to trunking shall be by coupling and male bush. Knock-outs shall not be provided, and trunking shall be drilled on site. Where trunking crosses expansion joints, a trunking system which will allow for expansion and maintain earth continuity shall be used. The system used shall be reviewed by the Architect prior to manufacture. Where the trunking passes through floors or fire compartments, fire resisting barriers shall be provided.

All supports and hangers shall be of hot-dipped galvanized mild steel construction with min. coating thickness of 85 micron and 210 micron for indoor and outdoor installation respectively. All bolts and nuts shall be electroplated with zinc or cadmium with min. plating thickness of 25 micron.

v. Cable Trays:

Cable trays are to be of perforated pattern 1.6mm minimum mild steel with returned edges galvanized overall. Trays shall be supported from the soffit of structural slabs and beams by mild steel rods not less than 6mm diameter and under slung mild steel angles, or alternatively, supported on steel angle brackets secured to walls. The former method shall be preferred where practicable. All supports and hangers shall be hot-dipped galvanized with bolts and nuts electroplated.

vi. Starters:

Contactors used in starters shall be of Class AC3 type provided with silver alloy contacts. Auxiliary contacts shall be provided to facilitate the connection of interlocks, status indication and auxiliary controls. Unless explicitly described, a minimum of one normally open and one normally closed contact shall be provided.

Each starter shall be completed with protection incorporating the following features :

overload protection in each supply phase adjustable from 80 to 120% of full rated load.
Manual reset

Phase failure protection

Ambient temperature compensation

An auxiliary contact to signal an overload condition.

Contactors or complete starters not mounted in switchboards shall be contained in metal or approved plastic enclosures with conduit entries, shrouded "stop" and "start" push buttons and a manual "reset" button, which may be combined with the "stop" button. Generally, reduced voltage starters of the following type shall be selected :-

Motors from 5.5 kW to 150 KW Star delta Motors in excess of 29 KW

Each starter of the open transition "Star-Delta" (OT.SD) type shall include the following:

One (1) main-line contactor suitably rated for the motor.

Star and Delta configuration contactors suitably rated for the motor, mechanically and electrically interlocked to prevent simultaneous operation.

One (1) triple pole overload relay meeting the requirements as specified previously in this clause under 'Generally'.

One (1) approved time delay relay, with at least 0-30 second adjustable time delay period, to control the star to delta switching contactors. Closed transition reduced voltage starters shall be approved type and manufacture and shall be capable of starting the motor from stopped to full load speed without interruption and in such a manner that the torque developed by the motor increases as uniformly as practicable during the whole starting sequence.

Closed Transition "Star-Delta" Starters (CT. SD)

Each starter of this type shall include the following equipment :-

The equipment as specified in Clause "Open Transition Star-Delta Starters (OT.SD)".

A suitably rated transition resistance bank such as to allow approximately full load supply current when in circuit prior to opening of the star point. The short time rating of the resistors shall also be considered in relation to the length of their "in circuit" requirements. A transition contactor suitably rated to facilitate connection of the resistance bank during the transition period. Any additional auxiliary contacts, timers, etc required for the transition sequencing operation.

vii. Earthing:

All metal work associated with the electrical installation but not forming part of a phase of neutral circuit shall be bonded together and solidly and effectively earthed. Metal conduit, ducts and cable armour shall be earthed at the switch-board at which they originate by means of locknuts, screwed connection or cable gland.

The electrical resistance of metallic enclosures or framework to earth shall be low enough to permit the passage of current necessary to operate the device protecting the associated circuit.

The size of all earth continuity and bonding conductors shall be in accordance with the Local Regulations. All earth conductors fixed or run outside the building shall be protected against corrosion and mechanical damage.

viii. Spares:

The Contractor shall supply the following items as spares :-

- a) 20% indicating lamps of all colors and sizes.
- b) Any other spares as indicated in the Schedules.

ix. Motor Control Circuits:

For each motor provide the following :-

- a) On-off auto test switch
 - b) Blue power on light
 - c) Green pilot light
 - d) Red fault light
 - e) Auxiliary contacts for remote stop-start
 - f) Auxiliary contacts for remote status indication
- (Items e and f to be connected to a labeled terminal strip in the switchboard)

x. Radio Interference:

All equipment and systems shall be properly designed to ensure that there is no interference caused to any transmitters, receivers or other electronic equipment in the near vicinity. Should interference be detected, the Contractor shall provide free of charge devices capable of eliminating such interference.

xi. Isolating Switches:

All items of equipment shall be provided with isolating switches adjacent to the item of equipment in an accessible position. Isolators shall be capable of being padlocked in either the on, auto or off positions.

Isolators for motors and equipment which are essential for fire and smoke control shall be labeled as specified elsewhere and in addition a second label with white lettering on a red background reading: **WARNING – ESSENTIAL FOR LIFE SAFETY.**

Do not switch off except in absolute emergency shall be provided.

xii. DDC/BAS Interfacing:

For installations incorporating a DDC/BM system, a separate terminal strip shall be provided in each switchboard for connection of DDC/BM interface cabling for monitoring and for control. Terminals shall be segregated from other terminals in the same panel and shall be of a different colour.

Contacts for monitoring of status and alarm conditions shall be potential free and arranged to close when the item of plant runs or when an alarm condition occurs. Contacts shall incorporate a wiping action to provide a consistently very low contact resistance and eliminate "open circuit" (high resistance) conditions due to oxide build up on contact surfaces. Contacts shall provide positive indication, compatible with the extra low voltage monitoring supply from the DDC/BM. This Contractor shall co-ordinate with the DDC/BM Contractor to determine the control output voltage from the DDC/BM. Interface relays shall be mounted within each panel and controlled direct from the DDC/BM at this voltage. Relay coil current and relay characteristic shall be completely compatible with the DDC/BM system.

Status and alarm contacts and relay interface connections shall be individually connected to terminals (that is, two connections per item). Any looping required for common connections shall be made at the terminal strip as required.

All DDC/BM point numbers shall be shown on the wiring diagrams consistent with the DDC/BASM numbering system.

6.0 General Characteristic

6.1 Rigidity and Stability of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).

6.2 Safety Controls of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).

- 6.3 **Operational Controls** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.4 **Lighting** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.5 **Machine Maintainability** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.6 **Wear Compensation Adjustment** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.7 **Coolant System (where applicable)** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.8 **Lubrication System (where applicable)** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.9 **Pneumatic System (where applicable)** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 7.0 **Proving Out Test at consignee's works:**

The supplier shall demonstrate the machine performance and prove out the claimed capability. After such successful demonstration as herein before the consignee, the machine performance shall be watched according to special condition of contract for mechanical works.

- 8.0 **Technical Literature:** of the M&Ps are to be read and followed in unison with special condition of contract of Mechanical works.

9.0 **Special Features:**

Special features incorporated in the system, if any, shall be indicated.

10.0 **Dispatch of the item from Manufacturer Works:**

The supplier shall dispatch the machine only after all the on-site requirements from supplier's side as well as consignee's side, for installation and commissioning of the machine on arrival, have been made ready.

11.0 **Joint Receipt Inspection:**

The contractor or his agent would be required to carry out a joint check at consignee's end, along with the consignee, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages. It is necessary that this joint receipt inspection be done immediately on receipt of the machine by consignee & bidder's representative to avoid commissioning delays due to shortages/transit damages. After receipt of the machine as above a Joint Receipt Inspection note (JRI) shall be prepared by the consignee and the firms representative.

- 12 **Service Facility in India and Technical Support** of the M&Ps are to be read and followed in unison with special condition of contract of Mechanical works.

13.0 **General:**

Warranty, foundation & related drawings, Training, Deviations and Dispatch of the system from Manufacturer Works are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

Schedule -I

Hydrant system:

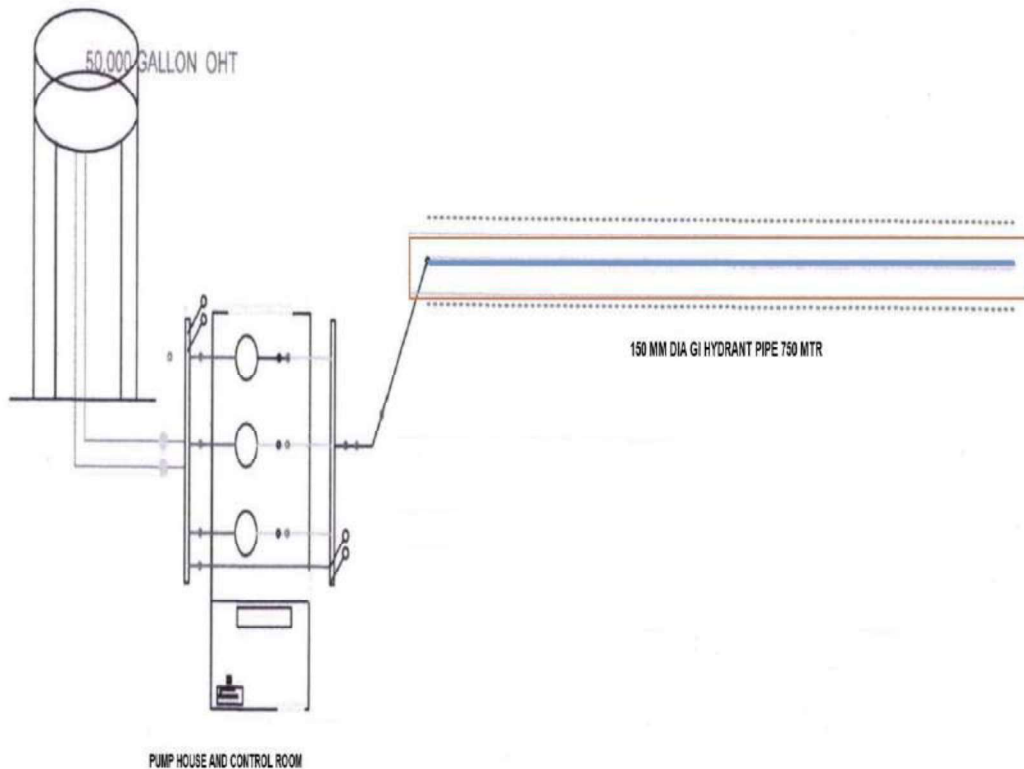
LEADING COMPONENTS FOR QUICK WATERING ARRANGEMENT

Item No	Description of Item	Unit	Qty
1	Pump sets 40 HP. 1 set= 2Nos Pump of 40 HP each along with Electric Motor). Motor & Pump should be of standard manufacturer such as M/s Kirloskar./ CGL/M&P/ D&B Vertical in Line or type/HSC.	Set	1
2	Common Skid Mounting For Pump set	Nos.	1
3	MS Fabricated Suction Main Fold	Nos.	2
4	M.S. Delivery Main Fold	Nos.	2
5	Butter Fly Valve 150 mm	Nos.	06
6	Non return Valve 150 mm	Nos.	4
7	Hydro Pneumatic Tank With Fittings	Nos.	1
8	On Line Flow meter 150NB .	Nos.	2
9	Electrical Operated Motorized Valve 150 mm make: CAIR/ZOLOTO/L&T/MTPL	Nos.	2
10	Laying of 1 sqmm 2 core Shielded cable including lugs etc.	Meter	200
11	Laying of RS 485 communication cable	Set	6
12	2X25 mm Casing Pipe for communication and power cables	Set	5
13	Panel for operation of Valves and flow meter	Set	1
14	Power Cable From Pumps to Control Panel 16Sq mm. Copper 3.5 core including lugs etc.	Metre	40
15	Control Panel for 2 pumps With VFD , PLC, HMI For Group Wise Pumping with APFC and suitable Capacitors.	Nos.	1
16	SITC of Smart Control to Operate system (Pumps and valves through mobile. Communication via GSM Network including SMPS power supply This may be installed in MCC Panel.	Nos.	1
17	2 KVA Industrial UPS to give back up of minimum 2 hr.	Nos.	1
18	Chemical Earthing as Per RDSO Nomes	Nos.	4
19	SCADA For 500 Tab , data analyser, including of PC, LED of 32" Key Board, Printer , allied accessories.	Set	1
20	Suction Pressure Transducer and Pressure Gauges With Fittings.	Nos.	1
21	Delivery Pressure Transducer With Pressure Gauge With Fittings.	Nos.	1

22	Delivery Pressure Transducer With Pressure Gauge With Fittings. Various type of Small Cable to Connect control panel to UPS ,PC, and others as per site requirement in Pump Room & control room. Various Type of Luges, Cable Gland, Terminals etc.	Job	1
23	Copper wire to Connect the Control Panel,& Motors	Kg	20
24	MS/GI/Fabricated Speceres like, Tee, Enlarger, reducer, spool including nut & bolts & packing, and flanges	Kg	80
25	Supply & Fixing of 150 mm G.I. Hydrant Pipe Line with bends, distance pieces running meter.	mtr	600
26	Supply of MS/G.I. Bends 90 degree 150 mm.	Nos.	15
27	Supply & Fixing of MS Flanges 150 mm.	Nos.	50
28	Making Hole in G.I. Hydrant Pipe Line in every three meter and Fixed the M.S. Coupling with welding.	Nos.	200
29	Supply of MS reducing Coupling Size 50 X 25mm with treading to connect the G.I. Nipple 25 mm.	Nos.	200
30	Bellow seal for Hydrant Line of 150 mm G. I, Pipe Line at the interval of 150 meters length.	Nos.	03
31	Supply of SS304 PTEF seat 25 mm dia. Brass Bal valve KOR valve India(p) Ltd or TBS Engineers (p) Ltd or similar make with IS 9001-2000 Certificate or ISI standard single PC Designing Ball valve SS 304.	Nos.	200

- Bidder should consider overall cost of the hydrant system on turnkey basis before quoting rate for the items above. Any other item/component required towards establishing the performance of the system will not be covered separately.

REPRESENTING LAYOUT OF QUICK WATERING LAYOUT FOR ANARA MEMU DEPOT



Note:

1. Performance certificate of above said Machine already supplied shall be furnished.
2. Any better/ latest technical parameter may also be welcomed if accepted by Railway.
3. If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
4. Tenderer should also furnish clausewise remarks on technical specifications.

**Specification for Transportation and Restoration/Renovation of NG/MG/BG Locomotive/Coach
for displaying as Indian Railway Heritage at Premises of Integrated maintenance of
MEMU,DEMU and Coaching stock at Anara**

1.0 Description:

Name of Work: Transportation of NG/MG/BG Locomotive/Coach from specified location including loading for **Integrated maintenance of MEMU, DEMU and Coaching stock at Anara yard shed** and unloading at a designated location, Restoration/Renovation of NG/MG/BG Locomotive/Coach for displaying as Indian Railway Heritage at Premises of Anara yard shed .

1.1 Sources: With prior approval of Railways before execution.

Note: Work should be got executed through a reputed heritage renovator and experienced transporter. The credential of renovator and transporter should be got approved from railways before start of the work.

2.0 General Description and Scope of Supply:**2.1 Transportation, Loading & unloading of NG/MG/BG Locomotive/Coach**

- 2.1.1 The lowering & lifting of Locomotive/Coach for dismantling/separation of body from trolleys is in the scope of contractor. Railway staff only assists in removing under frame members for ease in lifting and lowering purpose.
- 2.1.2 Contractor should take proper care during lowering and lifting of Locomotive/Coach body so as not to damage any part or item of the Coach.
- 2.1.3 Necessary fixtures, required for safe transportation of Coach body and Trolleys and securing will have to arrange by contractor.
- 2.1.4 Contractor has to arrange adequate suitable cranes with sufficient capacity to lift Locomotive/Coach and crossed the boundary of site. Lifting of Locomotive/Coach with only one crane shall not be permitted for the safety of the Locomotive/Coach and staff involved.
- 2.1.5 Contractor has to arrange the suitable trucks/Trailers/Trollers for loading and transporting of Locomotive/Coach upto destination safely with proper securing arrangement which is in the scope of contractor. Part loading of Bogies is permitted.
- 2.1.6 If any damage occurred to Locomotive/Coach during all operation the amount of damaged ascertain by Railways should be accepted by contractor and such amount should be deducted from the bills.
- 2.1.7 Contractor shall have to make special arrangement in the truck/Trailer/Troller for the transportation of Locomotive/Coach so as to avoid any damage to the coach during transportation by the contractor.

- 2.1.8 The Tenderer shall furnish before execution a copy of their valid transport permit, RTO registration, Insurance policy, and fitness certificate of the vehicles for transportation with carrying capacity.
- 2.1.9 The Locomotive/Coach should be transported on proper documents. Necessary documents have to be collected at loading point concerned and the same have to be handed over at unloading point along with material.
- 2.1.10 All paper formalities required for transporting of Locomotive/Coach shall be arranged by the Contractor. Railway will not bear any responsibility for preparing and collecting NOC etc. from state authorities however necessary documents required from Railway shall be provided to contractor, including e-way bill, if required.
- 2.1.11 Materials to be arranged by contractor : All the items used for lifting , loading, securing & Transportation including Man power shall be arrange by contractor.
- 2.1.12 ODC (Over dimensional consignment) , transportation guidelines need to be observed and it will be under contractor's scope.
- 2.1.13 If, the required locomotive/Coach to be transported in located at isolated location, required temporary pathway to facilitate loading will be covered from **Civil BOQ**.
- 2.1.14 No other private material should be carried in truck / road vehicle during the transportation of Locomotive/Coach.
- 2.1.15 The quantities for the above items are approximate and are variable. The contractor will have no claim due to variation / deletion of items.
- 2.1.16 Any wastage of labours and materials due to the site conditions will be on contractor's account and nothing extra will be paid on this account.
- 2.1.17 The contractor shall be responsible for the safety of the staff deployed by him. The railway administration shall not be liable to pay any compensation or offer any medical aid for any injury caused to persons employed by the contractor during the contract period.
- 2.1.18 Any illegal article /material transported at any time in the vehicle will result in termination of contract and the SD & PG available will stand forfeited. No correspondence in this matter will be entertained, railway not bear any legal bindings.
- 2.1.19 Tenderer has to provide mobile telephone to the driver, while transporting, so that in case of emergency Railway authorities can contact the driver during transit. Contractor has to inform the mobile number in writing along with photocopy of the driving license of the driver.
- 2.1.20 SAFETY & SECURITY OF MATERIAL:
- I.Crew / Driver will have to be changed by the contractor on the report of any misconduct / misbehavior on their part by railway representative failing which railway may terminate the

contract.

II.If a truck operator/crew provided by contractor is involved in any malpractices, the Railways may terminate the contract and Railway will not bear any cost on this account.

2.1.21 INSURANCE: Contractor in his own interest advised to obtain a insurance policy from an established insurance company for vehicle and Railway material and keep such policy in force at all times during the currency of contract to cover all risks of every nature whatsoever inclusive any damages caused by the truck to Railways property.

2.1.22 In case of any loss/theft/damage suffered by the Railways for Locomotive/Coach a suitable penalty equivalent to the cost of damages will be imposed on contractor.

2.1.23The transit risk will be transporter's account and responsibility of transporting the Locomotive/Coach with sufficient precautionary and safety measures to protect the consignment and unforeseen incidents in transit will be of the contractor.

2.1.24The driver engaged for transportation purpose must be in sound mental and healthy condition. The driver must possess a valid driving license for carrying heavy goods as per the prevailing sections in the motor vehicle rules/acts.

2.1.25 Railway may escort required transportation which has to be facilitated by Contractor.

2.1.26 Required Locomotive/Coach is to be installed on suitable pedestal to be constructed through **civil BOQ** at Railway's specified location.

2.1.27 Penalty :

- I. If any damage will occur during loading unloading & transportation, penalty will be imposed as cost of damaged component or whole as certified by Railways and deducted from contractor's bill. The assessment of damage shall be done by Railways and this assessment shall be final and binding on the contractor.
- II. Penalty may be waived off partially/wholly by Railways on production of satisfactory evidence.

2.2 Restoration /Renovation of Locomotive/ Coach for displaying as Indian Railway heritage:

2.2.1 Scope of works as and where applicable: The scope shall include remodeling of condemned 01 no. NG/MG/BG Locomotive/Coach for displaying Indian Railway Heritage at premises of Anara yard shed.

2.2.2 Detail scope of work:

(a) Exterior cutting, stripping work : The totally damaged , corroded, rusted panels from exterior sides needs to be repaired/replaced by cutting /stripping and repairing/patching/fixing with new metal sheet to be done as per requirement with smooth welding and fine grinding finish. In case some portions are visible later on after exterior depainting , the same should also be repaired /replaced as per requirement.

(b) The exterior fully damaged metallic /wooden roof panels should be repaired with suitable pine wood /metallic sheets.

(c) Flooring: In case the original flooring of driver cab of locomotive has been in wooden base, and found damaged /worn, it should be repaired /replaced as per requirement.

(d) Interior painting: All interior surfaces shall be cleaned so as to be free of rust and dust and then enamel painted as per color scheme provided by Railways. The path to have strip/markings with self glow paint for guidance to exit and enhance high safety as well as Aesthetics. The gang way should also be cleaned and painted with suitable enamel paints as per requirements.

(e) Exterior painting: All four exterior sides should be initially depainted and subsequently all steps of PU Painting process (RDSO Spec. No. M&C /PCN/100/2009) should be followed to have complete PU painted finish of all the four sides of the Rolling stock as per attached scope of work. The exterior portions like Bogie , Underframe, Wheels, Axles should be enamel painted as per suggested color scheme and roof to be painted with Aluminium paint as per IS :2339. The four corners of the coach should have a strip of retro reflective paint for high aesthetics and safety.

(f) Water proofing: Water proofing with the help of fusible expandable liner on all the joints of the roof should be done after cleaning of roof and then should be painted.

(g) Masking , taping and designing work should be done as per requirement.

(h) Application of decals should be done as per requirement on the exterior.

(i) Application of retro reflective and glow paints if applicable.

(j) In case of locomotive, driver cab having wooden floor should be covered with carpet mats (replaceable).

(k) In case of Locomotive, the interior cabin, Engine room should be cleaned and sanded as requirement.

(l) Application of enamel paint as per shade and colour in interior cabinet and engine room.

(m) All the interior damaged wooded panels of side walls, ceiling and flooring should be repaired /replaced with suitable pine wood/metallic sheets.

(n) In case of Coaches, the gang way, the interior seats, ceiling side walls, windows, railing etc. to be cleaned and painted with enamel paints as per colour scheme duly masking as per requirements.

2.2.3 The work will be executed based on plan as approved and as per instruction of authorized signatory representative with his entire satisfaction otherwise , necessary deduction can be made by the Railway Administration.

- 2.2.4 All the materials used in the work (as per scope of work) like wood/metal sheet, paints etc. will be provided by contractor only.
- 2.2.5 Complete scheme of Restoration/Renovation has to be got approved by the WPO before start of work.
- 2.2.6 All related materials required for remodeling of condemned rolling stock and fixing accessories shall be included in the cost of said item.
- 2.2.7 Any component, lights, accessories, handles knobs etc. missing or requiring new fixing of Heritage nature will be provided by Railways. Contractor should ensure its fitment.
- 2.2.8 Electrical illumination & related work will be under the scope of contractor. However, illumination of display area will be covered through electrical BOQ.
- 2.3 Technical specifications of M&Ps are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** and **General specification for supply of M&P** specified in the Tender Document.

3.0 General:

Deviations, Warranty /Guarantee and Dispatch of the system from Manufacturer Works are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

SCHEDULE- (I)

Specification No. : IM/MEMU/DEMU/Anara/WP/Mech/M&P/Heritage

Leading technical parameters shall be as per TS clauses no.2.0

Note:

1. If above clauses are found inadequate for furnishing all necessary information of the system offer, the Tenderer may append further information separately.
2. The tenderer must enclose performance certificates of the system of similar capacity.
3. Tenderer should also furnish clause wise remarks on technical specifications.



भारत सरकार Government of India
रेल मंत्रालय Ministry of Railways
(रेलवे बोर्ड) (Railway Board)

No. 2020/CE-I/CT/3E/GCC/Policy

New Delhi, dated 16.07.2020

As per list attached

Sub: Indian Railways Standard General Conditions of Contract, July 2020

1. Railway Board had issued Indian Railways Standard General Conditions of Contract, Sept 2019 vide letter No. 2018/CE-I/CT/37/GCC/Policy, dated 06.09.2019 and ACS No. 1 vide letter No. 2018/CE-I/CT/37/GCC/Policy, dated 12.05.2020.
2. On receipt of a number of suggestions from Railways, a few provisions of above GCC have been reviewed to expedite finalization of tenders and execution of works.
3. Board (ME, FC) has approved new Indian Railways Standard General Conditions of Contract, July 2020 (GCC, July 2020).
4. The GCC, July 2020 has been uploaded on Railway Board's website. It may be accessed through the path: www.indianrailways.gov.in/railwayboard >> "About Indian Railways" >> "Railway Board Directorates" >> "Civil Engineering" >> "Policy Matters" >> IR General Conditions of Contract, July 2020".
5. The GCC, July 2020 shall be applicable to works contracts on Indian Railways with prospective effect.
6. This issues with the concurrence of Finance Directorate of Ministry of Railways.

Prem Sagar
16/07/20
(प्रेम सागर गुप्ता)

कार्यकारी निदेशक सिविल इंजी.(जी)/रेलवे बोर्ड
[Phone: 030-44803(Rly): 011-23383379(MTNL)]

No. 2020/CE-I/CT/3E/GCC/Policy

New Delhi, dated 16.07.2020

Copy forwarded for information to:

1. The Deputy Comptroller & Auditor General of India (Railways), Room No. 224, Rail Bhawan, New Delhi.
2. The PFAs, All Indian Railways

P Singh

For Financial Commissioner/Railways

LIST FOR DISTRIBUTION (Letter No. 2020/CE-I/CT/3E/GCC/Policy dated 16.07.2020)

1. General Managers, All Indian Railways & Production Units
2. General Manager (Con), N.F. Railway, Guwahati
3. General Manager /CORE, Allahabad.
4. Chief Administrative Officers (Con), All Indian Railways (Except N.F. Railway)
5. Principal Chief Engineers, All Indian Railways

(A)

1. CAO, COFMOW, Tilak Bridge, New Delhi
2. Principal CAO, Diesel Loco Modernisation Works, Patiala (Punjab)
3. CAO (Workshop Projects), Chamber Bhawan, Judge's Court Road, Anta Ghat, Patna 800001, Bihar

(B)

1. Director General, RDSO, Manak Nagar, Lucknow
2. Director General, NAIR, Vadodara
3. Director, IRICEN, Pune – 411 001 (Maharashtra)
4. Director, IRIEEN, PB No.-233, Nasik Road-422101 (Maharashtra)
5. Director, IRISSET, Taa Naka Road, Lalla Guda, Secunderabad-500017
6. Director, IRIMEE, Jamalpur Distt-Jamalpur, PIN-811214 (Bihar).
7. Director, IRITM, Sarwati Residential Estate, IRITM Campus, Manak Nagar, Lucknow

(C)

1. MD, CONCOR, Concor Bhawan, C-3, Mathura Road, Opp. Apollo Hospital, New Delhi- 110076.
2. IRCON International Limited, C-4, District Centre, Saket, New Delhi- 110017
3. MD, RITES Ltd., RITES Bhawan, Plot No.1, Sector-29, Gurgaon.
4. CMD, RVNL, August Kranti Bhawan, Plot No.25, 1st Floor, Bhikaji Cama Place, New Delhi.
5. MD, MRVC Ltd., Churchgate Station Bldg, Mumbai- 400020
6. CMD, KONKAN Railway Corporation Ltd, Rail Bhawan, New Delhi-110001.
7. MD, DFCCIL, 5th Floor, Pragati Maidan Metro Station Building Complex, New Delhi-110001
8. MD, RLDA, Near Safdarjung Railway Station, Moti Bagh, Phase-I, New Delhi- 110021
9. MD, CRIS, Chanakyapur, New Delhi.

Prem Sagar
16/07/20

10. CMD, RailTel Corporation of India Ltd. Plot No. 143, Institutional Area, Sector-44, Gurgaon – 122003.
11. CME, IROAF, 12th Floor, Core-1, Scope Minar, Distt. Centre, Laxmi Nagar, Delhi-110092 /
12. Managing Director, IRFC Limited, UG Floor, East Tower, NBCC Place, Bhisham Pitamah Marg, Lodhi Road, Pragati Vihar, New Delhi.
13. CMD, IRCTC Ltd., B-148, 11th Floor, Statesman House, Barakhamba Road, New Delhi 110001
14. CMD, Braithwaite & Co. limited, 5 Hide Road Kolkata 700043.

Copy to:

(A)

1. General Secretary, IRCA, DRM Office, New Delhi.
2. General Secretary, AIRF, Rail Bhawan, New Delhi
3. General Secretary, NFIR, Rail Bhawan, New Delhi
4. General Secretary, IRPOF, Rail Bhawan, New Delhi
5. General Secretary, FROA, Rail Bhawan, New Delhi
6. General Secretary, AIRPA, Rail Bhawan, New Delhi
7. General Secretary, AISC & STREA, Rail Bhawan, New Delhi
8. The Secretary, RBSS, Group (A) Offices Association, Rail Bhawan
9. The Secretary, RBSS, Group (B) Offices Association, Rail Bhawan
10. General Secretary, RBSSS Association, Rail Bhawan
11. The Secretary, RBMSA, Rail Bhawan
12. The Secretary, Railway, Group (D) Employees Association, Rail Bhawan

(B)

1. Concerned PSO for kind information of CRB, ME, MTR, MRS, FC, MS, MST, MMM.
2. Chief Vigilance Officers, All Indian Railways.
3. DG(RHS), DG(RPF), AM(CE), AM(Works), AM(B), AM(Elec.), AM(RS), AM(ME), AM/Tele, AM/C&IS, AM/Sig., AM(Plg.), PED/SDE, PED(Bridges), PED(Vigilance), PED/Transformation, EDCE(G), EDCE(P), EDTK(M), EDTK(MC), EDTK(P), EDCE(B&S), EDF(X)-I, EDF(X)-II, ED(Works), EDW(Plg.), ED/Project(Mon.), ED(L&A), ED/SDE, ED(PSU), EDVE, ED(Safety), ED (Sig. Dev.), ED(Tele), EDRS(G), EDRE, EDEE(G), EDFE, EDE(N), ED(Accounts), ED/T&MPP, EDME(Chg.), EDME(Frt.), ED/Plg., ED/MTP, JS(conf), JS(P), JS(G), JS(D), Vigilance-III, Vig(Conf) of Railway Board.

Prem Sagar
16/07/20



Government of India
Ministry Of Railways
(Railway Board)

**Indian Railways
Standard
General Conditions of Contract**

GCC July 2020

New Delhi

Engineering Department

Indian Railways

STANDARD GENERAL CONDITIONS OF CONTRACT I N D E X

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PART I
REGULATIONS FOR TENDERS AND CONTRACTS
FOR THE GUIDANCE OF ENGINEERS & CONTRACTORS FOR WORKS
CONTRACTS

MEANING OF TERMS

1.0 Applicability: These conditions of contract shall be applicable for all the tenders and contracts of railways for execution of works as defined in GFR 2017.

1.01 Order of Precedence of Documents: In a tender/contract, in case of any difference, contradiction, discrepancy, with regard to conditions of tender/contract, specifications, drawings, bill of quantities etc., forming part of the tender/contract, the following shall be the order of precedence:

- i. Letter of Award
- ii. Schedule of Items, Rates & Quantities
- iii. Special Conditions of Contract
- iv. Technical Specifications as given in tender documents
- v. Drawings
- vi. Indian Railways Standard General Conditions of Contract updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents.
- vii. CPWD Specifications 2019 Vol I & II updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents, if applicable in the contract.
- viii. Indian Railways Unified Standard Specification (IRUSS-2019) updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents, if applicable in the contract.
- ix. Indian Railways Unified Standard Specifications (Works and Material) 2010 updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents, if applicable in the contract.
- x. IR Specifications/Guidelines updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents.
- xi. Relevant B.I.S. Codes updated with correction slips issued up to date of inviting tender or as otherwise specified in the tender documents.

1.1 Interpretation: These Regulations for Tenders and Contracts shall be read in conjunction with the Standard General Conditions of Contract which are referred to herein and shall be subject to modifications additions or suppression by Special Conditions of Contract and/or Special Specifications, if any, annexed to the Tender Forms.

1.2 Definition: In these Regulations for Tenders and Contracts the following terms shall have the meanings assigned hereunder except where the context otherwise requires:

(a) “Railway” shall mean the President of the Republic of India or the administrative officers of the Railway or Successor Railway authorized to deal with any matter, which these presents are concerned on his behalf.

(b) “General Manager” shall mean the Officer-in-Charge of the general superintendence and control of the Zonal Railway/Production Unit and shall also include Addl. General Manager, General Manager (Construction) and shall mean and include their successors of the Successor Railway.

(c) “Chief Engineer” shall mean the Officer-in-Charge of the Engineering Department of Railway and shall also include Chief Engineer (Construction), Chief Electrical Engineer, Chief Electrical Engineer (Construction), Chief Signal & Telecom Engineer, Chief Signal & Telecom Engineer (Construction), Chief Mechanical Engineer and shall mean and include their successors of the Successor Railway.

(d) “Divisional Railway Manager” shall mean the Officer-in-Charge of a Division of Zonal Railway and shall mean and include Divisional Railway Manager of the Successor Railway.

(e) “Engineer” shall mean the Divisional Engineer or Executive Engineer, Divisional Signal & Telecom Engineer, Divisional Electrical Engineer, Divisional Mechanical Engineer in executive charge of the works and shall include the superior officers, both Open Line and Construction Organisations, of Engineering, Signal & Telecom, Mechanical and Electrical Departments, i.e. the Senior Divisional Engineer/Deputy Chief Engineer, Senior Divisional Signal & Telecom Engineer / Dy. Chief Signal & Telecom Engineer, Senior Divisional Electrical Engineer / Deputy Chief Electrical Engineer, Senior Divisional Mechanical Engineer and shall mean & include the Engineers of the Successor Railway.

(f) “Tenderer” shall mean the person / firm / co-operative or company whether incorporated or not who tenders for the works with a view to execute the works on contract with the Railway and shall include their representatives, successors and permitted assigns.

(g) “Limited Tenders” shall mean tenders invited from all or some contractors on the approved or select list of contractors with the Railway.

(h) “Open Tenders” shall mean the tenders invited in open and public manner and with adequate notice.

- (i) “Works” shall mean the works contemplated in the drawings and schedules set forth in the tender forms and required to be executed according to the specifications.
- (j) “Specifications” shall mean the Specifications for Materials and Works of the Railway as specified under the authority of the Ministry of Railways or Chief Engineer or as amplified, added to or superseded by special specifications if any, appended to the Tender Forms.
- (k) “Schedule of Rates of the Railway” shall mean the Schedule of Rates issued under the authority of the Chief Engineer from time to time.
- (l) “Drawings” shall mean the maps, drawings, plans and tracings, or prints thereof annexed to the Tender Forms.
- (m) “Contractor’s authorized Engineer” shall mean a graduate engineer or equivalent, having more than 3 years experience in the relevant field of construction work involved in the contract, duly approved by the Engineer.
- (n) Date of inviting tender shall be the date of publishing tender notice on IREPS website if tender is published on website or the date of publication in newspaper in case tender is not published on website.

1.3 Words importing the singular number shall also include the plural and vice versa where the context requires.

CREDENTIALS OF CONTRACTORS

2. Application for Registration:

2.1 Works of construction and of supply of material shall be entrusted for execution to contractors whose capabilities and financial status have been investigated and approved to the satisfaction of the Railway. A list of approved contractors shall be maintained in the Railway. The said list be revised periodically once in a year or so by giving wide publicity through advertisements etc. A contractor including a contractor who is already on the approved list shall apply to the concerned General Manager (Construction) / Chief Administrative Officer (Construction) / Principal Chief Engineer / Principal Chief Signal & Telecommunication Engineer / Principal Chief Mechanical Engineer / Principal Chief Electrical Engineer / Divisional Railway Manager, furnishing particulars regarding:

- (a) his position as an independent contractor specifying engineering organization available with details of partners / staff / engineers employed with qualifications and experience;
- (b) his capacity to undertake and carry out works satisfactorily as vouched for by a responsible official or firm; details about the transport equipments, construction tools and plants etc. required for the work, maintained by him;

(c) his previous experience of works similar to that to be contracted for, in proof of which original certificates or testimonials may be called for and their genuineness verified, if needs be, by reference to the signatories thereof;

(d) his knowledge from actual personal investigation of the resources of the area/zone or zones in which he offers to work;

(e) his ability to supervise the work personally or by competent and duly authorized agent;

(f) his financial position;

2.2 An applicant shall clearly state the categories of works and the area/zone/division(s)/district(s) in which he desires registration in the list of approved contractors.

2.3 The selection of contractors for enlistment in the approved list would be done by a committee for different value of slabs as notified by Railway.

2.4 An annual fee as prescribed by the Railway from time to time would be charged from such approved contractors to cover the cost of sending notices to them and clerkage for tenders etc. Notices shall be sent to them on registered e-mail address and registered postal address.

TENDERS FOR WORKS

3. Tender Form: Tender Forms shall embody the contents of the contract documents either directly or by reference and shall be as per specimen form, Annexure-I. e-Tender Forms shall be issued free of cost to all tenderers.

4. Omissions & Discrepancies: Should a tenderer find discrepancies in or omissions from the drawings or any of the Tender Forms or should he be in doubt as to their meaning, he should at once notify the authority inviting tenders. The tender inviting authority may, if deemed necessary, clarify the same to all tenderers. It shall be understood that every endeavour has been made to avoid any error which can materially affect the basis of tender and successful tenderer shall take upon himself and provide for the risk of any error which may subsequently be discovered and shall make no subsequent claim on account thereof.

5. Earnest Money:

- (1) (a) The tenderer shall be required to deposit earnest money with the tender for the due performance with the stipulation to keep the offer open till such date as specified in the tender, under the conditions of tender. The earnest money shall be as under:

Value of the Work Earnest Money Deposit (EMD)

For works estimated to cost up to ₹ 1 crore	2% of the estimated cost of the work
For works estimated to cost more than ₹ 1 crore	₹ 2 lakh plus ½% (half percent) of the excess of the estimated cost of work beyond ₹ 1 crore subject to a maximum of ₹ 1 crore

Note:

- (i) The earnest money shall be rounded off to the nearest ₹100. This earnest money shall be applicable for all modes of tendering.
 - (ii) Any firm recognized by Department of Industrial Policy and Promotion (DIPP) as 'Startups' shall be exempted from payment of earnest money deposit detailed above.
 - (iii) 100% Govt. owned PSUs shall be exempt from payment of earnest money deposit detailed above.
 - (iv) Labour Cooperative Societies shall deposit only 50% of above earnest money deposit detailed above.
- (b) It shall be understood that the tender documents have been issued to the tenderer and the tenderer is permitted to tender in consideration of stipulation on his part, that after submitting his tender he will not resile from his offer or modify the terms and conditions thereof in a manner not acceptable to the Engineer. Should the tenderer fail to observe or comply with the said stipulation, the aforesaid amount shall be liable to be forfeited to the Railway.
- (c) If his tender is accepted this earnest money mentioned in sub clause (a) above will be retained as part security for the due and faithful fulfillment of the contract in terms of Clause 16 of the Standard General Conditions of Contract. The Earnest Money of other Tenderers shall, save as herein before provided, be returned to them, but the Railway shall not be responsible for any loss or depreciation that may happen thereto while in their possession, nor be liable to pay interest thereon.
- (2) The Earnest Money shall be deposited in cash through e-payment gateway or as mentioned in tender documents.

6. Care in Submission of Tenders:

- (a) (i) Before submitting a tender, the tenderer will be deemed to have satisfied himself by actual inspection of the site and locality of the works, that all conditions liable to be encountered during the execution of the works are taken into account and that the rates he enters in the tender forms are adequate and all inclusive to accord with the provisions in Clause-37 of the Standard General

Conditions of Contract for the completion of works to the entire satisfaction of the Engineer.

- (a)(ii) Tenderers will examine the various provisions of The Central Goods and Services Tax Act, 2017(CGST)/ Integrated Goods and Services Tax Act, 2017(IGST)/ Union Territory Goods and Services Tax Act, 2017(UTGST)/ respective state's State Goods and Services Tax Act (SGST) also, as notified by Central/State Govt. & as amended from time to time and applicable taxes before bidding. Tenderers will ensure that full benefit of Input Tax Credit (ITC) likely to be availed by them is duly considered while quoting rates.
- (a)(iii) The successful tenderer who is liable to be registered under CGST/IGST/UTGST/SGST Act shall submit GSTIN along with other details required under CGST/IGST/UTGST/SGST Act to railway immediately after the award of contract, without which no payment shall be released to the Contractor. The Contractor shall be responsible for deposition of applicable GST to the concerned authority.
- (a)(iv) In case the successful tenderer is not liable to be registered under CGST/IGST/UTGST/ SGST Act, the railway shall deduct the applicable GST from his/their bills under reverse charge mechanism (RCM) and deposit the same to the concerned authority.
- (b) When work is tendered for by a firm or company, the tender shall be signed by the individual legally authorized to enter into commitments on their behalf.
- (c) The Railway 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.

6.1 The tenderers shall submit a copy of certificate stating that all their statements/documents submitted along with bid are true and factual. Standard format of certificate to be submitted by the bidder is enclosed as **Annexure-V**. Non submission of above certificate 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 documents duly self attested by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document.

CONSIDERATION OF TENDERS

7. Right of Railway to Deal with Tenders: The Railway reserves the right of not to invite tenders for any of Railway work or works or to invite open or limited tenders and when tenders are called to accept a tender in whole or in part or reject any tender or all tenders without assigning reasons for any such action.

7A. Two Packets System of Tendering: With a view to assess the tenders technically without being influenced by the financial bids, 'Two Packets System of tendering' shall be adopted wherein tender documents provide for the same.

7B. Provisions of Make in India Policy 2017 issued by Govt. of India, as amended from time to time, shall be followed for consideration of tenders.

CONTRACT DOCUMENTS

8. Execution of Contract Document: The Tenderer whose tender is accepted shall be required to appear in person at the office of General Manager/General Manager (Construction), Chief Administrative Officer (Construction), Divisional Railway Manager or concerned Engineer, as the case may be, or if tenderer is a firm or corporation, a duly authorized representative shall appear and execute the contract agreement within seven days of notice from Railways that the Contract Agreement is ready. The Contract Agreement shall be entered into by Railway only after submission of valid Performance Guarantee by the Contractor. Failure to do so shall constitute a breach of the agreement affected by the acceptance of the tender. In such cases the Railway may determine that such tenderer has abandoned the contract and there upon his tender and acceptance thereof shall be treated as cancelled and the Railway shall be entitled to forfeit the full amount of the Earnest Money and other dues payable to the Contractor under this contract. The failed Contractor shall be debarred from participating in the re-tender for that work.

9. Form of Contract Document: Every contract shall be complete in respect of the document it shall so constitute. Not less than 2 copies of the contract document shall be signed by the competent authority and the Contractor and one copy given to the Contractor.

(a) For Zone Contracts, awarded on the basis of the percentage above or below the applicable Schedule of Rates for the whole or part of financial year, the contract agreement required to be executed by the tenderer whose tender is accepted shall be as per specimen form, Annexure-II. During the currency of the Zone Contract, work orders as per specimen form Annexures-III, for works not exceeding ₹ 5, 00,000 each, shall be issued by the Divisional Railway Manager / Executive Engineer under the agreement for Zone Contract.

(b) For contracts for specific works, the contract document required to be executed by the tenderer whose tender is accepted shall be an agreement as per specimen form Annexure- IV.

_____ RAILWAY
TENDER FORM (First Sheet)

Tender No. _____

Name of Work _____

To

The President of India

Acting through the _____ Railway

I/We _____ have read the various conditions to tender attached hereto and agree to abide by the said conditions. I/We also agree to keep this tender open for acceptance for a period of _____ days from the date fixed for opening the same and in default thereof, I/We will be liable for forfeiture of my/our "Earnest Money". I/We offer to do the work for _____ Railway, at the rates quoted in the attached schedule and hereby bind myself/ourselves to complete the work in all respects within _____ months from the date of issue of letter of acceptance of the tender.

2. I/We also hereby agree to abide by the Indian Railways Standard General Conditions of Contract, with all correction slips up-to-date and to carry out the work according to the Special Conditions of Contract and Specifications of materials and works as laid down by Railway in the annexed Special Conditions/Specifications, Schedule of Rates with all correction slips up-to-date for the present contract.

3. A sum of ₹ _____ has already been deposited online as Earnest Money. Full value of the Earnest Money shall stand forfeited without prejudice to any other right or remedies in case my/our Tender is accepted and if:

- (a) I/We do not submit the Performance Guarantee within the time specified in the Tender document;
- (b) I/We do not execute the contract documents within seven days after receipt of notice issued by the Railway that such documents are ready; and
- (c) I/We do not commence the work within fifteen days after receipt of orders to that effect.

4. (a) I/We am/are a Startup firm registered by Department of Industrial Policy and Promotion (DIPP) and my registration number is valid upto (Copy enclosed) and hence exempted from submission of Earnest Money.

5. We are a 100% Govt. owned PSUs and hence exempted from payment of Earnest Money.

6. We are a Labour Cooperative Society and our Registration No. is with and hence required to deposit only 50% of Earnest Money.

7. Until a formal agreement is prepared and executed, acceptance of this tender shall constitute a binding contract between us subject to modifications, as may be mutually agreed to between us and indicated in the letter of acceptance of my/our offer for this work.

Signature of Witnesses:

(1) _____

(2) _____

Signature of Tenderer(s)

Date _____

Address of the Tenderer(s)

TENDER FORM (Second Sheet)

1. Instructions to Tenderers and Conditions of Tender: The following documents form part of Tender / Contract:

- (a) Tender Forms – First Sheet and Second Sheet
- (b) Special Conditions/Specifications (enclosed)
- (c) Schedule of approximate quantities (enclosed)
- (d) Standard General Conditions of Contract and Standard Specifications (Works and Materials) of Indian Railways as amended/corrected upto latest correction slips, copies of which can be seen in the office of _____ or obtained from the office of the Chief Engineer, _____ Railway on payment of prescribed charges.
- (e) Schedule of Rates as amended / corrected upto latest correction slips, copies of which can be seen in the office of _____ or obtained from the office of the Chief Engineer, _____ Railway on payment of prescribed charges.
- (f) All general and detailed drawings pertaining to this work which will be issued by the Engineer or his representatives (from time to time) with all changes and modifications.

2. Drawings for the Work: The Drawing for the work can be seen in the office of the _____ and / or Chief Engineer, _____ Railway at any time during the office hours. The drawings are only for the guidance of Tenderer(s). Detailed working drawings (if required) based generally on the drawing mentioned above, will be given by the Engineer or his representative from time to time.

3. The Tenderer(s) shall quote his / their rates as a percentage above or below the Schedule of Rates of _____ Railway as applicable to _____ Division except where he/they are required to quote item rates and must tender for all the items shown in the Schedule of approximate quantities attached. The quantities shown in the attached Schedule are given as a guide and are approximate only and are subject to variation according to the needs of the Railway. The Railway does not guarantee work under each item of the Schedule. The tenderer(s) shall quote rates / rebates only at specified place in Tender Form supplied by Railway. Any revision of rates / rebates submitted (quoted) through a separate letter whether enclosed with the bid (Tender Form) or submitted separately or mentioned elsewhere in the document other than specified place shall be summarily ignored and will not be considered.

4. Tenders containing erasures and / or alterations of tender documents are liable to be rejected. Any correction made by tender(s) in his/their entries must be attested by him / them.

5. The works are required to be completed within a period of _____ months from the date of issue of acceptance letter.

6. Earnest Money:

- (a) The tender must be accompanied by a sum of ₹ _____ as Earnest Money deposited in cash through e-payment gateway or as mentioned in tender documents, failing which the tender shall not be considered. Any firm recognized by Department of Industrial Policy and Promotion (DIPP) as 'Startups' shall be exempted from payment of Earnest Money on submission of Registration Certificate issued by appropriate authority.
- (b) The Tenderer(s) shall keep the offer open for a minimum period of 45 days (in case of two packet system of tendering 60 days) from the date of opening of the Tender. It is understood that the tender documents have been issued to the Tenderer(s) and the Tenderer(s), is / are permitted to tender in consideration of the stipulation on his / their part that after submitting his / their tender subject to the period being extended further, if required by mutual agreement from time to time, he will not resile from his offer or modify the terms and conditions thereof in a manner not acceptable to _____ Railway. Should the tenderer fail to observe or comply with the foregoing stipulation, the amount deposited as Earnest Money for the due performance of the above stipulation, shall be forfeited to the Railway.
- (c) If his tender is accepted the earnest money mentioned in sub clause (a) above will be retained as part security for the due and faithful fulfillment of the contract in terms of Clause 16 of the Standard General Conditions of Contract. The Earnest Money of other Tenderers shall, save as herein before provided, be returned to them, but the Railway shall not be responsible for any loss or depreciation to the Earnest Money that may happen thereto-while in their possession, nor be liable to pay interest thereon.
- (d) In case Contractor submits the Term Deposit Receipt/Bank Guarantee Bond towards full Security Deposit, the Railway shall return the Earnest Money so retained to the Contractor.

7. Rights of the Railway to deal with Tender: The authority for the acceptance of the tender will rest with the Railway. It shall not be obligatory on the said authority to accept the lowest tender or any other tender, and tenderer(s) shall neither demand any explanation for the cause of rejection of his/ their tender nor the Railway to assign reasons for declining to consider or reject any particular tender or tenders.

8. If the tenderer(s) deliberately gives / give wrong information in his / their tender or creates / create circumstances for the acceptance of his / their tender, the Railway reserves the right to reject such tender at any stage.

9. If the tenderer(s) expire(s) after the submission of his / their tender or after the acceptance of his / their offer, the Railway shall deem such tender cancelled. If a partner of a firm expires after the submission of their tender or after the acceptance of their tender, the Railway shall deem such tender as cancelled, unless the firm retains its character.

10. Eligibility Criteria:

10.1 Technical Eligibility Criteria:

(a) The tenderer must have successfully completed any of the following during last 07 (seven) years, ending last day of month previous to the one in which tender is invited:

Three similar works each costing not less than the amount equal to 30% of advertised value of the tender, or

Two similar works each costing not less than the amount equal to 40% of advertised value of the tender, or

One similar work each costing not less than the amount equal to 60% of advertised value of the tender.

(b) (i) In case of tenders for composite works (e.g. works involving more than one distinct component, such as Civil Engineering works, S&T works, Electrical works, OHE works etc. and in the case of major bridges – substructure, superstructure etc.), tenderer must have successfully completed any of the following during last 07 (seven) years, ending last day of month previous to the one in which tender is invited:

Three similar works each costing not less than the amount equal to 30% of advertised value of each component of tender, or

Two similar works each costing not less than the amount equal to 40% of advertised value of each component of tender, or

One similar work each costing not less than the amount equal to 60% of advertised value of each component of tender.

Note for b(i): Separate completed works of minimum required values for each component shall also be considered for fulfillment of technical eligibility criteria.

(b) (ii) In such cases, what constitutes a component in a composite work shall be clearly pre-defined with estimated tender cost of it, as part of the tender documents without any ambiguity.

(b) (iii) To evaluate the technical eligibility of tenderer, only components of work as stipulated in tender documents for evaluation of technical eligibility, shall be considered. The scope of work covered in other remaining components shall be either executed by tenderer himself if he has work experience as mentioned in clause 7 (a) (ii) of Part-II of GCC or through subcontractor fulfilling the requirements as per clause 7 of Part-II of GCC or jointly i.e., partly himself and remaining through subcontractor, with prior approval of Chief Engineer in writing.

However, if required in tender documents by way of Special Conditions, a formal agreement duly notarised, legally enforceable in the court of law, shall be executed by the main contractor with the subcontractor for the component(s) of work proposed to be executed by the subcontractor(s), and shall be submitted along with the offer for considering subletting of that scope of work towards fulfilment of technical eligibility.

In case after award of contract or during execution of work it becomes necessary for contractor to change subcontractor, the same shall be done with subcontractor(s) fulfilling the requirements as per clause 7 of Part-II of GCC, with prior approval of Chief Engineer in writing.

Note for Item 10.1:

Work experience certificate from private individual shall not be considered. However, in addition to work experience certificates issued by any Govt. Organisation, work experience certificate issued by Public listed company having average annual turnover of Rs 500 crore and above in last 3 financial years excluding the current financial year, listed on National Stock Exchange or Bombay Stock Exchange, incorporated/registered at least 5 years prior to the date of opening of tender, shall also be considered provided the work experience certificate has been issued by a person authorized by the Public listed company to issue such certificates.

In case tenderer submits work experience certificate issued by public listed company, the tenderer shall also submit along with work experience certificate, the relevant copy of work order, bill of quantities, bill wise details of payment received duly certified by Chartered Accountant, TDS certificates for all payments received and copy of final/last bill paid by company in support of above work experience certificate.

10.2. Financial Eligibility Criteria: The tenderer must have received contractual payments in the previous three financial years and the current financial year up to the date of inviting of tender, at least 150% of the advertised value of the tender. The tenderers shall submit Certificates to this effect which may be an attested Certificate from the concerned department / client or Audited Balance Sheet duly certified by the Chartered Accountant/Certificate from Chartered Accountant duly supported by Audited Balance Sheet.

Note for 10.2: Client certificate from other than Govt Organization should be duly supported by Form 16A/26AS generated through TRACES of Income Tax Department of India.

10.3 Bid Capacity: The tender/technical bid will be evaluated based on bid capacity formula detailed as Annexure-VI.

10.4 No Technical and Financial credentials are required for tenders having value up to Rs 50 lakh.

10.5 Credentials if submitted in foreign currency shall be converted into Indian currency i.e., Indian Rupee as under:

The conversion rate of US Dollars into Rupees shall be the daily representative exchange rates published by the Reserve Bank of India for the relevant date. Where, relevant date shall be as on the last day of month previous to the one in which tender is invited. In case of any other currency, the same shall first be converted to US Dollars as on the last day of month previous

to the one in which tender is invited, and the amount so derived in US Dollars shall be converted into Rupees at the aforesaid rate. The conversion rate of such currencies shall be the daily representative exchange rates published by the International Monetary Fund for the relevant date.

[Explanation for clause 10 including clause 10.1 to 10.5 - Eligibility Criteria:

- 1. In case a work is started prior to 07 (seven) years, ending last day of month previous to the one in which tender is invited, but completed in last 07 (seven) years, ending last day of month previous to the one in which tender is invited, the completed work shall be considered for fulfillment of credentials.*
- 2. If a work is physically completed and completion certificate to this extent is issued by the concerned organization but final bill is pending, such work shall be considered for fulfillment of credentials.*
- 3. If a part or a component of work is completed but the overall scope of contract is not completed, this work shall not be considered for fulfillment of technical credentials even if the cost of part completed work/component is more than required for fulfillment of credentials.*
- 4. **In case a work is considered similar in nature for fulfillment of technical credentials, the overall cost of that work including PVC amount if any shall be considered and no separate evaluation for each component of that work shall be made to decide eligibility.***
- 5. The value of final bill including PVC amount-if paid, or otherwise in case final bill is pending the contract cost in last approved variation statement plus PVC amount paid or cumulative amount paid up to last on-account bill including PVC amount and statutory deductions whichever is less, shall be considered as the completion cost of work.*
- 6. In case of newly formed partnership firm, the credentials of individual partners from previous propriety firm(s) or dissolved previous partnership firm(s) or split previous partnership firm(s), shall be considered only to the extent of their share in previous entity on the date of dissolution / split and their share in newly formed partnership firm. For example, a partner A had 30% share in previous entity and his share in present partnership firm is 20%. In the present tender under consideration, the credentials of partner A will be considered to the extent of $0.3 \times 0.2 \times \text{value of the work done in the previous entity}$. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc.*
- 7. In case of existing partnership firm, if any one or more partners quit the partnership firm, the credentials of remaining partnership firm shall be re-worked out i.e., the quitting partner(s) shall take away his credentials to the extent of his share on the date of quitting the partnership firm (e.g. in a partnership firm of partners A, B & C having share 30%, 30% & 40% respectively and credentials of Rs 10 crore; in case partner C quits the firm, the credentials of this partnership firm shall remain as Rs 6 crore). For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deed(s), dissolution deed(s) and proof of surrender of PAN No.(s) in case of dissolution of partnership firm(s) etc.*
- 8. In case of existing partnership firm if any other partner(s) joins the firm, the credentials of partnership firm shall get enhanced to the extent of credentials of newly added partner(s)*

on the same principles as mentioned in item 6 above. For this purpose, the tenderer shall submit along with his bid all the relevant documents which include copy of previous partnership deeds, dissolution/splitting deeds and proof of surrender of PAN No.(s) in case of dissolution of partnership firm etc.

- 9. Any partner in a partnership firm cannot use or claim his credentials in any other firm without leaving the partnership firm i.e., In a partnership firm of A&B partners, A or B partner cannot use credentials of partnership firm of A&B partners in any other partnership firm or propriety firm without leaving partnership firm of A&B partners.*
- 10. In case a partner in a partnership firm is replaced due to succession as per succession law, the proportion of credentials of the previous partner will be passed on to the successor.*
- 11. If the percentage share among partners of a partnership firm is changed, but the partners remain the same, the credentials of the firm before such modification in the share will continue to be considered for the firm as it is without any change in their value. Further, in case a partner of partnership firm retires without taking away any credentials from the firm, the credentials of partnership firm shall remain the same as it is without any change in their value.*
- 12. In a partnership firm "AB" of A&B partners, in case A also works as propriety firm "P" or partner in some other partnership firm "AX", credentials of A in propriety firm "P" or in other partnership firm "AX" earned after the date of becoming a partner of the firm AB shall not be added in partnership firm AB.*
- 13. In case a tenderer is LLP, the credentials of tenderer shall be worked out on above lines similar to a partnership firm.*
- 14. In case company A is merged with company B, then company B would get the credentials of company A also.]*

11. Tenderer Credentials:

Documents testifying tenderer previous experience and financial status should be produced along with the tender.

Tenderer(s) who is / are not borne on the approved list of the Contractors of _____ Railway shall submit along with his / their tender:

- (i) Certificates and testimonials regarding contracting experience for the type of job for which tender is invited with list of works carried out in the past.
- (ii) Certificates which may be an attested Certificate from the client, Audited Balance Sheet duly certified by the Chartered Accountant etc regarding contractual payments received in the past.
- (iii) The list of personnel / organization on hand and proposed to be engaged for the tendered work. Similarly list of Plant & Machinery available on hand and proposed to be inducted and hired for the tendered work.

- (iv) A copy of certificate stating that they are not liable to be disqualified and all their statements/documents submitted alongwith bid are true and factual. Standard format of the certificate to be submitted by the bidder is enclosed as Annexure-V. Non submission of a copy of certificate 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 documents duly self attested by which they/he are/is qualifying the Qualifying Criteria mentioned in the Tender Document.
- (v) The Railway reserves the right to verify all statements, information and documents submitted by the bidder in his tender offer, and the bidder shall, when so required by the Railway, make available all such information, evidence and documents as may be necessary for such verification. Any such verification or lack of such verification, by the Railway shall not relieve the bidder of its obligations or liabilities hereunder nor will it affect any rights of the Railway thereunder.
- (vi) (a) In case of any information submitted by tenderer is found to be false forged or incorrect at any time during process for evaluation of tenders, it shall lead to forfeiture of the tender Earnest Money Deposit besides banning of business for a period of upto five years.

(b) In case of any information submitted by tenderer is found to be false forged or incorrect after the award of contract, the contract shall be terminated. Earnest Money Deposit (EMD), Performance Guarantee and Security Deposit available with the railway shall be forfeited. In addition, other dues of the contractor, if any, under this contract shall be forfeited and agency shall be banned for doing business for a period of upto five years.

12. Non-compliance with any of the conditions set forth therein above is liable to result in the tender being rejected.

13. Execution of Contract Documents: The successful Tenderer(s) shall be required to execute an agreement with the President of India acting through the _____, _____ Railway for carrying out the work according to Standard General Conditions of Contract, Special Conditions / Specifications annexed to the tender and Standard Specifications (Works and Materials) of Railway as amended/corrected upto latest correction slips, mentioned in tender form (First Sheet).

14. Documents to be Submitted Along with Tender

(i) The tenderer shall clearly specify whether the tender is submitted on his own (Proprietary Firm) or on behalf of a Partnership Firm / Company / Joint Venture (JV) / Registered Society / Registered Trust / HUF etc. The tenderer(s) shall enclose the attested copies of the constitution of their concern, and copy of PAN Card along with their tender. Tender Documents in such cases are to be signed by such persons as may be legally competent to sign them on behalf of the firm, company, association, trust or society, as the case may be.

- (ii) Following documents shall be submitted by the tenderer:
- (a) **Sole Proprietorship Firm:**
 - (i) An undertaking that he is not blacklisted or debarred by Railways or any other Ministry / Department of Govt. of India from participation in tender on the date of opening of bids, either in individual capacity or as a member of the partnership firm or JV in which he was / is a partner/member. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the General Conditions of Contract.
 - (ii) All other documents in terms of explanatory notes in clause 10 above.
- (b) **HUF:**
 - (i) A copy of notarized affidavit on Stamp Paper declaring that he who is submitting the tender on behalf of HUF is in the position of 'Karta' of Hindu Undivided Family (HUF) and he has the authority, power and consent given by other members to act on behalf of HUF.
 - (ii) An undertaking that the HUF is not blacklisted or debarred by Railways or any other Ministry / Department of Govt. of India from participation in tender on the date of opening of bids, either in individual capacity or as a member of the partnership firm or JV in which HUF was / is a partner/member. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the General Conditions of Contract.
 - (iii) All other documents in terms of explanatory notes in clause 10 above.
- (c) **Partnership Firm:**
 - (i) The tenderer shall submit documents as mentioned in clause 18 of the Tender Form (Second Sheet).
- (d) **Joint Venture (JV):** The tenderer shall submit documents as mentioned in Clause 17 of the Tender Form (Second Sheet).
- (e) **Company registered under Companies Act 2013:**
 - (i) The copies of **MOA (Memorandum of Association) / AOA (Articles of Association)** of the company
 - (ii) A copy of Certificate of Incorporation
 - (iii) A copy of Authorization/Power of Attorney issued by the Company (backed by the resolution of Board of Directors) in favour of the individual to sign the tender on behalf of the company and create liability against the company.
 - (iv) An undertaking that the Company is not blacklisted or debarred by Railways or any other Ministry / Department of Govt. of India from participation in tender on the date of opening of bids, either in individual capacity or as a member of the partnership firm or JV in which the Company was / is a partner/member. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the General Conditions of Contract.
 - (v) All other documents in terms of explanatory notes in clause 10 above.

- (f) **LLP (Limited Liability Partnership):** If the tender is submitted on behalf of a LLP registered under LLP Act-2008, the tenderer shall submit along with the tender:
- (i) A copy of LLP Agreement
 - (ii) A copy of Certificate of Incorporation
 - (iii) A copy of Power of Attorney/Authorization issued by the LLP in favour of the individual to sign the tender on behalf of the LLP and create liability against the LLP.
 - (iv) An undertaking that the LLP is not blacklisted or debarred by Railways or any other Ministry / Department of Govt. of India from participation in tender on the date of opening of bids, either in individual capacity or as a member of JV in which the LLP was / is a member. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the General Conditions of Contract.
 - (v) All other documents in terms of explanatory notes in clause 10 above.
- (g) **Registered Society & Registered Trust:** The tenderer shall submit:
- (i) A copy of the Certificate of Registration
 - (ii) A copy of Deed of Formation
 - (iii) A copy of Power of Attorney in favour of the individual to sign the tender documents and create liability against the Society/Trust.
 - (iv) All other documents in terms of explanatory notes in clause 10 above.
- (iii) If it is NOT mentioned in the submitted tender that tender is being submitted on behalf of a Sole Proprietorship firm / Partnership firm / Joint Venture / Registered Company etc., then the tender shall be treated as having been submitted by the individual who has signed the tender.
- (iv) After opening of the tender, any document pertaining to the constitution of Sole Proprietorship Firm / Partnership Firm / Registered Company/ Registered Trust / Registered Society / HUF etc. shall be neither asked nor considered, if submitted. Further, no suo moto cognizance of any document available in public domain (i.e., on internet etc.) or in Railway's record/office files etc. will be taken for consideration of the tender, if no such mention is available in tender offer submitted.
- (v) A tender from JV / Partnership firm etc. shall be considered only where permissible as per the tender conditions.
- (vi) The Railway will not be bound by any change in the composition of the firm made subsequent to the submission of tender. Railway may, however, recognize such power of attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the Contractor.
- 15.** The tenderer whether sole proprietor / a company or a partnership firm / joint venture (JV) / registered society / registered trust / HUF etc if they want to act through agent or individual partner(s), should submit along with the tender, a copy of 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, co-ordinate measurements through contractor's authorized engineer, 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. The above power of attorney shall be submitted **even if** such specific person is authorized for above purposes through partnership deed / Memorandum of Understanding / Article of Association or such other document, failing which tender is liable to be rejected.

16. Employment/Partnership etc. of Retired Railway Employees:

(a) Should a tenderer

i) be a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement, whether in the executive or administrative capacity or whether holding a pensionable post or not, in the Engineering or any other department of any of the railways owned and administered by the President of India for the time being, OR

ii) being partnership firm / joint venture (JV) / registered society / registered trust etc have as one of its partners a retired Engineer of the gazetted rank or any other gazetted officer working before his retirement, OR

iii) being an incorporated company have any such retired Engineer of the gazetted rank or any other gazetted officer working before his retirement as one of its directors

AND

in case where such Engineer or officer had not retired from government service at least 1 year prior to the date of submission of the tender

THEN

the tenderer will give full information as to the date of retirement of such Engineer or gazetted officer from the said service and as to whether permission for taking such contract, or if the Contractor be a partnership firm or an incorporated company, to become a partner or director as the case may be, has been obtained by the tenderer or the Engineer or officer, as the case may be from the President of India or any officer, duly authorized by him in this behalf, shall be clearly stated in writing at the time of submitting the tender.

b) In case, upon successful award of contract, should a tenderer depute for execution of the works under or to deal matters related with this contract, any retired Engineer of gazette rank or retired gazetted officer working before his retirement in the Engineering or any other department of any of the railways owned and administered by the President of India for the time being, and now in his employment, then the tenderer will ensure that retired Engineer or retired gazetted officer had retired from government service at least 1 year

prior to the date of his employment with tenderer and in case he had retired from service within a year then he possesses the requisite permission from the President of India or any officer, duly authorized by him in this behalf, to get associated with the tenderer.

- c) Should a tenderer or Contractor being an individual, have member(s) of his family or in the case of partnership firm/ company / joint venture (JV) / registered society / registered trust etc. one or more of his partner(s)/shareholder(s) or member(s) of the family of partner(s)/shareholder(s) having share of more than 1% in the tendering entity employed in gazetted capacity in the Engineering or any other department of the railway, then the tenderer at the time of submission of tender, will inform the authority inviting tenders the details of such persons.

Note:-If information as required as per 16.a), b), c) above has not been furnished, contract is liable to be dealt in accordance with provision of clause 62 of Standard General Condition of contract.

JOINT VENTURE (JV) IN WORKS TENDERS

17. Participation of Joint Venture (JV) in Works Tender: This Clause shall be applicable for works tenders wherein tender documents provide for the same.

17.1 Separate identity/name shall be given to the Joint Venture.

17.2 Number of members in a JV shall not be more than three, if the work involves only one department (say Civil or S&T or Electrical or Mechanical) and shall not be more than five, if the work involves more than one Department. One of the members of the JV shall be its Lead Member who shall have a majority (at least 51%) share of interest in the JV. The other members shall have a share of not less than 20% each in case of JV with upto three members and not less than 10% each in case of JV with more than three members. In case of JV with foreign member(s), the Lead Member has to be an Indian firm/company with a minimum share of 51%.

17.3 A member of JV shall not be permitted to participate either in individual capacity or as a member of another JV in the same tender.

17.4 The tender form shall be purchased and submitted only in the name of the JV and not in the name of any constituent member. The tender form can however be submitted by JV or any of its constituent member or any person authorized by JV through Power of Attorney to submit tender.

17.5 Earnest Money Deposit (EMD) shall be deposited by JV or authorized person of JV through e-payment gateway or as mentioned in tender document.

17.6 A copy of Memorandum of Understanding (MoU) duly executed by the JV members on a stamp paper, shall be submitted by the JV along with the tender. The complete details of the

members of the JV, their share and responsibility in the JV etc. particularly with reference to financial, technical and other obligations shall be furnished in the MoU. (The MoU format for this purpose shall be finalized by the Railway in consultation with their Law Branch and shall be enclosed along with the tender).

17.7 Once the tender is submitted, the MoU shall not be modified / altered / terminated during the validity of the tender. In case the tenderer fails to observe/comply with this stipulation, the full Earnest Money Deposit (EMD) shall be liable to be forfeited.

17.8 Approval for change of constitution of JV shall be at the sole discretion of the Railway. The constitution of the JV shall not be allowed to be modified after submission of the tender bid by the JV, except when modification becomes inevitable due to succession laws etc., provided further that there is no change in qualification of minimum eligibility criteria by JV after change of composition. However, the Lead Member shall continue to be the Lead Member of the JV. Failure to observe this requirement would render the offer invalid.

17.9 Similarly, after the contract is awarded, the constitution of JV shall not be allowed to be altered during the currency of contract except when modification become inevitable due to succession laws etc. and minimum eligibility criteria should not get vitiated. Failure to observe this stipulation shall be deemed to be breach of contract with all consequential penal action as per contract conditions.

17.10 On award of contract to a JV, a single Performance Guarantee shall be submitted by the JV as per tender conditions. All the Guarantees like Performance Guarantee, Bank Guarantee for Mobilization Advance, Machinery Advance etc. shall be accepted only in the name of the JV and no splitting of guarantees amongst the members of the JV shall be permitted.

17.11 On issue of LOA (Letter of Acceptance), the JV entity to whom the work has been awarded, with the same shareholding pattern as was declared in the MOU/JV Agreement submitted along with the tender, shall be got registered before the Registrar of the Companies under 'The Companies Act -2013' (in case of Company) or before the Registrar/Sub-Registrar under the 'The Indian Partnership Act, 1932' (in case of Partnership Firm) or under 'The LLP Act 2008' (in case of LLP). A separate PAN shall be obtained for this entity. The documents pertaining to this entity including its PAN shall be furnished to the Railways before signing the contract agreement for the work. In case the tenderer fails to observe/comply with this stipulation within 60 days of issue of LOA, contract is liable to be terminated. In case contract is terminated railway shall be entitled to forfeit the full amount of the Earnest Money Deposit and other dues payable to the Contractor under this contract. The entity so registered, in the registered documents, shall have, inter-alia, following Clauses:

17.11.1 Joint And Several Liability - Members of the entity to which the contract is awarded, shall be jointly and severally liable to the Railway for execution of the project in accordance with General and Special Conditions of Contract. The members of the entity shall also be

liable jointly and severally for the loss, damages caused to the Railways during the course of execution of the contract or due to non-execution of the contract or part thereof.

17.11.2 Duration of the Registered Entity - It shall be valid during the entire currency of the contract including the period of extension, if any and the maintenance period after the work is completed.

17.11.3 Governing Laws - The Registered Entity shall in all respect be governed by and interpreted in accordance with Indian Laws.

17.12 Authorized Member - Joint Venture members in the JV MoU shall authorize one of the members on behalf of the Joint Venture to deal with the tender, sign the agreement or enter into contract in respect of the said tender, to receive payment, to witness joint measurement of work done, to sign measurement books and similar such action in respect of the said tender/contract. All notices/correspondences with respect to the contract would be sent only to this authorized member of the JV.

17.13 No member of the Joint Venture shall have the right to assign or transfer the interest right or liability in the contract without the written consent of the other members and that of the Railway in respect of the said tender/contract.

17.14 Documents to be enclosed by the JV along with the tender:

17.14.1 In case one or more of the members of the JV is/are partnership firm(s), following documents shall be submitted:

- (i) A notarized copy of the Partnership Deed,
- (ii) A copy of consent of all the partners or individual authorized by partnership firm, to enter into the Joint Venture Agreement on a stamp paper,
- (iii) A notarized or registered copy of Power of Attorney in favour of the individual to sign the MOU/JV Agreement on behalf of the partnership firm and create liability against the firm.

17.14.2 In case one or more members is/are HUF, the following documents shall be enclosed:

- (i) A copy of notarized affidavit on Stamp Paper declaring that he who is signing the affidavit on behalf of HUF is in the position of 'Karta' of Hindu Undivided Family (HUF) and he has the authority, power and consent given by other members to act on behalf of HUF.

17.14.3 In case one or more members of the JV is/are companies, the following documents shall be submitted:

- (i) A copy of resolutions of the Directors of the Company, permitting the company to enter into a JV agreement,
- (ii) The copies of **MOA (Memorandum of Association) / AOA (Articles of**

Association) of the company

- (iii) A copy of Certificate of Incorporation
- (iv) A copy of Authorization/copy of Power of Attorney issued by the Company (backed by the resolution of Board of Directors) in favour of the individual to sign the tender, sign MOU/JV Agreement on behalf of the company and create liability against the company

17.14.4 All the Members of JV shall certify that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders/contract on the date of opening of bids either in their individual capacity or as a member of the JV in which they were/are members.

17.14.5 All other documents in terms of explanatory notes in clause 10 above.

17.15 Credentials & Qualifying Criteria: Technical, financial eligibility and Bid capacity of the JV shall be adjudged based on satisfactory fulfillment of the following criteria:

17.15.1 Technical Eligibility Criteria ('a' or 'b' mentioned hereunder):

(a) For Works without composite components

The technical eligibility for the work as per para 10.1 above, shall be satisfied by either the 'JV in its own name & style' or 'any member having min 26% share'. Each **other** member of JV shall have technical capacity of minimum 10% of the cost of work i.e., each JV member must have satisfactorily completed during the last 07 (seven) years, ending last day of month previous to the one in which tender is invited, one similar single work for a minimum of 10% of advertised value of the tender.

(b) For works with composite components

(i) The technical eligibility for each component of work as per para 10.1 above, shall be satisfied by either the 'JV in its own name & style' or 'any member of JV having min 26% share'. Each **other** member of JV shall have technical capacity of minimum 10% of the cost of any component of work i.e., each JV member must have satisfactorily completed during the last 07 (seven) years, ending last day of month previous to the one in which tender is invited, one similar single work for a minimum of 10% of cost of any component of work.

OR

(ii) The technical eligibility for major component of work as per para 10.1 above, shall be satisfied by either the 'JV in its own name & style' or 'any member of JV having min 26% share' and technical eligibility for other components of work as per para 10.1 above, shall be satisfied by either the 'JV in its own name & style' or 'any member of the JV'. Each **other** member of JV shall have technical capacity of minimum 10% of the cost of any component of work. i.e., each JV member must have satisfactorily completed during the last 07 (seven) years, ending last day of month

previous to the one in which tender is invited, one similar single work for a minimum of 10% of cost of any component of work.

Note for Clause 17.15.1:

- (a) The Major component of the work for this purpose shall be the component of work having highest value. In cases where value of two or more component of work is same, any one work can be classified as Major component of work.*
- (b) Value of a completed work done by a Member in an earlier JV shall be reckoned only to the extent of the concerned member's share in that JV for the purpose of satisfying his/her compliance to the above mentioned technical eligibility criteria in the tender under consideration.*

17.15.2 Financial Eligibility Criteria

The JV shall satisfy the requirement of “Financial Eligibility” mentioned at para 10.2 above. The “financial capacity” of the lead partner of JV shall not be less than 51% of the financial eligibility criteria mentioned at para 10.2 above.

The arithmetic sum of individual “financial capacity” of all the members shall be taken as JV’s “financial capacity” to satisfy this requirement.

Note: Contractual payment received by a Member in an earlier JV shall be reckoned only to the extent of the concerned member’s share in that JV for the purpose of satisfying compliance of the above mentioned financial eligibility criteria in the tender under consideration.

17.15.3 Bid Capacity

The JV shall satisfy the requirement of “Bid Capacity” requirement mentioned at para 10.3 above. The arithmetic sum of individual “Bid capacity” of all the members shall be taken as JV’s “Bid capacity” to satisfy this requirement.

18. Participation of Partnership Firms in works tenders:

18.1 The Partnership Firms participating in the tender should be legally valid under the provisions of the Indian Partnership Act.

18.2 The partnership firm should have been in existence or should have been formed prior to submission of tender. Partnership firm should have either been registered with the Registrar or the partnership deed should have been notarized prior to date of tender opening as per the Indian Partnership Act.

18.3 Separate identity / name should be given to the partnership firm. The partnership firm should have PAN / TAN number in its own name and PAN / TAN number in the name of any of the constituent partners shall not be considered. The valid constituents of the firm shall be called partners.

18.4 Once the tender has been submitted, the constitution of the firm shall not normally be allowed to be modified / altered / terminated during the validity of the tender as well as the currency of the contract except when modification becomes inevitable due to succession laws etc., in which case prior permission should be taken from Railway and in any case the minimum eligibility criteria should not get vitiated. The re-constitution of firm in such cases should be followed by a notary certified Supplementary Deed. The approval for change of constitution of the firm, in any case, shall be at the sole discretion of the Railways and the tenderer shall have no claims what-so-ever. Any change in the constitution of Partnership firm after opening of tender shall be with the consent of all partners and with the signatures of all partners as that in the Partnership Deed. Failure to observe this requirement shall render the offer invalid and full EMD shall be forfeited.

If any Partner/s withdraws from the firm after opening of the tender and before the award of the contract, the offer shall be rejected and EMD of the tenderer will be forfeited. If any new partner joins the firm after opening of tender but prior to award of contract, his / her credentials shall not qualify for consideration towards eligibility criteria either individually or in proportion to his share in the previous firm. In case the tenderer fails to inform Railway beforehand about any such changes / modification in the constitution which is inevitable due to succession laws etc. and the contract is awarded to such firm, then it will be considered a breach of the contract conditions liable for determination of the contract under Clause 62 of General Conditions of Contract.

18.5 A partner of the firm shall not be permitted to participate either in his individual capacity or as a partner of any other firm in the same tender.

18.6 The tender form shall be submitted only in the name of partnership firm. The EMD shall be deposited by partnership firm through e-payment gateway or as mentioned in tender document. The EMD submitted in the name of any individual partner or in the name of authorized partner (s) shall not be considered.

18.7 One or more of the partners of the firm or any other person (s) shall be designated as the authorized person (s) on behalf of the firm, who will be authorized by all the partners to act on behalf of the firm through a “Power of Attorney”, specially authorizing him / them to submit & sign the tender, sign the agreement, receive payment, witness measurements, sign measurement books, make correspondences, compromise / settle / relinquish any claim (s) preferred by the firm, sign “No Claim Certificate”, refer all or any dispute to arbitration and to take similar such action in respect of the said tender / contract. Such “Power of Attorney” shall be notarized / registered and submitted along with the tender.

18.8 On issue of Letter of Acceptance (LOA) to the partnership firm, all the guarantees like Performance Guarantee, Guarantee for various Advances to the Contractor shall be submitted only in the name of the partnership firm and no splitting of guarantees among the partners shall be acceptable.

18.9 On issue of Letter of Acceptance (LOA), contract agreement with partnership firm shall be executed in the name of the firm only and not in the name of any individual partner.

18.10 In case the Letter of Acceptance (LOA) is issued to a partnership firm, the following undertakings shall be furnished by all the partners through a notarized affidavit, before signing of contract agreement.

(a) Joint and several liabilities:

The partners of the firm to which the Letter of Acceptance (LOA) is issued, shall be jointly and severally liable to the Railway for execution of the contract in accordance with General and Special Conditions of the Contract. The partners shall also be liable jointly and severally for the loss, damages caused to the Railway during the course of execution of the contract or due to non-execution of the contract or part thereof.

(b) Duration of the partnership deed and partnership firm agreement:

The partnership deed/partnership firm agreement shall normally not be modified/altered/terminated during the currency of contract and the maintenance period after the work is completed as contemplated in the conditions of the contract. Any change carried out by partners in the constitution of the firm without permission of Railway, shall constitute a breach of the contract, liable for determination of the contract under Clause 62 of the General Conditions of Contract.

(c) Governing laws: The partnership firm agreement shall in all respect be governed by and interpreted in accordance with the Indian laws.

(d) No partner of the firm shall have the right to assign or transfer the interest right or liability in the contract without the written consent of the other partner/s and that of the Railway.

18.11 The tenderer shall clearly specify that the tender is submitted on behalf of a partnership firm. The following documents shall be submitted by the partnership firm, with the tender:

- (i) A notarized copy of partnership deed.
- (ii) A notarized or registered copy of Power of Attorney in favour of the individual to tender for the work, sign the agreement etc. and create liability against the firm.
- (iii) An undertaking by all partners of the partnership firm that they are not blacklisted or debarred by Railways or any other Ministry / Department of the Govt. of India from participation in tenders / contracts as on the date of opening of bids, either in their individual capacity or in any firm in which they were / are partners. Concealment / wrong information in regard to above shall make the contract liable for determination under Clause 62 of the General Conditions of Contract.
- (iv) All other documents in terms of explanatory notes in clause 10 above.

18.12 Evaluation of eligibility of a partnership firm:

Technical and financial eligibility of the firm shall be adjudged based on satisfactory fulfillment of the eligibility criteria laid down in Clause 10 above.

(Signature)

(Designation)

Signature of Tenderer(s)

Date _____

_____Railway

Date _____

TENDER FORM (Third Sheet)**Name of Work:** _____**SCHEDULE OF RATES AND QUANTITIES**

SL	Item No.	Description of Item of Work	Approximate Quantity	Unit	Rates in Figures and Words (₹)	Amount (₹)
1	2	3	4	5	6	7

The quantities shown in above Schedule are approximate and are as a guide to give the tenderer(s) an idea of quantum of work involved. The Railway reserves the right to increase/decrease and/or delete or include any of the quantities given above and no extra rate will be allowed on this account.

I/We undertake to do the work at _____ % above/below the Schedule of Rates of the _____ Railway as applicable to _____ Division or at the rates quoted above for each item.

Dated _____

Signature of the Tenderer(s)

Note: Columns 1 to 5 shall be filled by the office of the Authority inviting tender. Columns 6 & 7 shall be filled by the Tenderer(s) only when percentage tenders are not invited.

AGREEMENT FOR ZONE CONTRACT

CONTRACT AGREEMENT No. _____ DATED _____.
 ARTICLES OF AGREEMENT made this _____ day of _____ between
 the President of India acting through the _____, _____ Railway
 hereinafter called the "Railway" of the one part and _____
 hereinafter called the "Contractor" of the other part.

WHEREAS the Contractor has agreed with the Railway during the period of _____
 months from _____ to _____ for the performance of:

(a) New Works, additions and alterations to existing structures, special repair works and
 supply of building materials subject to the contract value for such works not exceeding
 ₹ _____.

(b) All ordinary repair and maintenance works at any site between kilometer _____ and
 kilometre _____ as will be set forth in the work orders (which work orders shall be
 deemed and taken to be part of this contract) that will be issued during the said period at
 _____% above/below the Schedule of Rates of the _____ Railway, corrected up to
 the latest correction slips and Standard Specifications of the _____ Railway
 corrected upto latest correction slips and the Special Conditions and Special Specifications, if
 any in conformity with the drawings (if any) that will be issued with the work order, aforesaid
 AND WHEREAS the performance of the said work is an act in which the public are interested.

NOW THIS INDENTURE PRESENTS WITNESSETH That in consideration of the
 payment to be made by the Railway, the Contractor will duly perform the works set forth in the
 said Work Order and shall execute the same with great promptness, care and accuracy, in a
 workman like manner to the satisfaction of the Railway and will complete the same on or
 before the respective dates specified therein in accordance with the said specifications and said
 drawings (if any) and said conditions of contract and will observe, fulfill and keep all the
 conditions therein mentioned, (which shall be deemed and taken to be part of this contract as if
 the same had been duly set forth herein), AND the Railway both here-by agree that if the
 Contractor shall duly perform the said work in the manner aforesaid and observe and keep the
 said terms and conditions, the Railway will pay or cause to be paid to the Contractor for the
 said works on the completion thereof the amount due in respect thereof at the rates specified
 above.

Contractor _____

Address _____

Designation _____

Railway _____

(For President of India)

Witnesses (to signature of Contractor):

Signature of witnesses with address _____

Date _____

Signature of witnesses with address _____

Date _____

ANNEXURE - III**WORK ORDER UNDER ZONE CONTRACT**

WORK ORDER NO. _____, DATED _____ UNDER CONTRACT AGREEMENT

NO. _____ DATED _____.

Name of Work _____

(SITE) _____

Schedule of Drawings

Authority _____

Allocation _____

The Contractor(s) _____ is / are hereby ordered to carry out the following works at _____% above/below the Schedule of Rates of _____ Railway corrected upto latest correction slips of _____ Division under Zone Contract Agreement here-in-before referred to:

SL	Item No.	Description of Item of Work	Approximate Quantity	Unit	Rates in Figures and Words (₹)	Amount (₹)
1	2	3	4	5	6	7
Total Approximate Value of Work = ₹ _____						

The works herein mentioned are required to be completed on or before _____ (Date). The quantities provided herein are approximate and subject to variation under Clause 42 of the Standard General Conditions of Contract corrected upto latest correction slips.

Divisional Railway Manager/Divisional _____ Engineer

_____ Division

_____ Railway

Date _____

for President of India

I agree to complete the works herein set forth on or before the date specified under the Zone Contract Agreement herein before referred to in conformity with the drawings hereto annexed and in accordance with the General and Special (if any) Conditions of Contract

corrected upto latest Correction Slips and the Standard Specifications of _____ Railway with up-to-date Correction Slips.

I also agree to maintain such works for the period specified below from the date of completion:

- (a) Repair and maintenance work including white/color washing: three calendar months from date of completion.
- (b) All new works except earth work: Six calendar months from date of completion.

Contractor _____ (Signature) Railway: Designation _____

Address _____

For President of India)

Date _____

Date _____

Signature of Witnesses (to Signature of Contractor) with address

1.	_____	_____
	_____	_____
	_____	_____
2.	_____	_____
	_____	_____
	_____	_____

_____ RAILWAY
CONTRACT AGREEMENT OF WORKS

CONTRACT AGREEMENT NO. _____ DATED _____

ARTICLES OF AGREEMENT made this _____ day of _____ 20____
 between President of India acting through the Railway Administration hereafter called the
 "Railway" of the one part and _____ herein after called the
 "Contractor" of other part.

WHEREAS the Contractor has agreed with the Railway for performance of the works
 _____ set forth in the Schedule hereto annexed upon the Standard General
 Conditions of Contract, corrected upto latest correction slips and the Specifications of
 _____ Railway corrected upto the latest correction slips and the Schedule of Rates of
 _____ Railway, corrected upto latest correction slips and the Special Conditions and
 Special Specifications, if any and in conformity with the drawings here-into annexed AND
 WHEREAS the performance of the said works is an act in which the public are interested.

NOW THIS INDENTURE WITNESSETH that in consideration to the payments to be
 made by the Railways, the Contractors will duly perform the said works in the said schedule
 set forth and shall execute the same with great promptness, care and accuracy in a workman
 like manner to the satisfaction of the Railway and will complete the same in accordance with
 the said specifications and said drawings and said conditions of contract on or before the
 _____ day of _____ 20____ and will maintain the said works for a period of
 _____ Calendar months from the certified date of their completion and will observe, fulfill
 and keep all the conditions therein mentioned (which shall be deemed and taken to be part of
 this contract, as if the same have been fully set forth herein), AND the Railway, both hereby
 agree that if the Contractor shall duly perform the said works in the manner aforesaid and
 observe and keep the said terms and conditions, the Railway will pay or cause to be paid to the
 Contractor for the said works on the final completion thereof the amount due in respect thereof
 at the rates specified in the Schedule hereto annexed.

Contractor _____ (Signature)

Railway: Designation _____

Address _____

(For President of India)

Date _____

Date _____

Signature of **Witnesses** (to Signature of Contractor) with address:

Witnesses:

ANNEXURE-V

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

I..... (Name and designation)** appointed as the attorney/authorized signatory of the tenderer (including its constituents),

M/s_____ (hereinafter called the tenderer) for the purpose of the Tender documents for the work of _____ as per the tender No._____ of _____(Railway)**, 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 Indian Railway website www.ireps.gov.in . I/we have verified the content of the document from the website 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 the contract, the master copy available with the railway Administration shall be final and binding upon me/us.
4. 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.
5. **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.**
6. **I/We declare that the information and documents submitted along with the tender by me/us are correct and I/we are fully responsible for the correctness of the information and documents, submitted by us.**
7. 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 upto five year. Further, I/we (insert name of the tenderer) **_____and all my/our constituents understand that my/our offer shall be summarily rejected.
8. I/we also understand that if the certificates submitted by us are found to be false/forged or incorrect at any time after 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 upto five year.

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.**

ANNEXURE – VI

TENDERER'S CREDENTIALS (BID CAPACITY)**_____ RAILWAY**

For tenders costing more than Rs 20 crore wherein eligibility criteria includes bid capacity also, the tenderer will be qualified only if its available bid capacity is equal to or more than the total bid value of the present tender. The available bid capacity shall be calculated as under:

$$\text{Available Bid Capacity} = [A \times N \times 2] - B$$

Where,

A = Maximum value of construction works executed and payment received in any one of the previous three financial years or the current financial year (up to date of inviting tender), taking into account the completed as well as works in progress.

N= Number of years prescribed for completion of work for which bids has been invited.

B = Value of existing commitments and balance amount of ongoing works with the tenderer to be completed in next 'N' years.

Note:

- (a) The Tenderer(s) shall furnish the details of existing commitments and balance amount of ongoing works with tenderer as per the prescribed proforma of Railway for statement of all works in progress and also the works which are awarded to tenderer but yet not started upto the date of inviting of tender. In case of no works in hand, a 'NIL' statement should be furnished. This statement should be submitted duly verified by Chartered Accountant.
- (b) In case of JV, the tenderer(s) must furnish the details of existing commitments and balance amount of ongoing works with each member of JV as per the prescribed proforma of Railway for statement of all works in progress and also the works which are awarded to tenderer but yet not started upto the date of inviting of tender. In case of no works in hand, a 'NIL' statement should be furnished. This statement should be submitted duly verified by Chartered Accountant.
- (c) Value of a completed work/work in progress/work awarded but yet not started for a Member in an earlier JV shall be reckoned only to the extent of the concerned member's share in that JV for the purpose of satisfying his/her compliance to the above mentioned bid capacity in the tender under consideration.
- (d) The arithmetic sum of individual "bid capacity" of all the members shall be taken as JV's "bid capacity".
- (e) In case, the tenderer/s failed to submit the above statement along with offer, their/his offer shall be considered as incomplete and will be rejected **summarily**.
- (f) The available bid capacity of tenderer shall be assessed based on the details submitted by the tenderer. In case, the available bid capacity is lesser than estimated cost of work put to tender, his offer shall not be considered even if he has been found eligible in other eligibility criteria/tender requirement.

Part II

STANDARD GENERAL CONDITIONS OF CONTRACT

FOR USE IN CONNECTION WITH WORKS CONTRACTS

DEFINITIONS AND INTERPRETATION

1. (1) Definitions: In these Standard General Conditions of Contract, the following terms shall have the meaning assigned hereunder except where the context otherwise requires:

(a) "Railway" shall mean the President of the Republic of India or the Administrative Officers of the Railway or of the Successor Railway authorized to deal with any matters which these presents are concerned on his behalf.

(b) "General Manager" shall mean the Officer in-charge of the General Superintendence and Control of the Railway and shall also include Addl. General Manager, the General Manager (Construction) and shall mean and include their successors, of the successor Railway.

(c) "Chief Engineer" shall mean the Officer in-charge of the Engineering Department of Railway and shall also include Chief Engineer (Construction), Chief Signal & Telecommunication Engineer, Chief Signal & Telecommunication Engineer (Construction), Chief Electrical Engineer, Chief Electrical Engineer (Construction), Chief Mechanical Engineer and shall mean & include their successors, of the Successor Railway.

(d) "Divisional Railway Manager" shall mean the Officer in-charge of a Division of the Railway and shall mean and include the Divisional Railway Manager of the Successor Railway.

(e) "Engineer" shall mean the Divisional Engineer or the Executive Engineer, Divisional Signal & Telecom Engineer, Divisional Electrical Engineer, Divisional Mechanical Engineer in executive charge of the works and shall include the superior officers of Open Line and Construction organisations on the Railway of the Engineering, Signal & Telecom, Electrical and Mechanical Departments, i.e. the Senior Divisional Engineer/Deputy Chief Engineer, Senior Divisional Signal & Telecom Engineer / Dy. Chief Signal & Telecom Engineer, Senior Divisional Electrical Engineer / Deputy Chief Electrical Engineer, Senior Divisional Mechanical Engineer and shall mean & include the Engineers of the Successors Railway.

(f) "Engineer's Representative" shall mean the Assistant Engineer, Assistant Signal & Telecommunication Engineer and Assistant Electrical Engineer, Assistant Mechanical Engineer in direct charge of the works and shall include any Sr. Section/Junior Engineer of Civil Engineering/ Signal and Telecommunication Engineering/Mechanical Engineering/Electrical Engineering Departments appointed by the Railway and shall mean and include the Engineer's Representative of the Successor Railway.

- (g) "Contractor" shall mean the Person/Firm/Co-operative Society or Company whether incorporated or not who enters into the contract with the Railway and shall include their executors, administrators, successors and permitted assigns.
- (h) "Contract" shall mean and include the Agreement of Work Order, the accepted Schedule of Rates or the Schedule or Rates of Railway modified by the tender percentage for items of works quantified, or not quantified, the Standard General Conditions of Contract, the Special Conditions of Contracts, if any; the Drawing, the Specifications, the Special Specifications, if any and Tender Forms, if any.
- (i) "Works" shall mean the works to be executed in accordance with the contract.
- (j) "Specifications" shall mean the Standard Specifications for Materials & Works of Railway as specified by Railway under the authority of the Chief Engineer or as amplified, added to or superseded by Special Specifications, if any.
- (k) "Schedule of Rates of Railway" shall mean the Schedule of Rates issued under the authority of the Chief Engineer from time to time.
- (l) "Drawing" shall mean the maps, drawings, plans and tracings or prints there of annexed to the contract and shall include any modifications of such drawings and further drawings as may be issued by the Engineer from time to time.
- (m) "Constructional Plant" shall mean all appliances or things of whatsoever nature required for the execution, completion or maintenance of the works or temporary works (as hereinafter defined) but does not include materials or other things intended to form or forming part of the permanent work.
- (n) "Temporary Works" shall mean all temporary works of every kind required for the execution completion and/or maintenance of the works.
- (o) "Site" shall mean the lands and other places on, under, in or through which the works are to be carried out and any other lands or places provided by the Railway for the purpose of the contract.
- (p) "Period of Maintenance" shall mean the specified period of maintenance from the date of completion of the works, as certified by the Engineer.
- (q) 'Contractor's authorized Engineer' shall mean a graduate Engineer or equivalent, having more than 3 years experience in the relevant field of construction work involved in the contract, duly approved by Engineer.
- (r) Date of inviting tender shall be the date of publishing tender notice on IREPS website if tender is published on website or the date of publication in newspaper in case tender is not published on website.

1. (2) Singular and Plural: Words importing the singular number shall also include the plural and vice versa where the context requires.

1.(3) Headings and Marginal Headings: The headings and marginal headings in these Standard General Conditions are solely for the purpose of facilitating reference and shall not be deemed to be part thereof or be taken into consideration in the interpretation or construction thereof of the contract.

GENERAL OBLIGATIONS

2. (1) Execution Co-Relation and Intent of Contract Documents: The contract documents shall be signed in triplicate by the Railway and the Contractor. The contract documents are complementary and what is called for by anyone shall be as binding as if called for by all, the intention of the documents is to include all labour and materials, equipments and transportation necessary for proper execution of work. Materials or works not covered by or properly inferable from any heading or class of the specifications shall not be supplied by the Railway to the Contractors unless distinctly specified in the contract documents. Materials or works described in words which so applied have a well-known technical or trade meaning, shall be held to refer to such recognized standards.

2.(2) If a work is transferred from the jurisdiction of one Railway to another Railway or to a Project authority or vice versa while contract is in subsistence, the contract shall be binding on the Contractor and the Successor Railway/Project in the same manner & take effect in all respects as if the Contractor and the Successor Railway/Project were parties thereto from the inception and the corresponding officer or the Competent Authority in the Successor Railway/Project will exercise the same powers and enjoy the same authority as conferred to the Predecessor Railway/Project under the original contract/agreement entered into.

2. (3) If for administrative or other reasons the contract is transferred to the Successor Railway, the contract shall, notwithstanding any things contained herein contrary there to, be binding on the Contractor and the Successor Railway in the same manner and take effect in all respects as if the Contractor and the Successor Railway had been parties thereto from the date of this contract.

3. (1) Law Governing the Contract: The contract shall be governed by the law for the time being in force in the Republic of India.

3.(2) Compliance to Regulations and Bye-Laws: The Contractor shall conform to the provision of any statute relating to the works and regulations and bye-laws of any local authority and of any water and lighting companies or undertakings, with whose system the work is proposed to be connected and shall before making any variation from the drawings or the specifications that may be necessitated by so confirming give to the Engineer notice specifying the variation proposed to be made and the reason for making the variation and shall

not carry out such variation until he has received instructions from the Engineer in respect thereof. The Contractor shall be bound to give all notices required by statute, regulations or bye-laws as aforesaid and to pay all fees and taxes payable to any authority in respect thereof.

4. Communications to be in Writing: All notices, communications, reference and complaints made by the Railway or the Engineer or the Engineer's Representative or the Contractor inter-se concerning the works shall be in writing or e-mail on registered e-mail IDs and no notice, communication, reference or complaint not in writing or through e-mail, shall be recognized.

5. Service of Notices on Contractors: The Contractor shall furnish to the Engineer the name, designation and address of his authorized agent and all complaints, notices, communications and references shall be deemed to have been duly given to the Contractor, if delivered to the Contractor or his authorized agent or left at or posted to the address so given and shall be deemed to have been so given in the case of posting on day on which they would have reached such address in the ordinary course of post or on the day on which they were so delivered or left. In the case of contract by partners, any change in the constitution of the firm shall be forthwith notified by the Contractor to the Engineer.

6. Occupation and Use of Land: No land belonging to or in the possession of the Railway shall be occupied by the Contractor without the permission of the Railway. The Contractor shall not use, or allow to be used the site for any purposes other than that of executing the works. Whenever non-railway bodies/persons are permitted to use railway premises with competent authority's approval, conservancy charges as applicable from time to time may be levied.

7. Assignment or Subletting of Contract: The Contractor shall not assign or sublet the contract or any part thereof or allow any person to become interested therein in any manner whatsoever without the special permission in writing of the Chief Engineer, save as provided below. Any breach of this condition shall entitle the Railway to rescind the contract under Clause 62 of these Conditions and also render the Contractor liable for payment to the Railway in respect of any loss or damage arising or ensuing from such cancellation; provided always that execution of the details of the work by petty Contractor under the direct and personal supervision of the Contractor or his agent shall not be deemed to be sub-letting under this clause.

In case Contractor intends to subcontract part of work, he shall submit a proposal in writing seeking permission of Chief Engineer for the same. While submitting the proposal to railway, Contractor shall ensure the following:

- (a) (i) Total value of work to be assigned to sub-contractor(s) shall not be more than 50% of total contract value.

(ii)The subcontractor shall have successfully completed at least one work similar to work proposed for subcontract, costing not less than 35% value of work to be subletted, in last 5 years through a works contract directly given to him by a Govt. Department; or by a Public listed company having average annual turnover of Rs 500 crore and above in last 3 financial years excluding the current financial year, listed on National Stock Exchange or Bombay Stock Exchange, registered at least 5 years back from the date of submission of proposal by Contractor to Railway and work experience certificate issued by a person authorised by the Public Listed Company to issue such certificates.

In case contractor submits subcontractor's work experience certificate issued by public listed company, the contractor shall also submit along with work experience certificate, the relevant copy of work order, bill of quantities, bill wise details of payment received duly certified by Chartered Accountant, TDS certificates for all payments received and copy of final/last bill paid by company in support of above work experience certificate.

(iii)There is no banning of business with the sub-contractor in force over IR.

- (b) The Contractor shall provide to the Engineer a copy of the agreement to be entered into by Contractor with subcontractor. No subcontractor shall be permitted without a formal agreement between Contractor and subcontractor. This agreement shall clearly define the scope of work to be carried out by subcontractor and the terms of payment in clear & unambiguous manner.
- (c) On receipt of approval from Chief Engineer, Contractor shall enter into a formal agreement legally enforceable in Court of Law with subcontractor and submit a copy of the same to the Engineer.
- (d) The Contractor shall intimate to the Engineer not less than 7 days in advance, the intended date of commencement of subcontractor's work.
- (e) Once having entered into above arrangement, Contractor shall discontinue such arrangement, if he intends to do so at his own or on the instructions of Railway, with prior intimation to Chief Engineer.
- (f) The Contractor shall indemnify railway against any claim of subcontractor.
- (g) The Contractor shall endeavour to resolve all matters and payments amicably and speedily with the subcontractor.
- (h) In addition to issuance of work experience certificate to Contractor, the Engineer, when, based on documents, is satisfied that subcontracted work has been carried out by subcontractor, shall issue work experience certificate to the subcontractor also for the portion of work subcontracted and successfully completed by the sub-contractor.

- (i) The responsibility of successful completion of work by subcontractor shall lie with Contractor. Subcontracting will in no way relieve the Contractor to execute the work as per terms of the Contract.
- (j) Further, in case Engineer is of the view that subcontractor's performance is not satisfactory, he may instruct the Contractor to remove the subcontractor from the work and Contractor has to comply with the above instructions with due promptness. Contractor shall intimate the actual date of discontinuation of subcontract to Engineer. No claim of Contractor whatsoever on this account shall be entertained by the Railway and this shall be deemed as 'excepted matter' (matter not arbitrable).
- (k) The permitted subcontracting of work by the Contractor shall not establish any contractual relationship between the sub-contractor and the Railway and shall not relieve the Contractor of any responsibility under the Contract.

8. Assistance by Railway for the Stores to be obtained by the Contractor: Owing to difficulty in obtaining certain materials (including Tools & Plant) in the market, the Railway may have agreed without any liability therefore to endeavour to obtain or assist the Contractor in obtaining the required quantities of such materials as may be specified in the Tender. In the event of delay or failure in obtaining the required quantities of the aforesaid material, the Contractor shall not be deemed absolved of his own responsibility and shall keep in touch with the day to day position regarding their availability and accordingly adjust progress of works including employment of labour and the Railway shall not in any way be liable for the supply of materials or for the non-supply thereof for any reasons whatsoever nor for any loss or damage arising in consequence of such delay or non-supply.

9. Railway Passes: No free railway passes shall be issued by the Railway to the Contractor or any of his employee/worker.

10. Carriage of Materials: No forwarding orders shall be issued by the Railway for the conveyance of Contractor's materials, tools and plant by train which may be required for use in the works and the Contractor shall pay full freight charges at public tariff rates therefor.

11. Use of Ballast Trains: The Railway may agree to allow the Contractor use of the ballast or material trains under such conditions as shall be specially prescribed, provided that the Contractor shall pay for the use thereof charges calculated at public tariff rates on the marked carrying capacity of each vehicle subject to specified minimum charge per day or part of day and provided further that the Contractor shall indemnify the Railway against any claims or damages arising out of the use or misuse thereof and against any liabilities under the Workmen's Compensation Act, 1923 or any statutory amendments thereto.

12. Representation on Works: The Contractor shall, when he is not personally present on the site of the works place, keep a responsible agent at the works during working hours who shall on receiving reasonable notice, present himself to the Engineer and orders given by the

Engineer or the Engineer's representative to the agent shall be deemed to have the same force as if they had been given to the Contractor. Before absenting himself, the Contractor shall furnish the name and address of his agent for the purpose of this clause and failure on the part of the Contractor to comply with this provision at any time will entitle the Railway to rescind the contract under Clause 62 of these Conditions.

13. Relics and Treasures: All gold, silver, oil, other minerals of any description, all precious stones, coins, treasures relics antiquities and other similar things which shall be found in or upon the site shall be the property of the Railway and the Contractor shall duly preserve the same to the satisfaction of the Railway and shall from time to time deliver the same to such person or persons as the Railway may appoint to receive the same.

14. Excavated Material: The Contractor shall not sell or otherwise dispose of or remove except for the purpose of this contract, the sand, stone, clay ballast, earth, trees, rock or other substances or materials which may be obtained from any excavation made for the purpose of the works or any building or produced upon the site at the time of delivery of the possession thereof but all the substances, materials, buildings and produce shall be the property of the Railway provided that the Contractor may, with the permission of the Engineer, use the same for the purpose of the works either free of cost or pay the cost of the same at such rates as may be determined by the Engineer.

15. Indemnity by Contractors: The Contractor shall indemnify and save harmless the Railway from and against all actions, suit, proceedings, losses, costs, damages, charges, claims and demands of every nature and description brought or recovered against the Railways 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.

16.(1) Security Deposit: The Earnest Money deposited by the Contractor with his tender will be retained by the Railways as part of security for the due and faithful fulfillment of the contract by the Contractor. The Security Deposit shall be 5% of the contract value. Security Deposit may be deposited by the Contractor before release of first on account bill in cash or Term Deposit Receipt issued from Scheduled Bank, or may be recovered at the rate of 6% of the bill amount till the full Security Deposit is recovered. Provided also that in case of defaulting Contractor, the Railway may retain any amount due for payment to the Contractor on the pending "on account bills" so that the amounts so retained (including amount guaranteed through Performance Guarantee) may not exceed 10% of the total value of the contract.

Further, in case of contracts having value equal to or more than ₹ 50 crore (Rs Fifty crore) the Security Deposit may be deposited as Bank Guarantee Bond also, issued by a scheduled bank after execution of contract documents, but before payment of 1st on account bill. Provided

further that the validity of Bank Guarantee Bond shall be extended from time to time, depending upon extension of contract granted in terms of Clause 17 of the Standard General Conditions of Contract.

Further, in case Security Deposit has been submitted as Term Deposit Receipt/Bank Guarantee Bond in full amount, the Earnest Money deposited by the Contractor with his tender will be returned by the Railways.

Note: After the work is physically completed as certified by competent authority, Security Deposit recovered from the running bills of a Contractor can be returned to him, if he so desires, in lieu of Term Deposit Receipt/irrevocable Bank Guarantee for equivalent amount from Scheduled Bank, to be submitted by him.

16.(2) (i) Refund of Security Deposit: Security Deposit mentioned in sub clause (1) above shall be returned to the Contractor along with or after, the following:

- (a) Final Payment of the Contract as per clause 51.(1) **and**
- (b) Execution of Final Supplementary Agreement or Certification by Engineer that Railway has No Claim on Contractor **and**
- (c) Maintenance Certificate issued, on expiry of the maintenance period as per clause 50.(1), in case applicable.

16. (2) (ii) Forfeiture of Security Deposit: Whenever the contract is rescinded as a whole under clause 62 (1) of GCC, the Security Deposit already with railways under the contract shall be forfeited. However, in case the contract is rescinded in part or parts under clause 62 (1) of GCC, the Security Deposit shall not be forfeited.

16.(3) No interest shall 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 16.(4)(b) of this clause will be payable with interest accrued thereon.

16.(4) Performance Guarantee

The procedure for obtaining Performance Guarantee is outlined below:

- (a) The successful bidder shall have to submit a Performance Guarantee (PG) within 21 (Twenty one) days from the date of issue of Letter of Acceptance (LOA). Extension of time for submission of PG beyond 21 (Twenty one) 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 12% per annum shall be charged for the delay beyond 21(Twenty one) days, i.e. from 22nd day after the date of issue of LOA. Further, if the 60th day happens to be a declared holiday in the concerned office of the Railway, submission of PG can be accepted on the next working day.

In all other cases, if the Contractor fails to submit the requisite PG even after 60 days from the date of issue of LOA, the contract is liable to be terminated. In case

contract is terminated railway shall be entitled to forfeit Earnest Money Deposit and other dues payable against that contract. In case a tenderer has not submitted Earnest Money Deposit on the strength of their registration as a Startup recognized by Department of Industrial Policy and Promotion (DIPP) under Ministry of Commerce and Industry, DIPP shall be informed to this effect.

The failed Contractor shall be debarred from participating in re-tender for that work.

- (b) The successful bidder shall submit the Performance Guarantee (PG) in any of the following forms, amounting to 5% of the contract value:
- (i) A deposit of Cash;
 - (ii) Irrevocable Bank Guarantee;
 - (iii) Government Securities including State Loan Bonds at 5% below the market value;
 - (iv) Deposit Receipts, Pay Orders, Demand Drafts and Guarantee Bonds. These forms of Performance Guarantee could be either of the State Bank of India or of any of the Nationalized Banks;
 - (v) Guarantee Bonds executed or Deposits Receipts tendered by all Scheduled Banks;
 - (vi) Deposit in the Post Office Saving Bank;
 - (vii) Deposit in the National Savings Certificates;
 - (viii) Twelve years National Defence Certificates;
 - (ix) Ten years Defence Deposits;
 - (x) National Defence Bonds and
 - (xi) Unit Trust Certificates at 5% below market value or at the face value whichever is less. Also, FDR in favour of FA&CAO (free from any encumbrance) may be accepted.
- (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.
- (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. On the other hand, if the value of contract decreases by more than 25% of the original contract value, Performance Guarantee amounting to 5% (five percent) of the decrease in the contract value shall be

- returned to the Contractor. The PG amount in excess of required PG for decreased contract value, available with Railways, shall be returned to Contractor as per his request duly safeguarding the interest of railways
- (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.
 - (f) Whenever the contract is rescinded, the Performance Guarantee already submitted for the contract shall be encashed in addition to forfeiture of Security Deposit available with railway.
 - (g) The Engineer shall not make a claim under the Performance Guarantee except for amounts to which the President of India is entitled under the contract (not withstanding and/or without prejudice to any other provisions in the contract agreement) in the event of:
 - (i) Failure by the Contractor to extend the validity of the Performance Guarantee as described herein above, in which event the Engineer may claim the full amount of the Performance Guarantee.
 - (ii) Failure by the Contractor to pay President of India any amount due, either as agreed by the Contractor or determined under any of the Clauses/Conditions of the Agreement, within 30 days of the service of notice to this effect by Engineer.
 - (iii) The Contract being determined or rescinded under clause 62 of the GCC
 - (h) The tenderer who has offered lower total cost as compared to tender value by more than 10 %, shall be required to submit additional Performance Guarantee of value equal to half the percentage of tender value by which offer is lower than 10%. (e.g. *in a tender costing Rs 100, if contract value is Rs 80, additional Performance Guarantee shall be $[0.5 \times \{(100-80)-10\}]$ percentage of tender value.*)

17. Force Majeure Clause: If at any time, during the continuance of this contract, the performance in whole or in part by either party of any obligation under this contract shall be prevented or delayed by reason of any war, hostility, acts of public enemy, civil commotion, sabotage, serious loss or damage by fire, explosions, epidemics/pandemics, strikes, lockouts or acts of God (hereinafter, referred to events) provided, notice of the happening of any such event is given by either party to the other within 30 days from the date of occurrence thereof, neither party shall by reason of such event, be entitled to terminate this contract nor shall either party have any claim for damages against the other in respect of such non-performance or delay in performance, and works under the contract shall be resumed as soon as practicable after such event has come to an end or ceased to exist, and the decision of the Engineer as to whether the works have been so resumed or not shall be final and conclusive, PROVIDED FURTHER that if the performance in whole or in part of any obligation under this contract is prevented or delayed by reason of any such event for a period exceeding 120 days, either party may at its option terminate the contract by giving notice to the other party.

17A Extension of Time in Contracts: Subject to any requirement in the contract as to completion of any portion or portions of the works before completion of the whole, the Contractor shall fully and finally complete the whole of the works comprised in the contract (with such modifications as may be directed under conditions of this contract) by the date entered in the contract or extended date in terms of the following clauses:

- (i) **Extension due to Modification:** If any modifications have been ordered which in the opinion of the Engineer have materially increased the magnitude of the work, then such extension of the contracted date of completion may be granted as shall appear to the Engineer to be reasonable in the circumstances, provided moreover that the Contractor shall be responsible for requesting such extension of the date as may be considered necessary as soon as the cause thereof shall arise and in any case not less than one month before the expiry of the date fixed for completion of the works.
- (ii) **Extension for Delay not due to Railway or Contractor:** If in the opinion of the Engineer, the progress of work has any time been delayed by any act or neglect of Railway's employees or by other Contractor employed by the Railway under Sub-Clause (4) of Clause 20 of these Conditions or in executing the work not forming part of the contract but on which Contractor's performance necessarily depends or by reason of proceeding taken or threatened by or dispute with adjoining or to neighbouring owners or public authority arising otherwise through the Contractor's own default etc. or by the delay authorized by the Engineer pending arbitration or in consequences of the Contractor not having received in due time necessary instructions from the Railway for which he shall have specially applied in writing to the Engineer or his authorized representative then upon happening of any such event causing delay, the Contractor shall immediately give notice thereof in writing to the Engineer within 15 days of such happening, but shall nevertheless make constantly his best endeavours to bring down or make good the delay and shall do all that may be reasonably required of him to the satisfaction of the Engineer to proceed with the works. The Contractor may also indicate the period for which the work is likely to be delayed and shall be bound to ask for necessary extension of time. The Engineer on receipt of such request from the Contractor shall consider the same and shall grant such extension of time as in his opinion is reasonable having regard to the nature and period of delay and the type and quantum of work affected thereby. No other compensation shall be payable for works so carried forward to the extended period of time; the same rates, terms and conditions of contract being applicable as if such extended period of time was originally provided in the original contract itself.
- (iii) **Extension for Delay due to Railways:** In the event of any failure or delay by the Railway to hand over the Contractor possession of the lands necessary for the execution of the works or to give the necessary notice to commence the works or to provide the necessary drawings or instructions or any other delay caused by the Railway due to any other cause whatsoever, then such failure or delay shall in no way affect or vitiate the contract or alter the character thereof or entitle the Contractor to damages or compensation therefor, but in any such case, the Railway may grant such extension or extensions of the completion date as may be considered reasonable.

17B Extension of Time with Liquidated Damages (LD) for delay due to Contractor: The time for the execution of the work or part of the works specified in the contract documents shall be deemed to be the essence of the contract and the works must be completed not later than the date(s) as specified in the contract. If the Contractor fails to complete the works within the time as specified in the contract for the reasons other than the reasons specified in Clause 17 and 17-A, the Railway may, if satisfied that the works can be completed by the Contractor within reasonable short time thereafter, allow the Contractor for further extension of time (Proforma at Annexure-VII) as the Engineer may

decide. On such extension the Railway will be entitled without prejudice to any other right and remedy available on that behalf, to recover from the Contractor as agreed damages and not by way of penalty for each week or part of the week, a sum calculated at the following rates of the contract value of the works.

For the purpose of this Clause, the contract value of the works shall be taken as value of work as per contract agreement including any supplementary work order/contract agreement issued. Provided also, that the total amount of liquidated damages under this condition shall not exceed 5% of the contract value or of the total value of the item or groups of items of work for which a separate distinct completion period is specified in the contract.

S.No.	Duration of extension of time under Clause 17-B	Rate of Liquidated Damages
(i)	Up to Twenty percent of original period of completion including period of extension of DOC granted under Section 17A(i)	As decided by Engineer, between 0.01% to 0.10% of contract value for each week or part of the week
(ii)	Above Twenty percent but upto Thirty percent of original period of completion including period of extension of DOC granted under Section 17A(i)	0.20% of contract value for each week or part of the week
(iii)	Above Thirty percent but upto Forty percent of original period of completion including period of extension of DOC granted under Section 17A(i)	0.30% of contract value for each week or part of the week
(iv)	Above Forty percent of original period of completion including period of extension of DOC granted under Section 17A(i)	0.50% of contract value for each week or part of the week

Provided further, that if the Railway is not satisfied that the works can be completed by the Contractor and in the event of failure on the part of the contractor to complete the work within further extension of time allowed as aforesaid, the Railway shall be entitled without prejudice to any other right or remedy available in that behalf, to appropriate the contractor's Security Deposit and rescind the contract under Clause 62 of these Conditions, whether or not actual damage is caused by such default.

17C Bonus for Early Completion of Work: In case of open tenders having value more than Rs 20 crore and original period of completion 12 months or more, when there is no reduction in original scope of work by more than 10%, and no extension granted on either railway or Contractor's account, Contractor shall be entitled for a bonus of 1% for each 30 days early completion of work. The period of less than 30 days shall be ignored while working out bonus. The maximum bonus shall be limited to 3% of original contract value. The completion date shall be reckoned as the date of issuance of completion certificate by engineer.

18.(1) Illegal Gratification: Any bribe, commission, gift or advantage given, promised or offered by or on behalf of the Contractor or his partner or agent or servant or anyone on his

behalf, to any officer or employee of the Railway or to any person on his behalf in relation to obtaining or execution of this or any other contract with the Railway shall, in addition to any criminal liability which he may incur, subject Contractor to the rescission of the contract and all other contracts with the Railway and to the payment of any loss or damage resulting from such decision and the Railway shall be entitled to deduct the amounts so payable from the Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India.

18.(2) The Contractor shall not lend or borrow from or have or enter into any monetary dealings or transactions either directly or indirectly with any employee of the Railway and if he shall do so, the Railway shall be entitled forthwith to rescind the contract and all other contracts with the Railway. Any question or dispute as to the commission of any such offence or compensation payable to the Railway under this Clause shall be settled by the General Manager of the Railway, in such a manner as he shall consider fit & sufficient and his decision shall be final & conclusive. In the event of rescission of the contract under this Clause, the Contractor will not be paid any compensation whatsoever except payments for the work done upto the date of rescission.

EXECUTION OF WORKS

19.(1) Contractor's understanding: It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the progress of the works, the general and local conditions, the labour conditions prevailing therein and all other matters which can in any way affect the works under the contract.

19.(2) Commencement of Works: The Contractor shall commence the works within 15 days after the receipt by him of an order in writing to this effect from the Engineer and shall proceed with the same with due expedition and without delay

19.(3) Accepted Programme of Work: The Contractor who has been awarded the work shall as soon as possible but not later than 30 days after the date of receipt of the acceptance letter in respect of contracts with initial completion period of two years or less or not later than 90 days for other contracts have to submit the detailed programme of work indicating the time schedule of various items of works in the form of Bar Chart/PERT/CPM. He shall also submit the details of organisation (in terms of labour and supervisors), plant and machinery that he intends to utilize (from time to time) for execution of the work within stipulated date of completion. The programme of work amended as necessary by discussions with the Engineer, shall be treated as the agreed programme of the work for the purpose of this contract and the Contractor shall endeavor to fulfill this programme of work. The progress of work will be watched accordingly and the liquidated damages will be with reference to the overall

completion date. Nothing stated herein shall preclude the Contractor in achieving earlier completion of item or whole of the works than indicated in the programme.

19.(4) Setting out of Works: The Contractor shall be responsible for the correct setting out of all works in relation to original points, lines and levels of reference at his cost. The Contractor shall execute the work true to alignment, grade, levels and dimensions as shown in the drawing and as directed by the Engineer's representative and check these at frequent intervals. The Contractor shall provide all facilities like labour and instruments and shall co-operate with the Engineer's representative for checking of all alignment, grades, levels and dimensions. If, at any time, during the progress of the works any error appear or arise in any part of the work, the Contractor, on being required so to do by the Engineer's representative shall, at his own cost rectify such errors, to the satisfaction of the Engineer's representative.

Such checking shall not absolve the Contractor of his own responsibility of maintaining accuracy in the work. The Contractor shall carefully protect and preserve all bench marks, sight rails, pegs and other things used in setting out the work.

20.(1) Compliance to Engineer's Instructions: The Engineer shall direct the order in which the several parts of the works shall be executed and the Contractor shall execute without delay all orders given by the Engineer from time to time; but the Contractor shall not be relieved thereby from responsibility for the due performance of the works in all respects.

20.(2) Alterations to be Authorized: No alterations in or additions to or omissions or abandonment of any part of the works shall be deemed authorised, except under instructions from the Engineer. The Contractor shall be responsible to obtain such instructions in each and every case in writing from the Engineer.

20.(3) Extra Works: Should works over and above those included in the contract require to be executed at the site, the Contractor shall have no right to be entrusted with the execution of such works which may be carried out by another Contractor or Contractors or by other means at the option of the Railway.

20.(4) Separate Contracts in Connection with Works: The Railway shall have the right to let other contracts in connection with the works. The Contractor shall afford other Contractors reasonable opportunity for the storage of their materials and the execution of their works and shall properly connect and coordinate his work with theirs. If any part of the Contractor's work depends upon proper execution or result upon the work of another Contractor(s), the Contractor shall inspect and promptly report to the Engineer any defects in such works that render it unsuitable for such proper execution and results. The Contractor's failure so-to inspect and report shall constitute an acceptance of the other Contractor's work as fit and proper for the reception of his work, except as to defects which may develop in the other Contractor's work after the execution of his work.

21. Instruction of Engineer's Representative: Any instructions or approval given by the Engineer's representative to Contractor in connection with the works shall bind the Contractor as though it had been given by the Engineer provided always as follows:

- (a) Failure of the Engineer's representative to disapprove any work or materials shall not prejudice the power of the Engineer thereafter to disapprove such work or material and to order the removal or breaking up thereof.
- (b) If the Contractor shall be dissatisfied by reason of any decision of the Engineer's representative, he shall be entitled to refer the matter to the Engineer who shall thereupon confirm or vary such decision.

22.(1) Adherence to Specifications and Drawings: The whole of the works shall be executed in perfect conformity with the specifications and drawings of the contract. If Contractor performs any works in a manner contrary to the specifications or drawings or any of them and without such reference to the Engineer, he shall bear all the costs arising or ensuing therefrom and shall be responsible for all loss to the Railway.

22.(2) Drawings and Specifications of the Works: The Contractor shall keep one copy of Drawings and Specifications at the site, in good order, and such contract documents as may be necessary, available to the Engineer or the Engineer's Representative.

22.(3) Ownership of Drawings and Specifications: All Drawings and Specifications and copies thereof furnished by the Railway to the Contractor are deemed to be the property of the Railway. They shall not be used on other works and with the exception of the signed contract set, shall be returned by the Contractor to the Railway on completion of the work or termination of the Contract.

22.(4) Compliance with Contractor's Request for Details: The Engineer shall furnish with reasonable promptness, after receipt by him of the Contractor's request, additional instructions by means of drawings or otherwise, necessary for the proper execution of the works or any part thereof. All such drawings and instructions shall be consistent with the Contract Documents and reasonably inferable there from.

22.(5) Meaning and Intent of Specification and Drawings: If any ambiguity arises as to the meaning and intent of any portion of the Specifications and Drawings or as to execution or quality of any work or material, or as to the measurements of the works the decision of the Engineer thereon shall be final subject to the appeal (within 7 days of such decision being intimated to the Contractor) to the Chief Engineer who shall have the power to correct any errors, omissions, or discrepancies in aforementioned items and whose decision in the matter in dispute or doubt shall be final and conclusive.

23. Working during Night: The Contractor shall not carry out any work between sun-set and sun-rise without the previous permission of the Engineer. However, if the Engineer is

satisfied that the work is not likely to be completed in time except by resorting to night work, he may order the same without confirming any right on the Contractor for claiming any extra payment for the same.

24. Damage to Railway Property or Private Life and Property: The Contractor shall be responsible for all risk to the work and for trespass and shall make good at his own expense all loss or damage whether to the works themselves or to any other property of the Railway or the lives, persons or property of others from whatsoever cause in connection with the works until they are taken over by the Railway, although all reasonable and proper precautions may have been taken by the Contractor. In case the Railway shall be called upon to make good any costs, loss or damages, or to pay any compensation, including that payable under the provisions of the Workmen's Compensation Act or any statutory amendments thereof to any person or persons sustaining damages as aforesaid by reason of any act, or any negligence or omissions on the part of the Contractor; the amount of any costs or charges including costs and charges in connection with legal proceedings, which the Railway may incur in reference thereto, shall be charged to the Contractor. The Railway shall have the power and right to pay or to defend or compromise any claim of threatened legal proceedings or in anticipation of legal proceedings being instituted consequent on the action or default of the Contractor, to take such steps as may be considered necessary or desirable to ward off or mitigate the effect of such proceedings, charging to Contractor, as aforesaid; any sum or sums of money which may be paid and any expenses whether for reinstatement or otherwise which may be incurred and the propriety of any such payment, defence or compromise, and the incurring of any such expenses shall not be called in question by the Contractor.

25. Sheds, Storehouses and Yards: The Contractor shall at his own expense provide himself with sheds, storehouses and yards in such situations and in such numbers as in the opinion of the Engineer is requisite for carrying on the works and the Contractor shall keep at each such sheds, storehouses and yards a sufficient quantity of materials and plant in stock as not to delay the carrying out of the works with due expedition and the Engineer and the Engineer's representative shall have free access to the said sheds, store houses and yards at any time for the purpose of inspecting the stock of materials or plant so kept in hand, and any materials or plant which the Engineer may object to shall not be brought upon or used in the works, but shall be forthwith removed from the sheds, storehouses or yards by the Contractor. The Contractor shall at his own expenses provide and maintain suitable mortar mills, soaking vats or any other equipments necessary for the execution of the works.

26. Provision of Efficient and Competent Staff at Work Sites by the Contractor:

26.1 The Contractor shall place and keep on the works at all times efficient and competent staff to give the necessary directions to his workmen and to see that they execute their work in sound & proper manner and shall employ only such supervisors, workmen & labourers in or about the execution of any of these works as are careful and skilled in the various trades.

26.2 The Contractor shall at once remove from the works any agents, permitted sub-contractor, supervisor, workman or labourer who shall be objected to by the Engineer and if and whenever required by the Engineer, he shall submit a correct return showing the names of all staff and workmen employed by him.

26.3 In the event of the Engineer being of the opinion that the Contractor is not employing on the works a sufficient number of staff and workmen as is necessary for proper completion of the works within the time prescribed, the Contractor shall forthwith on receiving intimation to this effect deploy the additional number of staff and labour as specified by the Engineer within seven days of being so required and failure on the part of the Contractor to comply with such instructions will entitle the Railway to rescind the contract under Clause 62 of these conditions.

26A. Deployment of Qualified Engineers at Work Sites by the Contractor:

26A.1 The Contractor shall also employ qualified Graduate Engineer(s) or equivalent, or qualified Diploma Engineer(s), as prescribed in the tender documents.

26A.2 In case the Contractor fails to employ the Engineer, as aforesaid in Para 26A.1, he shall be liable to pay liquidated damages at the rates, as prescribed in the tender documents.

26A.3 No. of qualified Engineers required to be deployed by the Contractor for various activities contained in the works contract shall be specified in the tender documents as 'Special Condition of Contract'.

27.(1) Workmanship and Testing: The whole of the works and/or supply of materials specified and provided in the contract or that may be necessary to be done in order to form and complete any part thereof shall be executed in the best and most substantial workman like manner with materials of the best and most approved quality of their respective kinds, agreeable to the particulars contained in or implied by the specifications and as referred to in and represented by the drawings or in such other additional particulars, instructions and drawings given during the carrying on of the works and to the entire satisfaction of the Engineer according to the instructions and directions which the Contractors may from time to time receive from the Engineer. The materials may be subjected to tests by means of such machines, instruments and appliances as the Engineer may direct and wholly at the expense of the Contractor.

27.(2) Removal of Improper Work and Materials: The Engineer or the Engineer's Representative shall be entitled to order from time to time:

(a) The removal from the site, within the time specified in the order, of any materials which in his opinion are not in accordance with the specifications or drawings.

(b) The substitution of proper and suitable materials, and

(c) the removal and proper re-execution, notwithstanding any previous tests thereof or on account payments therefor, of any work which in respect of materials or workmanship is not in his opinion in accordance with the specifications and in case of default on the part of the Contractor in carrying out such order, the Railway shall be entitled to rescind the contract under Clause 62 of these conditions.

(d) The provision of Construction and Demolition Waste Management Rule 2016 issued by Ministry of Environment Forest and Climate Change dated 29.03.2016 and published in the Gazette of India, Part – II, Section -3, Sub-section (ii) are binding upon the Contractor. Contractor shall implement these provisions at worksites, for which no extra payment will be payable.

28. Facilities for Inspection: The Contractor shall afford the Engineer and the Engineer's Representative every facility for entering in and upon every portion of the work at all hours for the purpose of inspection or otherwise and shall provide all labour, materials, planks, ladders, pumps, appliances and things of every kind required for the purpose and the Engineer and the Engineer's Representative shall at all times have free access to every part of the works and to all places at which materials for the works are stored or being prepared.

29. Examination of Work before Covering Up: The Contractor shall give 7 days' notice to the Engineer or the Engineer's Representative whenever any work or materials are intended to be covered up in the earth, in bodies or walls or otherwise to be placed beyond the reach of measurements in order that the work may be inspected or that correct dimensions may be taken before being so covered, placed beyond the reach of measurement in default whereof, the same shall at the option of the Engineer or the Engineer's Representative be uncovered and measured at the Contractor's expense or no allowance shall be made for such work or materials.

30. Temporary Works: All temporary works necessary for the proper execution of the works shall be provided and maintained by the Contractor and subject to the consent of the Engineer shall be removed by him at his expenses when they are no longer required and in such manner as the Engineer shall direct. In the event of failure on the part of the Contractor to remove the temporary works, the Engineer will cause them to be removed and cost as increased by supervision and other incidental charges shall be recovered from the Contractor. If temporary huts are provided by the Contractor on the Railway land for labour engaged by him for the execution of works, the Contractor shall arrange for handing over vacant possession of the said land after the work is completed; if the Contractor's labour refuse to vacate, and have to be evicted by the Railway, necessary expenses incurred by the Railway in connection therewith shall be borne by the Contractor.

31.(1) Contractor to Supply Water for Works: Unless otherwise provided in the Contract, the Contractor shall be responsible for the arrangements to obtain supply of water necessary for the works.

31.(2) Water Supply from Railway System: The Railway may supply to the Contractor part or whole of the quantity of the water required for the execution of works from the Railway's existing water supply system at or near the site of works on specified terms and conditions and at such charges as shall be determined by the Railway and payable by the Contractor, provided that the Contractor shall arrange, at his own expense, to effect the connections and lay additional pipelines and accessories on the site and that the Contractor shall not be entitled to any compensation for interruption or failure of the water supply.

31.(3) Water Supply by Railway Transport: In the event of the Railway arranging supply of water to the Contractor at or near the site of works by travelling water tanks or other means, the freight and other charges incurred thereby, including demurrage charges that may be levied, shall be paid by the Contractor in addition to the charges referred to in Sub-Clause (2) of the Clause provided that the Contractor shall not be entitled to any compensation for interruption or failure of the water supply.

31.(4)(a) Contractor to Arrange Supply of Electric Power for Works: Unless otherwise provided in the contract, the Contractor shall be responsible for arrangements to obtain supply of Electric Power for the works.

(b) Electric Supply from the Railway System: The Railway may supply to the Contractor part or whole of the electric power wherever available and possible, required for execution of works from the Railway's existing electric supply systems at or near the site of works on specified terms and conditions and such charges as shall be determined by the Railway and payable by the Contractor provided the cost of arranging necessary connections to the Railway's Electric Supply systems and laying of underground/overhead conductor, circuit protection, electric power meters, transmission structure, shall be borne by the Contractor and that the Contractor shall not be entitled to any compensation for interruption or failure of the Electric supply system.

32. Property in Materials and Plant: The materials and plant brought by the Contractor upon the site or on the land occupied by the Contractor in connection with the works and intended to be used for the execution thereof shall immediately be deemed to be the property of the Railway. Such of them as during the progress of the works are rejected by the Engineer under Clause 25 of these conditions or are declared by him not to be needed for the execution of the works or such as on the grant of the certificate of completion remain unused shall immediately on such rejection, declaration or grant cease to be deemed the property of the Railway and the Contractor may then (but not before) remove them from the site or the said land. This clause shall not in any way diminish the liability of the Contractor nor shall the Railway be in any way answerable for any loss or damage which may happen to or in respect of any such materials or plant either by the same being lost, stolen, injured or destroyed by fire, tempest or otherwise.

33.(1) Tools, Plant and Materials Supplied by Railway: The Contractor shall take all reasonable care of all tools, plant and materials or other property whether of a like description or not belonging to the Railway and committed to his charge for the purpose of the works and shall be responsible for all damage or loss caused by him, his agents, permitted sub-contractor, or his workmen or others while they are in his charge. The Contractors shall sign accountable receipts for tools, plants and materials made over to him by the Engineer and on completion of the works shall hand over the unused balance of the same to the Engineer in good order and repair, fair wear and tear excepted, and shall be responsible for any failure to account for the same or any damage done thereto.

33.(2) Hire of Railway's Plant: The Railway may hire to the Contractor such plant as concrete mixers, compressors and portable engines for use during execution of the works on such terms as may be specified in the special conditions or in a separate agreement for Hire of Plant.

34.(1) Precaution During Progress of Works: During the execution of works, unless otherwise specified, the Contractor shall at his own cost provide the materials for and execute all shoring, timbering and strutting works as is necessary for the stability and safety of all structures, excavations and works and shall ensure that no damage, injury or loss is caused or likely to be caused to any person or property.

34.(2) Roads and Water Courses: Existing roads or water courses shall not be blocked cut through, altered, diverted or obstructed in any way by the Contractor, except with the permission of the Engineer. All compensations claimed for any unauthorized closure, cutting through, alteration, diversion or obstruction to such roads or water courses by the Contractor or his agent or his staff shall be recoverable from the Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India.

34.(3) Provision of Access to Premises: During progress of work in any street or thoroughfare, the Contractor shall make adequate provision for the passage of traffic, for securing safe access to all premises approached from such street or thoroughfare and for any drainage, water supply or means of lighting which may be interrupted by reasons of the execution of the works and shall react and maintain at his own cost barriers, lights and other safeguards as prescribed by the Engineer, for the regulation of the traffic, and provide watchmen necessary to prevent accidents. The works shall in such cases be executed night and day, if so ordered by the Engineer and with such vigour so that the traffic way be impeded for as short a time as possible.

34.(4) Safety of Public: The Contractor shall be responsible to take all precautions to ensure the safety of the public whether on public or railway property and shall post such look out men as may, in the opinion of the Engineer, be required to comply with regulations appertaining to the work. Contractor shall ensure placement of barricading / partitions at the place of work to

ensure safety of habitants of adjacent area, failing which Engineer may advise stoppage of work as per his discretion.

34.(5) Display Board: The Contractor shall be responsible for displaying the details of works i.e. name of work, approximate cost, expected date of completion, name and address of the Contractor and address of Engineer on a proper steel Board of size not less than 1m x 1m.

35. Use of Explosives: Explosives shall not be used on the works or on the site by the Contractor without the permission of the Engineer and then also only in the manner and to the extent to which such permission is given. Where explosives are required for the works, they shall be stored in a special magazine to be provided by and at the cost of the Contractor in accordance with the Explosive Rules. The Contractor shall obtain the necessary license for the storage and the use of explosives. All operations in which or for which explosives are employed shall be at the sole risk and responsibility of the Contractor and the Contractor shall indemnify the Railway in respect thereof.

36.(1) Suspension of Works: The Contractor shall on the order of the Engineer, suspend the progress of the works or any part thereof for such time or times and in such manner as the Engineer may consider necessary and shall during such suspension properly protect and secure the work so far as is necessary in the opinion of the Engineer. If such suspension is:

- (a) Provided for in the contract, or
- (b) Necessary for the proper execution of the works or by the reason of weather conditions or by some default on the part of the Contractor, and or
- (c) Necessary for the safety of the works or any part thereof.

36.(2) The Contractor shall not be entitled to the extra costs, if any, incurred by him during the period of suspension of the works, but in the event of any suspension ordered by the Engineer for reasons other than aforementioned and when each such period of suspension exceeds 14 days, the Contractor shall be entitled to such extension of time for completion of the works as the Engineer may consider proper having regard to the period or periods of such suspensions and to such compensations as the Engineer may consider reasonable in respect of salaries or wages paid by the Contractor to his employees during the periods of such suspension.

36.(3) Suspension Lasting More than 3 Months: If the progress of the works or any part thereof is suspended on the order of the Engineer for more than three months at a time, the Contractor may serve a written notice on the Engineer requiring permission within 15 days from the receipt thereof to proceed with the works or that part thereof in regard to which progress is suspended and if such permission is not granted within that time the Contractor by further written notice so served may, but is not bound to, elect to treat the suspension where it affects part only of the works as an omission of such part or where it affects the whole of the works, as an abandonment of the contract by the Railway.

37. Rates for Items of Works:

(i) The rates, entered in the accepted Schedule of Rates of the Contract are intended to provide for works duly and properly completed in accordance with the General and Special (if any) Conditions of the Contract and the Specifications and drawings together with such enlargements, extensions, diminutions, reductions, alterations or additions as may be ordered in terms of Clause 42 of these conditions and without prejudice to the generality thereof and shall be deemed to include and cover superintendence and labour, supply, including full freight of materials, stores, patterns, profiles, moulds, fittings, centerings, scaffolding, shoring props, timber, machinery, barracks, tackle, roads, pegs, posts, tools and all apparatus and plant required on the works, except such tools, plant or materials as may be specified in the contract to be supplied to the Contractor by the Railway, the erection, maintenance and removal of all temporary works and buildings, all watching, lighting, bailing, pumping and draining, all prevention of or compensation for trespass, all barriers and arrangements for the safety of the public or of employees during the execution of works, all sanitary and medical arrangements for labour camps as may be prescribed by the Railway, the setting of all work and of the construction, repair and upkeep of all centre lines, bench marks and level pegs thereon, site clearance, all fees duties, royalties, rent and compensation to owners for surface damage or taxes and impositions payable to local authorities in respect of land, structures and all material supplied for the work or other duties or expenses for which the Contractor may become liable or may be put to under any provision of law for the purpose of or in connection with the execution of the contract and all such other incidental charges or contingencies as may have been specially provided for in the Specifications.

However, if rates of existing GST or cess on GST for Works Contract is increased or any new tax /cess on Works Contract is imposed by Statute after the date of opening of tender but within the original date of completion/date of completion extended under clause 17 & 17A and the Contractor thereupon properly pays such taxes/cess, the Contractor shall be reimbursed the amount so paid.

Further, if rates of existing GST or cess on GST for Works Contract is decreased or any tax/cess on Works Contract is decreased / removed by Statute after the date of opening of tender, the reduction in tax amount shall be recovered from Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India.

38. Demurrage and Wharfage Dues: Demurrage charges calculated in accordance with the scale in force for the time being on the Railway and incurred by the Contractor failing to load or unload any goods or materials within the time allowed by the Railway for loading as also wharfage charges, of materials not removed in time, as also charges due on consignments booked by or to him shall be paid by the Contractor, failing which such charges shall be debited to the Contractor's account in the hands of the Railway and shall be deducted from any sums which may become due to him in terms of the contracts.

39.(1) Rates for Extra Items of Works: Any item of work carried out by the Contractor on the instructions of the Engineer which is not included in the accepted Schedules of Rates shall be executed at the rates set forth in the "Schedule of Rates of Railway" modified by the tender percentage, and for such items not contained in the latter, at the rate agreed upon between the Engineer and the Contractor before the execution of such items of work and the Contractors shall be bound to notify the Engineer at least seven days before the necessity arises for the execution of such items of works that the accepted Schedule of Rates does not include rate or rates for the extra work involved. The rates payable for such items shall be decided at the meeting to be held between the Engineer and Contractor, in as short a period as possible after the need for the special item has come to the notice. In case the Contractor fails to attend the meeting after being notified to do so or in the event of no settlement being arrived at, the Railway shall be entitled to execute the extra works by other means and the Contractor shall have no claim for loss or damage that may result from such procedure.

The assessment of rates for extra items shall be arrived at based on the prevailing rates and by taking guidance from the following documents in order of priority:

- (i) Analysis of Unified Schedule of Rates of Indian Railways
- (ii) Analysis of Delhi Schedule of Rates issued by CPWD
- (iii) Market Analysis

39.(2) Provided that if the Contractor commences work or incurs any expenditure in regard thereto before the rates as determined and agreed upon as lastly hereuntofore-mentioned, then and in such a case the Contractor shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of determination of the rates as aforesaid according to the rates as shall be fixed by the Engineer. However, if the Contractor is not satisfied with the decision of the Engineer in this respect, he may appeal to the Chief Engineer within 30 days of getting the decision of the Engineer, supported by analysis of the rates claimed. The Chief Engineer's decision after hearing both the parties in the matter would be final and binding on the Contractor and the Railway.

40.(1) Handing over of Works: The Contractor shall be bound to hand over the works executed under the contract to the Railway complete in all respects to the satisfaction of the Engineer. The Engineer shall determine the date on which the work is considered to have been completed, in support of which his certificate shall be regarded as sufficient evidence for all purposes. The Engineer shall determine from time to time, the date on which any particular section of the work shall have been completed, and the Contractor shall be bound to observe any such determination of the Engineer.

40.(2) Clearance of Site on Completion: On completion of the works, the Contractor shall clear away and remove from the site all constructional plant, surplus materials, rubbish and temporary works of every kind and leave the whole of the site and works clean and in a workman like condition to the satisfaction of the Engineer. No final payment in settlement of the accounts for the works shall be paid, held to be due or shall be made to the, Contractor till, in addition to any other condition necessary for final payment, site clearance shall have been affected by him, and such clearance may be made by the Engineer at the expense of the Contractor in the event of his failure to comply with this provision within 7 days after receiving notice to that effect. Should it become necessary for the Engineer to have the site cleared at the expenses of the Contractor, the Railway shall not be held liable for any loss or damage to such of the Contractor's property as may be on the site and due to such removal there from which removal may be affected by means of public sales of such materials and property or in such a way as deemed fit and convenient to the Engineer.

Clause 40A: At the final stage of completion and commissioning of work, in case the contractor's failure is limited to only some of the works costing not more than 2% of the original contract value, and the Contractor request the engineer that such works may be offloaded from him and got executed through another agency and additional cost incurred, if any, should be recovered from his dues; the Engineer on being convinced that the anticipated additional cost for such works will not be substantial and can be recovered from the dues of the contractor and that such offloading will help in completion and commissioning of work, may agree to such offloading without any adverse repercussion on the performance guarantee and security deposit of the Contractor. However, the Engineer will not be under any compulsion to agree to such a request. Further, before issuing letter of acceptance to another agency for such work, the Contractor shall be informed of the rates at which the work will be got executed and the Contractor should give his consent to do so and certify that he would have no future claim on this account and that the extra expenditure so incurred, if any, by the Engineer in getting the offloaded work done, shall be recovered from subsequent Bills or any other dues of the Contractor. In case the Contractor fails to give such consent within three working days, the Engineer may treat the same as not acceptable to Contractor and proceed accordingly. In any case, Railway shall deduct 10% of cost of such work or Rs one lakh whichever is lower, from the Contractor's dues as administrative charges for the process of finalizing new agency for such work irrespective of whether or not such work is finally offloaded from Contractor or not.

VARIATIONS IN EXTENT OF CONTRACT

41. Modification to Contract to be in Writing: In the event of any of the provisions of the contract required to be modified after the contract documents have been signed, the modifications shall be made in writing and signed by the Railway and the Contractor and no work shall proceed under such modifications until this has been done. Any verbal or written arrangement abandoning, modifying, extending, reducing or supplementing the contract or any of the terms thereof shall be deemed conditional and shall not be binding on the Railway unless and until the same is incorporated in a formal instrument and signed by the Railway and the Contractor, and till then the Railway shall have the right to repudiate such arrangements.

42.(1) Powers of Modification to Contract: The Engineer on behalf of the Railway shall be entitled by order in writing to enlarge or extend, diminish or reduce the works or make any alterations in their design, character position, site, quantities, dimensions or in the method of their execution or in the combination and use of materials for the execution thereof or to order any additional work to be done or any works not to be done and the Contractor will not be entitled, to any compensation for any increase/reduction in the quantities of work but will be paid only for the actual amount of work done and for approved materials supplied against a specific order.

42.(2) (i) Unless otherwise specified in the special conditions of the contract, the accepted variation in quantity of each individual item of the contract would be upto 25% of the quantity originally contracted, except in case of foundation work.

(ii) The Contractor shall be bound to carry out the work at the agreed rates and shall not be entitled to any claim or any compensation whatsoever upto the limit of 25% variation in quantity of individual item of works.

(iii) In case an increase in quantity of an individual item by more than 25% of the agreement quantity is considered unavoidable, then same shall be executed at following rates

- (a) Quantities operated in excess of 125% but upto 140% of the agreement quantity of the concerned item, shall be paid at 98% of the rate awarded for that item in that particular tender;
- (b) Quantities operated in excess of 140% but upto 150% of the agreement quantity of the concerned item shall be paid at 96% of the rate awarded for that item in that particular tender;
- (c) Variation in quantities of individual items beyond 150% will be avoided and would be permitted only in exceptional unavoidable circumstances and shall be paid at 96% of the rate awarded for that item in that particular tender.
- (d) Variation to quantities of Minor Value Item:
The limit for varying quantities for minor value items shall be 100% (as against 25% prescribed for other items). A minor value item for this purpose is defined as an item whose original agreement value is less than 1 % of the total original agreement value.

- d.(i) Quantities operated upto and including 100% of the agreement quantity of the concerned minor value item, shall be paid at the rate awarded for that item in that particular tender;
- d.(ii) Quantities operated in excess of 100% but upto 200% of the agreement quantity of the concerned minor value item, shall be paid at 98% of the rate awarded for that item in that particular tender;
- d.(iii) Variation in quantities of individual minor value item beyond 200% will be avoided and would be permitted only in exceptional unavoidable circumstances and shall be paid at 96% of the rate awarded for that item in that particular tender.

(iv) In case of earthwork, the variation limit of 25% shall apply to the gross quantity of earthwork and variation in the quantities of individual classifications of soil shall not be subject to this limit.

(v) In case of foundation work, no variation limit shall apply and the work shall be carried out by the Contractor on agreed rates irrespective of any variation.

(vi) As far as SOR items are concerned, the limit of 25% would apply to the value of SOR schedule as a whole and not on individual SOR items. However, in case of NS items, the limit of 25% would apply on the individual items irrespective of the manner of quoting the rate (single percentage rate or individual item rate).

42.(3) Valuation of Variations: The enlargements, extensions, diminution, reduction, alterations or additions referred to in Sub-Clause (2) of this Clause shall in no degree affect the validity of the contract; but shall be performed by the Contractor as provided therein and be subject to the same conditions, stipulations and obligations as if they had been originally and expressly included and provided for in the Specifications and Drawings and the amounts to be paid therefor shall be calculated in accordance with the accepted Schedule of Rates. Any extra items/quantities of work falling outside the purview of the provisions of Sub-Clause (2) above shall be paid for at the rates determined under Clause-39 of these Conditions.

CLAIMS

43.(1) Quarterly Statement of Claims: The Contractor shall prepare and furnish to the Engineer once in every quarter commencing from the month following the month of issue of Letter of Acceptance, an account giving full and detailed particulars of all claims for any additional expenses to which the Contractor may consider himself entitled to and of all extra or additional works ordered by the Engineer which he has executed during the preceding ~~month~~ quarter and no claim for payment for such work will be considered which has not been included in such particulars.

43.(2) Signing of "No Claim" Certificate : The Contractor shall not be entitled to make any claim whatsoever against the Railway under or by virtue of or arising out of this contract, nor shall the Railway entertain or consider any such claim, if made by the Contractor, after he

shall have signed a "No Claim" Certificate in favour of the Railway in such form as shall be required by the Railway after the works are finally measured up. The Contactor shall be debarred from disputing the correctness of the items covered by "No Claim" Certificate or demanding a clearance to arbitration in respect thereof.

MEASUREMENTS, CERTIFICATES AND PAYMENTS

44. Quantities in Schedule Annexed to Contract: The quantities set out in the accepted Schedule of Rates with items of works quantified are the estimated quantities of the works and they shall not be taken as the actual and correct quantities of the work to be executed by the Contractor in fulfillment of his obligations under the contract.

45(i). Measurement of Works by Railway: The Contractor shall be paid for the works at the rates in the accepted Schedule of Rates and for extra works at rates determined under Clause 39 of these Conditions on the measurements taken by the Engineer or the Engineer's representative in accordance with the rules prescribed for the purpose by the Railway. The quantities for items the unit of which in the accepted Schedule of Rates is 100 or 1000 shall be calculated to the nearest whole number, any fraction below half being dropped and half and above being taken as one; for items the unit of which in the accepted Schedule of Rates is single, the quantities shall be calculated to two places of decimals. Such measurements will be taken of the work in progress from time to time and at such intervals as in the opinion of the Engineer shall be proper having regard to the progress of works. The date and time on which 'on account' or 'final' measurements are to be made shall be communicated to the Contractor who shall be present at the site and shall sign the results of the measurements (which shall also be signed by the Engineer or the Engineer's representative) recorded in the official measurements book as an acknowledgement of his acceptance of the accuracy of the measurements. Failing the Contractor's attendance, the work may be measured up in his absence and such measurements shall, notwithstanding such absence, be binding upon the Contractor whether or not he shall have signed the measurement books provided always that any objection made by him to measurement shall be duly investigated and considered in the manner set out below:

(a) It shall be open to the Contractor to take specific objection to any recorded measurements or Classification on any ground within seven days of the date of such measurements. Any re-measurement taken by the Engineer or the Engineer's representative in the presence of the Contractor or in his absence after due notice has been given to him in consequence of objection made by the Contractor shall be final and binding on the Contractor and no claim whatsoever shall thereafter be entertained regarding the accuracy and Classification of the measurements.

(b) If an objection raised by the Contractor is found by the Engineer to be incorrect the Contractor shall be liable to pay the actual expenses incurred in measurements.

45(ii). Measurement of Works by Contractor's Authorized Representative (in case the contract provides for the same):

(a) The Contractor shall be paid for the works at the rates in the accepted Schedule of Rates and for extra works at rates determined under Clause 39 of these Conditions on the measurements taken by the Contractor's authorized Engineer in accordance with the rules prescribed for the purpose by the Railway. The quantities for items the unit of which in the accepted Schedule of Rates is 100 or 1000 shall be calculated to the nearest whole number, any fraction below half being dropped and half and above being taken as one; for items the unit of which in the accepted Schedule of Rates is single, the quantities shall be calculated to two places of decimals. Such measurements will be taken of the work in progress from time to time. The date and time on which 'on account' or 'final' measurements are to be made shall be communicated to the Engineer.

The date and time of test checks shall be communicated to the Contractor who shall be present at the site and shall witness the test checks, failing the Contractor's attendance the test checks may be conducted in his absence and such test checks shall notwithstanding such absence be binding upon Contractor provided always that any objection made by Contractor to test check shall be duly investigated and considered in the manner set out below:

- (i) It shall be open to the Contractor to take specific objection to test checks of any recorded measurement within 7 days of date of such test checks. Any re-test check done by the concerned Railway's authority in the presence of the Contractor or in his absence after due notice given to him in consequent of objection made by the Contractor shall be final and binding on the Contractor and no claim whatsoever shall thereafter be entertained regarding the accuracy and classification of the measurements.
- (ii) If an objection raised by the Contractor is found by the Engineer to be incorrect the Contractor shall be liable to pay the actual expenses incurred in measurements.

(b) Incorrect measurement, actions to be taken: If in case during test check or otherwise, it is detected by the Engineer that agency has claimed any exaggerated measurement or has claimed any false measurement for the works which have not been executed; amounting to variation of 5% or more of claimed gross bill amount, action shall be taken as following:

- (i) On first occasion of noticing exaggerated/ false measurement, Engineer shall recover liquidated damages equal to 10% of claimed gross bill value.
- (ii) On any next occasion of noticing any exaggerated/false measurement, railway shall recover liquidated damages equal to 15% of claimed gross bill value. In addition the facility of recording of measurements by Contractor as well as release of provisional payment shall be withdrawn. Once withdrawn, measurements shall be done by railway as per clause 45(i) above.

46.(1) "On-Account " Payments: The Contractor shall be entitled to be paid from time to time by way of "On-Account" payment only for such works as in the opinion of the Engineer

he has executed in terms of the contract. All payments due on the Engineer's/Engineer's Representative's certificates of measurements or Engineer's certified "Contractor's authorized Engineer's measurements" shall be subject to any deductions which may be made under these presents and shall further be subject to, unless otherwise required by Clause 16 of these Conditions, a retention of ten percent by way of Security Deposits, until the amount of Security Deposit by way of such retentions shall amount to 5% of the total value of the contract provided always that the Engineer may by any certificate make any correction or modification in any previous certificate which shall have been issued by him and that the Engineer may withhold any certificate, if the works or any part thereof are not being carried out to his satisfaction.

46.(2) Rounding off Amounts: The total amount due on each certificate shall be rounded off to the nearest rupee, i.e. sum less than 50 paise shall be omitted and sums of 50 paise and more upto ₹1 will be reckoned as ₹ 1.

46.(3) On Account Payments not Prejudicial to Final Settlement: "On-Account" payments made to the Contractor shall be without prejudice to the final making up of the accounts (except where measurements are specifically noted in the Measurement Book as "Final Measurements" and as such have been signed by the Contractor and Engineer/Engineer's Representative) and shall in no respect be considered or used as evidence of any facts stated in or to be inferred from such accounts nor of any particular quantity of work having been executed nor of the manner of its execution being satisfactory.

46.(4) Manner of Payment: Unless otherwise specified payments to the Contractor will be transferred electronically to his bank account.

46A. Price Variation Clause (PVC):

46A.1 Applicability: Price Variation Clause (PVC) shall be applicable only in those contracts where tender conditions specifically permit it. Materials supplied free of cost by Railway to the Contractors and any extra NS item(s) included in subsequent variation falling outside the purview of the Schedule of Items of tender shall fall outside the purview of Price Variation Clause. If, in any case, accepted offer includes some specific payment to be made to consultants or some materials supplied by Railway free or at fixed rate, such payments shall be excluded from the gross value of the work for the purpose of payment/recovery of price variation.

46A.2 Base Month: The Base Month for 'Price Variation Clause' shall be taken as month 28 days prior to opening of tender including extensions, if any, unless otherwise stated elsewhere. The quarter for applicability of PVC shall commence from the month following Base month. The Price Variation shall be based on the average Price Index of the quarter under consideration.

46A.3 Validity:

Rates accepted by Railway Administration shall hold good till completion of work and no additional individual claim shall be admissible except:

- (a) Payment/recovery for increase/decrease in GST on works contract or imposition/removal of any tax/cess on Works Contract as per Clause 37,
- (b) Payment/recovery for overall market situation as per Price Variation Clause given hereunder.

46A.4 Adjustment for variation in prices of material, labour, fuel, explosives, detonators, steel, concreting, ferrous, non-ferrous, insulators, zinc and cement shall be determined in the manner prescribed.

46A.5 Components of various items in a contract on which variation in prices be admissible, shall be Material, Labour, Fuel, Explosives & Detonators, Steel, Cement, Concreting, Ferrous, Non-ferrous, Insulator, Zinc, Erection etc. However, for fixed components, no price variation shall be admissible.

46A.6 The percentages of labour component, material component, fuel component etc. in various types of Engineering contracts shall be as under:

S. No.	Component	E/Work & Minor Bridges Contracts, Ballast Supply Contracts, Tunneling Contracts (without explosive)	Tunneling Contracts (with explosives)	Major and Important Bridges Contracts	Building Contracts	Permanent Way linking Contracts (Manual)	Other Works Contracts
1	Labour Component	20	20	20	40	50	20
2	Other Material Components	10	15	30	35	5	20
3	Plant Machinery & Spares	30	15	20	5	15	30
4	Fuel & Lubricants Component	25	15	15	5	15	15
5	Fixed Component*	15	15	15	15	15	15
6	Detonators & Explosive Component	-	20	-	-	-	-

* It shall not be considered for any price variation.

46A.7 Formulae: The Amount of variation in prices in several components (labour, material etc.) shall be worked out by the following formulae:

$$(i) \quad L = \frac{W \times (L_Q - L_B)}{L_B} \times \frac{L_C}{100}$$

$$(ii) \quad M = \frac{W \times (M_Q - M_B)}{M_B} \times \frac{M_C}{100}$$

$$(iii) \quad F = \frac{W \times (F_Q - F_B)}{F_B} \times \frac{F_C}{100}$$

$$(iv) \quad E = \frac{W \times (E_Q - E_B)}{E_B} \times \frac{E_C}{100}$$

$$(v) \quad PM = \frac{W \times (PM_Q - PM_B)}{PM_B} \times \frac{PM_C}{100}$$

$$(vi) \quad S = \frac{S_W \times (S_Q - S_B)}{S_B}$$

$$(vii) \quad C = C_V \times (C_Q - C_B) / C_B$$

For Railway Electrification Works:

$$(viii) \quad T = [(C_S - C_O) / C_O \times 0.4136] \times T_C$$

$$(ix) \quad R = [(R_T - R_O) / R_O + (Z_T - Z_O) / Z_O \times 0.06] \times R_C$$

$$(x) \quad N = [(P_T - P_O) / P_O] \times N_C$$

$$(xi) \quad Z = [(Z_T - Z_O) / Z_O] \times Z_C$$

$$(xii) \quad I = [(I_T - I_O) / I_T] \times 85$$

Where,

L	Amount of price variation in Labour
M	Amount of price variation in Materials
F	Amount of price variation in Fuel
E	Amount of price variation in Explosives
PM	Amount of price variation in Manufacture of machinery for mining, Quarrying and Construction
S	Amount of price variation in Steel
C	Amount of price variation in Cement
T	Amount of price variation in Concreting
R	Amount of price variation in Ferrous Items
N	Amount of price variation in Non-Ferrous Items
Z	Amount of price variation in Zinc
I	Amount of price variation in Insulator
L _C	% of Labour Component
M _C	% of Material Component
F _C	% of Fuel Component

E _C	% of Explosive Component
PM _C	% of Manufacture of machinery for mining, Quarrying and Construction Component
T _C	% of Concreting Component
R _C	% of Ferrous Component
N _C	% of Non-Ferrous Component
Z _C	% of Zinc Component
W	Gross value of work done by Contractor as per on-account bill(s) excluding cost of materials supplied by Railway at fixed price, minus the price values of cement and steel. This will also exclude specific payment, if any, to be made to the consultants engaged by Contractors (such payment shall be indicated in the Contractor's offer)
L _B	Consumer Price Index for Industrial Workers - All India: Published in R.B.I. Bulletin for the base period
L _Q	Consumer Price Index for Industrial Workers - All India: Published in R.B.I. Bulletin for the average price index of the 3 months of the quarter under consideration
M _B	Wholesale Price Index: All commodities – as published in the R.B.I. Bulletin for the base period
M _Q	Wholesale Price Index: All commodities – as published in the R.B.I. Bulletin for the average price index of the 3 months of the quarter under consideration
F _B	Wholesale Price Index for the group Fuel & Power as published in the R.B.I. Bulletin for the base period
F _Q	Index Number of Wholesale Price Index – By Groups and Sub-Groups for the group Fuel & Power as published in the R.B.I. Bulletin for the average price index of the 3 months of the quarter under consideration
E _B	Index number of Monthly Whole Sale Price Index for the category 'Explosive' of (g).Manufacture of other chemical products under (J) MANUFACTURE OF CHEMICALS AND CHEMICAL PRODUCTS, published by Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry, Department of Industrial Policy & Promotion (DIPP), for the base period.
E _Q	Index number of Monthly Whole Sale Price Index for the category 'Explosive' of (g).Manufacture of other chemical products under (J) MANUFACTURE OF CHEMICALS AND CHEMICAL PRODUCTS, published by Office of Economic Adviser, Govt. of India, Govt. of India, Ministry of Commerce & Industry, Department of Industrial Policy & Promotion (DIPP), for the average price index of 3 months of the quarter under consideration.
PM _B	Index number of Monthly Whole Sale Price Index for the category 'k. Manufacture of machinery for mining, quarrying and construction' under (R) MANUFACTURE OF MACHINERY AND EQUIPMENT, published by Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry, Department of Industrial Policy & Promotion (DIPP), for the base period.
PM _Q	Index number of Monthly Whole Sale Price Index for the category 'k. Manufacture of machinery for mining, quarrying and construction' under (R) MANUFACTURE OF MACHINERY AND EQUIPMENT, published by Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry, Department of Industrial Policy & Promotion (DIPP), for the average price index of 3 months of the quarter under consideration.

S _W	Gross value of steel supplied by the Contractor as per the ‘on-account’ bill for the month under consideration
S _B	Index number of Monthly Whole Sale Price Index for the relevant category of mild steel item as mentioned in Clause 46A.9, published by Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry Department of Industrial Policy & Promotion (DIPP); for the base period.
S _Q	Index number of Monthly Whole Sale Price Index for the relevant category of mild steel item as mentioned in Clause 46A.9, published by Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry Department of Industrial Policy & Promotion (DIPP); for the average price index of the 3 months of the quarter under consideration.
C _V	Value of Cement supplied by Contractor as per on account bill in the quarter under consideration
C _B	Index No. of Wholesale Price Index of sub-group Cement, Lime & Plaster as published in RBI Bulletin for the base period
C _Q	No. of Wholesale Price Index of sub-group Cement, Lime & Plaster as published in RBI Bulletin for the average price index of the 3 months of the quarter under consideration
C _S	RBI wholesale price index for Cement, Lime & Plaster for the month which is six months prior to date of casting of foundation
C _O	RBI wholesale price index for Cement, Lime & Plaster for the month which is one month prior to date of opening of tender
R _T	IEEMA price index for Iron & Steel for the month which is two months prior to date of inspection of material.
R _O	IEEMA price index for Iron & Steel for the month which is one month prior to date of opening of tender.
P _T	IEEMA price index for Copper wire bar for the month which is two months prior to date of inspection of material.
P _O	IEEMA price index for Copper wire bar for the month which is one month prior to date of opening of tender.
Z _T	IEEMA price index for Zinc for the month which is two months prior to date of inspection of material
Z _O	IEEMA price index for Zinc for the month which is one month prior to date of opening of tender
I _T	RBI wholesale price index for the sub-group “other Portland and Ceramic product” for the month which is two months prior to date of inspection of material
I _O	RBI wholesale price index for the sub-group “other Portland and Ceramic product” for the month which is one month prior to date of opening of tender

46A.8 The demands for escalation of cost shall be allowed on the basis of provisional indices as mentioned above in Clause 46A.7. Any adjustment needed to be done based on the finally published indices shall be made as and when they become available.

46A.9: Relevant categories of steel for the purpose of operating Price Variation formula as mentioned in this Clause shall be as under:

SL	Category of Steel Supplied in Railway Work	Category of Steel Items as mentioned in Office of Economic Adviser, Govt. of India, Ministry of Commerce & Industry Department of Industrial Policy & Promotion (DIPP).
1.	Reinforcement bars and other rounds	‘MS Bright Bars’ individual commodity of group item (d) Mild Steel-Long Products under (N) MANUFACTURE OF BASIC METAL.
2.	All types and-sizes of angles, channels and joists	‘Angles, Channels, Sections, Steel’ individual commodity of group item (d) Mild Steel-Long Products under (N) MANUFACTURE OF BASIC METAL.
3.	All types and sizes of plates	‘e. Mild Steel – Flat Products’ of (N) MANUFACTURER OF BASIC METAL.
4.	Any other section of steel not covered in the above categories and excluding HTS	Average of price for the 3 categories covered under SL 1, 2 & 3 above

46A.10 Price Variation during Extended Period of Contract

The price adjustment as worked out above, i.e. either increase or decrease shall be applicable upto the stipulated date of completion of work including the extended period of completion where such extension has been granted under Clause 17-A of the Standard General Conditions of Contract. However, where extension of time has been granted due to Contractor’s failure under Clause 17-B of the Standard General Conditions of Contract, price adjustment shall be done as follows:

- a. In case the indices increase above the indices applicable to the last month of original completion period or the extended period under Clause 17-A, the price adjustment for the period of extension granted under Clause 17-B shall be limited to the amount payable as per the Indices applicable to the last month of the original completion period or the extended period under Clause 17-A of the Standard General Conditions of Contract; as the case may be.
- b. In case the indices fall below the indices applicable to the last month of original/ extended period of completion under Clause 17-A, as the case may be; then the lower indices shall be adopted for the price adjustment for the period of extension under Clause 17-B of the Standard General Conditions of Contract.

47. Maintenance of Works: The Contractor shall at all times during the progress and continuance of the works and also for the period of maintenance specified in the Tender Form after the date of issue of the certificate of completion by the Engineer or any other earlier date subsequent to the completion of the works that may be fixed by the Engineer, be responsible for and effectively maintain and uphold in good substantial, sound and perfect condition all and every part of the works and shall make good from time to time and at all times as often as the Engineer shall require, any damage or defect that may during the above period arise in or

be discovered or be in any way connected with the works, provided that such damage or defect is not directly caused by errors in the contract documents, act of providence or insurrection or civil riot, and the Contractor shall be liable for and shall pay and make good to the Railway or other persons legally entitled thereto whenever required by the Engineer so to do, all losses, damages, costs and expenses they or any of them may incur or be put or be liable to by reasons or in consequence of the operations of the Contractor or of his failure in any respect.

48.(1) Certificate of Completion of Works: As soon as in the opinion of the Engineer, the work has been completed and has satisfactorily passed any final test or tests that may be prescribed, the Engineer shall issue a certificate of completion duly indicating the date of completion in respect of the work and the period of maintenance of the work shall commence from the date of completion mentioned in such 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 Railways against the contract concerned.

The Engineer may also issue such a certificate indicating date of completion with respect to any part of the work (before the completion of the whole of work), which has been both completed to the satisfaction of the Engineer and occupied or used by the Railway. When any such certificate is given in respect of part of a work, such part shall be considered as completed and the period of maintenance of such part shall commence from the date of completion mentioned in the completion certificate issued for that part of the work.

48.(2) Contractor not Absolved by Completion Certificate: The Certificate of Completion in respect of the works referred to in Sub-Clause (1) of this Clause shall not absolve the Contractor from his liability to make good any defects imperfections, shrinkages or faults which may appear during the period of maintenance specified in the tender arising in the opinion of the Engineer from materials or workmanship not in accordance with the drawings or specifications or instruction of the Engineer, which defects, imperfections, shrinkages or faults shall upon the direction in writing of the Engineer be amended and made good by the Contractor at his own cost; and in case of default on the part of Contractor, the Engineer may employ labour and materials or appoint another Contractor to amend and make good such defects, imperfections, shrinkages and faults and all expenses consequent thereon and incidental thereto shall be borne by the Contractor and shall be recoverable from any moneys due to him under the contract.

48(3) Final Supplementary Agreement: After the work is completed or otherwise concluded by the parties with mutual consent, and taken over by the Railway as per terms and conditions of the contract agreement, and there is unequivocal no claim on either side under the Contract other than as mentioned in item 4 of Annexure XIV, the parties shall execute the Final Supplementary Agreement as per Annexure XIV.

49. Approval only by Maintenance Certificate: No certificate other than Maintenance Certificate, if applicable, referred to in Clause 50 of the Conditions shall be deemed to constitute approval of any work or other matter in respect of which it is issued or shall be taken as an admission of the due performance of the contract or any part thereof.

50.(1) Maintenance Certificate: The Contract shall not be considered as completed until a Maintenance Certificate, if applicable, shall have been signed by the Engineer stating that the works have been completed and maintained to his satisfaction. The Maintenance Certificate shall be given by the Engineer upon the expiration of the period of maintenance or as soon thereafter as any works ordered during such period pursuant to Sub Clause (2) to Clause 48 of these Conditions shall have been completed to the satisfaction of the Engineer, and full effect shall be given to this Clause notwithstanding the taking possession of or using the works or any part thereof by the Railway.

The Competent Authority to issue above Maintenance Certificate shall normally be the authority who is competent to sign the contract. If this Competent Authority is of the rank lower than JA Grade, then a JA 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 Railways against the contract concerned

50.(2) Cessation of Railway's Liability: The Railway shall not be liable to the Contractor for any matter arising out of or in connection with the contract for execution of the works unless the Contractor has made a claim in writing in respect thereof before the issue of the Maintenance Certificate under this clause.

50.(3) Unfulfilled Obligations: Notwithstanding the issue of the Maintenance Certificate the Contractor and (subject to Sub-Clause (2) of this Clause) the Railway shall remain liable for the fulfillment of any obligation incurred under the provision of the contract prior to the issue of the Maintenance Certificate which remains unperformed at the time such Certificate is issued and for the purposes of determining the nature and extent of any such obligations, the contract shall be deemed to remain in force between the parties thereto.

51.(1) Final Payment: On the Engineer's certificate of completion in respect of the works, adjustment shall be made and the balance of account based on the Engineer or the Engineer's representative's certified measurements or Engineer's certified "contractor's authorized engineer's measurements" of the total quantity of work executed by the Contractor upto the date of completion and on the accepted schedule of rates and for extra works on rates determined under Clause 39 of these Conditions shall be paid to the Contractor subject always to any deduction which may be made under these presents and further subject to the Contractor having signed delivered to the Engineer enclosing either a full account in detail of all claims he may have on the Railway in respect of the works or having delivered No Claim Certificate and the Engineer having after the receipt of such account given a certificate in writing that such

claims are not covered under excepted matter i.e. Clauses 7(j), 8, 18, 22(5), 39, 43(2), 45(i)(a), 55, 55-A(5), 57, 57A, 61(1), 61(2) and 62(1) (i) to xv(B) of Standard General Conditions of Contract or in any Clause (stated as excepted matter) of the Special Conditions of the Contract, that the whole of the works to be done under the provisions of the Contracts have been completed, that they have been inspected by him since their completion and found to be in good and substantial order, that all properties, works and things, removed, disturbed or injured in consequence of the works have been properly replaced and made good and all expenses and demands incurred by or made upon the Railway for or in the respect of damage or loss by from or in consequence of the works, have been satisfied agreeably and in conformity with the contract.

51.(2) Post Payment Audit: It is an agreed term of contract that the Railway reserves to itself the right to carry out a post-payment audit and/ or technical examination of the works and the Final Bill including all supporting vouchers, abstracts etc. and to make a claim on the Contractor for the refund of any excess amount paid to him till the release of security deposit or settlement of claims, whichever is later, if as a result of such examination any over-payment to him is discovered to have been made in respect of any works done or alleged to have been done by him under the contract.

51-A. Production of Vouchers etc. by the Contractor:

- (i) For a contract of more than one crore of rupees, the Contractor shall, whenever required, produce or cause to be produced for examination by the Engineer any quotation, invoice, cost or other account, book of accounts, voucher, receipt, letter, memorandum, paper of writing or any copy of or extract from any such document and also furnish information and returns verified in such manner as may be required in any way relating to the execution of this contract or relevant for verifying or ascertaining cost of execution of this contract (the decision of the Engineer on the question of relevancy of any documents, information or return being final and binding in the parties). The Contractor shall similarly produce vouchers etc., if required to prove to the Engineer, that materials supplied by him, are in accordance with the specifications laid down in the contract.
- (ii) If any portion of the work in a contract of value more than one crore of rupees be carried out by a sub-contractor or any subsidiary or allied firm or company (as per Clause 7 of the Standard General Conditions of Contract), the Engineer shall have power to secure the books of such sub-contract or any subsidiary or allied firm or company, through the Contractor, and such books shall be open to his inspection.
- (iii) The obligations imposed by Sub Clause (i) & (ii) above is without prejudice to the obligations of the Contractor under any statute rules or orders binding on the Contractor.

52. Withholding and Lien in Respect of Sums Claimed: Whenever any claim or claims for payment of a sum of money arises out of or under the contract against the Contractor, the

Railway shall be entitled to withhold and also have a lien to retain such sum or sums in whole or in part from the security, if any, deposited by the Contractor and for the purpose aforesaid, the Railway shall be entitled to withhold the said cash Security Deposit or the Security if any, furnished as the case may be and also have a lien over the same pending finalization or adjudication of any such claim. In the event of the security being insufficient to cover the claimed amount or amounts or if no security has been taken from the Contractor, the Railway shall be entitled to withhold and have a lien to the extent of the such claimed amount or amounts referred to supra, from any sum or sums found payable or which at any time thereafter may become payable to the Contractor under the same contract or any other contract with this or any other Railway or any Department of the Central Government pending finalization or adjudication of any such claim.

It is an agreed term of the contract that the sum of money or moneys so withheld or retained under the lien referred to above, by the Railway will be kept withheld or retained as such by the Railways till the claim arising out of or under the contract is determined by the arbitrator (if the contract governed by the Arbitration Clause) or by the competent court as the case may be and that the Contractor will have no claim for interest or damages whatsoever on any account in respect of such withholding or retention under the lien referred to supra and duly notified as such to the Contractor. For the purpose of this clause, where the Contractor is a partnership firm or a company, the Railway shall be entitled to withhold and also have a lien to retain towards such claimed amount or amounts in whole or in part from any sum found payable to any partner / company, as the case may be whether in his individual capacity or otherwise.

52-A Lien in Respect of Claims in other Contracts:

- (i) Any sum of money due and payable to the Contractor (including the Security Deposit returnable to him) under the contract may be withheld or retained by way of lien by the Railway, against any claim of this or any other Railway or any other Department of the Central Government in respect of payment of a sum of money arising out of or under any other contract made by the Contractor with this or any other Department of the Central Government.
- (ii) However, recovery of claims of Railway in regard to terminated contracts may be made from the Final Bill, Security Deposits and Performance Guarantees of other contract or contracts, executed by the Contractor. The Performance Guarantees submitted by the Contractor against other contracts, if required, may be withheld and encashed. In addition, 10% of each subsequent 'on-account bill' may be withheld, if required, for recovery of Railway's dues against the terminated contract.
- (iii) It is an agreed term of the contract that the sum of money so withheld or retained under this Clause by the Railway will be kept withheld or retained as such by the Railway till the claim arising out of or under any other contract is either mutually settled or determined by arbitration, if the other contract is governed by Arbitration Clause or by the competent court as the case may be and Contractor shall have no claim for interest or

damages whatsoever on this account or on any other ground in respect of any sum of money withheld or retained under this Clause and duly notified as such to the Contractor.

53. Signature on Receipts for Amounts: Every receipt for money which may become payable or for any security which may become transferable to the Contractors under these presents, shall, if signed in the partnership name by anyone of the partners of a Contractor's firm be a good and sufficient discharge to the Railway in respect of the moneys or security purported to be acknowledged thereby and in the event of death of any of the Contractor, partners during the pendency of the contract, it is hereby expressly agreed that every receipt by anyone of the surviving Contractor partners shall if so signed as aforesaid be good and sufficient discharge as aforesaid provided that nothing in this Clause contained shall be deemed to prejudice or effect any claim which the Railway may hereafter have against the legal representative of any Contractor partner so dying for or in respect to any breach of any of the conditions of the contract, provided also that nothing in this clause contained shall be deemed to prejudice or effect the respective rights or obligations of the Contractor partners and of the legal representatives of any deceased Contractor partners interse.

LABOUR

54. Wages to Labour: The Contractor shall be responsible to ensure compliance with the provision of the Minimum Wages Act, 1948 (hereinafter referred to as the “said Act”) and the Rules made thereunder in respect of any employees directly or through petty Contractors or sub-contractors employed by him for the purpose of carrying out this contract.

If, in compliance with the terms of the contract, the Contractor supplied any labour to be used wholly or partly under the direct orders and control of the Railways whether in connection with any work being executed by the Contractor or otherwise for the purpose of the Railway such labour shall, for the purpose of this Clause, still be deemed to be persons employed by the Contractor.

If any moneys shall, as a result of any claim or application made under the said Act be directed to be paid by the Railway, such money shall be deemed to be moneys payable to the Railway by the Contractor and on failure by the Contractor to repay the Railway any moneys paid by it as aforesaid within seven days after the same shall have been demanded, the Railways shall be entitled to recover the same from Contractor’s bills/Security Deposit or any other dues of Contractor with the Government of India.

54-A. Apprentices Act: The Contractor shall be responsible to ensure compliance with the provisions of the Apprentices Act, 1961 and the Rules and Orders issued thereunder from time to time in respect of apprentices directly or through petty Contractors or sub-contractors employed by him for the purpose of carrying out the Contract.

If the Contractor directly or through petty Contractors or sub-contractors fails to do so, his failure will be a breach of the contract and the Railway may, in its discretion, rescind

the contract. The Contractor shall also be liable for any pecuniary liability arising on account of any violation of the provisions of the Act.

55. Provisions of Payments of Wages Act: The Contractor shall comply with the provisions of the Payment of Wages Act, 1936 and the rules made thereunder in respect of all employees employed by him either directly or through petty Contractors or sub-contractors in the works. If in compliance with the terms of the contract, the Contractor directly or through petty Contractors or sub-contractors shall supply any labour to be used wholly or partly under the direct orders and control of the Engineer whether in connection with the works to be executed hereunder or otherwise for the purpose of the Engineer, such labour shall nevertheless be deemed to comprise persons employed by the Contractor and any moneys which may be ordered to be paid by the Engineer shall be deemed to be moneys payable by the Engineer on behalf of the Contractor and the Engineer may on failure of the Contractor to repay such money to the Railways deduct the same from any moneys due to the Contractor in terms of the contract. The Railway shall be entitled to recover the same from Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India all moneys paid or payable by the Railway by way of compensation of aforesaid or for costs of expenses in connection with any claim thereto and the decision of the Engineer upon any question arising out of the effect or force of this Clause shall be final and binding upon the Contractor.

55-A. Provisions of Contract Labour (Regulation and Abolition) Act, 1970:

55-A.(1) The Contractor shall comply with the provision of the contract labour (Regulation and Abolition) Act, 1970 and the Contract labour (Regulation and Abolition) Central Rules 1971 as modified from time to time, wherever applicable and shall also indemnify the Railway from and against any claims under the aforesaid Act and the Rules.

55-A.(2) The Contractor shall obtain a valid license under the aforesaid Act as modified from time to time before the commencement of the work and continue to have a valid license until the completion of the work. Any failure to fulfill the requirement shall attract the penal provision of the Act.

55-A.(3) The Contractor shall pay to the labour employed by him directly or through sub-contractors the wages as per provision of the aforesaid Act and the Rules wherever applicable. The Contractor shall notwithstanding the provisions of the contract to the contrary, cause to be paid the wages to labour, indirectly engaged on the works including any engaged by sub-contractors in connection with the said work, as if the labour had been immediately employed by him.

55-A.(4) In respect of all labour directly or indirectly employed in the work for performance of the Contractor's part of the contract, the Contractor shall comply with or cause to be complied with the provisions of the aforesaid Act and Rules wherever applicable.

55-A.(5) In every case in which, by virtue of the provisions of the aforesaid Act or the rules, the Railway is obliged to pay any amount of wages to a workman employed by the Contractor or his sub-contractor in execution of the work or to incur any expenditure on account of the contingent, liability of the Railway due to the Contractor's failure to fulfill his statutory obligations under the aforesaid Act or the rules, the Railway will recover from the Contractor, the amount of wages so paid or the amount of expenditure so incurred and without prejudice to the rights of the Railway under the Section 20, Sub-Section (2) and Section 2, Sub-Section (4) of the aforesaid Act, the Railway shall be at liberty to recover such amount or part thereof from Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India. The Railway shall not be bound to contest any claim made against it under Sub-Section (1) of Section 20 and Sub-Section (4) of Section 21 of the aforesaid Act except on the written request of the Contractor and upon his giving to the Railway full security for all costs for which the Railway might become liable in contesting such claim. The decision of the Chief Engineer regarding the amount actually recoverable from the Contractor as stated above shall be final and binding on the Contractor.

55-B. Provisions of Employees Provident Fund and Miscellaneous Provisions Act, 1952: The Contractor shall comply with the provisions of Para 30 & 36-B of the Employees Provident Fund Scheme, 1952; Para 3 & 4 of Employees' Pension Scheme, 1995; and Para 7 & 8 of Employees Deposit Linked Insurance Scheme, 1976; as modified from time to time through enactment of "Employees Provident Fund & Miscellaneous Provisions Act, 1952", wherever applicable and shall also indemnify the Railway from and against any claims under the aforesaid Act and the Rules.

55-C (i) Contractor is to abide by the provisions of various labour laws in terms of above clause 54, 55, 55-A and 55-B of Indian Railways Standard General Conditions of Contract. In order to ensure the same, an application has been developed and hosted on website 'www.shramikkalyan.indianrailways.gov.in'. Contractor shall register his firm/company etc. and upload requisite details of labour and their payment in this portal. These details shall be available in public domain. The registration / updation in Portal shall be done as under:

- (a) Contractor shall apply for onetime registration of his company/firm etc. in the Shramikkalyan portal with requisite details subsequent to issue of Letter of Acceptance. Engineer shall approve the contractor's registration in the portal within 7 days of receipt of such request.
- (b) Contractor once approved by any Engineer, can create password with login ID (PAN No.) for subsequent use of portal for all Letter of Acceptances (LoAs) issued in his favour.
- (c) The contractor once registered on the portal, shall provide details of his Letter of Acceptances (LoAs) / Contract Agreements on shramikkalyan portal within 15 days of issue of any LoA for approval of concerned Engineer. Engineer shall update (if required) and approve the details of LoA filled by contractor within 7 days of receipt of such request.

- (d) After approval of LoA by Engineer, contractor shall fill the salient details of contract labours engaged in the contract and ensure updating of each wage payment to them on shramikkalyan portal on monthly basis.
 - (e) It shall be mandatory upon the contractor to ensure correct and prompt uploading of all salient details of engaged contractual labour & payments made thereof after each wage period.
- (ii) While processing payment of any 'On Account Bill' or 'Final Bill' or release of 'Advances' or 'Performance Guarantee / Security deposit', contractor shall submit a certificate to the Engineer or Engineer's representatives that "I have uploaded the correct details of contract labours engaged in connection with this contract and payments made to them during the wage period in Railway's Shramikkalyan portal at 'www.shramikkalyan.indianrailways.gov.in' till ____Month, ____Year."

55-D. Provisions of "The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996" and "The Building and Other Construction Workers' Welfare Cess Act, 1996":

The tenderers, for carrying out any construction work, shall get themselves registered with the Registering Officer under Section-7 of the Building and Other Construction Workers Act, 1996 and Rules made thereto by the concerned State Govt., and submit Certificate of Registration issued by Registering Officer of the concerned State Govt. (Labour Dept.). The Cess shall be deducted from contractor's bills as per provisions of the Act.

56. Reporting of Accidents: The Contractor shall be responsible for the safety of all employees directly or through petty Contractors or sub-contractor employed by him on the works and shall report serious accidents to any of them however and wherever occurring on the works to the Engineer or the Engineers Representative and shall make every arrangements to render all possible assistance.

57. Provision of Workmen's Compensation Act: In every case in which by virtue of the provisions of Section 12 Sub-Section (1) of the Workmen's Compensation Act 1923, Railway is obliged to pay compensation to a workman directly or through petty Contractor or sub-contractor employed by the Contractor in executing the work, Railway will recover from the Contractor the amount of the compensation so paid, and, without prejudice to the rights of Railway under Section 12 Sub-section (2) of the said Act, Railway shall be at liberty to recover such amount or any part thereof from Contractor's bills/Security Deposit or any other dues of Contractor with the Government of India. Railway shall not be bound to contest any claim made against it under Section 12 Sub-Section (1) of the said Act except on the written request of the Contractor and upon his giving to Railway full security for all costs for which Railway might become liable in consequence of contesting such claim.

57-A. Provision of Mines Act: The Contractor shall observe and perform all the provisions of the Mines Act, 1952 or any statutory modifications or re-enactment thereof for the time being in force and any rules and regulations made thereunder in respect of all the persons directly or through the petty Contractors or sub-contractors employed by him under this contract and shall indemnify the Railway from and against any claims under the Mines Act, or the rules and regulations framed thereunder, by or on behalf of any persons employed by him or otherwise.

58. Railway not to Provide Quarters for Contractors: No quarters shall normally be provided by the Railway for the accommodation of the Contractor or any of his staff employed on the work. In exceptional cases where accommodation is provided to the Contractor at the Railway's discretion, recoveries shall be made at such rates as may be fixed by the Railway for the full rent of the buildings and equipments therein as well as charges for electric current, water supply and conservancy.

59.(1) Labour Camps: The Contractor shall at his own expense make adequate arrangements for the housing, supply of drinking water and provision of latrines and urinals for his staff and workmen, directly or through the petty Contractors or sub-contractors and for temporary creche (Bal-Mandir) where 50 or more women are employed at a time. Suitable sites on Railway land, if available, may be allotted to the Contractor for the erection of labour camps, either free of charge or on such terms and conditions that may be prescribed by the Railway. All camp sites shall be maintained in clean and sanitary conditions by the Contractor at his own cost.

59.(2) Compliance to Rules for Employment of Labour: The Contractor(s) shall conform to all laws, bye-laws rules and regulations for the time being in force pertaining to the employment of local or imported labour and shall take all necessary precautions to ensure and preserve the health and safety of all staff employed directly or through petty contractors or sub-contractors on the works.

59.(3) Preservation of Peace: The Contractor shall take requisite precautions and use his best endeavours to

(i) Prevent any riotous or unlawful behaviour by or amongst his workmen and other employed directly or through the petty Contractors or sub-contractors on the works and for the preservation of peace and protection of the inhabitants and

(ii) Security of property in the neighbourhood of the works. In the event of the Railway requiring the maintenance of a Special Police Force at or in the vicinity of the site during the tenure of works, the expenses thereof shall be borne by the Contractor and if paid by the Railway shall be recoverable from the Contractor.

59.(4) Sanitary Arrangements: The Contractor shall obey all sanitary rules and carry out all sanitary measures that may from time to time be prescribed by the Railway Medical

Authority and permit inspection of all sanitary arrangements at all times by the Engineer, the Engineer's Representative or the Medical Staff of the Railway. Should the Contractor fail to make the adequate sanitary arrangements, these will be provided by the Railway and the cost thereof recovered from the Contractor.

59.(5) Outbreak of Infectious Disease: The Contractor shall remove from his camp such labour and their families as refuse protective inoculation and vaccination when called upon to do so by the Engineer or the Engineer's Representative on the advice of the Railway Medical Authority. Should cholera, plague, or other infectious disease break out, the Contractor shall burn the huts, beddings, clothes and other belongings of or used by the infected parties and promptly erect new huts on healthy sites as required by the Engineer, failing which within the time specified in the Engineer's requisition, the work may be done by the Railway and the cost thereof recovered from the Contractor.

59.(6) Treatment of Contractor's Staff in Railway Hospitals: The Contractor and his staff, other than labourers and their families requiring medical aid from the railway hospital and dispensaries will be treated as private patients and charged accordingly. The Contractors' labourers and their Families will be granted free treatment in railway hospitals and dispensaries where no other hospitals or dispensaries are available provided the Contractor pays the cost of medicines, dressing and diet money according to the normal scale and additional charges for special examinations such as pathological and bacteriological examination, X-Ray, etc. and for surgical operation.

59. (7) Medical Facilities at Site: The Contractor shall provide medical facilities at the site as may be prescribed by the Engineer on the advice of the Railway Medical Authority in relation to the strength of the Contractor's resident staff and workmen.

59. (8) Use of Intoxicants: The sale of ardent spirits or other intoxicating beverages upon the work or in any of the buildings, encampments or tenements owned, occupied by or within the control of the Contractor or any of his employees shall be forbidden and the Contractor shall exercise his influence and authority to the utmost extent to secure strict compliance with this condition.

59.(9) Restrictions on the Employment of Retired Engineers of Railway Services Within One Year of their Retirement: The Contractor shall not, if he is a retired Government Engineer of Gazetted rank, himself engage in or employ or associate a retired Government Engineer of Gazetted rank, who has not completed one year from the date of retirement, in connection with this contract in any manner whatsoever without obtaining prior permission of the President and if the Contractor is found to have contravened this provision it will constitute a breach of contract and administration will be entitled to terminate the contract and forfeit his Performance Guarantee as well as Security Deposit.

60.(1) Non-Employment of Labourers below the age of 15: The Contractor shall not employ children below the age of 15 as labourers directly or through petty Contractors or sub-contractors for the execution of work.

60.(2) Medical Certificate of Fitness for Labour: It is agreed that the Contractor shall not employ a person above 15 and below 19 years of age for the purpose of execution of work under the contract unless a medical certificate of fitness in the prescribed form (Proforma at Annexure-VIII) granted to him by a certifying surgeon certifying that he is fit to work as an adult, is obtained and kept in the custody of the Contractor or a person nominated by him in this behalf and the person carries with him, while at work; a token giving a reference to such certificate. It is further agreed that the responsibility for having the adolescent examined medically at the time of appointment or periodically till he attains the age of 19 years shall devolve entirely on the Contractor and all the expenses to be incurred on this account shall be borne by him and no fee shall be charged from the adolescent or his parent for such medical examination.

60.(3) Period of Validity of Medical Fitness Certificate: A certificate of fitness granted or renewed for the above said purposes shall be valid only for a period of one year at a time. The certifying surgeon shall revoke a certificate granted or renewed if in his opinion the holder of it, is no longer fit for work in the capacity stated therein. Where a certifying surgeon refuses to grant or renew a certificate or revoke a certificate, he shall, if so required by the person concerned, state his reasons in writing for doing so.

60.(4) Medical Re-Examination of Labourer: Where any official appointed in this behalf by the Ministry of Labour is of the opinion that any person employed in connection with the execution of any work under this contract in the age group 15 to 19 years is without a certificate of fitness or is having a certificate of fitness but no longer fit to work in the capacity stated in the certificate, he may serve on the Contractor, or on the person nominated by him in this regard, a notice requiring that such persons shall be examined by a certifying surgeon and such person shall not if the concerned official so directs, be employed or permitted to do any work under this contract unless he has been medically examined and certified that he is fit to work in the capacity stated in the certificate.

EXPLANATIONS:

- (1) Only Qualified Medical Practitioners can be appointed as "Certifying Surgeons" and the term "Qualified Medical Practitioners" means a person holding a qualification granted by an authority specified in the Schedule to the Indian Medical Degrees Act, 1916 (VII of 1916) or in the Schedule to the Indian Medical Council Act, 1933 (XXVII) of 1933.
- (2) The Certifying surgeon may be a medical officer in the service of State or Municipal Corporation.

DETERMINATION OF CONTRACT

61.(1) Right of Railway to Determine the Contract: The Railway shall be entitled to determine and terminate the contract at any time should, in the Railway's opinion, the cessation of work becomes necessary owing to paucity of funds or from any other cause whatever, in which case the value of approved materials at site and of work done to date by the Contractor will be paid for in full at the rate specified in the contract. Notice in writing from the Railway of such determination and the reasons therefor shall be conclusive evidence thereof.

61.(2) Payment on Determination of Contract: Should the contract be determined under sub clause (1) of this clause and the Contractor claims payment for expenditure incurred by him in the expectation of completing the whole of the work, the Railways shall admit and consider such claims as are deemed reasonable and are supported by vouchers to the satisfaction of the Engineer. The Railway's decision on the necessity and propriety of such expenditure shall be final and conclusive.

61.(3) The Contractor shall have no claim to any payment of compensation or otherwise, howsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not derive in consequence of determination of contract.

62.(1) Determination of Contract owing to Default of Contractor:

If the Contractor should:

- (i) Becomes bankrupt or insolvent, or
- (ii) Make an arrangement for assignment in favour of his creditors, or agree to carry out the contract under a Committee of Inspection of his creditors, or
- (iii) Being a Company or Corporation, go into liquidation (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), or
- (iv) Have an execution levied on his goods or property on the works, or
- (v) Assign the contract or any part thereof otherwise than as provided in Clause 7 of these Conditions, or
- (vi) Abandon the contract, or
- (vii) Persistently disregard the instructions of the Engineer, or contravene any provision of the contract, or
- (viii) Fail to adhere to the agreed programme of work by a margin of 10% of the stipulated period, or
- (ix) Fail to Execute the contract documents in terms of Clause 8 of the Regulations for Tenders and Contracts.

- (x) Fails to submit the documents pertaining to identity of JV and PAN in terms of Clause 17.11 of Tender Form available in the Regulations for Tenders and Contracts.
- (xi) Fail to remove materials from the site or to pull down and replace work after receiving from the Engineer notice to the effect that the said materials or works have been condemned or rejected under Clause 25 and 27 of these Conditions, or
- (xii) Fail to take steps to employ competent or additional staff and labour as required under Clause 26 of the Conditions, or
- (xiii) Fail to afford the Engineer or Engineer's representative proper facilities for inspecting the works or any part thereof as required under Clause 28 of the Conditions, or
- (xiv) Promise, offer or give any bribe, commission, gift or advantage either himself or through his partner, agent or servant to any officer or employee of the Railway or to any person on his or on their behalf in relation to the execution of this or any other contract with this Railway.
- (xv) Fail to adhere to the provisions of Clause 16 of Tender Form (Second Sheet) of Annexure I of Part I 'Regulations for Tenders and Contract', or provision of above Clause 59(9).
- (xvi) Submits copy of fake documents / certificates in support of credentials, submitted by the tenderer

Then and in any of the **said Clause**, the Engineer on behalf of the Railway may serve the Contractor with a notice (Proforma at Annexure-IX) in writing to that effect and if the Contractor does not within seven days after the delivery to him of such notice proceed to make good his default in so far as the same is capable of being made good and carry on the work or comply with such directions as aforesaid of the entire satisfaction of the Engineer, the Railway shall be entitled after giving 48 hours' notice (Proforma at Annexure-X or XII, as the case may be) in writing under the hand of the Engineer to rescind the contract as a whole or in part or parts (as may be specified in such notice) and after expiry of 48 hours' notice, a final termination notice (Proforma at Annexure-XI or XIII, as the case may be) should be issued.

Note: Engineer at his discretion may resort to the part termination of contract with notices (Proforma at Annexure- IX, XII and XIII), only in cases where progress of work is more than or equal to 80% of the original scope of work.

62.(2) Right of Railway after Rescission of Contract owing to Default of Contractor: In the event of any or several of the courses, referred to in Sub-Clause(1) of this Clause, being adopted:

- (a) The Contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any commitments or made any advances on account of or with a view to the execution of the works or the performance of the contract and Contractor shall not be entitled to recover or be paid any sum for any work thereto for actually performed under the contract unless and until the Engineer

shall have certified the performance of such work and the value payable in respect thereof and the Contractor shall only be entitled to be paid the value so certified.

(b) In the contract which has been rescinded as a whole, the Security Deposit already with railways under the contract shall be encashed/ forfeited and the Performance Guarantee already submitted for the contract shall be encashed. The balance work shall be got done independently without risk & 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.

Further the authorized representative of failed Contractor cannot be accepted as authorized representative in new contract.

(c) In the contract rescinded in part or parts,

(i) The full Performance Guarantee for the contract shall be recovered. No additional Performance Guarantee shall be required for balance of work being executed through the part terminated contract. The contract value of part terminated contract stands reduced to the balance value of work under the contract.

(ii) The Security Deposit of part terminated contract shall be dealt as per clause 16(2) of GCC.

(iii) The defaulting Contractor shall not be issued any completion certificate for the contract.

(iv) The balance work shall be got done independently without risk & 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.

(v) Further the authorized representative of failed Contractor will not be accepted as authorized representative in new contract.

(d) The Engineer or the Engineer's Representative shall be entitled to take possession of any materials, tools, implements, machinery and buildings on the works or on the property on which these are being or ought to have been executed, and to retain and employ the same in the further execution of the works or any part thereof until the completion of the works without the Contractor being entitled to any compensation for the use and employment thereof or for wear and tear or destruction thereof.

(e) The Engineer shall as soon as may be practicable after removal of the Contractor fix and determine ex-parte or by or after reference to the parties or after such investigation or enquiries as he may consider fit to make or institute and shall certify what amount (if any) had

at the time of rescission of the contract been reasonably earned by or would reasonably accrue to the Contractor in respect of the work then actually done by him under the contract and what was the value of any unused, or partially used materials, any constructional plant and any temporary works upon the site. The legitimate amount due to the Contractor after making necessary deductions and certified by the Engineer should be released expeditiously.

SETTLEMENT OF DISPUTES – INDIAN RAILWAY ARBITRATION AND CONCILIATION RULES

63. Conciliation of Disputes: All disputes and differences of any kind whatsoever arising out of or in connection with the contract, whether during the progress of the work or after its completion and whether before or after the determination of the contract, shall be referred by the Contractor to the "Chief Engineer" or "Divisional Railway Manager" through "Notice of Dispute" provided that no such notice shall be served later than 30 days after the date of issue of Completion Certificate by the Engineer. Chief Engineer or Divisional Railway Manager shall, within 30 days after receipt of the Contractor's "Notice of Dispute", notify the name of conciliator(s) to the Contractor.

The Conciliator(s) shall assist the parties to reach an amicable settlement in an independent and impartial manner within the terms of contract.

If the parties reach agreement on a settlement of the dispute, they shall draw up and sign a written settlement agreement duly signed by Engineer In-charge, Contractor and conciliator(s). When the parties sign the settlement agreement, it shall be final and binding on the parties.

The parties shall not initiate, during the conciliation proceedings, any arbitral or judicial proceedings in respect of a dispute that is the subject matter of the conciliation proceedings.

The conciliation proceedings shall be terminated as per Section 76 of 'The Arbitration and Conciliation Act, 1996.

63.1 Matters Finally Determined by the Railway: All disputes and differences of any kind whatsoever arising out of or in connection with the contract, whether during the progress of the work or after its completion and whether before or after the determination of the contract, shall be referred by the Contractor to the GM and the GM shall, within 120 days after receipt of the Contractor's representation, make and notify decisions on all matters referred to by the Contractor in writing provided that matters for which provision has been made in Clauses 7(j), 8, 18, 22(5), 39, 43(2), 45(i)(a), 55, 55-A(5), 57, 57A, 61(1), 61(2) and 62(1) of Standard General Conditions of Contract or in any Clause (stated as excepted matter) of the Special Conditions of the Contract, shall be deemed as 'excepted matters' (matters not arbitrable) and decisions of the Railway authority, thereon shall be final and binding on the Contractor; provided further that 'excepted matters' shall stand specifically excluded from the purview of the Arbitration Clause.

64.(1) : Demand for Arbitration:

64.(1)(i): In the event of any dispute or difference between the parties hereto as to the construction or operation of this contract, or the respective rights and liabilities of the parties on any matter in question, dispute or difference on any account or as to the withholding by the Railway of any certificate to which the Contractor may claim to be entitled to, or if the Railway fails to make a decision within 120 days, then and in any such case, but except in any of the “excepted matters” referred to in Clause 63.1 of these Conditions, the Contractor, after 120 days but within 180 days of his presenting his final claim on disputed matters shall demand in writing that the dispute or difference be referred to arbitration.

64.(1)(ii)(a): The demand for arbitration shall specify the matters which are in question, or subject of the dispute or difference as also the amount of claim item-wise. Only such dispute or difference, in respect of which the demand has been made, together with counter claims or set off, given by the Railway, shall be referred to arbitration and other matters shall not be included in the reference.

64.(1)(ii)(b): The parties may waive off the applicability of Sub-Section 12(5) of Arbitration and Conciliation (Amendment) Act 2015, if they agree for such waiver in writing, after dispute having arisen between them, in the format given under Annexure XV of these conditions.

64.(1)(iii)(a): The Arbitration proceedings shall be assumed to have commenced from the day, a written and valid demand for arbitration is received by the Railway.

64.(1)(iii)(b): The claimant shall submit his claims stating the facts supporting the claims alongwith all the relevant documents and the relief or remedy sought against each claim within a period of 30 days from the date of appointment of the Arbitral Tribunal.

64.(1)(iii)(c): The Railway shall submit its defence statement and counter claim(s), if any, within a period of 60 days of receipt of copy of claims from Tribunal, unless otherwise extension has been granted by Tribunal.

64.(1)(iii)(d): Place of Arbitration: The place of arbitration would be within the geographical limits of the Division of the Railway where the cause of action arose or the Headquarters of the concerned Railway or any other place with the written consent of both the parties.

64.(1)(iv): No new claim shall be added during proceedings by either party. However, a party may amend or supplement the original claim or defense thereof during the course of arbitration proceedings subject to acceptance by Tribunal having due regard to the delay in making it.

64.(1)(v): If the Contractor(s) does/do not prefer his/their specific and final claims in writing, within a period of 90 days of receiving the intimation from the Railways that the final bill is ready for payment, he/they will be deemed to have waived his/their claim(s) and the Railway shall be discharged and released of all liabilities under the contract in respect of these claims.

64.(2): Obligation During Pendency of Arbitration: Work under the contract shall, unless otherwise directed by the Engineer, continue during the arbitration proceedings, and no

payment due or payable by the Railway shall be withheld on account of such proceedings, provided, however, it shall be open for Arbitral Tribunal to consider and decide whether or not such work should continue during arbitration proceedings.

64.(3) : Appointment of Arbitrator:

64.(3)(a) : Appointment of Arbitrator where applicability of section 12 (5) of Arbitration and Conciliation Act has been waived off:

64.(3)(a)(i): In cases where the total value of all claims in question added together does not exceed ₹ 1,00,00,000/- (Rupees One Crore), the Arbitral Tribunal shall consist of a Sole Arbitrator who shall be a Gazetted Officer of Railway not below Junior Administrative Grade, nominated by the General Manager. The sole arbitrator shall be appointed within 60 days from the day when a written and valid demand for arbitration is received by General Manager.

64.(3)(a)(ii): In cases not covered by the Clause 64(3)(a)(i), the Arbitral Tribunal shall consist of a panel of three Gazetted Railway Officers not below Junior Administrative Grade or 2 Railway Gazetted Officers not below Junior Administrative Grade and a retired Railway Officer, retired not below the rank of Senior Administrative Grade Officer, as the arbitrators. For this purpose, the Railway will send a panel of at least four (4) names of Gazetted Railway Officers of one or more departments of the Railway which may also include the name(s) of retired Railway Officer(s) empanelled to work as Railway Arbitrator to the Contractor within 60 days from the day when a written and valid demand for arbitration is received by the General Manager.

Contractor will be asked to suggest to General Manager at least 2 names out of the panel for appointment as Contractor's nominee within 30 days from the date of dispatch of the request by Railway. The General Manager shall appoint at least one out of them as the Contractor's nominee and will, also simultaneously appoint the balance number of arbitrators either from the panel or from outside the panel, duly indicating the 'presiding arbitrator' from amongst the 3 arbitrators so appointed. General Manager shall complete this exercise of appointing the Arbitral Tribunal within 30 days from the receipt of the names of Contractor's nominees. While nominating the arbitrators, it will be necessary to ensure that one of them is from the Accounts Department. An officer of Selection Grade of the Accounts Department shall be considered of equal status to the officers in Senior Administrative Grade of other departments of the Railway for the purpose of appointment of arbitrator.

64.3.(a).iii: The serving railway officer working in arbitral tribunal in the ongoing arbitration cases as per clause 64.(3)(a)(i) and clause 64.(3)(a)(ii) above, can continue as arbitrator in the tribunal even after his retirement.

64.(3)(b): Appointment of Arbitrator where applicability of Section 12 (5) of Arbitration and Conciliation Act has not been waived off:

(i) In cases where the total value of all claims in question added together does not exceed ₹ 50,00,000/- (Rupees Fifty Lakh), the Arbitral Tribunal shall consist of a Retired Railway Officer, retired not below the rank of Senior Administrative Grade Officer, as the arbitrator. For this purpose, the Railway will send a panel of at least four (4) names of retired Railway Officer(s) empanelled to work as Railway Arbitrator duly indicating their retirement dates to the Contractor within 60 days from the day when a written and valid demand for arbitration is received by the General Manager.

Contractor will be asked to suggest to General Manager at least 2 names out of the panel for appointment as arbitrator within 30 days from the date of dispatch of the request by Railway. The General Manager shall appoint at least one out of them as the arbitrator.

(ii) In cases where the total value of all claims in question added together exceed ₹ 50,00,000/- (Rupees Fifty Lakh), the Arbitral Tribunal shall consist of a Panel of three (3) retired Railway Officer, retired not below the rank of Senior Administrative Grade Officer, as the arbitrators. For this purpose, the Railway will send a panel of at least four (4) names of retired Railway Officer(s) empanelled to work as Railway Arbitrator duly indicating their retirement date to the Contractor within 60 days from the day when a written and valid demand for arbitration is received by the General Manager.

Contractor will be asked to suggest to General Manager at least 2 names out of the panel for appointment as Contractor's nominee within 30 days from the date of dispatch of the request by Railway. The General Manager shall appoint at least one out of them as the Contractor's nominee and will, also simultaneously appoint the balance number of arbitrators either from the panel or from outside the panel, duly indicating the 'Presiding Arbitrator' from amongst the 3 arbitrators so appointed. General Manager shall complete this exercise of appointing the Arbitral Tribunal within 30 days from the receipt of the names of Contractor's nominees. While nominating the arbitrators, it will be necessary to ensure that one of them has served in the Accounts Department.

64.(3)(c)(i): If one or more of the arbitrators appointed as above refuses to act as arbitrator, withdraws from his office as arbitrator, or vacates his/their office/offices or is/are unable or unwilling to perform his functions as arbitrator for any reason whatsoever or dies or in the opinion of the General Manager fails to act without undue delay, the General Manager shall appoint new arbitrator/arbitrators to act in his/their place in the same manner in which the earlier arbitrator/arbitrators had been appointed. Such re-constituted Tribunal may, at its discretion, proceed with the reference from the stage at which it was left by the previous arbitrator (s).

64.(3) (c) (ii): (a) The Arbitral Tribunal shall have power to call for such evidence by way of affidavits or otherwise as the Arbitral Tribunal shall think proper, and it shall be the duty of the parties hereto to do or cause to be done all such things as may be necessary to enable the

Arbitral Tribunal to make the award without any delay. The proceedings shall normally be conducted on the basis of documents and written statements.

(b) Before proceeding into the merits of any dispute, the Arbitral Tribunal shall first decide and pass its orders over any plea submitted/objections raised by any party, if any, regarding appointment of Arbitral Tribunal, validity of arbitration agreement, jurisdiction and scope of the Tribunal to deal with the dispute (s) submitted to arbitration, applicability of time 'limitation' to any dispute, any violation of agreed procedure regarding conduct of the arbitral proceedings or plea for interim measures of protection and record its orders in day to day proceedings. A copy of the proceedings duly signed by all the members of tribunal should be provided to both the parties.

64.3(c)(iii): (i) Qualification of Arbitrator (s):

(a) Serving Gazetted Railway Officers of not below JA Grade level.

(b) Retired Railway Officers not below SA Grade level, one year after his date of retirement.

(c) Age of arbitrator at the time of appointment shall be below 70 years.

(ii) An arbitrator may be appointed notwithstanding the total number of arbitration cases in which he has been appointed in the past.

(iii) While appointing arbitrator(s) under Sub-Clause 64.(3)(a)(i), 64.(3)(a)(ii), 64.(3)(b)(i) & 64.(3)(b)(ii) above, due care shall be taken that he/they is/are not the one/those who had an opportunity to deal with the matters to which the contract relates or who in the course of his/their duties as Railway servant(s) expressed views on all or any of the matters under dispute or differences. A certification to this effect as per annexure- XVI shall be taken from Arbitrators also. The proceedings of the Arbitral tribunal or the award made by such Tribunal will, however, not be invalid merely for the reason that one or more arbitrator had, in the course of his service, opportunity to deal with the matters to which the contract relates or who in the course of his/their duties expressed views on all or any of the matters under dispute.

64.(3)(d)(i): The arbitral award shall state item wise, the sum and reasons upon which it is based. The analysis and reasons shall be detailed enough so that the award could be inferred therefrom.

64.(3)(d)(ii): A party may apply for corrections of any computational errors, any typographical or clerical errors or any other error of similar nature occurring in the award of a Tribunal and interpretation of a specific point of award to Tribunal within 60 days of receipt of the award.

64.(3)(d)(iii): A party may apply to Tribunal within 60 days of receipt of award to make an additional award as to claims presented in the arbitral proceedings but omitted from the arbitral award.

64.(4): In case of the Tribunal, comprising of three members, any ruling on award shall be made by a majority of members of Tribunal. In the absence of such a majority, the views of the Presiding Arbitrator shall prevail.

64.(5): Where the arbitral award is for the payment of money, no interest shall be payable on whole or any part of the money for any period till the date on which the award is made.

64. (6): The cost of arbitration shall be borne by the respective parties. The cost shall inter-alia include fee of the arbitrator(s), as per the rates fixed by Railway Board from time to time and the fee shall be borne equally by both the parties, provided parties sign an agreement in the format given at Annexure XV to these condition after/ while referring these disputes to Arbitration. Further, the fee payable to the arbitrator(s) would be governed by the instructions issued on the subject by Railway Board from time to time irrespective of the fact whether the arbitrator(s) is/are appointed by the Railway Administration or by the court of law unless specifically directed by Hon'ble court otherwise on the matter.

64.(7) Subject to the provisions of the aforesaid Arbitration and Conciliation Act 1996 and the rules thereunder and relevant para of General Conditions of Contract (GCC) and any statutory modifications thereof shall apply to the appointment of arbitrators and arbitration proceedings under this Clause.

PART-II ANNEXURES

ANNEXURE – VII

Reference Para 17(B)

Registered Acknowledgement Due

PROFORMA FOR TIME EXTENSION

No. _____ Dated: _____
Sub: (i) _____ (name of work).
(ii) Acceptance letter no. _____
(iii) Understanding/Agreement no. _____
Ref: _____ (Quote specific application of
Contractor for extension to the date received)

Dear Sir,

1. The stipulated date for completion of the work mentioned above is _____. From the progress made so far and the present rate of progress, it is unlikely that the work will be completed by the above date (or 'However, the work was not completed on this date').

2. Expecting that you may be able to complete the work if some more time is given, the competent authority, although not bound to do so, hereby extends the time for completion from _____ to _____.

3. Please note that an amount equal to the liquidated damages for delay in the completion of the work after the expiry of _____ (give here the stipulated date for completion with/without any liquidated damage fixed earlier) will be recovered from you as mentioned in Clause 17-B of the Standard General Conditions of Contract for the extended period, notwithstanding the grant of this extension. You may proceed with the work accordingly.

4. The above extension of the completion date will also be subject to the further condition that no increase in rates on any account will be payable to you.

5. Please intimate within a week of the receipt of this letter your acceptance of the extension of the conditions stated above.

6. Please note that in the event of your declining to accept the extension on the above said conditions or in the event of your failure after accepting or acting upto this extension to complete the work by _____ (here mention the extended date), further action will be taken in terms of Clause 62 of the Standard General Conditions of Contract.

Yours faithfully

For and on behalf of the President of India

ANNEXURE – VIII

Reference Para 60.(2)

CERTIFICATE OF FITNESS

1. (a) Serial Number _____
(b) Date _____
2. Name of person examined _____
3. Father's Name: son/daughter of _____
Residing at _____
4. Sex _____
5. Residence: _____

6. Physical fitness _____
7. Identification marks _____
8. Date of birth, if available, and/or certified age _____

I certify that I have personally examined (name) _____ who is desirous of being employed in a factory or on a work requiring manual labour and that his/her age as nearly as can be ascertained from my examination, is _____ years.

I certify that he/she is fit for employment in a factory or on a work requiring manual labour as an adult/child.

9. Reasons for :
(a) Refusal to grant certificate, or _____
(b) Revoking the certificate _____

Signature or left hand

Thumb impression of the person examined.

Signature of Certifying Surgeon

Note: In case of physical disability, the exact details and cause of the physical disability should be clearly stated.

ANNEXURE – IX

(Reference Clause 62.(1))

Registered Acknowledgement Due

PROFORMA OF 7 DAYS NOTICE FOR WORKS AS A WHOLE/ IN PARTS

(DETAILS OF PART OF WORK TO BE MENTIONED)

_____ **RAILWAY**

(Without Prejudice)

To

M/s _____

Dear Sir,

Contract Agreement No. _____

In connection with _____

In spite of repeated instructions to you by the subordinate offices as well as by this office through various letters of even no. _____, dated _____; you have failed to start work/show adequate progress and/or submit detailed programme for completing the work/ part of work (details of part of work to be mentioned).

2. Your attention is invited to this office/Chief Engineer's office letter no. _____, dated _____ in reference to your representation, dated _____.

3. As you have failed to abide by the instructions issued to commence the work /to show adequate progress of work you are hereby given 7 days' notice in accordance with Clause 62 of Standard General Conditions of Contract to commence works / to make good the progress, failing which further action as provided in Clause 62 of the Standard General Conditions of Contract viz. to terminate your Contract and complete the balance work without your participation will be taken.

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the President of India

ANNEXURE – X

Reference Para 62(1)

Registered Acknowledgement Due

PROFORMA OF 48 HRS. NOTICE FOR WHOLE WORK

_____ **RAILWAY**

(Without Prejudice)

To

M/s _____

Dear Sir,

Contract Agreement No. _____

In connection with _____

Seven days' notice under Clause 62 of Standard General Conditions of Contract was given to you under this office letter of even no., dated _____; but you have taken no action to commence the work/show adequate progress of the work.

2. You are hereby given 48 hours' notice in terms of Clause 62 of Standard General Conditions of Contract to commence works / to make good the progress of works, failing which and on expiry of this period your above contract will be rescinded and the work under this contract will be carried out independently without your participation and your Security Deposit shall be forfeited and Performance Guarantee shall also be encashed and any other consequences which may please be noted.

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the President of India

ANNEXURE – XI

Reference Para 62.(1)

Registered Acknowledgement Due

PROFORMA OF TERMINATION NOTICE

RAILWAY

(Without Prejudice)

No. _____

Dated _____

To

M/s _____

Dear Sir,

Contract Agreement No. _____

In connection with _____

Forty eight hours (48 hrs.) notice was given to you under this office letter of even no., dated _____; but you have taken no action to commence the work/show adequate progress of the work.

Since the period of 48 hours' notice has already expired, the above contract stands rescinded in terms of Clause 62 of Standard General Conditions of Contract and the balance work under this contract will be carried out independently without your participation. Your participation as well as participation of every member/partner in any manner as an individual or a partnership firm/JV is hereby debarred from participation in the tender for executing the balance work and your Security Deposit shall be forfeited and Performance Guarantee shall also be encashed.

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the President of India

ANNEXURE – XII

Reference Para 62.(1)

Registered Acknowledgement Due

PROFORMA OF 48 HRS. NOTICE FOR PART OF THE WORK.....

(DETAILS OF PART OF WORK TO BE MENTIONED)

_____ **RAILWAY**

(Without Prejudice)

To

M/s _____

Dear Sir,

Contract Agreement No. _____

In connection with _____

1. Seven days' notice under Clause 62 of Standard General Conditions of Contract was given to you under this office letter of even no., dated _____; but you have taken no action to commence the work/show adequate progress of the part of work.....(details of part to be mentioned).

2. You are hereby given 48 hours' notice in terms of Clause 62 of Standard General Conditions of Contract to commence works / to make good the progress of works, failing which and on expiry of this period your above part of work..... (Details of part to be mentioned) in contract will be rescinded and the work will be carried out independently without your participation.

3. Your full Performance Guarantee for the contract shall be forfeited and you shall not be issued any completion certificate for the contract. However, no additional Performance Guarantee shall be required for balance of work being executed through the part terminated contract.

4. The contract value of part terminated contract shall stands reduced to

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the President of India

ANNEXURE – XIII

Reference Para 62.(1)

Registered Acknowledgement Due

**PROFORMA OF TERMINATION NOTICE FOR PART OF THE WORK.....
(DETAILS OF PART OF WORK TO BE MENTIONED)**

_____ **RAILWAY**

(Without Prejudice)

No. _____

Dated _____

To

M/s _____

Dear Sir,

Contract Agreement No. _____

In connection with _____

1. Forty eight hours (48 hrs.) notice was given to you under this office letter of even no., dated _____; but you have taken no action to commence the work/show adequate progress of the part of work.....(details of part to be mentioned).
2. Your above part of work in contract(details of part to be mentioned) stands rescinded in terms of Clause 62 of Standard General Conditions of Contract and the same will be carried out independently without your participation. Your participation as well as participation of every member/partner in any manner as an individual or a partnership firm/JV is hereby debarred from participation in the tender for executing the balance work
3. Your full Performance Guarantee for the contract shall be forfeited and you shall not be issued any completion certificate for the contract. However, no additional Performance Guarantee shall be required for balance of work being executed through the part terminated contract.
4. The contract value of part terminated contract stands reduced to

Kindly acknowledge receipt.

Yours faithfully

For and on behalf of the President of India

ANNEXURE – XIV

Reference Para 48.(3)

FINAL SUPPLEMENTARY AGREEMENT

1. Articles of agreement made this day _____ in the year _____ between the President of India, acting through the _____ Railway Administration having his office at _____ herein after called the Railway of the one part and _____ of the second part.
2. Whereas the party hereto of the second part executed an agreement with the party hereto of the first part being agreement Number _____ dated _____ for the performance _____ herein after called the 'Principal Agreement'.
3. 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.
4. And whereas the party hereto of the first part already made payment to the party hereto of the second part diverse sums from time to time aggregating to ₹ _____ including the Final Bill bearing voucher No. _____ dated _____ of value _____ duly adjusted as per price variation clause, if applicable (the receipt of which is hereby acknowledged by the party hereto of the second part in full and final settlement of all his /its claims under the principal agreement.

And whereas the party hereto of the second part have received sum of ₹ _____ through the Final Bill bearing voucher No. _____ dated _____ duly adjusted as per price variation clause (PVC), if applicable (the receipt of which is hereby acknowledged by the party thereto of the second part) from the party hereto of the first part in full and final settlement of all his/its disputed claims under 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 excluding the security deposit, the party hereto of the second part have no further dues of claims against the party hereto of the first part under the said Principal Agreement. It is further agreed by and between the parties that the 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.

(Applicable in case Final Supplementary Agreement is signed after release of Final Payment)

Or

And whereas the party hereto of the first part already made payment to the party hereto of the second part diverse sums from time to time aggregating to ₹ _____ through various On Account Bills (the receipt of which is hereby acknowledged by the party hereto of the second part).

And whereas the party hereto of the second part have received sum of ₹ _____ through various On Account Bills (the receipt of which is hereby acknowledged by the

party thereto of the second part) from the party hereto of the first part and party hereto of the second part have accepted final measurements recorded on Page No..... to Page No.... of Measurement Book No.....and corresponding Final Bill duly adjusted as per price variation clause (PVC), if applicable, for full and final settlement of all his/its disputed claims under principal agreement.

Now, it is hereby agreed by and between the parties in the consideration of sums already paid through various On Account Bills and sums to be paid through Final Bill duly adjusted as per price variation clause (PVC), if applicable, based on accepted final measurements including the security deposit 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, the party hereto of the second part have no further dues of claims against the party hereto of the first part under the said Principal Agreement.

(Applicable in case Final Supplementary Agreement is signed before release of Final Payment)

5. 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 be deemed to be non-existent for all purposes.

Signature of the Contractor/s

for and on behalf of the President of India

Witnesses

ADDRESS: _____

ANNEXURE-XV

Reference Para 64.3 & 64.6

Agreement towards Waiver under Section 12(5) and Section 31A (5) of Arbitration and Conciliation (Amendment) Act

I/we..... (Name of agency/Contractor) with reference to agreement no..... raise disputes as to the construction and operation of this contract, or the respective rights and liabilities, withholding of certificate and demand arbitration in respect of following claims :

Brief of claim:

- (i) Claim 1- Detailed at Annexure-
- (ii) Claim 2 –
- (iii) Claim 3 –

I/we..... (post of Engineer) with reference to agreement no..... hereby raise disputes as to the construction and operation of this contract, or the respective rights and liabilities, withholding of certificate and demand arbitration in respect of following claims:

I/we.....do/do not agree to waive off applicability of section 12(5) of Arbitration and Conciliation (Amendment) Act.

Signature of Claimant_____ Signature of Respondent

Agreement under Section 31(5)

I/we..... (Name of claimant) with reference to agreement no..... hereby waive off the applicability of sub section 31-A (2) to 31-A (4) of the Arbitration and Conciliation (Amendment) Act. We further agree that the cost of arbitration will be shared by the parties as per Clause 64(6) of GCC.

Signature of Claimant_____ Signature of Respondent_____

*Strike out whichever not applicable.

Certification by Arbitrators appointed under Clause 63 & 64 of Indian Railways General Conditions of Contract

1. Name:
2. Contact Details:
3. Prior experience (Including Experience with Arbitrations):
4. **I do not have more than ten on-going Arbitration cases with me.**
5. I hereby certify that I have retired from Railways w.e.f. _____ and empanelled as Railway Arbitrator as per 'The Arbitration and Conciliation Act- 1996'.
6. I have no any past or present relationship in relation to the subject matter in dispute, whether financial, business, professional or other kind.
Or
I have past or present relationship in relation to the subject matter in dispute, whether financial, business, professional or other kind. The list of such interests is as under:
7. I have no any past or present relationship with or interest in any of the parties whether financial, business, professional or other kind, which is likely to give rise to justifiable doubts as to my independence or impartiality in terms of The Arbitration and Conciliation Act-1996.
Or
I have past or present relationship with or interest in any of the parties whether financial, business, professional or other kind, which is likely to give rise to justifiable doubts as to my independence or impartiality in terms of The Arbitration and Conciliation Act-1996. The details of such relationship or interests are as under:
8. There are no concurrent Circumstances which are likely to affect my ability to devote sufficient time to the arbitration and in particular to finish the entire arbitration within twelve months.
Or
There are Circumstances which are likely to affect my ability to devote sufficient time to the arbitration and in particular to finish the entire arbitration within twelve months. The list of such circumstances is as under:

Spec no. IM/MEMU/DEMU/Anara/WP/Mech/M&P/EAC(500CFM)

Item No. 13

**SPECIFICATION FOR ELECTRIC DRIVEN ROTARY SCREW TYPE AIR COMPRESSOR
(500 CFM) WITH COMPRESSED AIR PIPE LINE WITH VALVES, CLAMPS AND OTHER FITTINGS**

(A) ELECTRIC DRIVEN ROTARY SCREW TYPE AIR COMPRESSOR (500 CFM)

1.0 Scope:

The scope of supply of electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors will include design, manufacturing, inspection, supply, erection, commissioning & Proving-Out Test, packing, dispatch, transportation, safe delivery and handing over to user as per parameters specified in **Schedule-IA**. It includes all the concomitant accessories/equipments/works as detailed in the specification and other accessories, which the manufacturer considers essential to make the machine fully operational, when installed, commissioned and connected to power source and other utilities.

1.2 Sources:

Likely sources of manufacturers and suppliers are-

- (i) M/s Kirloskar Pneumatic Co. Ltd, Pune,
- (ii) M/s Elgi Equipments, Coimbatore,
- (iii) M/s Atlas Copco (P) Ltd, Pune

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources(if provided). However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

1.3 The compressed air plant shall be capable of:-

- a) Continuous round the clock working to supply completely oil free and moisture free air at full rated capacity and pressure.
- b) Sustained working at low noise level.
- c) Free Air Delivery of the compressed air will be 500 CFM $\pm$ 30 CFM.

2.0 General Description:

- 2.1 The plant shall comprise of electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors each of which shall have a rated capacity of 500 CFM $\pm$ 30 CFM free air delivery on wet basis at a working pressure of 10 Kgs/cm².
- 2.2 The compressor shall be capable of working in normal Indian Railways workshop environment with maximum ambient temperature up to 50°C and maximum relative humidity up to 100%.
- 2.3 The compressor shall be capable to perform the requirements of ISO: 1217 (latest) for packaged compressors.

- 2.4 All related erection material required for inspection and commissioning of electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors and connecting electrical equipments with cables, cable laying and fixing accessories shall be included in the cost of basic electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors.
- 2.5 Tool boxes containing all tools (Electrical and Mechanical) required for the maintenance of the machine should be supplied along with the machine. Tools shall be supplied in two different tool boxes, with individual pocket for each item and shall be of MEKASTER/TAPARIA or reputed ISI make. Unit cost of machine will be inclusive of cost of tool box.
- 2.6 Submission of GA Drawings and related drawings for approval to Railways by successful bidder.
- 2.7 All type of civil work [including foundation, (if required any)] for the erection of said machine shall be in contractor scope. The cost of machine foundation will be inclusive of cost of machine.
- 2.8 Technical specifications of M&Ps are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** and **General specification for supply of M&P (Appendix-A)** specified in the Tender Document.

2.9 Concomitant Accessories:

The following Concomitant Accessories should accompany along with the air compressor. Unit cost of machine will be inclusive of concomitant accessories

- (a) Vertical Air receiver of 3 m³ capacity conforming to IS: 2825 and IS: 7938 with all mountings- 01 no.
 - (b) Seamless air piping of suitable bore between Compressor and air receiver including sockets, NRV, Tee/elbow joints, isolating valves etc.-50 M or actual requirement at site
 - (c) First Fill of oils and lubricants (quantity of each item to be indicated in the bid), Rates of each item to be quoted along with total cost of all items required.-First fill
 - (d) Electrical cables to connect compressor panel to supply distribution board – 50 M or actual requirement at site
 - (e) Set of maintenance spares/consumables (including filters, separators, etc. but excluding oils and lubricants required for scheduled maintenance during warranty, assuming triple shift operation six days a week. Details (description and quantity of each) along with their rates shall be quoted.-01 set
 - (f) Compatible Servo Controlled voltage stabilizer-01 no.
Note: i. Servo Controlled voltage stabilizer should be preferably from indigenous make such as NEEL/SERVOMAX/CONSUL/APLAB.
 ii. Firm should give break up of electrical load of the air compressor and peripheries and clearly bring out the capacity of voltage stabilizer.
 - (g) Compatible Refrigerated Air drier for air compressors-01 no.
- 2.9.1 Any other equipment required to make the compressor fully functional at site shall be listed under concomitant accessories.

3.0 Layout:

- 3.1 Space for air compressor room will be provided by Railway. In case the contractor is of the view that the space available is inadequate for the equipment being proposed, he should indicate his requirement clearly.
- 3.2 The size/capacity of the different pipes and ancillary fittings such as valves etc shall also be indicated clearly by the contractor in the drawing. Pipeline layout shall also show location of supports.
- 3.3 Foundation details should be shown in a separate drawing.
- 3.4 Cable layout i.e. cable routing showing details of cable supports, number of cables etc. should also be furnished.
- 3.5 The contractor shall submit a properly dimensioned drawing indicating the layout of their equipment in consonance with the general schematic detailed in compressor room layout
- 3.6 The contractor shall also submit P&I diagram along with part description.

4.0 Performance Standards to be followed:

- 4.1 The electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors shall be designed, manufactured, erected and tested as per the latest relevant IS specifications.
- 4.2 Free air delivery (FAD), working pressure, power and specific energy consumption shall be as per ISO: 1217 (i.e. taking into account all losses) at the point of discharge.
- 4.3 The FAD will be measured at the discharge terminal point of the compressor package in accordance with the CAG/PNEUROP PN2CPTC2 Test Code (Annex C to ISO 1217).
- 4.4 The FAD is to be given in terms of ACFM where ACFM is actual cubic feet per minute at inlet conditions
- 4.5 The electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors shall be complete in all respects. The offer shall include the following items. Any variation from the specifications contained in this tender shall be brought out with reasons for the same. Any variation involving lower standards of design, performance and rating shall not be acceptable.

(a) Compressor including air intake filter and, air control valves, other valves, and in line filters.

(b) Air receiver with safety valves, pressure gauge, inlet and discharge connections

(c) Air dryers - 1 No.

(d) Piping upto battery limits.

(e) Seamless air piping of suitable bore between Compressor, air drier and air receiver including sockets, NRV, Tee/elbow joints, isolating valves etc.

(f) First fill of oils and lubricants.

(g) Electrical cables to connect compressor panel to supply distribution board.

- (h) All Civil work including foundation work and support for pipe line for electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors shall be in contractor's scope.

5.0 Rigidity, Control and Safety

- 5.1 The machine shall be robust, rigid and of sturdy construction. It shall be designed to meet heavy duty demands of various operations on the machine under normal Workshop environment for such machines. It shall be free for vibrations even when working at full capacity.
- 5.2 All machine castings shall be made of close grained high grade cast iron like Mechanite or equivalent materials meeting IS-210 Standards to ensure durability and rigidity. The casting shall be thermal stress relieved to ensure stability and continued accuracy..
- 5.3 All machine fabrications of critical load bearing assemblies like beds, columns etc. shall be adequately strengthened and stress relieved.
- 5.4 Change in ambient temperature shall not affect the performance of the machine.
- 5.5 There shall be no change in the performance of the machine either on switching on the machine or after continuous running.
- 5.6 There shall be no resonant vibrations throughout the working range of the machine at all load levels.

6.0 Basic Design Features (Mechanical):

6.1 Specific Characteristics

6.1.1 General Features:

- a) The leading parameters of the compressor shall be as at **Schedule-IA**.
- b) The compressor shall be microprocessor-based machine of rugged/ robust construction, shock proof and user friendly to operate.
- c) The equipment should be enclosed type, compact and with modular construction. It should be designed to provide easy access for maintenance and operation on-site.
- d) The equipment should be suitably designed to meet with the Indian climatic conditions during transportation, assembly and operation.

6.1.2 Component Details:

a) Air Intake Filters:

Suitable air intake filter, capable of filtering airborne particles up to 2-3 microns and maintenance user friendly with respect to cleaning and replacement. Suitable indication/ feature shall be provided in case of choking/ servicing due. The filter shall possess high separation efficiency, good accumulation capacity, low air resistance and be mechanically strong. The filter elements shall be capable of being easily cleaned for re-use. The method and criterion for cleaning of filter elements shall be clearly specified by the contractor in his design.

b) **Oil Filters:**

Filtration capacity of 25 microns and maintenance friendly with respect to cleaning and replacement. Suitable indication/ feature shall be provided in case of choking/ servicing due.

c) **Air-Oil Separator:**

Multi stage oil separation to ensure oil carry over less than 2 – 3 ppm oil, Pressure drop in the separator shall not exceed 0.2 kg/cm². It should be maintenance user friendly with respect to cleaning and replacement.

6.1.3 **Valves**

- a) Suction and delivery valves shall be of high durability and suitable to screw compressors. The details of the safety arrangement shall be spelt out in the offer. The valves shall be easily accessible for maintenance. Special design features of the valves shall also be furnished in the design.
- b) In addition to the above, other valves as considered necessary by the manufacturer for efficient, continuous and safe working of the compressor shall be provided. Function of these valves shall be explained in details.

6.1.4 **Controls**

6.1.4.1 Microprocessor based centralized control panel, automatic electronic control, alpha- numeric display, actuation of alarms & trips through pressure & temperature transmitters, ergonomically designed and within easy reach of the operator with the following features:

- I. Data read out display Working pressure, operating temperature, sump pressure, no. of motor starts, operating hours, service information and status data during shut downs & emergency stops.
- II. Setting of Operating parameters Working pressure (Full load / No load), warning levels, service levels.
- III. Fault Diagnostics Automatic indication of faults and shut down in case of high air-end discharge temperature, low unloaded sump pressure, starter fault, main motor overload, fan motor overload, reverse rotation or any other specific reason.
- IV. Automatic part load operation controls to ensure proportionately lower power consumption under part load working conditions.

6.1.5 **Bearings:** Only SKF/FAG/NORMA/NTN/KOYO/NBC/NSK/ TIMKIN acceptable makes.

6.1.6 **Cabling & Tubing:** Provision of following: -

- a) Instruments tubing from measuring points to gauge panel.
- b) Unloader piping from suction valves to Unloader.
- c) Power cabling between starter and motor neatly lay out through cable trays with fixing clamps.

- d) Control cabling between various instruments and starter-cum-control panel duly terminated properly lay through ducts/cable trays with fixing clamps.

6.1.7 Air Drier

- a) Refrigeration type, packaged, self-contained fully automatic air drier capable of handling free air delivery at the operating pressure as specified in Schedule-I along with automatic drainage arrangement and a DRO to indicate dew point, which shall be 50° C at standard design ambient conditions. Pressure drop in the drier shall not exceed 0.5 Kg./cm².
- b) If stand alone refrigerated air dryers are offered instead of integrated units then the acceptable make of the same will be limited to Sabro/ Dominick Hunter/ Bry Air/ Purifair/ Shalcot/ Ultrafilter/ Gem only.

c) Dryer Capability

The dryer shall receive oil free compressed air from the air receiver via an inline filter at specified pressure and flow. It shall deliver completely moisture-free air with minimum pressure loss and at a constant dew point.

6.1.8 Air Receiver

The air receiver shall be built and tested in accordance with IS: 7938 and IS: 2825. It shall be of the vertical cylindrical, all welded design. The air receiver shall be supplied complete with self-supporting mounting arrangement, man hole, safety valve, pressure gauge, automatic drain trap, tapping and connection for air control regulation and inlet and discharge connections. Details of anti-corrosion protection provided on the inside and outside of the air receiver shall be furnished.

6.1.9 Insulation

The water separator, interconnected piping shall be insulated with polyurethane foam or equivalent durable material.

6.1.10 Wear Compensation Adjustment:

The original built in accuracy of the machine shall be capable of being maintained conveniently and economically by suitable adjustments for taking up wear on slides, bearings and load screws. The system of adjustments incorporated shall be explained in the offer.

7.0 Standard specification (Electrical) to be followed:

- 7.1 The equipments and materials shall conform to relevant Indian Standard Specifications, latest Indian Electricity Rules and Regulations as regards safety requirements, earthing and other essential provisions specified therein.
- 7.2 The equipment shall be designed and selected to facilitate inspection, cleaning, replacement and repair, and for use where continuity of operation and safety are first considerations.

7.3 Earthing

All the electrical equipments shall be connected by means of two earthing terminals. The equipment in turn shall be made electrically continuous by providing jumpers over riveted or bolted joints. Equipments fed by flexible cables shall be earthed by means of spare core provided in the flexible cable. Earthing shall be carried out as per relevant IS standards and codes.

7.4 Relays and Contactors:

- a) All electrical relays and contactors shall operate on 110 V AC. Conversion transformers for 110 V AC of adequate capacity shall be in the scope of supply. Mounting of relays and contactors in an enclosed panel shall be such that they are easily accessible for maintenance.
- b) Relays/Contactors of preferred makes alone, conforming to relevant Indian Standards shall be employed.

7.5 Wiring: Panel wiring and cabling from control panel to various motors and other associated equipments, incomer cable shall be provided.

Incoming supply to the control panel shall be directly connected to main molded case circuit breaker (MCCB) of sufficient rating having adjustable magnetic and thermal overload setting.

7.6 Equipments:

All equipment should be of preferred makes. Contractor shall furnish the type and make of the equipments proposed to be supplied along with necessary technical particulars for the same.

8.0 Operational Controls:**8.1** The operation of the machine shall be by push buttons. The basic rules for the direction of operation of controls and the corresponding direction of movements of the machine tools shall be as per IS: 2987-1985.**8.2** The control devices shall be

- a) Clearly visible and identifiable.
- b) Ergonomically positioned for safe operation without hesitating or loss of time, and without ambiguity

8.3 CNC/PLC Controls (where applicable):- The general requirements of CNC/PLC controls shall be submitted. Technical details including make and model should be furnished.**9.0 Noise level**

Noise level of the compressor with canopy during operation shall not exceed 85 +/-5 dB at a distance of 7m when measured as per IS 11446-1985 or ISO 2151-1972 in free field condition. The actual noise level shall be indicated.

10.0 Inspection and testing at firms premises:**10.1** The contractor shall submit test certificates for all mechanical, electrical equipment, cables, filter, valves etc.**10.2** The manufacturer should demonstrate the load test conforming to requirements of ISO-1217 (latest on the offered Elect. Driven Air Compressor) at the manufacturer's works. Rigidity of the machine must be demonstrated to the satisfaction of the appointed Inspector or Inspecting Agency. The tenderer should furnish the actual load test scheme**11.3** The demonstration/inspection of the compressor shall also be carried out to verify the power consumption at manufacturer's premises for a period of at least 8 working hours for one compressor at full rated capacities are attained**10.4** The contactor shall submit material test certificates for structural steel and mechanical components such as couplings, filter, valves, controls etc.

- 10.5 The equipments shall be tested in all respects in conformity with QAP in the presence of Railways or his duly authorized representative before dispatch from the contractor's premises. The manufacturer shall inform the Railway at least 4 weeks prior to the testing of the Electric Driven Rotary Screw Type Air Compressor at manufacturer's works.
- 10.6 All electrical and mechanical equipment shall be tested in accordance with the appropriate Indian Standard at either the Electric Driven Rotary Screw Type Air Compressor maker's or equipment manufacturer's works and test certificates provided if required by the Purchaser or his representative.
- 10.7 Railways reserves the right for surveillance inspection of firm after placement of order to assess the ongoing process of manufacturing and facilities available with them. In case the inspection team observes the deficiencies/ deterioration in infrastructure/manufacturing capability at the firm's premises, the action can be initiated as considered appropriate on merit.
- 10.8 The contractor shall provide, arrange all the facilities for conducting the test.

11.0 Erection and Commissioning

- 11.1 The contractor shall arrange erection and commissioning of the electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors. Adequate number of teams of technical experts will be made available so that erection and commissioning delays are eliminated. Such personnel will be required to be present immediately as soon as the electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors has been received. The Contractor or his agent would be required to inspect the consignment at the consignee's end before unpacking is done and carry out a joint check of the receipt of components to avoid subsequent complaints regarding short shipment or transit damages.
 - 11.1.1 The contractor or his agent shall commission and prove out the machine successfully as per scheduled time frame
- 11.2 Following items of work shall be performed by the contractor
 - h. Installing of the electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors structure and associated machinery in position.
 - i. Complete fitting and wiring of all electrical items
 - j. Commissioning of the equipment. The electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors performance shall be demonstrated after successful commissioning.
- 11.3 In the interest of early commissioning, the supplier shall ensure minimum amount of assembly is necessary at site. Site welding and riveting shall be avoided as far as possible. The supplier, before proceeding with design details, shall satisfy himself about the site conditions so as avoid any difficulty at the time of erection.
- 11.4 The electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors shall be inspected and tested during different stages of its manufacture, starting from raw-materials till the completion of the electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors, by the Purchaser or his authorized

representative at the supplier's or his sub supplier's works. The Quality Assurance Programme (QAP) will be submitted by the suppliers for approval from Railways. However, the purchaser or his authorised representative is free to institute any further checks also, if he so desires, and shall be in no way bidding on the Purchaser.

- 11.5 All electrical and mechanical equipment shall be tested in accordance with the appropriate Indian Standard at either the electrically driven, rotary screw, air-cooled, microprocessor based stationary air compressors maker's or equipment manufacturer's works and test certificates provided if required by the Purchaser or his representative.

12.0 Start-up and trial operation (commissioning) tests

- 12.1 The contractor shall carry out the start up trial operation test (commissioning tests) on receipt of authorization from the Engineer. The following tests are to be carried out by the contractor as part of the commissioning Tests:

- (i) The contractor his authorized agent shall demonstrate the air compressor performance after successful commissioning at the respective consignee's works for a period of two 8 hrs. shifts. Thereafter the consignee shall watch the machine performance for a period of one month or minimum 100 hrs. of operation, whichever is later before final proving-out test certificate is issued.
- (ii) The strength of the insulation of the various items of electrical equipment, cabling and of the installation as a whole shall be tested with 500V meggers.
- (iii) The earthing of the equipment shall be tested as per Indian Electricity Rules.
- (iv) Verification of dimensional tolerance and clearances.
- (v) The satisfactory operation of each controller, switches contractor, relay and the other control device and in particular the correct operation of all limit switches.
- (vi) The correctness of all circuits, and interlocks and sequence of operations.
- (vii) The satisfactory operation of all protective devises.
- (viii) Compliances of the electrical equipment with the time rating indicated in the specifications.

- 12.2 The trials shall be carried out initially under no load condition, and on satisfactory compliance of this, the trail shall be repeated for various loads until the full rated load and operating range are covered.

- 12.3 During the trail operation, all necessary adjustments shall be made so as to ensure compliance with the operating characteristic for the complete equipment as stipulated in the Technical specifications.

13.0 Ancillaries

- 13.1 The ancillaries such as non-return valves, in line filters, moisture separators etc. shall be of preferred make. The contractor shall obtain prior approval from the Railway for these makes before he commences work.
- 13.2 The contractor has to ensure that the different items are fully compatible with the requirements of the entire system.

13.3 Information to be furnished by Contractor

The tenderer shall confirm that all clauses of these specifications will be fulfilled. He shall furnish full particulars against each of the items indicated in **Schedule I** along with GA drawing.

13.4 Lubrication

Contractor shall furnish detailed specifications of the recommended lubricants, their brand names and the quantity required for one year consumption.

14.0 Proving-out Tests**14.1 Performance Tests**

The contractor shall submit a copy of the manufacturers Type Test Report (in accordance with IS: 1217 for the design of compressor to be supplied.

14.2 Proving-out Test

14.2.1 Routine tests shall be carried out on each compressor (as per IS: 1217) at the manufacturer's works in the presence of Railway's authorized representative, to establish the capability for the following guarantee parameters –

- a) Free Air delivery
- b) Shaft in-put at full load and delivery pressure
- c) Specific power consumption at full load.
- d) Moisture content

14.2.2 Permissible variations from the guaranteed values shall not exceed -3%, +3% and –4% for free air delivery, shaft input and specific power consumption respectively.

14.2.3 If the contractor fails to demonstrate the guaranteed performance figures indicated in clause 4 above, the Railways shall permit the contractor to carry out necessary modifications and repairs and to repeat the routine test at his works.

14.2.4 After satisfactory completion of the trial operation test and proper sequence control at site, the contractor shall establish to the satisfaction of the Railway, the performance of the compressed air plant as below:-

The compressors and dryers shall be capable of trouble free operation and work satisfactorily over a continuous period of one week, during which they shall be subjected to the normal demand from the shops in a complete shift during each of the days.

14.2.5 Routine tests shall also be carried out on compressor (as per IS: 1217) at the manufacturer premises in the presence of Railway's authorized representative, to establish the capability for the following parameters –

- a) Free Air delivery
- b) Shaft in-put at full load and delivery pressure
- c) Specific power consumption at full load.
- d) Moisture content

15.0 Bought Out Items:

15.1 The tenderer shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the tenderer and proposed to be used, along with the manufacturer's name, brand model etc. The successful tenderer may be required to

produce invoices to ensure genuineness of such products / verification by the Inspecting agency.

- 15.2 The tenderer should clearly indicate that in case of components/sub assemblies taken from reputed companies such as Vickers, Rexroth, RITTAL, THK, and Shenburger etc., the parent company has already entered into contract with their Indian units/affiliates for undertakings repairs/after sales service during warranty and post warranty.

S. No.	Sub-assembly	Make
1.	Microprocessor & Drive Controller	SIEMENS/FANUC/Heidenhain/MISTUBISHI or OEM make
2.	Hydraulic system	Rexroth/Vickers/Yuken/Parker/Eaton
3.	Feed back devices	Heidenhain, Fagor, Siemens, Fanuc
4.	Ball screws	THK/INA/Tsubaki/Rexroth/Steinmeyerstar/Gamfior/Schenburger /Shuton.
5.	Spindle Bearings	FAG/SKF/Timken/NTN/KOYO
6.	Lubrication System	Cenlub/Dropco/Vogel/ Rexroth
7.	Electrical Control Cabinet	RITTAL/ Siemens/BCH or of other reputed make IP55 Protection level
8.	Servo Controlled Voltage Stabilizer	Neel/Servomax/Consul/Aplab
9.	Bearings	SKF/FAG/NBC/Timken
10.	Electromagnetic clutch	Vortex/Ghatge Patil
11.	A.C. Motors	NGEF/BBL/ABB/KEC/Crompton/SIEMENS
12.	Brake motors	Siemens/KEC/Crompton/NGEF/BBL
13.	D.C. Motor	KEC/Siemens/Crompton/NGEF/BBL
14.	Contactors	Siemens/BCH/ABB/Lakshmi
15.	Limit switches	BCH/Siemens/L&T
16.	Push button	Teknic/Siemens
17.	'O' Rings & rubber seals	Merlin/Parker/Busak/Hunger
18.	Pneumatic Control Equipment	Festo/Shavo Norgen/Shradder Scovil/Electro Pneumatics/Luthra
19.	Control gears	L&T/Siemens/BCH/ABB/Shneider
20.	Filters	Hydac, Hydroline
21.	Cable/wire	Finolex
22.	Gear reducer	Elecon/Greaves/Shanthi/ZF/New Allenbury
23.	AC Drive	Fanuc/Siemens
24.	AC servo motor	Fanuc/Siemens
25.	DC drive	Siemens, KEC
26.	PLC	Siemens/Messung/Hitachi/Mitsubishi
27.	Couplings	Fenner/Love Joy Inc., USA/Flex Couplings, Pune
28.	Air circuit breaker	Siemens/L&T

- Note:** (i) In case any other reputed make is offered, satisfactory justification with credentials for the same will have to be given in the offer.
- (ii) The tenderer should explicitly mention “not applicable” against the items indicated above, whichever is not applicable in the offered machine.

16.0 Commissioning Spares

The contractor shall ensure availability of sufficient quantity of commissioning spares required for proper erection and commissioning of the equipment until final acceptance following demonstration of proving-out test.

17.0 General:

Deviations, Warranty /Guarantee and Dispatch of the Machine from Manufacturer Works are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

18.0 Warranty:

Warranty of M&P is to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

SCHEDULE- I (A)

Leading parameters Electric Driven Rotary Screw Type Air Compressor (500 CFM) (Supplied by consignee for guidance of manufacturer)

1	Free air delivery	500 CFM $\pm$ 30 CFM
2	Maximum Working Air pressure	10 Kgs/cm ²
3	Dust protection	Heavy duty suction filter
4	Input Supply	415 V $\pm$ 10%, 3 Φ , 50Hz $\pm$ 3%
5	Noise Level (Max.)	85 $\pm$ 5 dB at a distance of 7m in free field condition

Note:

- Free air delivery (FAD), working pressure, power and specific energy consumption shall be as per ISO: 1217 (i.e. taking into account all losses) at the point of discharge of after cooler and moisture separator.
- The FAD will be measured at the discharge terminal point of the compressor package in accordance with the CAG/PNEUROP PN2CPTC2 Test Code (Annex C to ISO 1217).
- The FAD is to be given in terms of ACFM where ACFM is actual cubic feet per minute at inlet conditions
- Performance certificate of above said Machine already supplied shall be furnished.
- Any better/ latest technical parameter may also be welcomed if accepted by Railway.
- If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
- Tenderer should also furnish clausewise remarks on technical specifications.

(B) TECHNICAL SPECIFICATION OF COMPRESSED AIR PIPELINE**1. Scope:**

The specification cover supply, erection, testing and commissioning of compressed air pipeline complete with valves, filter cum moisture separators, flanges, flow meter and other misc. fittings in the shop and its connection from the main supply of compressors.

2. Objective:

The objective is to set up a complete system that will be capable to supply the compressed air pressure up to 10 Kg/cm² to various consuming points to cater the essential load within the relevant shops/Shed.

3. Description of the System:

- 3.1 All fittings, materials and equipments supplied for laying and anchoring of pipes, valves, joints and seals etc shall comply with all applicable statutes, regulations and safety codes. The equipment shall conform to latest applicable Indian/British/USA standards. Where the above standards are in conflict with the stipulations of these specifications, these specifications supersede them. All supplies and workmanship for erection and installation of the system shall be as per sound engineering practices and of the highest standards.
- 3.2 The pipeline will be generally laid in overhead position throughout the workshop, at the height stipulated normally along structures already designed/built inside the shop covered areas. The anchoring brackets, fixtures etc are to be fabricated to suit the arrangements. Where it is necessary to lay the pipeline in open spaces the contractor will have to design, fabricate and erect suitable supports complete with pipe clamping arrangements for the pipeline depending upon the sizes, weights etc. but without infringing any equipment/structures. The structures should be designed for wind and other loads as per IS: 875.
- 3.4 Wherever pipelines or structures cross the rail tracks/roads, the structures are to be designed so as to give a clear minimum height of 6160 mm from top of rail level/road to the lowest point of the overhead pipelines. Also the horizontal distance between the centers of the track to the nearest edge of the structure should be at a minimum distance of 2745 mm.
- 3.5 The span of support structures should be so designed that the pipe joints will not come under stress due to bending of pipes due to their own weight. Where longer spans are inevitable owing to any structural obstructions the pipe line is to be supported through tie rods from the adjoining supports of such long spans.
- 3.6 The necessary brackets for supporting the pipe lines on columns will be provided by the contractor. Wherever the pipes are outside these areas, necessary support structures along with brackets have to be also provided by the contractor.
- 3.7 Where pipe lines are to be laid across the bay of a shop where EOT cranes are proposed to work, the alignment of the pipe line in such a bay has to be led above the EOT crane and again lowered to standard alignment.
- 3.8 The length of each section of pipeline between two flanged joints should normally be of a maximum of 4 standard commercial lengths. The intermediate joints shall be electrically welded. Both ends of such sections should be fitted with steel flanges. All welding by electric arc process shall be as per IS: 823 or equivalent and all gas welding process shall be as per IS: 1323 or equivalent. All welding works shall be carried out by qualified welders and the contractor shall produce proof of tests of welders. All filler materials, edge preparation, post weld treatment etc shall be as per relevant Indian Standard or equivalent. The contractor shall clearly mention in his design the codes and standards to be adopted by him in carrying out the work.

- 3.9 The nominal bore diameters of pipes at different sections as well their elevations are indicated on the general lay out drawing. These are indicative and contractor may give his own design.
- 3.10 Flanges used shall be of screwed boss type and shall be forged or machined from plates of sufficient thickness and the steel used shall conform to specifications IS: 2004 or latest.
- 3.11 Thickness of the flanges, boss, threading, PCD of bolt holes and the size as well as the number of holes shall be as per IS: 6392.
- 3.12 The flange faces are to be machined and grooved and flanges are to be mounted on pipes duly screwed as per specification IS: 6392. Joints shall be assembled with the inside of all pipes and fittings smooth, clean and free from burrs, blisters, scale, welding slag, sand and dirt. The inside edges of pipes and tubing shall be reamed after cutting to remove burrs.
- 3.13 Gaskets used at the flange joints shall be of compressed asbestos jointing materials of reliable and reputed makes conforming to IS: 2712 and the thickness of the jointing at any location shall not be more than 1.6 mm.
- 3.14 At no point, reduction of sizes of pipes shall be done by sudden step down. In the event of such necessity, a special reducing socket of sufficient length to IS 1239-Part II shall be used.
- 3.15 2 Nos. of indicating type flow meters shall be provided immediately after the isolating valves of the main header so that the volume of air passing through each grid can be regulated to suit the needs.
- 3.16 The system shall be provided with all necessary piping, fittings, isolating and stop valves, filter cum moisture separators, loops fitted with condensator, down take pipes, extensions, connections and misc. fittings. The air pipeline shall generally run over the head position throughout inside shop at height stipulated normally along the structure / column and shall be clamped on support bracket to be fixed on the column / beam girder etc. Outside shop, the pipelines shall be clamped on brackets carried on support structures without infringing any equipment / structure suitable for wind and other load as per IS: 875. The support structure should be fabricated from standard steel section conforming to IS: 226 latest version.
- 3.17 The down take shall be taken from the main distribution pipeline through a return u-bend mounted upward. The down take connections shall be running vertically along the structure and terminated with female screw ends in sufficient nos. to meet the requirement.
- 3.18 The system shall be fitted with all safety guard and safety features stipulated by statutory board and other regulatory system in force from time to time and executed as per relevant Indian / International standards.
- 3.19 The work is to be carried out on turnkey basis where in complete responsibilities rest with contractors for complete design, supply, erection, testing and of all material and equipment for the system and proving of performance to the complete satisfaction of Railways.
- 3.19 Pipe up to nominal bore diameter of 80 NB GI pipe shall conform to IS: 1239 (Part-I) latest version.
- 3.21 All down take pipes are to be provided with collector tubes with a valve to drain out moisture at appropriate height.
- 3.22 The bottom end of the collector tube shall be flanged and bolted for enabling the cleaning of tubes.
- 3.22 All down takes should be fitted with a cross Tee for taking terminal connections and where no service units are provided they should be dummied with suitable plugs.

4. Tenderers Satisfaction About Requirements.

- 4.1 The tenderer shall satisfy himself about the requirement through study of the site condition, the layout drawings and other relevant drawings available in Workshop projects Office.
- 4.2 Tenderer is advised to visit MEMU maintenance sheds of Indian Railways in his own interest for detailed understanding of application and requirement of compressed air pipeline system.
- 4.3 If the contractor feels that information furnished is any way inadequate to meet the requirement specified, he shall bring out the area of such deficiency with complete working sheet

- 5. **The successful tenderer shall have to supply the material as per the schedule of work.** Tenderer may also quote separately any item left in the schedule of material and found essential in the opinion of tenderers for successful installation and commissioning of compressed air pipe line.

6. Proving Out Tests

- 6.1 Entire pipeline, accessories, fittings etc. after erection in the field are to be field tested for performance.
- 6.2 All welded joints shall be subjected to hand hammer test while under test pressure. The welded joints should be tested radiographically. Defects revealed by the above tests shall be repaired or defective parts shall be replaced and the system retested as above. Test pressure shall be maintained until the entire section under test has been examined for leaks defects revealed shall be rectified and the sections retested. The system regardless of construction shall be capable of withstanding without failure leakage or permanent distortion at internal pneumatic test pressure equal to 110% of the working pressure. Pneumatic tests shall be performed with compressed air with soap suds applied at all joints or points where leakage may occur. Defects revealed by the test shall be repaired or defective parts shall be replaced and the system retested. Purging of pipelines will be done with air for 30 meters or till all dirt, scales and foreign matter are purged out in sections.
- 6.3 The leakage losses should not exceed 3% of the total capacity of the measuring compressor.
- 6.4 The pipe line dimensions have been designed for higher capacity than required; hence the pressure drop between the compressor house to the farthest point shall not exceed 0.3 bars due to leaks or faulty laying or excessive resistance due to inferior quality of pipes fittings and workmanship.
- 6.5 The contractor shall arrange to provide for the duration of the tests all such instruments and gauges as would be necessary for conducting the tests and hence include the cost therefore for such services in the charges for erection.
- 6.6 All instruments used for tests shall be calibrated by an approval independent or National Laboratory.
- 6.7 Should the result of the tests of the system performance fall short of the required standards prescribed, the contractor shall bear all expenses for improving the performance of the system by necessary rectification/replacement of equipment/materials and carryout another acceptance test.
- 6.8 The farthest point of supply shall be taken to determine the leakage loss. In case the total leakage exceeds a maximum of 5%, the works shall be redone at the risk and cost of the contractor.
- 6.9 The pressure loss due to leakage as measured at the farthest limit of supply of the shop/shed shall not exceed 0.3 bars. In case the pressure drop exceeds 0.6 bars (i.e. 0.3 bars over and above the maximum specified), the works will be redone at the risk of the contractor.

- 6.10 Contractor shall supply necessary catalogues, design, drawings, specifications etc for the accessories, over head structures. The contractor must also clearly specify any deviation from technical specification on particular items. General statements like “equipments shall be manufactured as per IS standard and your specification” will not be acceptable.

SCHEDULE – I (B)**LEADING PARAMETERS**

Contractor shall be responsible for successful commissioning of compressed air pipelines systems with compressors in integration

Item No.	Item description	Unit	Qty.
1.0	Procure, Install and Commission of compressed air pipe line with valves, clamps and other fittings	Set	1
1.1	80 NB GI Pipe (IS:1239, Part-I) Heavy class (C class) including cutting, threading, welding etc. bends, elbow, reducers, nut bolts, washers, with one coat of primer and two coats of synthetic enamel paint of approved make and shade (Make: TATA/JINDAL/SURYA/ ZENITH, C class Above Ground)	Meter	350
1.2	25 NB GI Pipe (IS:1239, Part-I) Heavy class (C class) including cutting, threading, welding etc. bends, elbow, reducers, nut bolts, washers, with one coat of primer and two coats of synthetic enamel paint of approved make and shade	Meter	92
1.3	CI Ball Valve suitable for 15 Kg/sq cm, complete in all respect, 80 mm dia nominal bore, Make: AUDCO,LEADER/SANT/VEESON	Nos.	5
1.4	Forged Brass Ball valve with hard chrome plated ball valve suitable for 15 Kg/sq.cm, complete in all respects, 25 mm dia nominal bore, Make: AIRPIPE/ KITZ/PARKER	Nos.	20
1.5	Support Clamp 80mm- AIRPIPE, ARCON, KAESER	Nos.	42
1.6	Support Clamp 25mm- AIRPIPE, ARCON, KAESER	Nos.	120
1.7	TEE Bolt M8 X 50mm	Nos.	168
1.8	Mounting Bracket 300mm-AIRPIPE, ARCON, KAESER	Nos.	42
1.9	Branching Reducer 80mm X 25 mm	Nos.	20

Note: (i) The payment shall be made on the basis of actual quantities executed under various item(s) and the accepted rates thereof, and not on the quantities mentioned in the above Schedule-I.

(ii) Before fitting, pipelines may be got tested at required pressure (operating pressure x factor of safety). Contractor should facilitate necessary testing as per engineer's requirement.

**SPECIFICATION FOR CAMTECH DESIGN OF HYDRANT SYSTEM FOR QUICK WATERING
ARRANGEMENT FACILITIES**

1.0 Description:

The scope of supply shall include design, supply, installation, testing, commissioning and proving out of **HYDRANT SYSTEM FOR QUICK WATERING ARRANGEMENT** and parameters specified in technical specification. It includes all the concomitant accessories/equipments/works as detailed in the specification and other accessories, which the manufacturer considers essential to make the machine fully operational, when installed, commissioned and connected to power source and other utilities as per instructions and conditions of contract. It shall also include installation and commissioning of related equipment, supply of spares, training of personnel in operation and maintenance of machine and supply of technical documentation.

2.0 Likely sources of manufacturers & supplier :

- (i) M/s MECO TECHNOLOGIES Pvt. Ltd. Kolkata,
- (ii) M/s SAIRAM CONSTRUCTIONS, Chittor, Andhrapradesh
- (iii) M/s DRONKAR AND BROTHERS, Indore, MP
- (iv) M/s NISSAN CLEAN India Pvt. Ltd. , Ahmedabad, Gujrat

Note: Bidders may quote for any of the reputed brands from the above or authorized representative of above likely sources(if provided). However, makes quoted other than 'Likely Sources' can also be considered in case enough documentary evidences in support of proven design, successful supply and satisfactory performance in Railway Industry, adequate manufacturing capacity, established quality norms of Railways or similar heavy industries are submitted along with offer or later.

- 2.1 **The system** with all accessories spares etc.
- 2.2 All related material required for inspection, erection and commissioning of the equipment and fixing accessories shall be included in the cost of basic machine.
- 2.3 Tool boxes containing all tools (Electrical and Mechanical) required for the maintenance of the machine should be supplied along with the machine. Tools shall be supplied in two different tool boxes, with individual pocket for each item and shall be of MEKASTER/TAPARIA or reputed ISI make. Unit cost of machine will be inclusive of cost of tool box.
- 2.4 Necessary information regarding the conditions under which the machine is to be used, together with other particulars necessary for manufacture and commissioning of the equipment, are given in Schedule-I. Sub mission of Catalogues, specification and related drawings for approval to Railways by successful bidder.
- 2.5 The system shall be designed, manufactured, erected and tested as per the latest relevant IS specifications.
- 2.6 The bidder's attention is drawn to the **Special Conditions of Contract for Mechanical Works and General specification of M&Ps (Appendix-A)** specified in Tender Document.

3.0 Scope of Supply:

The scope includes Design, Supply, and erection and commissioning of Water distribution system Manual/SCADA control consisting of suction and delivery piping, flow and Energy meters, pressure gauges, pressure transducers, Electrical actuate valves, Bi-pass valves, and

other accessories complete to provide Watering arrangement in Pit line at Anara MEMU/Coaching SHED.

- a. Laying of hydrant pipe line on pit line with proper clamping & fastening arrangement of delivery pipes with brackets as per standard design approved.
- b. Generate water operation APP which should be installed in PC & mobiles so that can be operated from anywhere from platform as per field requirement. System faults must be reflected through this APP so that operational safety is ensured.
- c. Suitable hose pipes and nozzles for watering MEMU Cars/Coaches.
- d. System should facilitate full rake as well as part rake watering.
- e. System should be operable in quick watering as well as normal watering mode both.

General requirements:

- (i) All materials shall be new and best quality conforming to specifications and subject to the approval of WPO.
- (ii) All equipment shall be of the best available make manufactured by reputed firms or specified makes.
- (iii) All equipment shall be installed on suitable foundations, true to level and in a neat workmanlike manner.
- (iv) Equipment shall be so installed as to provide sufficient clearance between the end walls and between equipment to equipment.
- (v) Piping from pump house/supply line should be done as per the site conditions without affecting other work. Piping within the pump house shall be so done as to prevent any obstruction in the movement within the pump house. In case of connection from supply line, proper connection to be insured with minimum pressure loss.
- (vi) Each pumping set shall be provided with a sluice Valve/butterfly valve on the suction and delivery side and a dual plate type return valve on the delivery side.
- (vii) All delivery headers/hanging pipes within the pump house shall be floor supported.
- (viii) Location for the Booster pumping arrangement will be decided by WPO and the drawing will be provided in time.
- (ix) Booster pump arrangement design must be capable of watering entire 24 coach length train in 5 minutes.
- (x) Proper back pressure arrangement should be provided to the system for the safety of the entire system of pipe line.
- (xi) The entire system should as far as possible consume minimum Electrical power supply. Pumps and other all accessories should be of reputed Brand/Make with ISO certification.
- (xii) The implementation of quick watering system must be done taking guideline from CAMTECH report as well as guidelines from WPO/Local authorities.
- (xiii) The salient feature of the recommended watering system of 'CAMTECH' are as under:
Water flow from 200 m³/hr to 600 m³/hr.
- (xiv) Design and drawing will have to be developed to meet the requirement and get approval of WPO before supply of all pumps and accessories. Required design calculations with factor of safety considerations etc must be submitted at the time of approval. However such approval will not indemnify the contractor towards establishing the field performance.
- (xv) **Safety Gear** - The Contractor should supply all personal protective gears to his staff for the purpose of carrying out the work. The Contractor shall remain fully responsible for ensuring safety and in case of any accident, shall bear the cost of all damages to his/her/their equipment & men and also damages to the Railway.
- (xvi) The Contractor should ensure all Fire Prevention measures and any Damage if occurred due to Contractor will be recovered as per norms.

Basic Principle:

Flow requirement is varying from 200 m³ /hr. minimum to 600m³/hr. maximum as per CAMTECH report but it is necessary to maintain constant pressure for feeding water to coaches while considering the following points.

- a) Optimum power consumption.
- b) No wastage of water.
- c) Minimum manual interface.
- d) Flexibility of operation on D.G set.
- e) Flexibility of operation in auto and manual mode.

One single large pumping unit is not suitable for the requirement instead of it multiple pumps parallel with speed control to optimize the power consumption in proportion of flow and complete control of system and automation will be based on header pressure and line pressure sensed by pressure transducers fitted on appropriate location.

The work shall be carried out on turnkey basis such that the parameters to be maintained in the system are:

- (i) 3Kg/Cm² Pressure is to be maintained in all the pipe lines at any point of time during coach watering.
- (ii) Approx. 25920 litres fed to each rake (formation) or as much required.

Improvement to the en-route watering system must be based on the report on standardization of En- route coach watering system issued by CAMTECH vide letter No. CAMTECH/2008/M/C/1.0(Revised) October 2008 with latest corrections.

System comprises of the following major components: -

S N	Title	Purpose	Advantages
1	On/Off valves	To allow/disallow the liquid to pass-thru.	Can be controlled via PLC (On/Off position) hence response time increases, wastage of water decreases etc.
2	Flow meters	Quantitative measure of liquid passed	The information of how much water is consumed by each train is known. This increases the accuracy of the system.
3	VFD	To control the speed of the pump motor	The pump speed is varied as per our process pressure. This helps us to achieve the aim of the project, power consumed by pumps can be reduced, pump longevity etc.
4	PLC system	For automating the process	In Automation system Accuracy & Response of the system can be increased also the wastage of resources like water & power can be minimized.
5	SCADA, Web Servers	For remote access of the data	The authorized user can access the data at any place at ease.
6	2" LCD Monitors	For viewing the process graphically on line.	For Visual clarity

The Recommended list of materials to be used for the system are detailed in schedule-I.

All the above system is detailed as schedule-I is based on CAMTECH report; however any minor variation or change in Design or working of proposed system can be done based on actual site requirements with prior approval of WPO. If any small works are to be done, it should be done free of cost duly informing to the Railway supervisor concerned.

4.0 WATERING INSTALLATION SPECIFICATION:

A. PIPING WORK Designing of pipe line :

Total piping must be divided in three segments,

- I. Piping from over head tank to pump house.
- II. Piping within Pump House, common manifold and Header.
- III. Feeder Pipe line from pump house to track and main distribution line along the track.
(* Required provision of space in pump house 4mx5m , foundation support for Hydrant Pipeline as per approved design, Digging & back filling of pipeline if required will be covered from Civil BOQ.).

Size of all above piping is dependent on required parameters as per Annexure. Piping materials:

- a. MS pipe should be 'B' class duly fabricated with all fittings must be red oxide coated and finally

enamel painted in suitable colours.

b. GI pipe should be 'B' class flanged joint.

c. Piping measurement:

- i. Suction and delivery headers for each pumping system shall be measured as per linear meter of finished length and shall include all items as given in Annexure 1 to 7. Painting also shall be measured as per linear meter.
- ii. G.I. pipes between various equipment's shall be measured per linear meter of the finished length and shall include all fittings, flanges, joints, clamps for fixing to walls or hangers and testing. Flanges shall include 3 mm thick insertion rubber gasket, nuts, bolts and testing.
- iii. Vibration eliminators, "Y" strainers, butterfly valves, slim non return valves shall be measured by numbers and shall include all items as given in the Bill of Quantities and specifications.
- iv. Check all clamps, supports and hangers provided for the pipes.

Fill up pipes with water and apply hydrostatic pressure to the system as given in the relevant section of the specifications. If any leakage is found, rectify the same and retest the pipes.

B. PUMPS AND MOTORS PUMPS:

S.N.	Description	Technical specification
1.	Pump make	Kirloskar Brothers Ltd./CRI/KSB/Jyoti
2.	Type	Centrifugal/INLine
3.	Flow rate	180 to 200 m ³ /hr
4.	Head	28 to 35 m
5.	Nozzle orientation	Side
6.	Size	As per manufacture
7.	Suction head	Flooded (Positive suction)
8.	Recommended Pipe size	Suction 150/200 mm depending as per duty
9.	Recommended Pipe size	Suction 150/200 mm depending as per duty
10.	Sp. Gravity	Water Sp. Gr. 1
11.	Efficiency of Pump	75% (+/- 3%)
12.	BKW	24.13 KW
13.	Recommended Primer mover	30 Kw/1450/2900 rpm.
14.	Shut off head	As per Pump manufacturer
15.	Pump casing	Cast iron C.I. IS 210 GR 260
16.	Impeller	Bronze IS 318 GR2/SS
17.	Casing –wear Ring	Bronze/SS
18.	Shaft sleeve	Bronze/SS
19.	Sealing	Mech. Seal
20.	Other part of Pump material	As per manufacturer

(i) Water booster Pump system for water supply:

The packaged water booster pump system shall be a standard product of a single pump manufacturer. The manufacturer of the packaged pump system shall also be the manufacturer of the pumps. "one of a kind" packaged (assembled) pump system shall be considered equal.

The packaged water booster pump system shall use advanced variable frequency drive and dedicated electronic pump controller to maintain a constant water pressure of 3 to 3.4 Bar to a maximum flow of 540 to 600 Cum /hr. Max supply pressure shall be 3 Bar (Positive Pressure).

(ii) Pump-Motor Sets for Hydro Booster:

The packaged pump system shall have 2 nos. identical pumps . The duty point of each pump shall be 180 to 200 Cum/hr @ 35 to 28 meters TDH. The pump minimum B.E.P. shall be 70 %. Each pump motor rating shall be 30 KW and suitable for 3 phase, 415 volts. The pumps shall be of the inline Horizontal / Vertical , Single / multi stage , centrifugal design. The pump suction/discharge

chamber (base) shall be in CI with Painting, primer facing etc on CI parts. Motor stool and pump shaft coupling shall be constructed of cast iron.

MOC of pumps should be body of Cast Iron, Impeller of bronze (LTB-2 Grade)/SS., Shaft of carbon steel, MECH. Seal fitted, MS fabricated base frame to align complete set, said common skid in this specification and coupling should be such that repairing can be done without disturbing MOTOR.

(iii) Horizontal Split Case Centrifugal Pumps:

- a. The contractor shall furnish and install pumps as outlined on the equipment schedule and described in these specifications.
- b. Pumps shall be of a single stage double suction horizontal split case centrifugal pump(s) or equal, designed to deliver the scheduled flow rate (in LPS), the specified total dynamic head (in m), at the scheduled efficiency and scheduled speed (RPM).
- c. To ensure maximum efficient throughout the operating range, the proposed pumps duty point shall be as closed as possible to the pump BEP.
- d. The efficiency curves of the proposed pumps shall have broad brands characteristic.
- e. To ensure cavitations free operation, each pump's NPSH requirement must be low enough to permit stable, continuous operation at 120% or greater of best efficiency point.
- f. Each Pump shall be factory tested hydrostatically as per HI standards.
- g. It shall then be thoroughly cleaned and painted with at least one layer of primer and follow with finishing coats prior to shipment.

(iv) Pumps Installation:

- a. Pump and motor shall be pre-aligned at the factory by the manufacturer. The contractor shall realign the pump and motor at site before start up.
- b. Alignment limits shall be according to the standards of the Hydraulic Institute or manufacturer recommendation and shall be carried out with laser alignment tools or dial gauges.
- c. Site realignment shall be carried out after grouting of base, connection of piping; system and pump casing completely bleed and filled with pumping fluid.
- d. If pump sets are installed on inertia base, it shall be properly leveled by adjusting the vibration isolation dampers below the inertia block.
- e. The contractor shall ensure that the pumps foundation/inertia blocks are accurately sized; the pump set seating face shall be properly leveled. Pump set shall be properly installed and bolted in position by anchor bolts.
- f. Piping connected to the pumps flanges must be properly aligned, free of stresses and forces.
- g. The contractor shall ensure that pumps submitted will meet the design flow, head and efficiencies as outlined in the equipment schedule.

(v) ELECTRICAL MOTOR :

Description	Tech. Specification
Manufacturer	KBL/ABB/Siemens
Type	3-phase TEFC SCR Induction Motor, High efficiency.
Voltage	415V (±10%)
Type	Squirrel cage(SER)
Frequency	50±5%Hz.
Combined Variation	±10% (Absolute SUM)
Rating	Continuous.
Insulation	Class "F" with class "B" Tem rise.
Ambient	50°C
Temp.Rise	70°C

Degree of Protection	IP 55
Frame size	As per Manufacture.
FL RPM	1475/2900
Efficiency	FL 92 ³ / ₄ Load 92 ¹ / ₂ Load 90.
Power factor	FL 0.89 ³ / ₄ Load 0.86 ¹ / ₂ Load 0.78

(I) Motor & Variable frequency drive:

The motors shall be TEFC type, class F insulation, 4 pole, efficiency class "Eff -2", should be a NEMA standard motor. Drive-end motor bearings shall be designed to absorb thrust and shall be adequately sized to ensure long motor life. The variable frequency drive enclosure shall include dry-contact fault-output relay contacts along with analog and digital inputs. The motor shall detect/protect itself against under voltage, over voltage, excessive temperature, and set-point signal fault.

(II) Motors:

- a. All motors shall be of a type constructed to relevant Indian Standard.
- b. Motors shall be selected to obtain the most suitable drive for the specified equipment, as recommended by the equipment manufacturers. Squirrel cage induction motors are preferred. Motors shall generally be three phase. Motors 1 KW or less may be single phase.
- c. Ratings shall be based on continuous duty in the prescribed environment or an ambient temperature of 43 degree C whichever is the more demanding.
- d. Motors in all cases shall be entirely suitable for the duty. A margin of not less than 10% shall be provided between the continuous rating of the motors (without overloading) and the maximum power absorbed by the item of equipment (as installed) under its most arduous operating condition, taking account of the characteristics of the driving machine. All motors up to 30 KW shall have full load efficiency of not less than 85% and power factor of not less than 85. Motors of rating greater than 30 KW shall have full load efficiency of not less than 90% and power factor of not less than 0.85.
- e. Winding insulation and general construction of the motor casing, terminal block etc. shall be to Class F, allowing 80 degree C temperature rise above ambient, unless otherwise specified.
- f. All motors shall have an isolating switch adjacent to and within sight of the motor. The switch shall be such that all conductors to the motor are isolated in one operation.
- g. Motors up to and including 3.7 KW shall be fitted with ball bearings at both ends. Larger motors shall be fitted with roller or deep groove ball bearings. Motors operating with vertical shafts shall be equipped with bearings designed to counter unbalanced end thrust. Except where noted, motors shall have a synchronous speed not exceeding 1500 rpm.
- h. All motors rated at 22 KW or more shall be fitted with thermostats or other sealed temperature sensitive devices embedded in the windings and suitable for connection to motor protection control circuits.
- i. Terminal blocks enclosed in cast iron or aluminium boxes shall be provided for all wiring. Connections to motors. The blocks shall be arranged to enable easy access for maintenance.
- j. Motors shall be mounted on a common bed plate with the driven machine wherever possible. The whole assembly shall be supported on vibration isolating material or springs to eliminate the transmission of noise and vibration into the structure. All holding down bolts required shall be supplied and fixed by this Contractor.
- k. Motors rated in excess of 5.5KW shall be supplied with anti-condensation heaters, controlled such that the heater is only 'ON' when the motor is 'OFF'.
- l. The drive selected for any machine shall be the type recommended by the Manufacturer of the driven machine and subject to approval. All drives shall be fitted with safety guards.

- m. For multi-winding motors there shall be no way that the motor isolating switch can be operated whereby any winding may be energized whilst another winding is isolated.
- n. Terminal boxes shall be of such dimensions as will ensure access to the terminals and allow room for the supply leads.
- o. Each box shall be fitted with normal bottom or top cable entry. With exception of motors with ratings less than 1 KW, all boxes shall be capable of being turned to a further 3 positions, 90 degrees apart without affecting the terminal base or terminals. Standardize frame sizes for all applications so that the minimum practical number of motors need be carried as spares. Ensure that motors of different frame sizes spared by a single motor be provided with adaptor plates, oversize couplings, oversize terminal boxes, standard keyways etc to
- p. facilitate replacement.
- q. Motors of a particular type or application shall be of the same manufacturer.
- r. Motors above 7.5 KW shall be provided with suitably sized tinned brass cable sockets. The type of cable terminations shall be as shown on the drawings. Three phase motors shall be fitted with separate earthing terminals.
- s. On all motors over 25 kg in weight, lifting eyes or lugs shall be supplied.

Unless specified otherwise, enclosures for motors shall be as follows:

Hazardous areas	:Flame proof
External	:TEFC – Tropical
In forced air flow	:TE non-fan cooled or TEFC
Areas subject hosing	:Hose proof
All other areas	:TEFC.

- t. All motors shall be provided with name plates. Motors shall have a maximum SPL of 85db (A) at 1 meter.
- u. Overloads and thermostat protection shall not be provided for smoke exhaust fan motors or stair pressurization fan motors which operate only under a fire alarm condition and are essential for fire and smoke control.
- v. Motors for fans having a dual function, e.g. smoke spil/return air fans, which are essential for fire and smoke control, shall be protected as specified above. However, such protection shall be overridden in a fire alarm condition.
- w. Protection for supply air fan motors shall be provided as indicated above and shall remain in circuit at all times.

C. OTHER ACCESSORIES :

Description	Tech. Specification
Base Plate	M.S. Fabrication with drip tray arrangements on common skid mounting
Coupling Guard	M.S. Fabricated
Coupling	Love Joy Tyre
Set of Foundation Bolts	Fabricated./KOR
Strainer	Fabricated/KOR
Valves	As per site requirement
Sluice Valve	KBL/KSB/Leader/L&T/KOR NRV
KBL/KSB/Leader/L&T/KOR Butterfly Valve	KBL/KSB/L&T/KOR
Electrically operated Valves	KBL/SAM/Leader/L&T/Imported
Pressure gauge and piping	Standard
Flow Meter	NOVA Control/ABB

I. VALVES

- i. Cast Iron Rising spindle Sluice valve: They shall be provided on delivery side, Size as per recommendation of pump manufacturer CIDF type. Valves should work for clear water having turbidity to 5000 ppm and temp ambient. Sluice valve shall be confirming to BS: 5155/IS 13095 with latest amendments. The tentative size of sluice valve shall be as per manufacturer recommendation or designed by contractor as per delivery pipe size. It shall be double flanged type PN 1.0 and PN 1.6. The valves shall withstand seat test pressure of 10 kg/cm² and body test pressure of 15 kg/cm² Duration of test shall be as per table- 3 of IS 13095-1991. Contractors shall provide test certificate for each valve.

Materials for construction of valve.

S.N	Component	Material	IS referred	Grade
1.	Body	Cast Iron	IS 210-1978	FG 200 Min
2.	Body wedge Ring	Leaded tin Bronze	IS 318 Gr LTB2	
3.	Stem	Stainless steel	AISI 410/304	
4.	Stem Nut	Leaded tin Bronze	IS 318 LTBr2	
5.	Shaft bearings	SLEEVE		
6.	Internal fasteners	As per manufacturer recommendation		
7.	External Bolting	As per manufacturer recommendation.	—	—

Marking

ISI/ B.S. Certification mark

- The manufacture's name or trade marks
- Nominal pressure of valve
- Size of valve
- Heat cost number

ii. Non return check valves

They shall be provided delivery side of each pump and size as per recommendation of pump manufacturer. The valve shall be designed in such a manner to effect non slam closure. The valve must be energy efficient with low pressure drop across the valve. To substantiate this CV values and pressure drop.

Material of construction

Body	Cast iron
Disc with hinge pin	Cast iron
Sealing	Nitrile "O" ring
Bypass	valve
Make	KSB/Kirloskar/,Audco /KOR
Working pressure	2 10 AND 16 kg / cm
Body & seat Pressure	As per IS Code

Marking

IS/B.S. Certification marks

- Manufacturer's name
- trade mark
- Nominal pressure
- Size of valve

iii. Cast Iron Butterfly valve :

They shall be provided on suction side, Size as per recommendation of pump manufacturer sandwich type. Valves should work for clear water heaving turbidity to 5000 ppm and temp ambident. Butterfly valve shall be confirming to BS: 5155/IS 13095 with latest amendments. The tentative size of Butterfly valve shall be as per manufacturer recommendation or designed by contractor as per delivery pipe size. It shall be sandwich type PN 1.0 The valves shall with stand seat test pressure of 10 kg/cm² and body test pressure of 15 kg/cm²

Duration of test shall be as per table-3 of IS 13095-1991. Contractors shall provide test certificate for each valve.

Materials for construction of valve

S.No.	Component	Material	IS referred	Grade
1	Body	Cast Iron	IS 210-1978	FG 200 Min
2	Disc	SG Iron		
3	Stem	Stainless Steel	AISI 410/304	
4	Stem Nut	Leaded tin Bronze	IS 318 LTB ₂	
5	Shaft bearing	Not required		
6	Internal fasteners	As per manufacturer recommendation		
7	External Bolting	As per manufacturer recommendation		

Acceptable make: Kirloskar, KOR, KSB, L&T Aduco. /KOR

Marking

ISI/B.S. Certification mark

- The manufacture' name or trademarks
- Nominal pressure of valve
- Size of valve

iv. Stainless Steel Ball valve

They shall be of two piece assembly design having SS Ball and SS body having seat Ring of PTFE.

Materials for construction of valve

S.No	Component	Material	IS referred	Grade
1	Body	SS	AISI 410	CF 8
2	Disc	SS	AISI 410	CF 8
3	Stem	Stainless Steel	AISI 410/304	
4	Stem Nut	SS		
5	Seat Ring	PPTe		
6	Internal fasteners	As per manufacturer		
7	External Bolting	As per manufacturer	--	--

Acceptable make - Kirloskar, KOR, KSB, L&T Aduco.

Marking

ISI/B.S. Certification mark.

The manufacture' name or trademarks.

Nominal pressure of valve.

II. STRAINERS:

i. Basket strainer:

They shall be provided on suction side, Size as per recommendation of pump manufacturer T type having both side flanged ends, should work for clear water heaving turbidity to 5000 ppm and temp ambient. Strainer shall be confirming to BS: 5154/IS 13090 with latest amendments. The size of Strainer shall be as per manufacturer recommendation or designed by contractor as per suction pipe size. The Strainer shall with stand test pressure of 6 kg/cm² and. Contractors shall provide test certificate for each Strainer.

Material of construction – body M.S. Fabricated and strainer bucket of S.S./Bronze SIZE -From 100 mm to 400 mm.

ii. Y strainer:

They shall be provided on suction side, Size as per recommendation of pump manufacturer Y type having both side flanged ends, should work for clear water heaving turbidity to 2000 ppm and temp ambient. Strainer shall be confirming to BS: 5154/IS 13090 with latest amendments. The size of Strainer shall be as per manufacturer recommendation or designed by

contractor as per suction pipe size. The Strainer shall withstand test pressure of 6 kg/cm² and Contractors shall provide test certificate for each Strainer.

Material of construction –

body Cast iron and

strainer of S.S./ Brass.

SIZE - from 80 mm to 100 mm.

D. CONTAINER OF PUMPING SYSTEM:

- M .S. Container delivery to site a complete plant room facility pre-packaged steel enclosure ready to install at site packaged pump house.
- Main structure of MS formed sections, sides of steel corrugated sheets, base of C and I sections, flooring of chequered plates.
- Two piece doors on at least three sides for maintenance and placement of equipments.
- Pallet truck as well as crane lifting arrangements whether proof enclosure.
- Thermal insulated walls with PU and FRP sheets
- Facility of drainage leakage through PVC TUBES
- Container with natural ventilation at lower and upper parts as well as with mechanical forced ventilation.
- Painting with antirust and final coat of whether proof epoxy paint.
- Provisions of flange joints of inlet outlet pipelines and stuffing box for cable entries.
- It should capable to handle the weight approx 6000 to 7000 kg with less vibration.
- Separate partition for control panel with cooling arrangement, if system required air condition then air conditioner to be provide for control panel chamber.
- Container should have proper lighting inside and outside as per specified by railway department with proper cooling arrangement.

E. SCADA AND PLC SYSTEMS:

A dedicated pump logic controller shall be a Multi pump controller or approved equal. The controller shall have a large graphical display with VGA 240 X 320 pixels. The logic controller shall be modular in design and should be expandable based on the system requirement. The controller should have following minimum communication ports:

- Ethernet port for remote connectivity.
- Service port.
- IO port for system expandability.

The controller shall operate the pumps to maintain the required system pressure while using minimum energy.

As flow demand begins, one of the pumps will start at low speed. As demand increases, the pump will speed up until it reaches full RPM. At this point the second pump will start. The speed of the first pump will vary until it builds up required system pressure. This sequence will continue for additional pumps. Pumps will changeover automatically to maintain the system pressure depending on demand, time, and fault.

When flow demand is zero, the system shall shut off. If the system runs continuously, the lead pump shall alternate every 24 hrs. If the system includes an optional standby pump, the controller shall exercise the standby pump as a part of the system and equally run the pump as other pumps in the system. The controller shall accept a low-suction pressure or other suction fault input to shut

down/protect the system. Means should be provided for friction loss compensation for increased consumption rate. Booster set should incorporate following "Power saving features" as standard. Selection of 3 basis set points for pressure relative to time. Pipe compensation i.e., Change of set point depending on water consumption mpulsory change of starring of sequence i.e., equal operating time for pump, both for frequency control and ON/OFF regulation. Inputs and outputs for external communication. A small sized pressure tank (as per the BOQ) to provide for reducing Impact of water hammer. Diaphragm pressure tank shall be in MS construction, suitable for 10 bar pressure rating. The tank should have an interchangeable membrane with tiered membrane design and with built – in pressure gauge. The functions of the controller should incorporate the following features. Ethernet connectivity for remote monitoring and control. Graphical view of the system with status indication of the complete system.

- Trouble free step by step installation wizard.
- Open loop control.
- On/Off operation at low flow.
- Automatic cascade control of pumps.
- Selection of switching sequences, automatic pump change and pump priority.
- Manual operation.
- Analog set point influence.
- Friction loss compensation.
- Set point adjustment.
- The remote control functions should have the following features.
- Control and monitoring of the system from remote location on Ethernet.
- Remote system On/Off –Hardwired Interface.
- Switching of individual pumps.
- Remote common alarm – Hardwired interface.
- Individual pump status through potential free contacts.
- The monitoring functions will have the following features.
- Pressure Loop.
- Pre pressure.
- Motor protection.
- Water shortage monitoring.
- Data of VFD through RS – 485 (Modbus protocol).

I. PROGRAMMABLE FUNCTIONS:

The display shall be menu driven for status indication, Operation, alarm and settings. System functions shall be programmable through the display. These programmable menu functions/ settings and information shall include, but not be limited to :

- Large graphical display with overview of the system including key measuring points.
- Backlight display.
- Menu bar for easy navigation.
- System information and status.
- Control functions.
- PI control setting.
- Setting of alternative set points.
- Setting of primary sensor.
- Setting of Redundant primary sensor.
- Automatic pump alterations.
- Automatic cascade control of pumps.
- Set point adjustment and control.
- Pump priority.

- Standby pump designation.
- Friction loss compensation (set point).
- System pressure set point.
- Actual system pressure.
- System faults.
- High and low discharge pressure shut-down limit.
- Analog input for remote set-point control.
- Digital input for remote stop/start.
- Data communication for remote control.

II. LOG AND STATISTICS:

The system shall be capable of obtaining and logging the valid operation data and statistics such as System performance, Energy consumption, Water consumption, Alarm and Warning Log etc.

III. CONTROL CABINET:

The controller shall be mounted in a control cabinet of CRCA Sheet Metal construction with an IP 20 enclosure of suitable rating (or specified optional cabinet) with the keypad and display screen mounted through the outer door. In addition to the electronic pump controller, the control cabinet shall include circuit breakers for each pump and the control circuit and control relays for alarm functions.

- Control cabinet shall include the following, but not be limited to:
- Motor protection
- Dry run protection
- Bus communication
- Display with VGA 240 X 320 pixels
- Pump Fault Lights – A Red light for fault indications Visual Alarm
- Manual Operation

The entire packaged pumping system shall be mounted on a Hot Dipped Galvanized MS or SS fabricated skid. The control cabinet shall be mounted in one of the following ways depending on the size of the cabinet.

On a Hot Dipped GI MS fabricated control cabinet stand attached to the system skid. On a Hot Dipped GI MS fabricated skid, separate from the main system skid. Floor mounted control cabinet with plinth. Delivery manifold shall include a pressure gauge pressure sensor. The suction manifold shall have as standard a pressure switch, and pressure gauge. The pump performance curve shall comply with the tolerance standard according to ISO 9906

5.0 ELECTRICAL INSTALLATION:

A. GENERAL:

The Contractor staffs, who are working with Electrical works in this contract, should possess valid competency certificate. This section covers the general requirements for electrical work to be installed under this specification. The Contractor shall supply and install all electric wiring, switchgear etc., necessary for the complete, safe and satisfactory operation of the plant covered by the Specification. All electrical wiring and cables shall be properly tagged to the satisfaction of the Consultant / E-I-C. All equipment provided shall be 'tropicalized', i.e. designed for use in conditions up to 50°C ambient air temperature and 100% relative humidity. All equipment, materials, workmanship and fittings shall comply with the appropriate Indian Standard or Code of Practice as listed in the relevant paragraphs of this Section, or any approved equivalent international standards.

B. ELECTRICAL SUPPLY:

The electricity supply shall be 415/240 Volts, 50 Hz, 3 phases, 4 wires. All equipment shall be designed to operate with a + 10% voltage tolerance without a loss of rated output. All equipment shall be connected to ensure that the phases are balanced, to the requirements of the local supply authority.

C. SWITCH BOARD AND SWITCH BOARD EQUIPMENT:**i. Motor Control Panel:**

Control panels shall be self-contained, suitable for the location indicated and an operating environment of 50 degree C, built up of enclosed compartments conforming to form 3B as per BS 5486 Part-I : 1990 and IEC 439-1 to preclude fault transference between sections of the switchboard. Control panels shall be arranged for the maximum safety of personnel. All power wiring and busbars shall be fully enclosed with isolating and insulating barriers and interlocks provided to ensure maximum safeguards. All switches shall be lockable in both of the 'OFF' or 'ON' positions. Control panel shall be of the floor standing, type tested modular design, totally enclosed "dead front" type, consisting of dished front panels and doors built up on an approved substantial mild steel angle or channel frame with no cross- struts, and shall be fitted with removable rear and end panels held in position with six fixing points.

All panels and doors shall be constructed of best quality, dead-flat CRCA MS sheet not less than 2 mm thick. Neat cut-outs shall be provided in dished panels to allow the exposure of circuit breaker escutcheons and toggles, and switch operating handles and indicators only. The edges of all outlets and drilled holes shall be burr free. Doors shall be stiffened and provided with metal based neoprene gaskets and concealed nonferrous door hinges. Door handles shall be chrome plated and incorporate a barrel type locking mechanism and shaft adjustment for increasing sealing pressure.

All switches/MCCB shall be provided with mechanical interlocks to prevent any positive access to any equipment inside the cubicle when the switch is in the 'ON' position. Dished panels shall be stiffened and held in place with chrome plated castle head nuts attached to fixed studs of not less than 10mm nominal diameter. All fixing hardware shall be cadmium plated. The removable rear panels shall be provided with a pair of handles for easy fixing/removal of the panels. Provision shall be made for lifting cubicle switchboards. Eye bolts shall not be used when subjected to shear stresses. Adequate provision and space shall be provided for bending and connecting cables, which shall be separated from switchboard busbars.

All internal small wiring shall be PVC insulated, neatly, bunched and run on supporting cleats or in trunking, colour coded and labelled or sleeved for identification. All switch-board small wiring is to terminate on labeled terminal boards or strips to which external connections are made. Insulators, including busbar supports, shall be non-hygroscopic and non- deteriorating. The use of fibrous materials, linseed oil, varnish, "Presspalin", etc is prohibited.

Low voltage switchboards shall be constructed to withstand a system fault level of 25 KA at 415 volts for 1 second. Low voltage switchboards shall be designed to comply IS: 13947:1993. Type test certificates, issued by a reputed and independent testing authority such as CPRI certifying the circuit breaker, busbar and its enclosure shall be submitted for review. Ventilating water-proof louvers are to be provided on the sides and back and are to be of approved design with internal dust baffles.

Where ventilating fans are installed, a low level, filtered air intake shall be provided. The filter shall be removable from outside the switchboard. Current transformers shall be mounted without reduction of busbars or connections and arranged for ease of removal.

ii. Wall Mounted Panel:

Wall mounted panels with an appropriate rating and number of circuits shall be provided to supply power to plant located throughout the building. Panel enclosures are to be fabricated from CRCA sheet metal of minimum 2 mm thickness and finished in enamel of a colour to the approval of the

Architect. Inside the enclosure door, a circuit chart indicating the number of ways, location of equipment, loading and protection rating shall be fixed.

All wiring terminations, busbars, and live parts within the panel board shall be adequately shrouded and an insulating front shield of minimum 1.6mm thickness shall be provided to completely screen the unit's interior. Only the operating dolly and insulated surround shall project through the shield. The units are to be provided with sufficient wiring ways for outgoing circuits at both the top and bottom of the board. Space for future ways shall be provided.

iii. Busbars:

All busbars shall be made of hard drawn high conductivity aluminium. Conductor conforming to grade 91E of IS 5082-1981, making and arrangement of the busbars, connections and auxiliary wiring shall be to relevant Indian Standard. Bus bars shall be insulated with heat shrunk PVC sleaving of 1.1 KV grade and Bus bar joints shall be provided with clip on shrouds. Busbars shall be adequately rated and supported by porcelain or moulded insulators spaced at suitable intervals, the complete assembly being capable of withstanding the maximum mechanical stress to which it may be subjected under fault conditions. Full size neutral bars shall be provided.

Busbars shall be so arranged that all conductors can be brought onto the bars without undue bending. Conductors between the busbars and MCCBs or isolators are to be high conductivity aluminium bar having a current rating of not less than that of the switches to which they are connected. The conductors are to be insulated with PVC sheathing and colour coded for phase identification. Removable bolted links shall be provided for the accommodation of current transformers for metering and protection facilities without affecting the mechanical and electrical properties of the busbars as a whole.

iv. Moulded Case Circuit Breakers (MCCBs):

All moulded case circuit breakers shall conform to IS: 13947-1993, and be of approved manufacturer throughout the project. The body and base of the units are to be moulded and the units are to be sealed after assembly.

The load handling contacts are to be silver/tungsten and the contacts and operating mechanism so designed as to give a wiping action both at make and break. The breaker operating mechanism is to be of the trip-free type so designed to prevent the load handling contacts from closing on a fault.

The toggle handle shall open and close all poles of a multiple circuit breaker simultaneously. A fault on one pole shall open all poles. The MCCBs shall have the fault level rated as per schedule of quantities. Circuit protection against overload and fault conditions is to be provided by means of a thermal magnetic device designed to give thermal operation on overload and magnetic operation under fault conditions. The position of the breaker operating dolly is to be clearly indicated for 'ON' and 'OFF'. MCCBs shall be suitable for use at temperatures of 50 C Ambient.

v. Miniature Circuit Breaker:

Single pole or triple pole miniature circuit breakers (MCB) are to be used for sub-circuit protection. All MCBs shall conform to IS: 8828- 1996. The body and base of the units are to be moulded bakelite or similar material and the units are to be sealed after assembly. The load handling contacts are to be silver/ tungsten, and the contacts and operating mechanism shall be so designed as to give a wiping action both at make and break. The breaker operating mechanism is to be the trip free type. A thermal-magnetic time tripping mechanism is to be included for circuit protection against overload and short circuit. Short circuit level of MCBs shall not be less than 10 KA. Tripping characteristics of MCBs shall be able to discriminate with upstream breakers.

vi. Isolators:

All isolators whether mounted in a cubicle type switchboard or separately mounted shall be heavy duty type conforming to the requirements of IS : 13947-1993. All contacts are to be fully shrouded and are to have a breaking capacity on manual operation as required by British

Standards. Operation of switches shall be independent of the operator's control, with a quick make/quick breakaction. The links for switch are to be high rupturing capacity.

The category of duty of the main switchboard, sub main switches and cable tee-offs shall be as indicated in the schedules. Switches and isolators mounted in cubicle type switch-boards are to be enclosed in separate sheet metal compartments, and mechanical interlocks are to be provided between the cubicle doors and the switch operating mechanisms, so arranged that the cubicle door may not be opened with the switch in the 'ON' position. Similarly it shall not be possible to close the switch with the cubicle door open, except that provision shall be made within the cubicle for authorized persons to defeat the mechanical interlock for test purposes, and close the switch with the door in the open position. The 'ON' and 'OFF' positions of all switches and isolators shall be clearly indicated by a mechanical flag indicator or similar device. In TPN switch units, bolted neutral links are to be fitted. For single pole and neutral switches and isolating switches, the neutral conductor is to be taken through a bolted link.

vii. Contactors:

Contactors or control relays are to be single or triple pole, conforming to IS :13947- 1993 (part IV Section 3). The rating shall be as noted on the drawing but in any case, shall not be less than 10A or the rating of the circuit, whichever is the greater. All ratings shall be "continuous" and all contacts shall be silver plated. Contactor coils shall operate from the supply provided.

viii. Measuring Instruments and Protection Relays:

All ammeters and voltmeters for use in conjunction with switch-gear are to be of the moving iron pattern to comply with relevant Indian Standard. Unless otherwise specified, all meters are to be 96mm dial square flush pattern with quadrant scales. Ammeters with scale deflections greater than 100A installed in the Switch Board shall indicate all phase and neutral currents. All ammeters shall have a continuous overload capability of 120% of the upper limit of the scale for two hours. Each ammeter shall be provided with an adjustable red index pointer to indicate the normal full load current. Ammeters shall be provided for motors of 5.5KW or larger and they shall be capable of starting current and shall have a compressed overload scale for this purpose. Motor current reading shall be provided on one phase only. Voltmeters shall be of accuracy Class 2 and have expanded scales.

Voltmeters shall be connected to the incoming side of the power supply through 6 ampere MCB's. Mechanical zero adjustment shall be provided for voltmeters and ammeters by means of a screw slot at the face of the meters.

Energy and maximum demand meters shall be installed as specified. Energy meters shall provide a direct, single, digital reading, without the need to apply multiplication factors. Earth fault and over current protection relays shall be as specified in the drawings. Current transformers for measurement and protection shall be of ring pattern, clamped on readily removable, bolted copper links with accessible terminals. Selector switches of the rotary type shall be provided to enable all phase currents and all phase and phase to neutral voltages to be read.

Instrument MCB shall be mounted on the panel adjacent to their associated instruments. All instrument and indicating lamp wiring behind hinged front panels shall be protected by clear acrylic sheets. The arrangement, scale deflections and ratios of all instruments and relays shall be approved prior to assembly of the associated switchboard.

ix. Labelling:

All items of equipment on the switchboard shall be labeled to indicate function with black Traffolyte labels and white engraved lettering securely fixed with chrome plated screws. Lettering shall be at least 10mm high. Labels to all switches, isolators and the like shall indicate the supply and cable details. All labels shall be approved prior to engraving. The use of adhesive labels will not be permitted. All electrical equipment not mounted on the switchboard shall also be labeled as specified above.

x. Time Delays.

Time delays shall be provided to prevent the simultaneous starting of any two motors above 3.5 kW and to prevent short cycling of automatically controlled motors.

xi. Control Switches.

All control switches shall be of the rotary type of approved manufacturer. Each control switch shall be panel mounted and engraved to clearly indicate the equipment controlled or function of the switch.

xii. Indicating Lamps:

Indicating lamps shall be individual flush mounted units. Lamps shall have chromium plated and polished solid brass body and ring with metallic threaded section and shall be circular in shape of approximately 22 mm diameter. Indicating lamps shall be of 240/110 V and rated to withstand not less than 20% continuous over voltage.

Lamps shall be well ventilated and the design shall permit removal of lamp glasses and bulbs from the front of the unit without the need of any special tool. A push button lamp test facility shall be provided for all switchboards.

Indicating lamps shall be colour coded as follows:

Green- Motor stopped, circuit breaker OFF
 Amber-Supply available
 White- Valve open, circuit breaker auto trip
 Red- Motor running, circuit breaker ON
 Blue- Valve closed
 Control circuit shall be of 240V supply

xiii. Push Button Switches:

Push button switches shall comply with and be tested and certified to relevant Indian standard. Electrical rating shall be 500V AC or 250 V DC as appropriate. Push buttons for alarm duty shall be minimum of 2 amp rated Push buttons for control duty shall be 10 amp rated. Push buttons shall be individual flush mounted units with metallic chromium plated and polished solid brass body and ring, circular in shape and approximately 20mm diameter.

Unless specified otherwise, push buttons shall be colour coded as follows :

Green	-	Start motor
White	-	Open valve
Red	-	Stop motor
Blue	-	Closed valve
Black	-	Reset
protection/alarm, lamp test Yellow	-	Except alarm

xiv. Earth System:

All metal work associated with the switchboard installation not forming part of a phase or neutral circuit shall be bonded together and shall be solidly and effectively earthed through the system provided by the Main Electrical Contractor. Continuous earth bus suitable to withstand prospective short circuit current shall be provided. Hinged doors shall be connected to earth through adequately sized flexible braids. It shall be the responsibility of this Contractor to ensure that adequate means of earthing are provided.

xv. Cabling:

A cabling zone clear of busbars, switch and circuit breaker chambers shall be provided in such a manner to give minimum difficulty in connecting sub-main cables entering the switchboard for connection to switch units or circuit breakers. The cabling zone shall be fully

isolated from any live metal part so that future cabling and alterations can be carried out in complete safety without the necessity of shutting down the complete switchboard.

xvi. Terminal Blocks:

Terminal blocks for control wiring shall be rated not less than 20 amp and shall clamp the wire securely between two plates secured by a captive screw. Terminal blocks shall have easily removable copper links to short circuit adjacent terminals or shall be fitted with suitable holders where required. Pinch screw type terminal blocks will not be acceptable. Cables having the same number shall be terminated at adjacent terminals and connected by means of cable links at the terminal block. The incoming cable cores shall be terminated at the lower or outer side of the block, and the outgoing cable cores at the upper or inner side of the terminal block, and cable links on any free side. Terminal blocks at different voltage, shall be segregated into groups, distinctively labeled and provided with permanent rigid barriers. Terminals in groups shall have separate non-combustible transparent plastic covers. 100% spare terminals shall be provided on each terminal block.

xvii. Wiring Diagrams:

Prepare construction layouts and functional wiring diagrams of all switchboards, which shall be reviewed prior to commencement of any work thereon. The wiring diagrams shall show control circuits separate from main circuits and shall indicate the size of each conductor and the colour, number and/or terminal connection designation of each control conductor. Switchboard drawings shall include a schedule of all equipment mounted therein, including make, model, and where applicable, fuse rating and set point of all variable adjusters. Circuit diagrams shall be mounted near the switchboard in an approved location and shall be covered with either glass or clear Perspex sheet not less than 3mm thick.

xviii. General Requirements:

The Contractor shall ensure that the switchboards ordered can be accommodated (together with the control cubicles) in the space provided. A rubber insulating mat shall be placed in front of the switchboard for its entire length.

D. PVC INSULATED ARMoured COPPER CABLE:

Cables of this type are to be 1100 volt grade complying to IS-1554-1998 with each conductor of the same cross sectional area. PVC insulated and colour coded cores shall be sheathed with PVC which shall serve as a bedding for galvanized strip armouring. The armouring shall be covered with an outer PVC sheath. Cables shall be terminated in a gland fitted with an armour clamp. The gland body shall be provided with an internal conical seating to receive the armour wires ensuring that the armour wires are tightly clamped between the armour cone and conical armour seating. The minimum bending radius for power cables shall be twelve times the overall cable diameter. When cables are run on a wall they shall be cleated at distances not exceeding 1 meter.

E. PVC INSULATED ALUMINIUM CABLES:

PVC insulated aluminium cables shall comply with IS:1554-1988 (Part I). Cables are to be 1100 volt grade depending on size.

i. Wiring:

The current carrying capacity is to be in accordance with IEE Wiring Regulations and is to be limited by the allowable voltage drop. All wiring shall be carried out on the loop-in system. For conduit wiring systems, wiring shall be drawn into the conduits after the whole of the conduit installation has been completed. No joints or connectors will be allowed in any such cables, except that connectors may be used in accessible positions within lighting fittings or device outlet boxes. All cables shall be colour coded consistently over their entire length. Red, yellow and blue shall be used for phase conductor and black and green for neutral and earth respectively.

The maximum number of cables that may be accommodated in a given size of conduit, cable tray, trunking is not to exceed the number given in the Indian Standard. Where wiring penetrates fire walls, then these shall be sealed using fire retardant pillows packed tightly on both sides of the penetration. Internal fire barriers within trunking shall also be provided. All fire retardant materials used shall be to the approval of the Architect and local authorities. Floor penetrations for cable risers shall be made weatherproof progressively during construction to minimize damage due to the weather. Where wiring penetrates vapor barriers, adequate air tight seals shall be provided.

Wiring shall enter the low temperature area via conduit and the conduit itself shall be sealed internally to provide an airtight barrier within the conduit. All wiring associated with equipment necessary for fire and smoke control shall be provided.

ii. Conduit:

All conduits shall be heavy gauge galvanized/black enamelled ERW steel complying with relevant Indian Standard. No conduits shall be less than 25 mm nominal diameter. Conduit shall be concealed in concrete as construction proceeds, and so arranged as to drain naturally to outlet boxes. Prior to laying this, Contractor shall check with the Contractor responsible for the building work that conduits of the sizes proposed will not affect the structural integrity of the concrete. Sealing caps shall be placed on all conduits before concrete pouring commences to ensure no water enters the conduit. Expansion couplings shall be fitted at all building expansion joints. Surface conduits shall in no circumstances be fixed to floor slabs.

All conduit systems are to be installed fully in accordance with the requirements of the IEE Regulations. All conduits shall be swabbed through to clean out all dirt, burrs and moisture. All sets and bends in conduit runs are to be formed on site with bending machines. Distortion of conduits due to bending is not acceptable. Runs between draw-in boxes are not to have more than two right angle bends or their equivalent and the length of such runs shall be limited to 12 m to permit easy drawing-in of cables. Flexible conduit shall be used for final connections to equipment subject to vibration. The conduit shall be watertight with the provision of separate earth wire enclosed for earth continuity. All flexible steel conduit shall be PVC sheathed. The contractor shall make good any damage to the finish of all conduits including threads cut at site, by painting damaged areas with two coats of aluminium primer paint.

Supply for review prior to installation conduit layout drawings for the entire installation. The approved set shall be kept upto date on site and on completion, three sets of record drawings shall be provided for record purposes.

iii. Conduit Boxes:

All conduit junction boxes are to be malleable iron (surface mounted) or mild steel (concealed) and of standard pattern. Standard pattern boxes are to be used with conduits up to and including 25 mm diameter. Rectangular pattern boxes are to be used for conduits of 25 mm diameter and larger. For the drawing-in of cables, standard pattern through boxes are to be used. All conduit boxes are to be galvanized finish.

Adaptor boxes are to be of galvanized zinc passivated mild steel not less than 3 mm thick. Boxes are to be not less than 5 mm deep and of such dimensions as will enable the largest size cable for which the conduit run is suitable to be drawn in without excessive bending of the cables. Covers of approved material with fixing screws are to be provided. All boxes are to be drilled for holes according to the conduit entries required.

All conduit entries to adaptor boxes, outlet boxes and switchgears are to be made with couplings and hexagonal male bushes. The protective coating of the boxes shall be heavy both inside and outside.

iv. Cable Trunking:

Metal trunking shall comply with BS 4678 and shall be manufactured in minimum lengths of 2 m from 2 mm thick zinc sprayed sheet steel finished with rust resisting primer and sprayed overall grey enamel. Covers are to be held in place by screws. Trunking shall be terminated with end flanges bolted directly to switch or distribution boards. Connecting pieces are to be used and bolted with cadmium plated mushroom head steel screws, nuts and shake-proof washers. Each joint is to have a copper link to ensure electrical continuity. Conduit entries to trunking shall be made with couplings and brass make bushes. Knockouts will not be required and trunkings may be drilled on site.

Trunkings shall not contain more cable than allowed by the space factors described in the IEE Regulations.

Each joint shall have a copper bond bolted to each adjacent trunking to ensure electrical continuity. All frayed and sharp edges shall be removed from trunking before installation. Conduit entry to trunking shall be by coupling and male bush. Knock-outs shall not be provided, and trunking shall be drilled on site. Where trunking crosses expansion joints, a trunking system which will allow for expansion and maintain earth continuity shall be used. The system used shall be reviewed by the Architect prior to manufacture. Where the trunking passes through floors or fire compartments, fire resisting barriers shall be provided.

All supports and hangers shall be of hot-dipped galvanized mild steel construction with min. coating thickness of 85 micron and 210 micron for indoor and outdoor installation respectively. All bolts and nuts shall be electroplated with zinc or cadmium with min. plating thickness of 25 micron.

v. Cable Trays:

Cable trays are to be of perforated pattern 1.6mm minimum mild steel with returned edges galvanized overall. Trays shall be supported from the soffit of structural slabs and beams by mild steel rods not less than 6mm diameter and under slung mild steel angles, or alternatively, supported on steel angle brackets secured to walls. The former method shall be preferred where practicable. All supports and hangers shall be hot-dipped galvanized with bolts and nuts electroplated.

vi. Starters:

Contactors used in starters shall be of Class AC3 type provided with silver alloy contacts. Auxiliary contacts shall be provided to facilitate the connection of interlocks, status indication and auxiliary controls. Unless explicitly described, a minimum of one normally open and one normally closed contact shall be provided.

Each starter shall be completed with protection incorporating the following features :

overload protection in each supply phase adjustable from 80 to 120% of full rated load.
Manual reset

Phase failure protection

Ambient temperature compensation

An auxiliary contact to signal an overload condition.

Contactors or complete starters not mounted in switchboards shall be contained in metal or approved plastic enclosures with conduit entries, shrouded "stop" and "start" push buttons and a manual "reset" button, which may be combined with the "stop" button. Generally, reduced voltage starters of the following type shall be selected :-

Motors from 5.5 kW to 150 KW Star delta Motors in excess of 29 KW

Each starter of the open transition "Star-Delta" (OT.SD) type shall include the following:

One (1) main-line contactor suitably rated for the motor.

Star and Delta configuration contactors suitably rated for the motor, mechanically and electrically interlocked to prevent simultaneous operation.

One (1) triple pole overload relay meeting the requirements as specified previously in this clause under 'Generally'.

One (1) approved time delay relay, with at least 0-30 second adjustable time delay period, to control the star to delta switching contactors. Closed transition reduced voltage starters shall be approved type and manufacture and shall be capable of starting the motor from stopped to full load speed without interruption and in such a manner that the torque developed by the motor increases as uniformly as practicable during the whole starting sequence.

Closed Transition "Star-Delta" Starters (CT. SD)

Each starter of this type shall include the following equipment :-

The equipment as specified in Clause "Open Transition Star-Delta Starters (OT.SD)".

A suitably rated transition resistance bank such as to allow approximately full load supply current when in circuit prior to opening of the star point. The short time rating of the resistors shall also be considered in relation to the length of their "in circuit" requirements. A transition contactor suitably rated to facilitate connection of the resistance bank during the transition period. Any additional auxiliary contacts, timers, etc required for the transition sequencing operation.

vii. Earthing:

All metal work associated with the electrical installation but not forming part of a phase of neutral circuit shall be bonded together and solidly and effectively earthed. Metal conduit, ducts and cable armour shall be earthed at the switch-board at which they originate by means of locknuts, screwed connection or cable gland.

The electrical resistance of metallic enclosures or framework to earth shall be low enough to permit the passage of current necessary to operate the device protecting the associated circuit.

The size of all earth continuity and bonding conductors shall be in accordance with the Local Regulations. All earth conductors fixed or run outside the building shall be protected against corrosion and mechanical damage.

viii. Spares:

The Contractor shall supply the following items as spares :-

- a) 20% indicating lamps of all colors and sizes.
- b) Any other spares as indicated in the Schedules.

ix. Motor Control Circuits:

For each motor provide the following :-

- a) On-off auto test switch
 - b) Blue power on light
 - c) Green pilot light
 - d) Red fault light
 - e) Auxiliary contacts for remote stop-start
 - f) Auxiliary contacts for remote status indication
- (Items e and f to be connected to a labeled terminal strip in the switchboard)

x. Radio Interference:

All equipment and systems shall be properly designed to ensure that there is no interference caused to any transmitters, receivers or other electronic equipment in the near vicinity. Should interference be detected, the Contractor shall provide free of charge devices capable of eliminating such interference.

xi. Isolating Switches:

All items of equipment shall be provided with isolating switches adjacent to the item of equipment in an accessible position. Isolators shall be capable of being padlocked in either the on, auto or off positions.

Isolators for motors and equipment which are essential for fire and smoke control shall be labeled as specified elsewhere and in addition a second label with white lettering on a red background reading: **WARNING – ESSENTIAL FOR LIFE SAFETY.**

Do not switch off except in absolute emergency shall be provided.

xii. DDC/BAS Interfacing:

For installations incorporating a DDC/BM system, a separate terminal strip shall be provided in each switchboard for connection of DDC/BM interface cabling for monitoring and for control. Terminals shall be segregated from other terminals in the same panel and shall be of a different colour.

Contacts for monitoring of status and alarm conditions shall be potential free and arranged to close when the item of plant runs or when an alarm condition occurs. Contacts shall incorporate a wiping action to provide a consistently very low contact resistance and eliminate "open circuit" (high resistance) conditions due to oxide build up on contact surfaces. Contacts shall provide positive indication, compatible with the extra low voltage monitoring supply from the DDC/BM. This Contractor shall co-ordinate with the DDC/BM Contractor to determine the control output voltage from the DDC/BM. Interface relays shall be mounted within each panel and controlled direct from the DDC/BM at this voltage. Relay coil current and relay characteristic shall be completely compatible with the DDC/BM system.

Status and alarm contacts and relay interface connections shall be individually connected to terminals (that is, two connections per item). Any looping required for common connections shall be made at the terminal strip as required.

All DDC/BM point numbers shall be shown on the wiring diagrams consistent with the DDC/BASM numbering system.

6.0 General Characteristic

6.1 Rigidity and Stability of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).

6.2 Safety Controls of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).

- 6.3 **Operational Controls** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.4 **Lighting** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.5 **Machine Maintainability** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.6 **Wear Compensation Adjustment** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.7 **Coolant System (where applicable)** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.8 **Lubrication System (where applicable)** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 6.9 **Pneumatic System (where applicable)** of the M&Ps are to be read and followed in unison with General Specification for supply of M&P (Appendix-A).
- 7.0 **Proving Out Test at consignee's works:**

The supplier shall demonstrate the machine performance and prove out the claimed capability. After such successful demonstration as herein before the consignee, the machine performance shall be watched according to special condition of contract for mechanical works.

- 8.0 **Technical Literature:** of the M&Ps are to be read and followed in unison with special condition of contract of Mechanical works.

9.0 **Special Features:**

Special features incorporated in the system, if any, shall be indicated.

10.0 **Dispatch of the item from Manufacturer Works:**

The supplier shall dispatch the machine only after all the on-site requirements from supplier's side as well as consignee's side, for installation and commissioning of the machine on arrival, have been made ready.

11.0 **Joint Receipt Inspection:**

The contractor or his agent would be required to carry out a joint check at consignee's end, along with the consignee, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages. It is necessary that this joint receipt inspection be done immediately on receipt of the machine by consignee & bidder's representative to avoid commissioning delays due to shortages/transit damages. After receipt of the machine as above a Joint Receipt Inspection note (JRI) shall be prepared by the consignee and the firms representative.

- 12 **Service Facility in India and Technical Support** of the M&Ps are to be read and followed in unison with special condition of contract of Mechanical works.

13.0 **General:**

Warranty, foundation & related drawings, Training, Deviations and Dispatch of the system from Manufacturer Works are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

Schedule -I

Hydrant system:

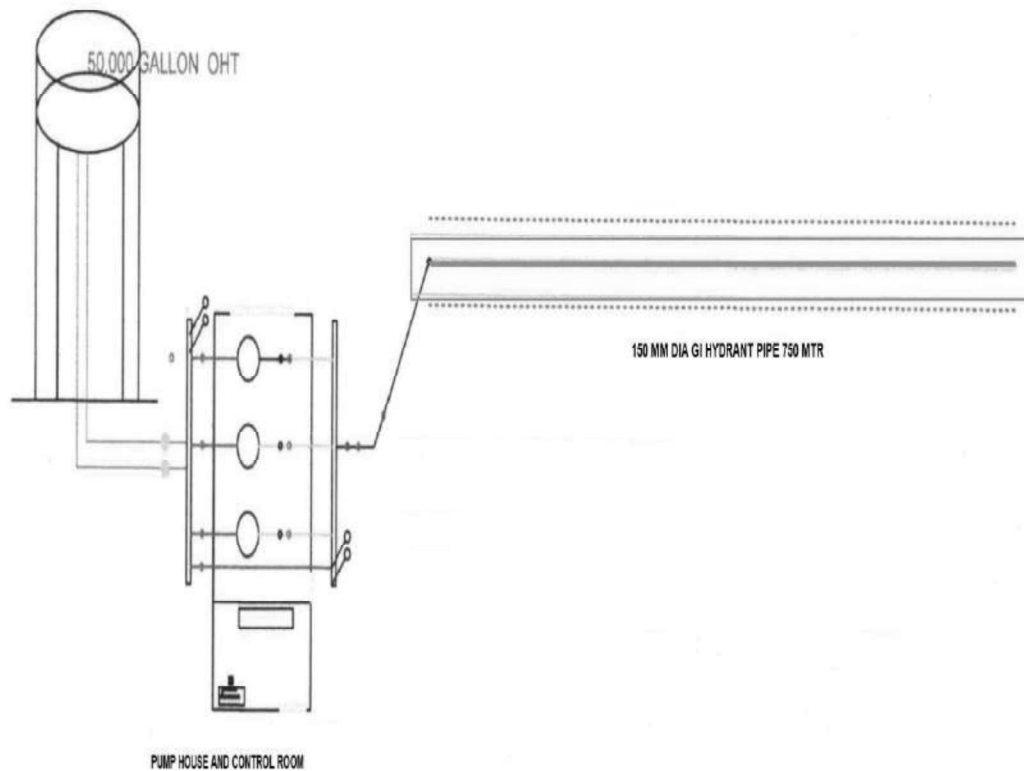
LEADING COMPONENTS FOR QUICK WATERING ARRANGEMENT

Item No	Description of Item	Unit	Qty
1	Pump sets 40 HP. 1 set= 2Nos Pump of 40 HPeach along with Electric Motor). Motor & Pumpshould be of standard manufacturer such as M/s Kirloskar./ CGL/M&P/ D&B Vertical in LineOr type/HSC.	Set	1
2	Common Skid Mounting For Pump set	Nos.	1
3	MS Fabricated Suction Main Fold	Nos.	2
4	M.S. Delivery Main Fold	Nos.	2
5	Butter Fly Valve 150 mm	Nos.	06
6	Non return Valve 150 mm	Nos.	4
7	Hydro Pneumatic Tank With Fittings	Nos.	1
8	On Line Flow meter 150NB .	Nos.	2
9	Electrical Operated Motorized Valve 150 mm make: CAIR/ZOOTO/L&T/MTPL	Nos.	2
10	Laying of 1 sqmm 2 core Shielded cableincluding lugs etc.	Meter	200
11	Laying of RS 485 communication cable	Set	6
12	2X25 mm Casing Pipe for communication and power cables	Set	5
13	Panel for operation of Valves and flow meter	Set	1
14	Power Cable From Pumps to Control Panel 16Sq mm. Copper 3.5 core including lugs etc.	Metre	40
15	Control Panel for 2 pumps With VFD , PLC, HMIFor Group Wise Pumping with APFC and suitable Capacitors.	Nos.	1
16	SITC of Smart Control to Operate system (PUMPS and valves through mobile. Communication via GSM Network including SMPS power supply This may be installed inMCC Panel.	Nos.	1
17	2 KVA Industrial UPS to give back up of minimum2 hr.	Nos.	1
18	Chemical Earthing as Per RDSO Nomes	Nos.	4
19	SCADA For 500 Tab , data analysiser, including of PC, LED of 32" Key Board, Printer , allied accessories.	Set	1
20	Suction Pressure Transducer and PressureGauges With Fittings.	Nos.	1
21	Delivery Pressure Transducer With PressureGauge With Fittings.	Nos.	1

22	Delivery Pressure Transducer With Pressure Gauge With Fittings. Various type of Small Cable to Connect control panel to UPS ,PC, and others as per site requirement in Pump Room & control room. Various Type of Luges, Cable Gland, Terminals etc.	Job	1
23	Copper wire to Connect the Control Panel,& Motors	Kg	20
24	MS/GI/Fabricated Speceres like, Tee, Enlarger, reducer, spool including nut & bolts & packing, and flanges	Kg	80
25	Supply & Fixing of 150 mm G.I. Hydrant Pipe Line with bends, distance pieces running meter.	mtr	600
26	Supply of MS/G.I. Bends 90 degree 150 mm.	Nos.	15
27	Supply & Fixing of MS Flanges 150 mm.	Nos.	50
28	Making Hole in G.I. Hydrant Pipe Line in every three meter and Fixed the M.S. Coupling with welding.	Nos.	200
29	Supply of MS reducing Coupling Size 50 X 25mm with treading to connect the G.I. Nipple 25 mm.	Nos.	200
30	Bellow seal for Hydrant Line of 150 mm G. I, Pipe Line at the interval of 150 meters length.	Nos.	03
31	Supply of SS304 PTEF seat 25 mm dia. Brass Bal valve KOR valve India(p) Ltd or TBS Engineers (p) Ltd or similar make with IS 9001-2000 Certificate or ISI standard single PC Designing Ball valve SS 304.	Nos.	200

- Bidder should consider overall cost of the hydrant system on turnkey basis before quoting rate for the items above. Any other item/component required towards establishing the performance of the system will not be covered separately.

REPRESENTING LAYOUT OF QUICK WATERING LAYOUT FOR ANARA MEMU DEPOT



Note:

1. Performance certificate of above said Machine already supplied shall be furnished.
2. Any better/ latest technical parameter may also be welcomed if accepted by Railway.
3. If above clauses are found inadequate for furnishing all necessary information of the machine offer, the Tenderer may append further information separately.
4. Tenderer should also furnish clausewise remarks on technical specifications.

**Specification for Transportation and Restoration/Renovation of NG/MG/BG Locomotive/Coach
for displaying as Indian Railway Heritage at Premises of Integrated maintenance of
MEMU, DEMU and Coaching stock at Anara**

1.0 Description:

Name of Work: Transportation of NG/MG/BG Locomotive/Coach from specified location including loading for **Integrated maintenance of MEMU, DEMU and Coaching stock at Anara yard shed** and unloading at a designated location, Restoration/Renovation of NG/MG/BG Locomotive/Coach for displaying as Indian Railway Heritage at Premises of Anara yard shed .

1.1 Sources: With prior approval of Railways before execution.

Note: Work should be got executed through a reputed heritage renovator and experienced transporter. The credential of renovator and transporter should be got approved from railways before start of the work.

2.0 General Description and Scope of Supply:

2.1 Transportation, Loading & unloading of NG/MG/BG Locomotive/Coach

- 2.1.1 The lowering & lifting of Locomotive/Coach for dismantling/separation of body from trolleys is in the scope of contractor. Railway staff only assists in removing under frame members for ease in lifting and lowering purpose.
- 2.1.2 Contractor should take proper care during lowering and lifting of Locomotive/Coach body so as not to damage any part or item of the Coach.
- 2.1.3 Necessary fixtures, required for safe transportation of Coach body and Trolleys and securing will have to arrange by contractor.
- 2.1.4 Contractor has to arrange adequate suitable cranes with sufficient capacity to lift Locomotive/Coach and crossed the boundary of site. Lifting of Locomotive/Coach with only one crane shall not be permitted for the safety of the Locomotive/Coach and staff involved.
- 2.1.5 Contractor has to arrange the suitable trucks/Trailers/Trollers for loading and transporting of Locomotive/Coach upto destination safely with proper securing arrangement which is in the scope of contractor. Part loading of Bogies is permitted.
- 2.1.6 If any damage occurred to Locomotive/Coach during all operation the amount of damaged ascertain by Railways should be accepted by contractor and such amount should be deducted from the bills.
- 2.1.7 Contractor shall have to make special arrangement in the truck/Trailer/Troller for the transportation of Locomotive/Coach so as to avoid any damage to the coach during transportation by the contractor.

- 2.1.8 The Tenderer shall furnish before execution a copy of their valid transport permit, RTO registration, Insurance policy, and fitness certificate of the vehicles for transportation with carrying capacity.
- 2.1.9 The Locomotive/Coach should be transported on proper documents. Necessary documents have to be collected at loading point concerned and the same have to be handed over at unloading point along with material.
- 2.1.10 All paper formalities required for transporting of Locomotive/Coach shall be arranged by the Contractor. Railway will not bear any responsibility for preparing and collecting NOC etc. from state authorities however necessary documents required from Railway shall be provided to contractor, including e-way bill, if required.
- 2.1.11 Materials to be arranged by contractor : All the items used for lifting , loading, securing & Transportation including Man power shall be arrange by contractor.
- 2.1.12 ODC (Over dimensional consignment) , transportation guidelines need to be observed and it will be under contractor's scope.
- 2.1.13 If, the required locomotive/Coach to be transported in located at isolated location, required temporary pathway to facilitate loading will be covered from **Civil BOQ**.
- 2.1.14 No other private material should be carried in truck / road vehicle during the transportation of Locomotive/Coach.
- 2.1.15 The quantities for the above items are approximate and are variable. The contractor will have no claim due to variation / deletion of items.
- 2.1.16 Any wastage of labours and materials due to the site conditions will be on contractor's account and nothing extra will be paid on this account.
- 2.1.17 The contractor shall be responsible for the safety of the staff deployed by him. The railway administration shall not be liable to pay any compensation or offer any medical aid for any injury caused to persons employed by the contractor during the contract period.
- 2.1.18 Any illegal article /material transported at any time in the vehicle will result in termination of contract and the SD & PG available will stand forfeited. No correspondence in this matter will be entertained, railway not bear any legal bindings.
- 2.1.19 Tenderer has to provide mobile telephone to the driver, while transporting, so that in case of emergency Railway authorities can contact the driver during transit. Contractor has to inform the mobile number in writing along with photocopy of the driving license of the driver.
- 2.1.20 SAFETY & SECURITY OF MATERIAL:
- I.Crew / Driver will have to be changed by the contractor on the report of any misconduct / misbehavior on their part by railway representative failing which railway may terminate the

contract.

II.If a truck operator/crew provided by contractor is involved in any malpractices, the Railways may terminate the contract and Railway will not bear any cost on this account.

2.1.21 INSURANCE: Contractor in his own interest advised to obtain a insurance policy from an established insurance company for vehicle and Railway material and keep such policy in force at all times during the currency of contract to cover all risks of every nature whatsoever inclusive any damages caused by the truck to Railways property.

2.1.22 In case of any loss/theft/damage suffered by the Railways for Locomotive/Coach a suitable penalty equivalent to the cost of damages will be imposed on contractor.

2.1.23The transit risk will be transporter's account and responsibility of transporting the Locomotive/Coach with sufficient precautionary and safety measures to protect the consignment and unforeseen incidents in transit will be of the contractor.

2.1.24The driver engaged for transportation purpose must be in sound mental and healthy condition. The driver must possess a valid driving license for carrying heavy goods as per the prevailing sections in the motor vehicle rules/acts.

2.1.25 Railway may escort required transportation which has to be facilitated by Contractor.

2.1.26 Required Locomotive/Coach is to be installed on suitable pedestal to be constructed through **civil BOQ** at Railway's specified location.

2.1.27 Penalty :

- I. If any damage will occur during loading unloading & transportation, penalty will be imposed as cost of damaged component or whole as certified by Railways and deducted from contractor's bill. The assessment of damage shall be done by Railways and this assessment shall be final and binding on the contractor.
- II. Penalty may be waived off partially/wholly by Railways on production of satisfactory evidence.

2.2 Restoration /Renovation of Locomotive/ Coach for displaying as Indian Railway heritage:

2.2.1 Scope of works as and where applicable: The scope shall include remodeling of condemned 01 no. NG/MG/BG Locomotive/Coach for displaying Indian Railway Heritage at premises of Anara yard shed.

2.2.2 Detail scope of work:

(a) Exterior cutting, stripping work : The totally damaged , corroded, rusted panels from exterior sides needs to be repaired/replaced by cutting /stripping and repairing/patching/fixing with new metal sheet to be done as per requirement with smooth welding and fine grinding finish. In case some portions are visible later on after exterior depainting , the same should also be repaired /replaced as per requirement.

(b) The exterior fully damaged metallic /wooden roof panels should be repaired with suitable pine wood /metallic sheets.

(c) Flooring: In case the original flooring of driver cab of locomotive has been in wooden base, and found damaged /worn, it should be repaired /replaced as per requirement.

(d) Interior painting: All interior surfaces shall be cleaned so as to be free of rust and dust and then enamel painted as per color scheme provided by Railways. The path to have strip/markings with self glow paint for guidance to exit and enhance high safety as well as Aesthetics. The gang way should also be cleaned and painted with suitable enamel paints as per requirements.

(e) Exterior painting: All four exterior sides should be initially depainted and subsequently all steps of PU Painting process (RDSO Spec. No. M&C /PCN/100/2009) should be followed to have complete PU painted finish of all the four sides of the Rolling stock as per attached scope of work. The exterior portions like Bogie , Underframe, Wheels, Axles should be enamel painted as per suggested color scheme and roof to be painted with Aluminium paint as per IS :2339. The four corners of the coach should have a strip of retro reflective paint for high aesthetics and safety.

(f) Water proofing: Water proofing with the help of fusible expandable liner on all the joints of the roof should be done after cleaning of roof and then should be painted.

(g) Masking , taping and designing work should be done as per requirement.

(h) Application of decals should be done as per requirement on the exterior.

(i) Application of retro reflective and glow paints if applicable.

(j) In case of locomotive, driver cab having wooden floor should be covered with carpet mats (replaceable).

(k) In case of Locomotive, the interior cabin, Engine room should be cleaned and sanded as requirement.

(l) Application of enamel paint as per shade and colour in interior cabinet and engine room.

(m) All the interior damaged wooded panels of side walls, ceiling and flooring should be repaired /replaced with suitable pine wood/metallic sheets.

(n) In case of Coaches, the gang way, the interior seats, ceiling side walls, windows, railing etc. to be cleaned and painted with enamel paints as per colour scheme duly masking as per requirements.

2.2.3 The work will be executed based on plan as approved and as per instruction of authorized signatory representative with his entire satisfaction otherwise , necessary deduction can be made by the Railway Administration.

- 2.2.4 All the materials used in the work (as per scope of work) like wood/metal sheet, paints etc. will be provided by contractor only.
- 2.2.5 Complete scheme of Restoration/Renovation has to be got approved by the WPO before start of work.
- 2.2.6 All related materials required for remodeling of condemned rolling stock and fixing accessories shall be included in the cost of said item.
- 2.2.7 Any component, lights, accessories, handles knobs etc. missing or requiring new fixing of Heritage nature will be provided by Railways. Contractor should ensure its fitment.
- 2.2.8 Electrical illumination & related work will be under the scope of contractor. However, illumination of display area will be covered through electrical BOQ.
- 2.3 Technical specifications of M&Ps are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** and **General specification for supply of M&P** specified in the Tender Document.

3.0 General:

Deviations, Warranty /Guarantee and Dispatch of the system from Manufacturer Works are to be read and followed in unison with **Special Conditions of Contract for Mechanical Works** specified in Tender Document.

SCHEDULE- (I)

Specification No. : IM/MEMU/DEMU/Anara/WP/Mech/M&P/Heritage

Leading technical parameters shall be as per TS clauses no.2.0

Note:

1. If above clauses are found inadequate for furnishing all necessary information of the system offer, the Tenderer may append further information separately.
2. The tenderer must enclose performance certificates of the system of similar capacity.
3. Tenderer should also furnish clause wise remarks on technical specifications.

CHAPTER - 20**Workshop Projects Organisation
(Indian Railway)****SPECIAL CONDITIONS OF CONTRACT FOR MECHANICAL WORKS****1.0 Instruction to Tenderers for filling Technical and Financial Bids:**

- a) The Tenderer must furnish the informations as per the format given in **Annexure-E(M) of special conditions of contract for Mechanical Works**. All the information as asked for, in the format must be given accordingly e.g. wherever a parametric value is asked for, it should be furnished, if a write up is asked for, this should be provided and if a brochure or drawing or sketch is expected this should be provided. In case of incomplete/sketchy information, the technical offer being incomplete is **liable to be rejected**.
- b) Unless otherwise stated, latest alterations/ revisions of specifications/ standards/ drawings shall be applicable. In respect of safety standards and environmental standards relevant to the machine, the machine manufacturers shall ensure compliance with international (CE/ISO/DIN/JIS)/National standards (IS) (where applicable).
- c) The bidder should quote only for the specified make of machinery and plants, sub-assemblies and equipment wherever mentioned. Makes of sub-systems other than the specified ones will normally not be acceptable. In case, some other make is quoted, specific reasons for the same including its features/advantages over *specified* makes must be brought out in the offer.
- d) In case there is a contradiction in any information provided (some parametric values given in the specification and those given in the brochure or some other document enclosed by the tenderer), unless specifically mentioned in the deviation cum confirmation statement under **Annexure – M of chapter 6-of tender documents**, the values as given in the specification shall be taken as confirmed by the tenderer and offer evaluated accordingly.
- e) Tenderer or his authorized agent, in their own interest, should visit the work site with prior appointment with field officer and acquaint themselves with processes of maintenance work, site conditions, facility etc.
- f) The Railway may accept internationally accepted alternative specifications which ensure equal or higher quality than the specifications mentioned in the Technical Specification. However, the decision of the Railway in this regard shall be final. A copy of the alternative specifications offered should be sent along with the offer. The Tenderer should also furnish "Statement of Deviations" from tender specifications (as per **Annexure – M of chapter-6 of tender documents**) in packet-I of the tender document.
- g) Railway reserves the right to verify the details submitted by the bidder by actual site visit.
- h) The Tenderer should fill the **Annexure-E(M)** of this special condition along with information in schedule-I of specification for each M&P items, which shall be submitted in packet-I (Technical Bid) of the tender.
- i) The Bidder shall quote the prices in Indian Currency (Rupees) only. If any additional charge is quoted anywhere else in the offer, other than in the price schedule, the same will not be taken into consideration during evaluation. However, disclosing a rate elsewhere, in case of a two packet system shall render the offer **liable to be rejected**. Similarly, if a price or tax discount is offered anywhere else in the offer, the same will not be considered during commercial evaluation of the offers. However, the bidder will be bound to offer those discounts to the purchaser, in case order is placed on that bidder.

1.1 Definitions:

The following terms and expressions as used in this Contract shall have the meaning hereof assigned to them except where the context otherwise requires:

- 1.1.1 "Approval" shall mean the written approval by the Railway of a document or drawing or other particulars or matters in relation to the Contract.

- 1.1.2 "Contract Drawings" shall mean the designs, plans, drawings, sketches, tracings and prints thereof and details which have been supplied by the Contractor as per terms of the Contract for the execution of this Contract and shall include the once approved by the Railway. This shall also include "good for construction drawings" for construction work supplied by the Railway.
- 1.1.3 "Contract Specifications" or "Specifications" shall mean the Technical specifications, General Specifications, schedules, detailed design drawings, statements of technical data, performance characteristics value and all such "particulars" mentioned in the Contract and such other modifications required by the Railway relating to the work.
- 1.1.4 "Delivery" shall mean delivery by the dates on FOR site basis as specified in the Contract for work or materials which are found acceptable by the Railway and not the submission of equipment, materials and supplies which are not to the required standard or which are not delivered by due dates, and in case of erection work, delivery shall mean the approval by the Railway of the said erection work within the period prescribed for such completion.
- 1.1.5 "Dimensions" shall mean the extent of a line, area, volume. They are to be based on the metric system.
- 1.1.6 "Erection" shall mean the putting up of structures and / or installation of the Plant & Equipment under the supervision of the Contractor and / or sub-Contractor and will include any service which the Contractor is required to perform at the site with his own and/or other staff and/or labour for the due fulfillment of this Contract.
- 1.1.7 "Inspector"/"Inspecting Engineer" shall mean any person or firm nominated by or on behalf of the Railway or his duly authorized agent to inspect equipment, supplies, materials, tests or work under the Contract.
- 1.1.8 "Engineer" shall mean an Engineer appointed by designation from time to time by the Railway.
- 1.1.9 "Engineer's Representative" means any assistant of the "Engineer" or any other employee or Agent appointed from time to time by the Railway or the Engineer to perform the various duties.
- 1.1.10 "Plant" shall mean and include "Equipment", "Stores", "Item", and "Material", "Machinery" or any part thereof to be provided for under the Contract.
- 1.1.11 "Site" shall mean the place or places envisaged by the Railway at which the plant & equipment supplied under the Contract are to be erected and / or the construction are to be carried out and/or services are to be performed under the Contract with such other places as may be specifically provided by the Railway for the purpose of the Contract.
- 1.1.12 "Supervision" shall mean the successive control and directions given to the Contractor in relation to Contract work during execution of the Contractor's and/or his Sub- Contractor's work at site.
- 1.1.13 "Supply and Services" shall mean and include any and all equipment, supplies, materials, drawings, documents and engineering & technical services to be made/performed by the Contractor under this Contract.
- 1.1.14 "Test" shall mean and include any and all tests to be performed under the Contract in order to ascertain the quality and efficiency of the Contract work or part thereof and material tests in particular.
- 1.1.15 "Time" shall be reckoned by months, weeks, days and hours, the period of a month being equivalent to the calendar month according to the Gregorian Calendar. The day or days unless herein otherwise expressly defined shall mean calendar day or days of 24 hours each.
- 1.1.16 "Unit/sub-unit" shall mean the functional plant areas as described in Contract Specification.
- 1.1.17 "Writing" shall include manuscript, typewritten, printed statement under or over signature or seal as the case may be.
- 1.1.18 "Manufacturer" refers to a person or firm who is the producer and supplier of material or designer and fabricator of equipment to either the Railway or the Contractor or both under the Contract.

- 1.1.19 "Government" means the Central Government or a State Government, as the case may be.
- 1.1.20 "Preliminary Acceptance Test (PAT) Certificate" means the Certificate to be issued by the Engineer on completion of erection and commissioning of Plants and Equipments as per clause 7.2 of Special Condition of Contract for Mechanical Works.
- 1.1.21 "Proving-out Test (PTC) Certificate" means the Certificate to be issued by the Engineer on successful completion of Proving-out Tests as per clause 7.3 of Special Condition of Contract for Mechanical Works.
- 1.1.22 "Taking Over" means the physical possession by the Railway, after issuance of PAT and PTC Certificate as per clause 7.4 of Special Condition of Contract for Mechanical Works. However, the Contractor shall not be relieved of his obligations under the Contract.
- 1.1.23 "Final Acceptance Test (FAT) Certificate" means the Certificate to be issued by the Railway/Engineer on fulfillment of the obligations in accordance with the provisions of the Contract, as per Clause 7.5 of Special Condition of Contract for Mechanical Works.
- 1.1.24 "Works" shall mean the work contemplated in the drawings and schedules set forth in the tender forms and required to be executed according to the specifications.
- 1.1.25 "Project Manager" shall mean the Contractor who shall be overall in-charge of the Project at site shall be appointed /deputed in consultation with the Railway.

2.0 The scope of work is broadly divided into six major parts.

- (i) Design & drawing of machine layout and its sub-systems, process flow, Equipment layout, load data & other drawings as per specification of machineries and plant (M&P) will be prepared by contractor but can be improved upon by the Railway with or without associates within the time schedule and without extra cost to the Railway.
- (ii) Design, Manufacture, Inspection, Supply, Erection, Testing & Commissioning and Proving out tests of Machinery and Plant (M&P).
- (iii) Supply of Maintenance Spares, Maintenance tools and tackles, Manuals and Drawings of M&P as per technical specification.
- (iv) Inspection to be carried out as per the approved Drawings and QAP at firms premises.
- (v) Any other activities which are not mentioned in above scope for successful Design, Manufacturing, Inspection, Supply, Erection, Testing & Commissioning, training, Proving out tests of M&P and bidders scope shall be in contractor's scope.

(vi) Civil Engineering Works:

The bidder shall arrange for provision and construction of necessary foundation for the machines as per the drawings supplied by the OEM using expansion type bolts & buffer pads for vibration free operation of the machine and cost of the same (bolts, pads, rails, fittings etc) and **allied Electrical & Mechanical works of schedule F-1 of Chapter 24**—of tender documents shall be included in the cost of the machine except for

(A) Long Travel (LT)/Gantry Rail on Gantry Girder for EOT cranes and Rail of Surface traverser which will be paid separately as per Civil BOQ.

(B) Foundation work of surface Traverser & Turning Bridge/Turn Table will be paid separately as per Civil BOQ

***Any additional items like chequered plates, stairs, railings etc which are part of civil structure and essentially required towards completeness, maintenance, operations etc of M&Ps, will be covered from Civil BOQ.**

- 2.1 Supply of M&P equipment (as per (i) to (v) above): This includes design, engineering, manufacture and supply of equipment and facilities including mechanical equipment, electrical equipment & controls and utility services as per the Contract Specifications of Plant & Equipment together with the necessary vibration pad, foundation (if any), foundation bolts, special inserts, integrating parts, field foundation plates and bolts, railings, cross-over and safety guards within the stipulated delivery time. Unit cost of machine will be inclusive of cost of two years maintenance spares and other tackles/tools required for smooth operation and maintenance.

2.2 **Commissioning spares Maintenance spares and consumables:**

2.2.1 **Commissioning spares:**

The Contractor shall provide necessary commissioning spares as may be required during erection, cold tests, start-up and initial operation of the unit till successful completion of Proving-out tests.

2.2.2 **Maintenance Spares:**

- i) The Contractor shall supply two years maintenance spares. These are to be supplied **before issuance of Proving-out Test Certificate (PTC)**. List of two years maintenance spares to be submitted with the offer. Cost of these items is included in the contract price for the M&Ps.
- ii) The Contractor shall supply complete ordering specification and drawings including the list of suppliers to enable the Railway to procure maintenance spares after the warranty period. The Contractor shall furnish such information not later than two months from the date of approval of M&P by Railway.
- iii) The identification of maintenance spares shall be intelligibly engraved on the parts within or on a label securely fixed to the part.
- iv) The responsibility of the tenderer under the Warranty Clause will not be diluted in any way with regard to supply of spares during warranty period as per clause **23.0**

2.2.3 **Tools & Tackles:**

- i) The Contractor shall provide necessary tools, tackles, instruments and appliances for erection, testing, operation & maintenance, and commissioning of the unit as required. The cost of the same is included in the Contract Price for Plant & equipment.
- ii) The Contractor shall provide ordering specification including the names of suppliers giving sufficient details to enable the Railway to procure at a later date when necessary such special tools, tackles, instruments and appliances. The Contractor shall furnish such information not later than two months from the date of approval of M&P by Railway.

2.2.4 **Initial Fill of Oils, Lubricants and Consumables, and initial supply of refractory (if any) and thermal insulations (if any).**

- i) The Contractor shall, within the Contract price of the equipment, supply all consumables including oils, lubricants, fuels, chemicals, usual stores and small materials and other consumables required for flushing the first fill, as well the quantity required during the Contract with extra provision to cover the normal wastage for transportation, storage, handling, PAT and Proving-out tests till the machine is taken over after PTC. The Contractor shall be fully responsible for ensuring adequate quantities at site so as not to delay implementation of the project.
- ii) Equipment related consumables till the machine is taken over after PTC, are to be supplied by contractor.
- iii) The Contractor shall also furnish machine design specific consumables with optimal consumption rates of consumables along with estimated annual requirement and ordering specification to enable the Railway to procure these in time for uninterrupted operation of the unit. The Contractor shall furnish such information not later than two months from the date of approval of M&P by Railway.

2.3 **Concomitant Accessories:**

- a) The machine should be accompanied by all the concomitant accessories to make the machine fully operational on installation or as mentioned in technical specification of machine.
- b) The cost of concomitant accessory will be included in the basic price of the machine.

- c) The scope of concomitant accessories may also include among other things the anti vibration pads, voltage stabilizer and isolation transformers, loading and unloading systems etc, where necessary.

2.4 Tooling (Wherever applicable):

- a) The contractor shall provide all machines in fully tooled up condition.
- b) The tools should be supplied, sufficient for a period of two years covering normal consumption.
- c) The tenderer should quote separately for each of the tooling items (wherever applicable).
- d) The tenderer shall furnish full details in regard to tooling items including the make, part number, source and expected annual consumption for each of the tooling.

2.5 The Scope also includes preparation of the following:

2.5.1 Engineering & Technical services:

The engineering & technical services of the Contractor shall generally include amongst others the following:

- a) Equipment layout, load data & other part assembly drawings as per specification.
- b) Backup drawings, necessary data, to enable the Railway to check and approve drawings only where modifications and design changes are made by the contractor for system integration etc. also, in some packages, the contractor is required to design the system before construction. He will be required to supply the drawings and data for these items also.
- c) Quality control and time schedule control of site work.
- d) All coordination relating to design, manufacture, supply, transportation, insurance & claim settlement, inspection, construction planning and scheduling and all other services till handing over of the plant & equipment.
- e) Clearance of installations from the Statutory Authorities.
- f) Drawings of layout, proposed floor plan of the machines in the shed, layout drawings for pneumatic pipe lines, water pipe lines & industrial gas pipeline (if required) shall be prepared and submitted to Railway for approval before commencing the work

2.5.2 Scope of work for storage, handling, inspection, erection, testing, commissioning and carrying out demonstration of proving out tests.

The Contractor shall make all arrangements to deliver the equipment at site by trucks/trailers, build his own stores (covered, uncovered and air-conditioned, if necessary) for the proper storage of equipment, maintain the stores and all related documents and records, transport the equipment to site for erection purpose.

All security arrangement also shall be made by the Contractor. Only open space shall be made available to the Contractor by the Railway.

The Contractor shall be responsible for proper and neat storage and also undertake conservation of all consignments including damaged consignments.

During storage of equipment, the Contractor shall take into account deterioration and carry out the re-conservation of the complete equipment/parts/ supplies as may be necessary as per the Storage Instructions of the Manufacturer of equipment/components. The Contractor shall also supply the consumables required for such re-conservation work and repair/replace parts required thereof for the proper functioning of the equipment after erection and commissioning.

2.5.3 The Contractor shall unpack and do visual checking against physical damages to the equipment/cases, cleaning of equipment before start of erection. Damage/shortage if any, will be reported to the Railway and shall be rectified/ replaced expeditiously, free of charge to the Railway so as not to upset the erection and commissioning schedule. Delay on account of settlement of insurance claims by the Contractor shall not be considered an excuse for delay in completion.

- 2.5.4 The Plant and equipment will be installed on civil foundation/structures including grouting, anchoring and fixing etc. complete by the contractor **as applicable unless otherwise specified.**
- 2.5.5 The Contractor shall provide erection consumables like oxygen and acetylene gas, welding rods, solder lugs, oil, grease, kerosene, cotton waste, etc. required for erection of equipment.
- 2.5.6 The Contractor shall provide all necessary construction tools & tackles, compressors, small hand tools, instruments, all testing & commissioning instruments, welding equipment, service bolts, nuts, jigs and fixtures, winches, alignment tools, precision levels etc. and the material handling equipment and other equipment which may be required for carrying out the erection and commissioning work efficiently within the time schedule provided in the Contract. Unless otherwise specified, the above construction materials shall be the property of the Contractor after the erection work is over. The Contractor shall ensure that proper documentation is followed at entry gate of the Railway's premises for such items which shall be carried back by Contractor after completion of work.
- 2.5.7 The Contractor shall provide all temporary ladders, scaffolding materials, platforms, supports and other necessary facilities required for handling, erection, testing and visual inspection of supplies at the point of installation and shall also provide necessary packing plates, wedges, shims, leveling screws etc. required for erection of equipment.
- 2.5.8 The Contractor shall erect and maintain his own site offices, main stores and site stores as required for the work and arrange for maintaining in a neat manner the area placed at the Contractor's disposal. The plans for the same shall be approved by the Railway.
- 2.5.9 The contractor shall provide sufficient fencing, notice boards and lights to protect the work site, as well as contain the disturbance, noise and other pollution within tolerable limits within the worksite. He will also make necessary arrangements to prevent entry of outsiders and warn them of the ongoing work and prevent their entry to the worksite, accidentally or otherwise as may be considered necessary by the Railway.
- 2.5.10 The Contractor shall mobilize himself with adequate material handling equipment like mobile cranes, forklifts, trailers, etc. in addition to other erection tools and consumables, keeping in view the erection schedule. Within one month of placement of order, Contractor shall provide his detailed scheme for mobilization with Bar Chart indicating clearly the resources, manpower and machinery proposed to be deployed to ensure timely completion of work and quality of workmanship.
- 2.5.11 The equipment will be erected as per the instructions of the suppliers/manufacturers and under the supervision of the supervisory personnel to be deputed by the Contractor along with supervisory personnel of equipment supplier/ manufacturer, if so desired at site and with the approval of the Railway. The Contractor shall use to the maximum extent pre-assemblies and mechanization in order to fulfill erection targets.
- 2.5.12 The Contractor shall align, level and couple, and securely fix all equipment, appurtenances and accessories. All precision survey instruments including leveling instruments, theodolite etc. shall be arranged by the Contractor.
- 2.5.13 The Contractor shall procure and carry out flushing and filling of oil and lubricants till successful commissioning and demonstration of Proving-out tests.
- 2.5.14 The Contractor shall be responsible for checking the correctness of erection of mechanical equipment and auxiliary systems, electrical equipment etc as per the specification.
- 2.5.15 The Contractor shall be responsible for Installation and connection of all piping and fittings as per the specification/approved drawing.
- 2.5.16 The Contractor shall be responsible for installation and connection as well as supplying, laying and termination of cables, bus bars, bus ducts, lightning protection and earthing as well as to check electrical connections to individual items.
- 2.5.17 The Contractor shall be responsible for the management of erection work with proper and adequate supervision for ensuring progress of erection work and quality of workmanship.

- 2.6.18 The Contractor shall organize the work in a manner that other work at site is not impeded and the workmen therein not endangered and shall arrange temporary access at site, if required for the erection work.
- 2.5.19 The Contractor shall deploy required number of supervisory, skilled, unskilled and auxiliary labour as required for the erection work and comply with such reasonable instructions of the Railway/ in the interest of satisfactory progress and completion of the work according to the schedule. The Contractor shall work in 3 shifts per day basis for meeting the completion target, if required without any extra price. However, in such cases, Contractor shall obtain the prior approval from the Railway.
- 2.5.20 The Contractor shall return to the Railway all returnable materials such as empty crates, packing materials, supporting materials for consignment etc. belonging to the Railway at a place designated by the Railway.
- 2.5.21 All necessary tests/checks shall be conducted during erection by the Contractor. The Contractor shall attend to the rectification of erection defects, if any, expeditiously. The Contractor shall arrange all testing instruments for such testing at site.
- 2.5.22 The Contractor shall carry out final painting of the Plant & Equipment and structures erected as per the instructions of the Railway.
- 2.5.23 The Contractor shall be responsible for total commissioning of the Plant including trial run and carrying out demonstration of proving out Tests. Railway's supervisory and skilled operating personnel shall, however, be associated during erection of equipments and their commissioning and proving out tests.
- 2.5.24 The Contractor shall comply with all applicable statutory Rules & Regulations with respect to the employment of labour at site.
- 2.5.25 All safety measures as required to be adopted as per the Statutory Regulations and the Safety Rules of the Plant shall be strictly followed by the Contractor during the execution of the Contract. The Contractor shall set up a suitable safety organization of his own in this regard.
- 2.5.26 The Contractor shall be responsible for commissioning of all the machines, equipment and infrastructure as stipulated as per the Contract Specification and shall also ensure that it is fit for operation and achieve the Performance standards and other parameters as specified. Railway's supervisory personnel shall, however, be associated during erection of equipments and their commissioning and proving out tests
- 2.5.27 If the Railways is not satisfied with the progress of work at site, it shall direct the Contractor to depute more number of supervisory personnel/workers to meet the completion schedule as per the contract. Upon receiving such direction Contractor shall deploy additional personnel within 7 days without any extra cost.
- 2.5.28 All guarantees and test certificates obtained by the Contractor during the execution of work shall be transferred to the Railway before issue of PAT certificate.
- 2.5.29 The contractor shall provide and install all measuring instruments required for checking the guaranteed performance which are not included among the permanent measuring instruments of the Unit/sub-units
- 2.5.30 Materials brought to the site shall not be removed from the site without the written consent of the Railway. Any material brought to site and rejected by the Railway shall be removed by the Contractor from the site of work immediately at Contractor's expense.
- 2.5.31 The Railway may during the progress of work, order the removal of part or whole of the work executed, found not in accordance with the approved drawings/ specifications/ instructions. No extra claims shall be entertained for re- executing or altering of such work.
- 2.5.32 Construction of site office, labour huts, store sheds etc and arrangement of required water and electricity for all purposes in connection with this work shall be at the contractor's responsibility, liability and cost as per tender condition. Security as per the requirement shall also be arranged by the Contractor. Any delay in making arrangements for the same shall not be taken as an excuse for delay in starting the work. However Railway may give land at very

nominal rent for the purpose of fabrication yard, batching plant & site office within the project premises.

2.5.33 Contractor shall equip his site office with adequate number of Computers equipped with high speed internet facility, photocopy machine and Fax machine along with operators conversant with software programs such as Primavera/MS-Projects, MS-Office and AutoCAD. These are to be provided at site office till completion of the project. Contractor shall submit daily/weekly/monthly diagrammatic progress reports on approved format.

2.5.34 On completion of the work, the site shall be left in good order and the excess materials, scraps, debris, if any, shall be removed & dumped by the Contractor at place/places as designated by the Railway.

2.5.35 Certification:

- a) The design of the machine foundation & Construction of the foundation is in accordance with the latest version of the relevant part of the Indian Standard for Code of practice for design & construction of machine foundation as specified in IS:2974. The contractor shall arrange certification of the foundation design by approved design consultant. The original certificate issued by the design consultant for certification of foundation design and a copy of the same shall be submitted by the contractor to the Railway.
- b) The supplier shall stand a warranty for the foundation along with the machine. He shall arrange to rectify any defects (e.g. sinking or cracking) occurring during the warranty period in the foundation. He shall also be responsible for uprooting and reinstalling the machine if so required for carrying out the repairs to the foundation. The warranty period would be extendable by the time period for which the machine remains out of commission due to the defect in the foundation or a period of one year, whichever is more.
- c) Bidders must study the statutory requirements, laws like Indian Electricity Act, Indian Industrial Safety procedures, Contractor Labour Act, Pollution Control Act etc and once the work is awarded, they shall be liable to conform to all the statutory requirements including local and State laws, rules and regulations.

2.5.36 The Contractor shall be responsible for proper fencing, lighting, guarding and watching of all works at site until they are handed over and further proper provisions for like period of temporary power, drainage, roadways, footways, guards and fences as far as may be rendered necessary by reason of works for accommodation and protection of the Railway's and occupiers of adjacent property, the public and others. No naked light shall be used by the Contractor on the site otherwise than in the open air without the special permission in writing from the Railway.

2.6 Construction Water:

The Contractor shall at his own expenses, arrange for, and lay and maintain, the pipelines for the water required for construction purpose (including drinking water) for the work covered under the scope of the contract for his work site with suitable connections, storage reservoir, etc. as may be necessary. The Contractor shall ensure avoidance of misuse or wastage of water, make adequate arrangements for storage and regulate supply and if necessary install supplementary arrangements for supply of water. The Contractor will endeavor to maintain a regular supply of water to meet the construction requirements.

2.7 Construction Power:

2.7.1 The Contractor will make his own arrangement for electrical power for the construction, erection & commissioning work at the site till start of proving out test. Railway shall arrange power from Proving out test.

2.7.2 The Contractor shall make his own arrangements to lay and maintain further distribution lines and wiring necessary for the work at his own cost and in accordance with latest Indian Electricity Rules. The distribution diagram with loadings and specifications shall be submitted to the Engineer for his approval before the system is installed.

2.7.3 The Contractor shall obtain the approval of the Engineer for installation of machinery, construction of buildings and electric power supply connection to them. The Contractor shall be responsible for any defect therein. Any defects pointed out by the Engineer in the

distribution system shall be rectified forthwith to the satisfaction of Engineer by the Contractor, failing which the power supply may be cut off by the Employer/Engineer.

- 2.7.4 To operate any electrical equipments of the contractor at site for their activities, contractor should always use PVC insulated and PVC sheathed core cable and not with plastic cables (single core) and avoid using of many joints and with suitably rated fuses, switches and plugs in order to ensure safety at site.

2.8 **Completeness:**

- 2.8.1 Any supply and services as set forth hereinabove and which might not be even specifically mentioned in this Contract relating to the Project or in the specifications and drawings in respect of the Plant and equipment package under the scope of work of the Contractor and which are not expressly excluded there from but which are necessary for the performance of the Plant and Equipment in accordance with the specifications as an integral part of the Plant and/or for normal and efficient running and maintenance under Indian conditions, shall be provided for and rendered by the Contractor **without any extra cost**.

- 2.8.2 The approval by the Railway at any stage for any supplies and services by the Contractor shall not relieve him of his obligations under **Clause 2.8.1** above.

2.9 **Total responsibility:**

The Contractor shall be solely responsible for the entire supplies and services irrespective of whether supplies and services have been made/rendered by him directly or by his Sub-Contractors with or without the approval of the Railway.

2.10 **Progress Report and Photographs:**

- 2.10.1 The Contractor shall furnish copies of all Purchase Orders without prices placed by him on various sub-suppliers/ Contractors and work orders issued to his own manufacturing units containing scope of work, technical specification, time schedule etc.
- 2.10.2 THE RAILWAY shall have the right to depute his representatives to ascertain the progress of work at the premises of works of the Contractor or any of his Sub- Contractors.
- 2.10.3 The Contractor shall submit a weekly progress report in a proforma including photograph with such details as may be required by the Railway so as to enable the Railway to monitor the progress of the Project.
- 2.11 Total value of the offer will be calculated on the basis of scope of work as specified in the tender document, and shall include:
- a) The cost of all machinery & plant including concomitant accessories, complete foundation, installation and commissioning of the machines.
 - b) Applicable duties and taxes, insurance, freight, packing and forwarding charges.
 - c) Cost of training, maintenance spares, warranty spares, tools & tackles etc.
 - d) The cost of preventive maintenance to be carried out during warranty period of 2 years shall be included in the total value of the offer.

3.0 **Contract Price:**

The offer price should include following:

- 3.1 The offer may be quoted in format given in **Schedule F-1, Chapter 24** of tender documents. The single and common percentage will be uniformly applicable for each of the items shown in the schedule above. Indicate above by "+", below by "-" and at par by "=".
- 3.2 Price of Equipments/Machines:
- a) The prices are inclusive of all taxes and duties.

- b) The prices are inclusive of **civil work** including foundation **wherever applicable unless specified otherwise**, supply, Inspection, erection/installation, commissioning, Proving-out tests and training as per the specifications.
 - c) The prices are inclusive of packing, forwarding, freight, insurance, & training charges.
 - d) The prices are inclusive of cost of concomitant accessories and maintenance spares.
 - e) Drawings, Manuals, documents, Part catalogues, Softwares with license key/dongle etc related to operation & maintenance of machine/equipments. The list of accessories and maintenance spares along with price may be obtained from OEM and supplied.
 - f) The prices of warranty spares and services.
 - g) The contract prices are inclusive of all charges & expenses including storage, loading, unloading, handling, erection, testing & commissioning and performance guarantee test towards labour, tools & tackles, construction plant & equipment, scaffolding, power, fuel, oil, lubricants, etc. including 3 shifts working, if required up to issue of FAT.
 - h) No Service Tax is payable on Railway contracts as on date. If at a future date this becomes applicable, the contractor will be reimbursed at actual
- 3.3 Amongst other, the contract price for supplies shall be deemed to include the cost of all foundation bolts, anchoring parts, floor plates, hand railings, crossovers, safety guards etc and cover all royalty/fees for all articles and processes protected by letters, patents or otherwise incorporated in or used in connection with the work and all other payments in connection with obtaining all the materials for the work and shall indemnify the Railway.
- Indemnity which, the Contractor hereby gives against all actions, proceedings, claims, damages, costs and expenses arising from the incorporation in or use of work of any such articles, processes or supplies.
- 3.4 The Contractor is responsible for the total scope of work starting from design and manufacture till the unit is successfully commissioned, and proved out.
- The break-up of the contract price is only for the purpose of release of payments to the Contractor for the various activities involved in respect of this contract and this cannot be construed as full and final payment in respect of each activity for which such break-up is given.
- In the event of the Contractor failing to fulfill all his contractual obligations till successful commissioning, proving out and Final acceptance of the whole unit covered under this contract, the Contractor shall be liable for forfeiture of all the amounts received under this contract, without prejudice to such rights and remedies which are available under this contract for the Railway and the Contractor.
- 3.5 The Contractor shall quote percentage value over/under/at par on total estimated cost of the machines. Additional amount shall be calculated based on the percentage quoted.
- 3.6 Total contract value of the work will be ascertained based on the total final value including the total cost of maintenance spares, concomitant accessories and warranty spares, Slings/Chains/Lifting tackles/tools as specified in respective technical specifications.
- 3.7 ***The rates quoted for machinery and plants by tenderer and accepted by Railway administration shall hold good till the Proving out Test (PTC) and no additional individual claim will be admissible on account of fluctuation in market rates, increase in taxes/ any other levies/tolls etc***
- 4.0 **Terms of Payment:**
- Individual liabilities register for Supply, Erection & Commissioning and Maintenance Spares, tools & tackles, concomitant accessories to be maintained at site shall be jointly certified by the Railways and Contractor. Subject to any deductions from the Contract price, which the Railway is entitled to make, the Contractor shall receive the payment in the following manner:
- 4.1 **Manufacture and supply of plant & equipment:**

75% of the contract price of individual M&P items as per approved Billing Schedule of Schedule F-1 shall be released after receipt of equipment / items at site in full and good conditions, subject to submission of requisite documents as detailed in the Contract along with relevant supporting inspection certificates, duly certified by Railways. Establishment of "Good Conditions" as mentioned above would be done with a joint verification (Railway and tenderer) for completeness of supplies as per Bill of Materials and visual inspection as per the prescribed proforma.

- 4.2 15% of the contract price of individual M&P items covered under Schedule F-1 shall be released after issuance of PAT and PTC certificate including supply of maintenance spares, tools & tackles, concomitant accessories as per schedule, duly certified by the Railways as per the prescribed proforma. This 15% of the contract price as per approved Billing Schedule is further bifurcated into two stages i.e.

- a) 05% of total contract value of individual M&P items covered under Schedule F-1 shall be released after Issuance of PAT certificate.
- b) Balance 10% of total contract value of individual M&P items covered under Schedule F-1 shall be released after Issuance of PTC and supply of maintenance spares, tools & tackles, concomitant accessories, training etc.

4.3 **Final Payments:**

Balance 10% of the contract value shall be released on submission of a separate bill by the contractor for Schedule F-1 along with the following documents:-

- a) Final Acceptance Certificate issued by the Railway.
- b) Bank Guarantee of 10% of the contract price of individual M&P items under Schedule F-1 as **Warranty Guarantee (WBG)**.
- c) No objection certificate (NOC) issued by the Railway.
- d) No claim certificate (NCC) submitted by the firm.

- 4.4 Unit cost of machine will be inclusive of cost of two years maintenance spares and Slings/Chains/Lifting tackles, tools required for smooth operation and maintenance.

5.0 **Responsibility for Performance of Contract:**

- 5.1 The Contractor shall be responsible for the due and faithful performance of the Contract in all respects according to the intent and meaning of the drawings, specifications and all other documents referred to in this Contract. Any approval which the Railway may have given in respect of the stores, materials, supplies or other particulars and the work or the workmanship involved in the Contract (whether with or without test carried out by the Contractor or the Railway) shall not bind the Railway and notwithstanding any approval or acceptance given by the Railway, it shall be lawful for the Railway to reject the material on arrival at site, if it is found that the materials supplied and/or erection work carried out by the Contractor are not in conformity with the terms and conditions of the Contract in all respects.

- 5.2 The Contractor shall co-operate with the Railway's other Contractors, if any, for any associated plant and coordinate for any interface activity at his battery limits.

6.0 **Dispatch Schedule:**

- 6.1 The Contractor shall prepare and submit in triplicate detailed dispatch schedule for the Machinery and Plant to be dispatched to the Railway. Railway may alter/modify such dispatch schedules as per requirements/site conditions etc.

6.2 **Dispatch of Materials and Dispatch Documents:**

The dispatch of equipment / materials shall be as per dispatch schedule. All dispatch/shipment documents shall be submitted by the Contractor to the Railways at the time of supply of Machinery and Plants.

- 6.3 All packing cases, containers, packing and other similar materials shall be new and supplied free by the Contractor and same will not be returned unless otherwise stated in the contract specifications.

6.4 Notwithstanding anything stated in this Clause, the Contractor shall be entirely responsible for loss, damage or depreciation or deterioration to the materials & supplies due to faulty protective and insecure packing.

6.5 All dispatches must commence after fulfillment of Para 7.1 & Para 9.0.

7.0 **Acceptance of the Unit:**

7.1 **Inspection:**

Firm will be required to submit a detailed Quality Assurance Programme (QAP) for each of the machine that will be followed during the manufacturing of the machine. Railways may change/add/modify the Quality Assurance Programme (QAP) of a machine in case it is not satisfied with the QAP submitted by the firm. The QAP should incorporate check points at every stage from the raw material procurement stage to in-process inspection of various assemblies and final inspection of the machine.

7.2 **Preliminary Acceptance Test (PAT)**

7.2.1 On completion of erection and commissioning of the plant & equipment preliminary acceptance tests shall be performed to conduct the systematic check of the components which have been machined/assembled on the equipment supplied by the contractor.

7.2.2 Tests shall be performed on the individual sub-assemblies of the unit and shall be designed to conduct the systematic check of the components and of the functional operation thereof.

7.2.3 Tests shall be conducted by the Contractor as per **Clause 7.2** under his sole responsibility and employing his personnel. Results of tests shall be recorded jointly by the Contractor and the Railway. The Contractor shall hand over all the test certificates obtained by them during execution of the work.

7.2.4 A detailed programme of tests shall be drawn up by the Contractor and shall be subject to the approval of the Railway. Such programme may be revised and adjusted as may be required by the Railway during the test run.

7.2.5 The Contractor shall rectify the defects observed during commissioning. On successful completion of erection & commissioning and liquidation of the defects as mentioned in joint commissioning note (JCN) in prescribed performa (**Annexure-B(M)**), PAT Certificate shall be issued by the Railway within 30 days from JCN/liquidation of defects/deficiencies whichever is later.

7.3 **Proving out Test (PTC)**

7.3.1 Proving-out tests will be carried out and performance values achieved in accordance with **Clause 10**. Proving-out test will be carried out within 30 days after issuance of PAT certificate of the Machinery and Plant.

7.3.2 A Proving-out Test Certificate (PTC) shall be issued by the Railway within 30 days for each of the machine on a prescribed performa (**Annexure-D(M)** to standard condition of contract for Mechanical Works) on successful completion of proving-out test and supply of complete maintenance spares, Slings/Chains/Lifting tackles, tools required for smooth operation and maintenance.

7.3.3 Inspection and approval of installation of statutory authorities like electrical inspectorate/CEA etc shall be obtained by the Contractor before issue of Proving-out Test Certificate (PTC).

7.4 **Taking over of Machinery and Plants:**

7.4.1 The unit shall be taken over physically by the Railway when:

- a) Contractor has completed erection & commissioning and proving-out test of all the equipments as per respective technical specifications.
- b) PAT and PTC certificates have been issued by the Railway.
- c) The Contractor has submitted all documents as per provisions of this Contract/Technical Specification of Machinery and Plants.
- d) The Contractor has supplied concomitant accessories, tools & tackles and maintenance spares required for smooth operation and maintenance.

- e) The Contractor has complied to the satisfaction of the Railway all the objections / observations, if any.

7.4.2 The Contractor shall submit un-priced copies of purchase orders placed on Sub-Contractors.

7.5 **Final Acceptance Test (FAT):**

Final Acceptance Test certificate shall be issued by the Railway within 60 days from the following date (whichever is later) when:

- a) PTC has been issued after Proving-out tests carried out and performance values achieved in accordance with **Clause 10**.
- b) The Contractor has rectified in a definitive manner all defects/ objections/ observations mentioned in the Proving-out Test Certificates (PTC) if any.
- c) Final documentation incorporating latest modifications has been submitted by the Contractor in requisite copies,
- d) The Contractor has met any and all other obligations under this Contract;

8.0. **Supply, Installation, commissioning and proving-out tests:**

- 8.1 **Joint Check:** The contractor or his agent would be required to carry out a joint check at consignee's end, along with the consignee, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages. It is necessary that this joint receipt inspection be done immediately on receipt of the machine by consignee & contractor representative to avoid commissioning delays due to shortages/transit damages.

After receipt of the machine as above a Joint Receipt Inspection Note (JRI) as per **Annexure-A(M)** to the special conditions of contract for Mechanical works shall be prepared by the consignee and the firms representative indicating the tentative time schedule for various activities of installation and commissioning.

- 8.2 A Joint Commissioning Note (JCN) to this effect shall be made as per the format at **Annexure-B(M)** to the special conditions of contract for Mechanical works. After joint recording of JCN, the PAT shall be issued within 30days after liquidation of defects as mentioned in JCN and other contractual obligations. If any breakdowns are noticed after issuance of JCN, these shall be attended by the contractor without any extra cost before issuance of PAT Certificate.
- 8.3 A Proving-out Test Certificate (PTC) shall be issued by the Railway within 30 days for each of the machine on a prescribed performa **Annexure-D(M)** to the special conditions of contract for Mechanical works) on successful completion of proving-out test and supply of complete maintenance spares, Slings/Chains/Lifting tackles, tools required for smooth operation and maintenance. If any breakdowns are noticed after the issuance of PTC, these shall be attended by the contractor without any extra cost before issuance of FAT Certificate.

9.0 **Inspection and Tests at Contractor's Premises:**

- 9.1 THE RAILWAY or his authorized Inspecting Agency shall have the right of inspecting and testing the contract work or any part thereof at any time during the manufacture. The Contractor on demand from the Railway/Inspection Agency shall carry out such tests in appropriate manner in the presence and free of charge to the Railway/Inspection Agency. Should a part of the plant be manufactured not on Contractor's own premises but on other premises, the Contractor shall likewise obtain permission the Railway to inspect and test the work as if the said plant were being manufactured on the sub-contractor's premises. The inspection, examination or testing carried out by the Railway/ Inspection Agency shall not relieve the Contractor from any of his obligations under this Contract.
- 9.2 The inspection and tests shall be so conducted as not to unreasonably impede the progress of manufacture.
- 9.3 The Contractor shall bear all costs of any and all inspections and tests as per **Clause 9.1** above and extend all such facilities to the Railway or his authorized representative to

accomplish the same. Where special tests in addition to agreed tests are required by the Railway, the Contractor shall bear the cost of the testing only if such special test proves that the equipment is not in accordance with the specifications. All expenses relating to travel, boarding etc shall be borne by Railways or its authorized inspecting agency. Other costs of organizing the inspection have to be borne by the contractor.

- 9.4 **THE RAILWAY upon giving 7 days notice in writing and stating any grounds of objection, shall have the right to reject any or all equipment or demand rectification or replacement thereof.**
- 9.5 The Contractor shall submit to the Railway quarterly programme of inspection and tests one month in advance of the commencement of the quarter. The Contractor shall give the Railway a minimum of six weeks clear notice of any work being ready for inspection and tests specifying the period likely to be required for such inspection and tests. Thereafter, the Railway or his inspector shall, unless inspection or test is voluntarily waived, on giving 3 days previous notice in writing to the Contractor attend at the Contractor's or his Sub-Contractor's premises, such inspection and test. Should however the Railway so instruct the Contractor, the Contractor shall proceed with the inspection and test which shall be deemed to have been made in the Railway's presence and shall forthwith forward to the Railway copies of inspection /test certificates for acceptance by the Railway. The proforma and number of copies for inspection/test certificates shall be mutually agreed and included in the project manual.
- 9.6 When the tests have been satisfactorily completed at the Contractor's or sub-Contractor's premises, the Railway shall forthwith issue a certificate to that effect. If the tests were not witnessed by the Railway or his representative the certificate shall be issued on receipt of the test reports from the Contractor but not later than 30 days after the receipt of the test reports by the Railway. No plant shall be shipped or otherwise dispatched before such certificates have been issued.
- 9.7 In case any inspection/tests fails, re-inspection/ retest shall be carried out after necessary rectification/ replacement by the Contractor. No plant & equipment and material shall be shipped before inspection certificate and dispatch instructions have been issued by the Railway.
- 9.8 The satisfactory completion of inspection/test or issuance of the certificate by the Railway or his inspector/representative shall not discharge the Contractor of his liability should the equipment on further inspection/ test during or after erection, be found not to comply with the requirement of the contract.
- 9.9 In the case of commissioning spares and operating & maintenance spares, the same shall be offered for inspection only after the main equipment has been inspected and satisfactorily tested. In the case of such plant & equipment, where tests set forth above cannot be conducted either partially or fully in Contractor's premises but have to be conducted at site only after assembly/erection, the provisions under this article shall also apply. However, in such cases prior approval of the Railway shall be obtained by the Contractor.
- 9.10 Railway reserves rights of 'Stage Inspection' i.e. during manufacture in the case of safety related/critical M&Ps which has to be facilitated by the contractor as per requirement of Railway. Tentative production schedule in this regard is required to be provided by the contractor in this regard.
- 10.0 **Proving-out Test for Machinery and Plants:**
- 10.1 The Contractor shall guarantee smooth, safe and reliable working of the project as per Contract Specification.
- 10.2 The Contractor shall also demonstrate and establish Proving-out Tests for the M&P and achieve performance parameters as indicated in Technical Specifications.
- 10.3 Performance of concern Machinery and Plants shall be demonstrated in a test run as specified in the Technical Specification. Performance parameters are specified in Technical Specification individually for each package. It is clarified that if the performance parameters of

the various M&P and equipment, as laid down are achieved individually for 6 days continuously on two shifts basis(with 85% up time), the plant will be acceptable to Railways.

- 10.4 Proving-out Tests shall be held only after removing/rectifying any/all deficiencies of the M&P.
- 10.5 Details of Proving-out Tests and methods of computation of performance values shall be in accordance with Technical Specification.
- 10.6 The Contractor shall supervise and direct the operation during Proving-out Tests and shall take full responsibility in this regard.
- 10.7 The Contractor shall provide and install all measuring instruments required for checking the performance which are not included among the permanent measuring instruments of the Unit/sub-units. Such instruments shall be provided by the Contractor for the duration of the Proving-out Tests.
- 10.8 If, subject to provisions in Contract for reasons for which the Contractor is responsible, the performance values as per Contract Specification cannot be reached in whole or in part during the Proving-out Tests, the Contractor shall repeat the tests in whole in order to demonstrate the performances values not yet reached. Before repeating the tests, the Contractor shall at his own cost take any and all measures as may be needed in order that the performance values can be achieved.
- 10.9 The observations and facts of each Proving-out tests shall be established and formulated between the Railway and the Contractor and shall be recorded.
- 10.10 Subject to the provisions in the Contract, if during the test period an interruption or reduced performance should occur due to the reason solely attributable to the Railway, the test period shall be extended reasonably, at least by the duration of any such occurrence. Such time of interruption or reduced performance and the production achieved during this period shall be discarded in evaluating the tests.
- 10.11 If, even with two repetitive tests the performance values are not achieved for reasons within the Contractor's responsibility, the Contractor shall undertake at his own cost such modification or replacement as are considered necessary to obtain the performance values as stipulated in Contract Specification and the responsibility to demonstrate successful Proving-out Tests shall continue to remain with the Contractor till so established.
- 10.12 If, within three months, after several attempts of rectification one or several of the essential performance data can, in the opinion of the Railway, not be achieved and if such shortcomings are not offset by better performance and other essential data, then liquidated damages shall be levied up to a maximum of 5% of the accepted rate of concerned M&P items of schedule **F-1 chapter-24**.
- 10.13 Should the performance values fall below rejection level then the Contractor shall be liable either to replace the plant or to pay damages to the Railway as may be determined solely by the Railway.
- 10.14 For carrying out rectification work for achieving performance values, the Contractor shall do so without seriously hampering the normal operation.
- 11.0 **Approvals:**
- 11.1 Detailed Design & Drawings, Part Assembly drawings and Documents shall be submitted by the Contractor and shall be subject to the approval/review of the Railway. All changes from the agreed specifications/drawings shall be subject to the approval of the Railway.
- 11.2 All sub-contracts as per **Clause 12** for design and engineering, manufacture, supplies and any other work/services covered under the Contract shall be subject to prior written approval of the Railway.
- 11.3 While the Contractor shall make/execute/perform supplies, work and services in terms of the Contract, the Railway shall have the right to check and approve design, type, quality, quantity, materials and workmanship of any or all items of supplies, work and services where considered necessary by the Railway to ensure that supplies, work and services made/executed/ performed by the Contractor are in accordance with the provisions of this Contract.

- 11.4 The **Project Manager** of the Contractor who shall be overall in-charge of the Project at site shall be appointed /deputed in consultation with the Railway.
- 11.5 To enable the Railway to accord approval/review as **per Clause 11.1**, the Contractor shall submit back-up data/calculations /assumptions as may be required by the Railway.
- 11.6 Insurance Policies shall be subject to the approval of the Railway as per **clause 25.0**.
- 11.7 Where approval of the Railway is necessary or implied but is not specifically provided for elsewhere in this Contract, such approval shall also come within the purview of this schedule.
- 11.8 Approval by the Railway in terms of this schedule shall not relieve the Contractor of his obligations under this Contract.
- 11.9 **Foundation and detailed engineering Drawings for Machinery and Plants:**
- a) The contractor shall furnish 4 copies of foundation drawings, electrical cable layout drawings and other related diagrams indicating overall dimensions of foundation design details, including design calculation of Machinery and Plants to the Railways for approval. The foundation design should be based on bearing capacity of the soil which should be submitted along with design calculation. On approval of the drawings, the supplier shall execute and complete all the civil foundation (**as applicable unless otherwise specified**) work of Machinery and Plants and keep the site ready for erection and commissioning of the machine on receipt.
 - b) The contractor shall furnish 4 copies of detailed engineering drawing of all Machinery and Plants including electrical, electronics etc. to the Railways for approval. On approval of the drawings, the supplier shall execute and complete all work of Machinery and Plants for erection and commissioning of the machine on receipt.
 - c) The contractor shall furnish soft copy (PDF & AutoCAD) of all the drawing approved by the Railways in DVD.
 - d) On completion of contractual works, the contractor shall furnish four hard copies of all as built drawings including two hard copies on good quality of tracing paper and one soft copy (AutoCAD) of as built drawing along with relevant software at the time of handing over of Machinery and Plants.
- 11.10 **Manuals/Documents/Software's:**
- The contractor shall furnish 04 sets of operation and maintenance manuals along with trouble shooting guide and Parts catalogue of M&Ps and one copy of operating & application software with license key/dongle at the time of handing over of Machinery and Plants.
- 12.0 **Sub-Contracting:**
- 12.1 The Contractor shall not assign or sublet the contract or any part thereof or allow any person to become interested therein any manner whatsoever without the special permission in writing of the Railway.
- 12.2 The Contractor may sub-contract a portion of the Contract Work to third parties with the prior written approval of the Railway. The Contractor shall furnish full particulars about the proposed Sub-Contractor(s) and the details of the work to the Railway while seeking such approval.
- 12.3 THE RAILWAY shall give approval or shall refuse approval in writing within 15 days of receipt of request along with all supporting details as per **Clause 12.2**
- 12.4 Bought-out items, critical components, proprietary items and equipment manufactured and supplied by specialized manufacturers which the Contractor intends to incorporate in the Contract Work shall also come within the purview of the provision under **Clause 12.2**.
- 12.5 Unless otherwise specified approval of the Railway under **Clause 12.2** shall not be required in the case of materials bearing test certificates such as rolled steel materials, pipes or such other standard materials.

- 12.6 In case of sub-contracting the Contractor shall hire the services of manufacturer's erection/commissioning personnel for supervision of erection/commissioning, testing and commissioning of the equipment supplied by them. The sub- Contractor should also have necessary valid licenses of wireman / electrician / supervisor which shall be submitted for verification by the Railway.
- 12.7 The approval extended by the Railway to Sub-Contractors recommended by the Contractor shall not discharge the latter from his Contract obligations. The Contractor shall remain solely liable for any action, deficiency, and/or negligence on the part of his Sub-Contractors.
- 12.8 The Contractor shall submit un-priced copies of purchase orders with technical specifications included in all orders placed on Sub-Contractors.
- 12.9 In the event if certain obligations extended by a Sub-Contractor to the Contractor are extended beyond the guarantee period specified in the Contract, the Railway shall automatically be entitled to the benefit thereof.
- 12.10 In no event shall the Railway be deemed to have any Contract obligations whatsoever in respect of Contractor's, Sub-Contractors and/or title-holders of any sub-orders placed by him.
- 13.0 **Responsibility for Damage to Contractor's Materials:**
- a. The Railway Administration will not be responsible for any loss or damage to Contractor's materials, equipments, tools and plants due to fire, flood or any other cause(s) whatsoever.
 - b. The materials issued by the Railway to the Contractor for use in the works shall be treated as Contractor's materials for this purpose, and the Contractor(s) shall make good these materials in the event of any loss/ damage thereto.
 - c. Works finished but not taken over by the Railway shall be treated as Contractor's materials for this purpose, and the Contractor shall be responsible for making good any loss or damage thereto.
- 14.0 **Patents:**
- 14.1 If the performance of the Contract involves the use of a patent, trade mark, registered design, copy rights and/or industrial property rights of which the Contractor holds the title, the Contractor shall not be entitled to any license fee, royalty and/or compensation from the Railway outside the Contract price which shall be deemed to include such license fee, royalty and/or compensation.
- 14.2 Where the title holder of a patent, trade mark, registered design, copy rights and/or industrial property rights used is a third party, the Contractor shall be liable for settling with such party and paying any license fee, royalty and/or compensation thereon.
- 14.3 The Contractor shall submit to the Railway a certificate from the licensor attesting that the equipment supplied fully complies with their recommendations and the technology of the license granted.
- 14.4 In the event of any third party raising claim or bringing action against the Railway including but not limited to action for injunction in connection with third party's alleged rights affecting the equipment covered under the Contract or the use thereof, the Contractor agrees and undertakes:
- i) To defend and to assist the Railway in defending at the Contractor's cost against such third party's claim and/or actions and against any law suits of any kind initiated against the Railway.
 - ii) To indemnify, keep indemnified and hold harmless the Railway against all actions, claims, demands, costs, charges and expenses arising from or incurred by reason of any infringement of patent, trade mark, registered design, copy rights and/or industrial property rights by manufacture, sale or use of the equipment supplied by the Contractor whether or not the Railway is held liable for by any court judgment.

Provided, however, that:

- a) THE RAILWAY shall, as soon as reasonably possible notify the Contractor in writing of such third party's claims and/or actions and:
 - i) The Contractor shall at its own cost defend or assist the Railway in defending its rights against any such claims and/or actions; or
 - ii) If the Contractor defends the case, the Railway shall, assist the Contractor free of charge by providing all such information and documents as are available with the Railway, save and except that in case of production of any witness at the request or instance of the Contractor, the Contractor shall bear all costs and expenses required in this regard.
- b) THE RAILWAY shall not without the Contractor's consent (which shall not be unreasonably withheld) enter into any commitment or admit any fact capable of supporting third party's claims, unless the Railway shall release the Contractor of its liabilities and obligations.
- c) The Contractor shall at its own cost, without prejudice to the provisions of this Schedule, may either carry out such alterations or modifications of the equipment which are necessary to avoid the infringement without affecting the efficient operation of the unit to the satisfaction of the Railway or to procure a right to the unrestricted use of the infringing equipment by the Railway.

14.5 Nothing in this Schedule shall abrogate or abridge the Contractor's own liability for infringement or violation of patent, trade mark, registered design, copy rights and/or industrial property right of a third party, if such infringement or violation is proved before and sustained in court of law and the Contractor fails to take action in terms of provisions of **Clause 14.4**.

14.6 The rights and liabilities of the parties under this Schedule shall survive this Contract.

15.0 **Co-Operation with other Contractors:**

The Contractor shall co-operate with the Railway's other Contractors, if any, for any associated plant and freely extend all help. The Contractor shall adjust, if found necessary his work so as to co-ordinate with the work of other Contractors. No compensation for such co-operation / adjustment of work can be claimed from the Railway on any account.

16.0 **Waiver:**

- a. Non-enforcement by either party of any of the provisions of this Contract shall not operate or constitute as a waiver of the provision itself or any subsequent breach thereof.
- b. The validity of the Contract shall not be affected, should one or more of its stipulations be or become legally invalid and such stipulation is severable from and not fundamental to the obligations of either party to this Contract. In such a case, the parties shall negotiate in good faith to replace the invalid clause by an agreed stipulation which is in accordance with the applicable law and which shall be as close as possible to the parties' original intent.

17.0 **Language:**

All documents, instructions, catalogues, brochures pamphlets, design data, norms and calculations, drawings, operation, maintenance, trouble shooting and safety manuals, reports, labels, on deliveries and any other data shall be in English Language.

18.0 **Care of Work:**

From the commencement to the completion of work, the Contractor shall take full responsibility for the care of Plant and Equipment and for all temporary works and in case of any damage or loss to the Plant and Equipment or to any temporary works or to any surrounding property of the Railway from any cause whatsoever, the Contractor shall at his own cost replace or repair and make good the same.

19.0 **Restriction of Visitors:**

The Contractor shall not allow any visitors at site without the prior written approval of the Railway.

20.0 Possession Prior to Completion:

THE RAILWAY shall have the right to take possession or use any completed or partially completed work. Such possession or use shall not be deemed to be an acceptance of any work done not in accordance with the Contract.

21.0 Bought Out Items:

The tenderer shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the tenderer and proposed to be used, along with the manufacturer's name, brand model etc. The successful tenderer may be required to produce invoices to ensure genuineness of such products / verification by the Inspecting agency.

Test certificates of bought item should be provided by the supplier with proper identification at the time of inspection.

22.0 Deviations:

22.1 The tenderer shall certify that the offered Machinery and Plant (M&P) fully meets the specification. Various design features incorporated in the Machinery and Plant (M&P) to fulfill different technical performance requirements shall be fully explained in the offer.

However, minor deviations from these specifications which do not affect or in any way interfere with the stipulated performance standards or would result in improved safety/ reliability or would reduce recurring maintenance/operating cost of the Machinery and Plant (M&P) can be considered for acceptance. The tenderer in such eventuality shall clearly indicate the details of these deviations and their implications **as per Annexure- M of Chapter-6 of tender documents.**

22.2 All Deviations in Technical specification of Machinery and Plants (if any) should be clearly indicated in the deviation statement of clause 22.1 above. If the bidders fail to submit any deviations then it will be safely assumed by the Railways that there is no deviation and the bidder has agreed to comply with all the conditions of the **schedules.**

23.0 Warranty:

The following conditions regarding Maintenance and reliability shall also apply:-

23.1 Within the terms of the Warranty, the Contractor shall be liable for any defect/deficiency in design, material, manufacture, packing, transport, shipment, construction, erection, installation testing, commissioning, Proving-out tests, workmanship, any act of omission of the contractor, any defects/deficiencies not specifically mentioned & not attributable to Railways.

23.2 Warranty Period:

(a) For installation in newly constructed shop/depot/shed, warranty clause of M&P should be started from 24 months from issuance of PAT or 18 months from project completion whichever is later.

(b) For installation in existing shop/shed/depot area, warranty clauses of M&P should be started from 24 months from issuance of PAT.

23.3 Up to expiry of the Warranty period, the Contractor shall remain solely liable for compliance of his supplies with the Contract provisions and with the best trade and engineering practice. He shall be held to perform entirely at his expense any modification, adjustment and/or revision acknowledged to be required to meet the conditions of the Contract.

23.4 The Contractor shall also, at his expense, replace any part having defects rendering it unsuitable for the use for which intended or liable to reduce the operating life time thereof without the Railway having to identify the nature of such defect to which the defective facility might be exposed.

23.5 Where it is established that a defect is occasioned by a genuine error in design, the Contractor shall replace all identical components furnished within the compass of the Contract with components better suited to perform the same functions in the same conditions, even though such components may not have given rise to any failure.

- 23.6 Regarding any additional Spare parts, the Warranty period shall be 12 months after delivery.
- 23.7 If during the Warranty period some parts of the supplies are replaced owing to the defects/damages under the Warranty, the Warranty period for such replaced parts shall be 24 months/12 months (as per clause no.23.2) from the date of replacement unless otherwise agreed.
- 23.8 The tenderer shall ensure that in case a failure is reported by a consignee qualified service engineers shall visit the site within two days from the date of complaint on calendar day's basis.
- The period of two days after the failure report shall be treated as grace period, which will not count towards breakdown time for up to one failure per month and a maximum of 3 failures per quarter. In case the number of failure exceeds one failure per month or three during any quarter of warranty, grace period of only 1 day will be permissible for such additional failure. Complaints shall be lodged by Railway by fax phone, e-mail or per bearer at address given by the tenderer.
- 23.9 If the warranty period expires on a Saturday/ Sunday/ Holiday, it will be deemed to have been extended to the following working day.
- 23.10 If during the period of Warranty the entire plant should be unavailable for reasons ascribable to the Contractor or for performing a design modification to better adapt the facility of new technological progress, the period of Warranty covering the entire works shall be extended by all of the period of unavailability of the equipment.
- a) Upon detection of defects either by the Railway or by the Contractor and/or notification thereof in writing to the Contractor by the Railway, the Contractor shall immediately take appropriate or efficient measures to remove the defects at his cost by repair or replacement as may be approved by the Railway.
 - b) If the Contractor does not commence the rectification either by repair or replacement of such defects within 30 days from the date of notice by the Railway or does not complete the said rectification with reasonable diligence and within a reasonable time as may be mutually agreed, the Railway may, at its option, rectify the defects at the Contractor's expense. The Railway shall, in such a case, deduct from payment due to the Contractor the expenses incurred by the Railway for remedy of such defects without prejudice to the other rights of the Railway under this Contract.
 - c) In the case of defective parts not repairable at site but essential in the mean time for the use of the plant, the Contractor shall replace at site free of cost to the Railway the said defective parts, before the defective parts are removed to his works.
- If the spare parts are available with the Railway, the Contractor shall be allowed to use the same in replacing the defective parts, provided that the Contractor shall replace such parts within a reasonable time thereafter as may be required by the Railway.
- d) If an assembly/sub-assembly requires to be taken back to the manufacturer's premises for repairs/replacement either before commissioning or during warranty, the manufacturer or his agent would be required to submit an Indemnity Bond. In case the entire Plant/Equipment has to be taken back, a Bank Guarantee would have to be submitted. The Indemnity Bond/Bank Guarantee should be of adequate value so as to cover the cost of the assembly/sub-assembly/paid up cost of the Plant/Equipment.
 - e) If the Contractor, on account of the defects, repairs and/or replaces certain items by changing the design or materials, such change shall not reduce the performance of the unit.
- 23.11 If any drawings/documents supplied by the Contractor are found to be incorrect or incomplete within the period of Warranty, the Contractor shall correct or complete such drawings/documents at his cost within a reasonable time.
- 23.12 The issuance of any acceptance certificate/inspection certificate/ approval by the Railway shall in no way relieve the Contractor from the provisions of this contract.

- 23.13 Maximum permissible down time till it is restored back to the contractual output and accuracy levels, in any quarter of the year during the warranty period, shall be 150 hrs. In case the total breakdown period in any one of year during warranty period, exceeds 500 hrs., the Railways would be entitled to forfeit the payment deducted for warranty i.e 5% of the item cost as specified at clause no 4.3 (c).

To ensure this a record of breakdown in hours on quarterly basis should be maintained by the consignee. At the end of first and second year of warranty, these details of breakdown hours during warranty period should be advised to **Workshop Projects Organisation (WPO)** and firm as per performance appraisal report given in Annexure–**C(M)**. A copy of these should be sent to **Chief Mechanical Engineer & FA&CAO**, Workshop Projects Organisation, Patna. The firm will then request Workshop Projects Organisation for release of WBG annexing the performance appraisal report as per **Annexure-C(M)** and the breakdown details mentioned above.

If these details are not received in time, penal action to forfeit the payment withheld for warranty i.e 5% of the item cost as specified at clause no 4.3 (c), as per the reliability clause should be initiated by Workshop Projects Organisation, Patna. Besides, forfeiture of payment deduction for warranty, the adverse performance of the supplier would be noted for deciding their credentials.

24.0 **Communications with Contractor(s):**

Subject to and as otherwise provided in this contract, all notices as are required to be given shall be signed by the competent officer of the Railway for and on behalf of The President of India and all other actions shall be taken by the Engineer and/or his representative.

25.0 **Insurance:**

- 25.1 The Contractor shall be responsible and take a comprehensive Insurance Policy for "transit-cum-storage-cum-erection" in the joint name of the Railway and Contractor for value covering all risks and liabilities for all supplies on **FOR site basis**, storage at site up to erection, testing & commissioning and handing over of the Plant to the Railway as per terms of Contract. The Contractor shall also take insurance for Third Party Liability covering loss of human life (engineers and workmen not belonging to Contractor) and also covering the risks of damage of other's material/ equipment/ properties during execution of the Contract. However, the value of third party liability for compensation for loss of human life and damage of equipment/property shall be subject to the approval of the Railway. The Contractor shall produce the insurance policy and the receipts for the premium at the appropriate time.
- 25.2 The Contractor shall ensure that the insurance coverage is obtained to take care of future cost escalation and variation in taxes & duties during the tenure of the Contract. The Contractor shall, if necessary, also enhance and extend the insurance coverage till completion of the work and handing over of the unit.
The Insurance cover shall remain in full force up to the time the Machinery and Plant is accepted and Final Acceptance Test Certificates (FAT) is issued by the Engineer.
- 25.3 In order to adequately cover under comprehensive transit-cum- storage-cum-erection insurance, the Contractor shall fulfill the necessary requirement/obligations of the Insurance Company including provisions of adequate fire fighting facilities, watch & ward etc.
- 25.4 In all cases, the Contractor shall lodge the claims with the Underwriters and also get the claims settled. However, the Contractor shall proceed with the repairs and /or replacement of the equipment /components in their scope of supply without waiting for the settlement of the claims. In case of seizure of materials by concerned authorities, the Contractor shall arrange prompt release against bond, security or cash as required. The Railway will extend all assistance to the Contractor in such a case.
- 25.5 All the insurance claims pertaining to their scope shall be processed by the Contractor and the missing / damaged items shall be replaced / repaired by them without any extra cost to the Railway and without affecting the completion time.
- 25.6 The Contractor shall also arrange Accident Insurance Policy for his personnel deputed to site including a separate policy as per Workmen's Compensation Act.

The Accident Insurance policy shall be for payment of an ex-gratia amount of (INR) Rs. 1,00,000/- (Indian Rupees One lakh only) per head in case of fatal accident to the Contract labour engaged by him in addition to the Workmen's Compensation Insurance Policy. As and when a fatal accident takes place, along with the Workmen's Compensation, the Contractor is required to pay the ex-gratia amount within seven (7) days from the date of accident.

In case of any delay in paying the ex-gratia amount as above, the Railway has the right to pay such amount directly to the family of the deceased and recover the same from the Contractor's running/future bills.

- 25.7 The vehicles, mobile equipment and any other equipment (whether or not those are owned by them) deployed at site by the Contractor or his sub-Contractor shall be covered under Automobile Liability Insurance at Contractor's cost.

26.0 Indemnity:

- 26.1 The Contractor shall at all times indemnify and keep indemnified the Railway against all claims which may be made against the Railway in respect of any infringement of any rights protected by patent as per **Clause 14**. In this connection, the Railway shall pass on all claims made against him to the Contractor for settlement.
- 26.2 The Contractor assumes responsibility for and shall indemnify and save harmless the Railway from all liability, claims, costs, expenses, taxes and assessments including penalties, punitive damages, attorney's fees and court costs which are or may be required with respect to any breach of the Contractor's obligations under the Contract or for which the Contractor has assumed responsibility under the Contract including those imposed under any Contract, local or national law or laws, or in respect to all salaries, wages or other compensation of all persons employed by the Contractor or his Sub-Contractors or suppliers in connection with the performance of any work covered by the Contract. The Contractor shall execute, deliver and shall cause his Sub- Contractor and suppliers to execute and deliver, such other further instruments and to comply with all the requirements of such laws and regulation as may be necessary there-under to conform and effectuate the Contract and to protect the Railway at all times.
- 26.3 THE RAILWAY shall not be held responsible for any accident or damages incurred or claims arising there-from during the period of execution of work under the responsibility of the Contractor and putting into operation of the plant under the supervision of the Contractor in so far as the latter is responsible.
However, the Contractor shall be liable for such accidents as may be due to negligence on his part in accordance with Indian laws and regulations.
- 26.4 The contractor shall submit the **Indemnity Bond** as per the format given in **Annexure-F(M)** of special conditions of contract for Mechanical Works before supply of machines.

27.0 Service Facility in India and Technical Support:

- 27.1 The tenderer will clearly spell out in the offer the facilities available with him or his agent for providing adequate after-sales service in India during warranty period in the appropriate section of **Annexure 'C(M)'** of Special condition of contract for Mechanical Works. The complete details such as organization for after sales service, availability of technically competent engineers and warehousing facilities for spares should be clearly indicated.
Bidders not offering complete servicing/repair facilities in India to ensure quick response to maintenance/ servicing calls are not likely to be considered.
- 27.2 After the warranty period, if any, the manufacturer or his agent shall agree to provide service supports for trouble shooting and obtaining spare parts. The manufacturer shall be obliged to provide spare parts required by the Purchasers for a period of 15 years from the date of delivery of the machine at the ultimate destination to safeguard against obsolescence.
- 27.3 Tenderer who are OEM, shall undertake to supply spare parts for a period of expected life of machine. Other tenderers shall submit undertaking from OEM for supply of spare parts for a period of expected life of the machine.

27.4 Tenderers shall indicate the list of spares required for maintenance of the machine beyond warranty period. Current cost of such spares and current service charges for the items of work of repair of machine shall also be indicated.

27.5 During warranty period, the supplier or his authorized agent shall attend for break down as soon as possible, but in no case later than 72 hours of receipt of intimation of the breakdown.

27.6 AMC/CAMC of Major M&Ps at Consignee end:

27.6.1 The Contractor shall be responsible for AMC/CAMC services for the supplied Machines/Equipments/Items as per Schedule F-1 either directly or through the OEM. An affidavit in this regard is required to be submitted along with the offer/GAD submission / approval towards facilitating required AMC/CAMC services along with spares support at the consignee location as per agreed terms and conditions with consignee, minimum upto 05 years including spare parts support as per Para 27.2. The AMC/CAMC should include complete responsibility for the bought out sub assemblies and components like CNC System, Diesel Engine, AC Unit, Software/Hardware support etc . Preventive maintenance shall preferably to be conducted on weekends/Holidays through mutual agreement with the consignee. The preventive maintenance regime offered must be aimed at achieving minimum 90% uptime of the plant excluding the plant downtime for preventive maintenance schedules.

27.6.2 AMC/CAMC shall be operated, managed and paid by the consignees indicated. A formal agreement is required for operating AMC/CAMC at consignee end. However, an indicate rate with broad terms and conditions towards AMC/CAMC support need to be provided alongwith Offer/GAD Submission/Approval, this rate should be within 5% of the machine/equipment/item value as per F-1 Schedule. Spare prices will be governed as per certified pricelist provided to railways time to time or as uploaded on firms website.

27.6.3 AMC/CAMC is not part of scope of supply (if not specifically part of the specification) being an optional requirement and not included in commercial evaluation criteria. Therefore, the option to award AMC/CAMC shall remain with the consignee after completion of warranty period. In case consignee wants to exercise the option of entering into AMC/CAMC after warranty, then the contractor will be bound to enter into AMC/CAMC either directly or through OEM. However, contractor/OEM will not have any claim towards such service support and railway/consignee will have rights towards getting such service support from open market, if desired.

27.6.4 Non-compliance of above at any stage i.e. either during the warranty period of the Machines/Equipments/Items as per Schedule F-1 or the statutory period assigned as per this Para towards AMC/CAMC support, contractor shall be liable for a penal action including forfeiture of the Performance Guarantee. In addition, the OEM shall also be liable for getting delisted from vendor directory of railways including/excluding cancellation of in hand/future orders for the same or any other Machines/Equipments/Items by the railways. Such provision may be incorporated in the sub-agreement by the contractor with the OEM for the supply of Machines/Equipments/Items as per Schedule F-1.

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Percentage BoQ

Tender Inviting Authority: Eastern Regional Office, Kolkata

Name of Work: Tender for Turnkey Labour/ Petty contract for Mechanical Works comprising Supply, Erection, Testing & Commissioning of Machinery & Plant in connection with Development of Infrastructure for Integrated Maintenance of MEMU, DEMU & other Coaching Stock in SER (Phase-1) at Anara, South Eastern Railway in PKG 2.

Contract No: ERO/CON/941/1354

Name of the Bidder/ Bidding Firm / Company :						
PRICE SCHEDULE (This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevent columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)						
NUMBER #	TEXT #	NUMBER #	TEXT #	NUMBER	NUMBER #	TEXT #
Sl. No.	Item Description	Quantity	Units	Estimated Rate in Rs. P	TOTAL AMOUNT in Rs. P	TOTAL AMOUNT In Words
1	2	3	4	5	6	7
1	Turnkey Labour/ Petty contract for Mechanical Works comprising Supply, Erection, Testing & Commissioning of Machinery & Plant in connection with Development of Infrastructure for Integrated Maintenance of MEMU, DEMU & other Coaching Stock in SER (Phase-1) at Anara, South Eastern Railway in PKG 2 including labour welfare cess and all other taxes, duties, levies etc.	1.000	Each	10914145.00	10914145.00	INR One Crore Nine Lakh Fourteen Thousand One Hundred & Forty Five Only
2	Add GST @ 18% on base price of Sl. No. 1	1.000	Item	1964546.10	1964546.00	INR Nineteen Lakh Sixty Four Thousand Five Hundred
Total in Figures					12878691.00	INR One Crore Twenty Eight Lakh Seventy Eight Thousand Six Hundred & Ninety One Only
Quoted Rate in Figures			Select		0.00	INR Zero Only
Quoted Rate in Words		INR Zero Only				

ENGINEERING PROJECTS (I) LTD.

(A GOVT. OF INDIA ENTERPRISES)

Tender for Turnkey Labour/ Petty contract for Mechanical Works comprising Supply, Erection, Testing & Commissioning of Machinery & Plant in connection with Development of Infrastructure for Integrated Maintenance of MEMU, DEMU & other Coaching Stock in SER (Phase-1) at Anara, South Eastern Railway in PKG 2.

TENDER No: ERO/CON/941/1354, date:24.04.2024

Sl. No.	Description	Quantity	Unit	Rate	Amount
1. a)	Description:- Supply, Installation and commissioning of Air compressor of capacity 500 CFM with air receiver and air drier along with compressed air pipe line with valves, clamps and other fittings as per specification no. IM/MEMU/DEMU/Anara/WP/Mech/ M&P /EAC(500CFM) 13 (a) Supply, Installation and commissioning of Air compressor of capacity 500 CFM with air receiver and air drier	1.00	Numbers	₹ 2,123,446.00	₹ 2,123,446.00
1. b)	Description:- Supply, Installation and commissioning of Air compressor of capacity 500 CFM with air receiver and air drier along with compressed air pipe line with valves, clamps and other fittings as per specification no. IM/MEMU/DEMU/Anara/WP/Mech/ M&P/EAC(500CFM) 13(b) Supply, Installation & Commissioning of 80 NB GI Pipe (IS:1239, Part-I) Heavy class (C class) including cutting, threading, welding etc. bends, elbow, reducers, nut bolts, washers, with one coat of primer and two coats of synthetic enamel paint of approved make and shade.	250.00	Metre	₹ 2,615.25	₹ 653,812.50
1. c)	Description:- Supply, Installation and commissioning of Air compressor of capacity 500 CFM with air receiver and air drier along with compressed air pipe line with valves, clamps and other fittings as per specification no. IM/MEMU/DEMU/Anara/WP/Mech/ M&P /EAC(500CFM) 13(c) Supply, Installation & Commissioning of 25 NB GI Pipe (IS:1239, Part-I) Heavy class (C class) including cutting, threading, welding etc. bends, elbow, reducers, nut bolts, washers, with one coat of primer and two coats of synthetic enamel paint of approved make and shade.	60.00	Metre	₹ 1,039.00	₹ 62,340.00
1. d)	Description:- Supply, Installation and commissioning of Air compressor of capacity 500 CFM with air receiver and air drier along with compressed air pipe line with valves, clamps and other fittings as per specification no. IM/MEMU/DEMU/Anara/WP/Mech/ M&P/ EAC(500CFM) 13(d) Supply, Installation & Commissioning of CI Ball Valve suitable for 15 Kg/sq cm, complete in all respect, 80 mm dia nominal bore.	3.00	Numbers	₹ 9,717.00	₹ 29,151.00
1. e)	Description:- Supply, Installation and commissioning of Air compressor of capacity 500 CFM with air receiver and air drier along with compressed air pipe line with valves, clamps and other fittings as per specification no. IM/MEMU/DEMU/Anara/WP/Mech/ M&P/EAC(500CFM) 13(e) Supply, Installation & Commissioning of Forged Brass Ball valve with hard chrome plated ball valve suitable for 15 Kg/sq.cm, complete in all respects, 25 mm dia nominal bore.	20.00	Numbers	₹ 3,269.49	₹ 65,389.80
1. f)	Description:- Supply, Installation and commissioning of Air compressor of capacity 500 CFM with air receiver and air drier along with compressed air pipe line with valves, clamps and other fittings as per specification no. IM/MEMU/DEMU/Anara/WP/Mech/ M&P /EAC(500CFM) 13(f) Supply, Installation & Commissioning of Support Clamp 80mm.	50.00	Numbers	₹ 531.36	₹ 26,568.00

Sl. No.	Description	Quantity	Unit	Rate	Amount
1. g)	Description:- Supply, Installation and commissioning of Air compressor of capacity 500 CFM with air receiver and air drier along with compressed air pipe line with valves, clamps and other fittings as per specification no. IM/MEMU/DEMU/Anara/WP/Mech/ M&P /EAC(500CFM) 13(g) Supply, Installation & Commissioning of Support Clamp 25mm.	50.00	Numbers	₹ 204.24	₹ 10,212.00
1. h)	Description:- Supply, Installation and commissioning of Air compressor of capacity 500 CFM with air receiver and air drier along with compressed air pipe line with valves, clamps and other fittings as per specification no. IM/MEMU/DEMU/Anara/WP/Mech/ M&P/EAC(500CFM) 13(h) Supply, Installation & Commissioning of TEE Bolt M8 X 50mm	100.00	Numbers	₹ 32.20	₹ 3,220.00
1. i)	Description:- Supply, Installation and commissioning of Air compressor of capacity 500 CFM with air receiver and air drier along with compressed air pipe line with valves, clamps and other fittings as per specification no. IM/MEMU/DEMU/Anara/WP/Mech/ M&P/EAC(500CFM) 13(i) Supply, Installation & Commissioning of Mounting Bracket 300mm.	50.00	Numbers	₹ 377.12	₹ 18,856.00
1. j)	Description:- Supply, Installation and commissioning of Air compressor of capacity 500 CFM with air receiver and air drier along with compressed air pipe line with valves, clamps and other fittings as per specification no. IM/MEMU/DEMU/Anara/WP/Mech /M&P /EAC(500CFM) 13(j) Supply, Installation & Commissioning of Branching Reducer 80mm X 25 mm	20.00	Numbers	₹ 2,270.34	₹ 45,406.80
2. i)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P/QWA 14(i) Pump sets 40 HP. 1 set= 2Nos Pump of 40 HP each along with Electric Motor). Motor & Pump should be of standard manufacturer such as M/s Kirloskar./ CGL/M&P/ D&B Vertical in Line Or type/HSC.	1.00	Set	₹ 480,830.51	₹ 480,830.51
2. ii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(ii) Common Skid Mounting For Pump set	1.00	Numbers	₹ 60,634.75	₹ 60,634.75
2. iii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(iii) MS Fabricated Suction Main Fold	2.00	Numbers	₹ 52,535.59	₹ 105,071.18
2. iv)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(iv) M.S. Delivery Main Fold	2.00	Numbers	₹ 52,536.00	₹ 105,072.00
2. v)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(v) Butter Fly Valve 150 mm	6.00	Numbers	₹ 15,252.54	₹ 91,515.24
2. vi)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/ M&P /QWA 14(vi) Non return Valve 150 mm	4.00	Numbers	₹ 13,255.93	₹ 53,023.72

Sl. No.	Description	Quantity	Unit	Rate	Amount
2. vii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(vii) Hydro Pneumatic Tank With Fittings	1.00	Numbers	₹ 55,998.31	₹ 55,998.31
2. viii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(viii) On Line Flow meter 150NB.	2.00	Numbers	₹ 163,038.14	₹ 326,076.28
2. ix)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(ix) Electrical Operated Motorized Valve 150 mm make: CAIR/ZOLOTO /L&T/MTPL	2.00	Numbers	₹ 163,038.14	₹ 326,076.28
2. x)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/ M&P /QWA 14(x) Laying of 1 sqmm 2 core Shielded cable including lugs etc.	200.00	Metre	₹ 229.66	₹ 45,932.00
2. xi)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(xi) Laying of RS 485 communication cable	6.00	Set	₹ 23,949.15	₹ 143,694.90
2. xii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(xii) 2X25 mm Casing Pipe for communication and power cables	5.00	Set	₹ 36,061.86	₹ 180,309.30
2. xiii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P/QWA 14(xiii) Panel for operation of Valves and flow meter	1.00	Set	₹ 163,038.14	₹ 163,038.14
2. xiv)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P/QWA 14(xiv) Power Cable From Pumps to Control Panel 16 Sq mm. Copper 3.5 core including lugs etc.	40.00	Metre	₹ 467.80	₹ 18,712.00
2. xv)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P/QWA 14(xv) Control Panel for 2 pumps With VFD , PLC, HMI For Group Wise Pumping with APFC and suitable Capacitors.	1.00	Numbers	₹ 813,712.71	₹ 813,712.71
2. xvi)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P/QWA 14(xvi) SITC of Smart Control to Operate system (PUMPS and valves) through mobile. Communication via GSM Network including SMPS power supply This may be installed in MCC Panel.	1.00	Numbers	₹ 402,233.05	₹ 402,233.05

Sl. No.	Description	Quantity	Unit	Rate	Amount
2. xvii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P/QWA 14(xvii) 2 KVA Industrial UPS to give back up of minimum 2 hr.	1.00	Numbers	₹ 115,674.58	₹ 115,674.58
2. xviii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P/QWA 14(xviii) Chemical Earthing as Per RDSO Norms	4.00	Numbers	₹ 27,411.86	₹ 109,647.44
2. xix)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(xix) SCADA For 500 Tab, data analysiser, including of PC, LED of 32" Key Board, Printer, allied accessories.	1.00	Set	₹ 413,211.86	₹ 413,211.86
2. xx)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(xx) Suction Pressure Transducer and Pressure Gauges With Fittings.	1.00	Numbers	₹ 23,401.69	₹ 23,401.69
2. xxi)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(xxi) Delivery Pressure Transducer With Pressure Gauge With Fittings.	1.00	Numbers	₹ 23,401.69	₹ 23,401.69
2. xxii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/ M&P /QWA 14(xxii) Delivery Pressure Transducer With Pressure Gauge With Fittings. Various type of Small Cable to Connect control panel to UPS ,PC, and others as per site requirement in Pump Room and control room. Various Type of Luges, Cable Gland, Terminals etc.	1.00	Job	₹ 23,598.00	₹ 23,598.00
2. xxiii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/ M&P /QWA 14(xxiii) Copper wire to Connect the Control Panel & Motors	20.00	Kg	₹ 896.61	₹ 17,932.20
2. xxiv)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14 (xxiv) MS/GI/Fabricated Speceres like, Tee, Enlarger, reducer, spool including nut & bolts & packing, and flanges	80.00	Kg	₹ 205.93	₹ 16,474.40
2. xxv)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(xxv) Supply & Fixing of 150 mm G.I. Hydrant Pipe Line with bends, distance pieces running meter.	600.00	Metre	₹ 2,773.73	₹ 1,664,238.00

Sl. No.	Description	Quantity	Unit	Rate	Amount
2. xxvi)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14 (xxvi) Supply of MS/G.I. Bends 90 degree 150 mm.	15.00	Numbers	₹ 1,387.29	₹ 20,809.35
2. xxvii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(xxvii) Supply & Fixing of MS Flanges 150 mm.	50.00	Numbers	₹ 1,165.25	₹ 58,262.50
2. xxviii)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(xxviii) Making Hole in G.I. Hydrant Pipe Line in every three meter and Fixing the M.S. Coupling with welding.	200.00	Numbers	₹ 203.39	₹ 40,678.00
2. xxix)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14 (xxix) Supply of MS reducing Coupling Size 50 X 25mm with treading to connect the G.I. Nipple 25 mm.	200.00	Numbers	₹ 148.31	₹ 29,662.00
2. xxx)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14(xxx) Bellow seal for Hydrant Line of 150 mm G. I, Pipe Line at the interval of 150 meters length.	3.00	Numbers	₹ 24,966.10	₹ 74,898.30
2. xxxi)	Description:- Supply, Installation and commissioning of Hydrant system for quick watering arrangement as per specification no. IM/MEMU/DEMU/Anara/WP/ Mech/M&P /QWA 14 (xxx) Supply of SS304 PTEF seat 25 mm dia. Brass Bal valve KOR valve India(p) Ltd or TBS Engineers (p) Ltd or similar make with IS 9001-2000 Certificate or ISI standard single PC Designing Ball valve	200.00	Numbers	₹ 1,747.46	₹ 349,492.00
3. a)	Description:- Transportation and Restoration / Renovation of Rolling Stock for displaying as Indian Railway Heritage at Premises of Pratapnagar Workshop 15(a) Transportation of 1 no. of BG/NG/MG Locomotive/Coach up to 63 KM by Road transport with loading and unloading by suitable crane & Trailer etc.	1.00	Job	₹ 148,608.47	₹ 148,608.47
3. b)	Description:- Transportation and Restoration / Renovation of Rolling Stock for displaying as Indian Railway Heritage at Premises of Pratapnagar Workshop 15(b) Transportation Charges for extra per Km rate beyond 63 Km including cost of fuel, lubricant etc. as per enclosed terms and conditions.	800.00	Kilometre	₹ 208.47	₹ 166,776.00
3. c)	Description:- Transportation and Restoration/ Renovation of Rolling Stock for displaying as Indian Railway Heritage at Premises of Pratapnagar Workshop 15(c) Restoration / Renovation of Locomotive / Coach for displaying as Indian Railway Heritage	1.00	Job	₹ 1,207,046.00	₹ 1,207,046.00
	Total =				₹ 10,914,145.00