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VOLUME - IA

Technical Conditions of Contract (TCC) for "Construction & Development of Open Storage Yard and closed storage shed, including Civil, Sanitary, Internal & External Electrification work, Fencing etc. for Railway Electrification Birlanagar - Etawah 386 KM/440TKM Project"

FOR

RE WORKS OF BHANDAI-UDI, BIRLANAGAR-ETAWAH AND FARRUKHABAD-SHIKOHABAD INCLUDING MAINPURI-ETAWAH

OF

NORTH CENTRAL RAILWAY

BHARAT HEAVY ELECTRICALS LIMITED

	Technical Conditions Of Contract (TCC) **PROJECT ENGINEERING & SYSTEMS DIVISION** **HYDERABAD**	Ref No: HY/PE&SD/Projects/TCC/2018-19/Enabling works/01 Rev. No. 00

TECHNICAL CONDITIONS OF CONTRACT (TCC)

FOR

"CONSTRUCTION & DEVELOPMENT OF OPEN STORAGE YARD AND CLOSED STORAGE SHED, INCLUDING CIVIL, SANITARY, INTERNAL & EXTERNAL ELECTRIFICATION WORK, FENCING ETC".

FOR

RAILWAY ELECTRIFICATION PROJECT IN BHANDAI-UDI, BIRLANAGAR-ETAWAH AND SHIKOHABAD-FARRUKHABAD INCLUDING MAINPURI-ETAWAH, SECTION OF AGRA, JHANSI AND ALLAHABAD DIVISIONS OF NORTH CENTRAL RAILWAY UNDER RE PROJECT LUCKNOW, TOTAL RKM 386/440TKM

Revisions: Refer to record of revisions	Prepared By:		Checked By & Approved By:	Date
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Volume IA
Part I
Contract specific details

Chapter I- Project Information

1.0 Project Details

Bharat Heavy Electricals Limited has been awarded the "The Electrification of Railway Lines of the section Birlanagar-Etawah, Bhandai-Udi and Farrukhabad-Shikohabad including Mainpuri-Etawah of North Central Railway 386 RKM/440 TKM" project on EPC basis by Central organization for railway electrification (CORE), Allahabad.

1	Customer	:	Central organization for railway electrification (CORE), Allahabad.
2	Project Information	:	Electrification of Railway Lines of the section Birlanagar-Etawah, Bhandai-Udi and Farrukhabad-Shikohabad including Mainpuri-Etawah of North Central Railway 386 RKM/440 TKM
3	Location	:	Birlanagar-Etawah, Bhandai-Udi and Farrukhabad-Shikohabad including Mainpuri-Etawah of North Central Railway 386 RKM/440 TKM, Madhya Pradesh and Uttar Pradesh.
4	Address Detail	:	Birlanagar-Etawah, Bhandai-Udi and Farrukhabad-Shikohabad including Mainpuri-Etawah of North Central Railway.
5	Nearest Railway Station	:	Agra, Etawah, Birlanagar, Shikohabad and others
6	Road Approach	:	NA
7	Nearest Air Port	:	Lucknow, Kanpur
11	Ambient Air Temperature (Average)	:	a) Maximum : 45^0 C b) Minimum : 2^0 C
12	Average Relative Humidity	:	40 %
13	Climatic Condition	:	Tropical Climate
14	MP Border		State boundary between Udi More and Phoop Station

Bidder is advised to visit the project site and appraise himself about the local conditions and infrastructure available in the area for fulfilling their commitments under the contract. BHEL will not admit any claims whatsoever on account of Contractor's non-familiarization of local conditions.

Chapter II- Scope of Work

The work to be performed under the scope of this tender mainly consists of but not limited to complete scope of for "Construction & Development of Open Storage Yard and closed storage shed, including Civil, Sanitary, Internal & External Electrification work, Fencing etc."

The Scope including:

1. Open Storage Yard at 3 different places, approx. 3375 Sqm area each Boundary wall & Fencing
2. Closed Storage Shed.
3. Fencing.
4. Internal & External Electrification work.

All works shall be complete as per drawings & RDSO, CORE, ACTM, BHEL & other railway standards.

The flowing are the tentative location of Open storage yard and closed Storage of the project.

1) Bhind
2) Bah
3) Karhal

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Chapter III- Facilities in the scope of BHEL/Contractor

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE**:			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with customer(CORE)
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with customer(CORE)
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipment, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc.		Yes	
f	Firefighting equipment like buckets, extinguishers etc.		Yes	
g	Fencing of storage area, office, canteen etc. of the bidder		Yes	
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labor colony (as per availability)	Yes		Can be provided as per availability
b	Labor Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			
3.2.1	Electricity For construction purposes		Yes	
3.2.2	Electricity for the office, stores, canteen etc. of the bidder		Yes	
3.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc.		Yes	
3.3.0	**WATER SUPPLY**			
3.3.1	For construction purposes		Yes	

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.3.2	Water supply for bidder's office, stores, canteen etc.		Yes	
3.3.3	Water supply for Living Purpose		Yes	
3.4.0	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc. during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Téléphone, fax, internet, intranet, e-mail etc.		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
3.7.0	**Demobilization of all the above facilities**		Yes	
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipment and consumables (T&P, Consumables etc.)		Yes	

Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.9.1	**Engineering works for construction:**			
a	Providing the construction drawings for all the works covered under this scope			**Not Applicable**
b	Drawings for construction methods			**Not Applicable**
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		Yes	In consultation with BHEL
d	Shipping lists etc. for reference and planning the activities		Yes	In consultation with BHEL
e	Preparation of construction (Concreting B/W, etc.) schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site construction schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly construction schedules based on S. No. e. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
h	Daily construction / work plan based on S. No. g. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
i	Periodic visit of senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two Weeks.		Yes	
j	Arranging the materials required for Work		Yes	
k	Coordination for inspection & checking and getting clearance from customer and consultancy		Yes	
l	Preparation of formats for completion of activities		Yes	

Chapter IV- T&P's to be Deployed By Contractor

LIST OF TOOLS AND PLANT:

The following tools and equipment but not limited to, are required for the efficient execution of the civil works. The contractor shall make them available for construction purposes, including all consumables likely to be used at his own cost at the time of mobilization.

S.No.	Description	Minimum Quantity	Remarks
1	Digital Concrete Mixer 2 to 4 cum with hopper/Self-loading mobile concrete mixer (Azax)with printer	3 nos.	
2	Needle Vibrator (Needle type 40mm)	4 nos.	
3	Needle Vibrator (Needle type 25mm)	2 nos.	
4	Surface Vibrator	1 no.	
5	Concrete Pump		Need based
6	Dewatering Pump	2 nos.	
7	Earth Compactor	2 nos.	Need based
8	Reinforcement steel cutting & Bending machine	2 nos.	
9	Welding Machine	2 nos.	
10	Grinding Machine	4 nos.	
11	Excavator	5 no.	
12	Dozer	7 nos	
13	Dumper	1 nos.	
14	Water Tanker	2nos.	
15	Theodolite with staff	2 nos.	
16	Dumpy level with staff	1 no.	
17	Compression testing machine (for concrete cubes)	1 no	
18	Cube mould (15 cm x 15 cm x 15 cm)	12 nos.	
19	Sieve analysis sieve sets for coarse & fine aggregates	1 set	
20	Jar/Beaker for Bulk density test of sand	1 no.	
21	Proctor test equipment	1 set	
22	Tractor with trolley	2 Set	
23	Tractor mounted Auger machine	2 Set	
24	Proctor test equipments	1 set	
25	All the required filed quality test equipment/instruments	1 set	

BHEL will not provide any tool, plants or any testing facility/apparatus for the work. It will be contractor's responsibility to arrange all required tools, plants and other testing apparatus, etc. at their own cost. The prices quoted & finalized are inclusive of the charges towards providing such T&P. No extra payment will be entertained on account of this.

Chapter V- Time Schedule

5.1 TIME SCHEDULE

5.1.1
The entire work of construction of "Construction & Development of Open Storage Yard and closed storage shed, including Civil, Sanitary, Internal & External Electrification work, Fencing etc. as detailed elsewhere in the Tender Specification shall be completed within 10 (Ten) Months from the date of commencement of work at site.

5.1.2
During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.

5.1.3
The work shall be commenced on the mutually agreed date between the bidder and BHEL engineer. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

5.2 COMMENCEMENT OF CONTRACT PERIOD

The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy, the decision of BHEL engineer will be final.

5.3 MOBILISATION

5.3.1
The activities for work shall be started as per directions of Construction manager of BHEL.
5.3.2
The contractor should mobilize man power in order to complete the work in **10 (Ten) Months**
5.3.3
Requisite Material, men and machinery should be arranged in order to complete the project within stipulated time period.
5.3.4
The contractor has to augment his resources in such a manner that to achieved major milestones of the project are achieved on specified schedules:

In order to meet above schedule in general, and any other intermediate targets set, to meet project, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

5.4 CONTRACT PERIOD

For the purpose of contract, the period shall be taken as **10 (Ten) Months.** Completion of the work shall be as per BHEL Bar Charts revised from time to time. In order to expedite the work, the contractor has to deploy manpower as per site requirement without any extra cost to BHEL.

5.5 PROTECTION OF WORK

The contractor shall have total responsibility for protecting his works till it is taken over by the Employer. No claim will be entertained by the Employer or the representative of the Employer for any damage or loss to the Contractor's works and the Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings. Should any such damage to the Contractor's Works occur because of other party not being under his supervision or control, the Contractor shall make his claim directly with the party concerned.

If disagreement, conflict, or dispute develops between the Contractor and the other party or parties concerned regarding the responsibility for damage to the Contractor's Works the same shall be rectified. The Contractor shall not cause any delay in the repair of such damaged Works because of any delay in the resolution of such disputes. The Contractor shall proceed to repair the Work immediately and no cause thereof will be assigned pending resolution of such disputes.

Chapter VII- Payment Conditions

1. Payment for the work shall be done as per actual measurement and certification by BHEL Engineer at site.

2. All the line items will be measured and paid as per actuals. However, payment shall be made as per work completed in all respect according to the measurement.

Chapter VII- Statutory Regulation

6.2 BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998 and

INTER-STATE MIGRANT WORKMEN ACT, 1979 (IN CASE BIDDER ENGAGE MANPOWER FROM OTHER STATE)

In case any portion of work involves execution through building or construction workers and/or inter-state migrant workmen, then compliance to the above titled Acts as applicable shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances, it may be ensured as under:-

It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a license to the Competent Authority under the BOCW Act and/or ISMW Act as applicable and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of license / permission to BHEL within a period of one month from the date of award of contract.

It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these acts and rules including that of payment / deposit of cess as per the applicability under above referred Acts within a period of one month from the receipt of payment.

It shall be the responsibility of the sub-contractor to furnish the receipts / challans towards deposit of the cess together with the number, name and other details of beneficiaries (building/Inter-state Migrant workmen) engaged by the sub-contractor during the preceding month.

It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.

Volume IA
Part II
Technical Specification

Chapter II- Detailed Scope of Work

2.0	**GENERAL SCOPE OF WORK**
2.1	The tender specification covers all the works for **"DESIGNING, CONSTRUCTION & DEVELOPMENT OF CLOSED STORAGE SHEDS (APPROX. SIZE: 675 SQM) AND OPEN YARD OF APPROX. 10125 SQM AREA INCLUDING CIVIL, SANITARY, INTERNAL & EXTERNAL ELECTRIFICATION WORK, FENCING ETC FOR RAILWAY ELECTRIFICATION BIRLANAGAR - ETAWAH 386 KM/440TKM PROJECT** Work under this tender includes supply of all required materials, labor, consumables, transportation, sample testing such as cement, aggregates, TMT, Structural Steel, Permanently color coated GI Sheets, false ceiling, steel / wooden doors, aluminum work, brick work, sanitary and water Supply work, electrical works etc. for completion of Tender Scope in all respect.
2.2	The complete works shall be carried out as per BOQ cum Rate schedule. If any work covered in the scope of contract cannot be executed, using items available in BOQ cum Rate Schedule, additional / extra items shall be made and rates for such items shall be worked out as per **GCC clause**. However contractor shall be bound to execute all the works under the scope of the contract and decision whether an extra item is applicable or not, shall be taken by BHEL, which will be final and binding on the contractor.
2.3	Any activity which is necessarily required for satisfactory execution of any item of 'BOQ cum Rate Schedule' in line with technical specifications shall be deemed to be included in BOQ item even if it is not described in the item description and no extra Payment shall be made against such activity.
2.4	In case the description / specifications as per BOQ are found to be incomplete, Indian Standard Codes (IS Codes) specifications shall be followed. Quantities mentioned in the 'BOQ cum Rate Schedule', are approximate only and liable for variation due to change of scope of work / variation in schedule of quantities, changes in design etc. The tenderers shall undertake to execute actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually executed at site and payments will also be regulated for the same. The quantities indicated against each item may vary to any extent and no compensation will be payable in variation of Individual Quantity.
2.5	**The Scope of Work comprise but not limited to the following:** **A.** Design, Manufacturing, Supply, Receipt at site, Erection & Finishing works (if any) and handing over to site using insulated / PUF Panels including Foundations, Super structure, Electricals, Sanitary, Internal / External Plumbing Works & Sewage connections etc. all complete.

	B. Design, Manufacturing, Supply, Receipt at Site, Erection, Site Painting etc. including Civil Works, Foundations, Super structure, Electricals, Sanitary, Internal / External Plumbing Works & Sewage connections etc. all complete and Handing over to site, Storage Shed with In-charge Room, Side Racks, Pantry & Toilet etc. – **01 No. (Size: 15mx36mx6m).** **C.** Construction and development of Open Storage Yard including development of storage yards, Internal/External Roads, Side /internal, Drains, illumination, Fencing, Security Post etc.- **Approx. Size 10125SQM.** All above jobs shall be executed as per BHEL Engineer's instructions, drawings, Detailed specifications and respective BOQ cum Rate Schedule.
2.6	**RESPONSIBILITY OF CONTRACTOR**
2.6.1	Furnishing all labour (skilled, unskilled etc.), materials (except those specified in BHEL scope), supervision, construction plans, equipment, supplies, transport to and from the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown or specified but reasonably implied or necessary for the proper completion, maintenance and handing over the works, in accordance with the stipulations and specifications laid down in the contract documents and additional stipulations as may be provided by The BHEL Engineer during the course of works.
2.6.2	Furnishing samples of all materials required by the BHEL Engineers for testing / inspection and approval, for use in the works. The samples may be retained by the BHEL Engineer for final incorporation in the works.
2.6.3	Furnishing test reports for the products used or intended to be used, if called for the Specifications or if so desired by the BHEL Engineer.
2.6.4	Giving all notices, paying all fees, taxes etc., in accordance with the General Conditions of contract that is required for all works including temporary works.
2.6.5	Arranging manufacturer's supervision for items of work done as per manufacturer's Specifications when so specified.

2.6.6	Carrying out survey of the work area to establish levels and coordinates at suitable intervals from existing grid levels and coordinates furnished by the owner established bench marks, setting out the locations and levels of proposed structures, constructions and marking of reference pillars and other identification works etc. as required, The contractor shall provide the Customer / BHEL such assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used.
2.7	**GENERAL**
2.7.1	Contractor shall furnish the **manufacturers test certificate** for the steel & cement procured by them. Apart from this all, the field test shall be arranged by contractor for cement, bricks, coarse & fine aggregate either at site or nearby Field Quality Lab. approved by BHEL if so desired by BHEL's Engineer. All the expenses in these regards shall be borne by contractor. **Contractor shall procure reinforcement steel, structural steel & Cement* from reputed manufacturer** & approval for the same shall be obtained from BHEL well in advance before ordering for the materials. *Cement shall be 'PPC CONFIRMING TO IS 1489 (Part-I)' OR 'OPC GRADE 43 or Higher'.
2.7.2	The contractor shall visit the site and ascertain the local conditions, entry/traffic restrictions, all obstructions in the area and also ascertain all site conditions and particularly the sub-soil conditions etc. **The contractor at his own cost shall carry out the survey to study the properties of soil/sub soil like strength to withstand the weight of structure during all weather conditions without sinking of foundation**. If any of such defects like cracks, sinking of foundation etc. occur after completion of work till the performance guarantee period, it shall be rectified by contractor free of cost including the supply of materials required. No claim shall be entertained on this account under any circumstances from the contractor.
2.7.3	The contractor shall provide and maintain at his own cost pumps and other equipment to keep the work free from water and continue to do so until the handing over of the work. The contractor shall clear all trees, rubbish, vegetation, brickbats etc. and dispense them suitably in allotted areas at own cost.
2.8	**SPECIFICATION FOR CIVIL WORK, PLUMBING WORK, SANITARY WORK, ELECTRIFICATION WORK FOR CLOSED STORAGE SHEDS, OPEN YARD ETC.:**

2.8.1	Standard specifications for various items of work for building construction as per the relevant IS-codes (latest edition) and CPWD Specifications shall be applicable for this work. The work has to be executed as per relevant standards, IS Codes specifications, CPWD Specifications, approved drawings and as directed by BHEL Engineer to the satisfaction of BHEL.
2.8.3	**CLOSED STORAGE SHED AND OPEN YARD**
2.8.3.1	**SCOPE:** **1.** Design, Preparation and Submission of drawings for BHEL approval, Supply, Receipt at Site, Erection, Site Painting etc. including Civil Works, Foundations, Super structure, Electricals, Sanitary,

	Internal / External Plumbing Works & Sewage connections etc. all complete and Handing over to site, Removable/Re-erectable type Pre-Engineered, Pre-fabricated Steel Storage Shed etc. – **01 No. (Approx Size: 15mx36mx6m).** **2.** Construction and development of Open Storage Yard including development of storage yards, Internal/External Roads, Side /internal, Drains, illumination, Fencing, Security Post etc.- **Approx. Size 3375 SQM each.**

2.8.3.2	**DESIGN CONSIDERATIONS FOR CLOSED STORAGE SHED** 1. Size of Closed Shed – 15Mc/c X 36Mc/c X 6.0M (approximate). 2. Clear Height of closed Shed (between FFL & Bottom of truss/ Structural Member) – 6.0M. 3. Columns shall be spanning – 6.0M c/c long span & 5.0M c/c short span. 4. All side cladding/ roof sheets shall be fitted in such a way that they can be removed at any point of time. 5. 20 gauge MS Rolling Shutters of size 5m x 5m or 5m x 6m (approx.) as per IS code specifications, complete, mechanically operated from inside and outside both, as instructed by BHEL Engineer including two coats of synthetic enamel paint of approved color and quality over one coat of red oxide primer, with locking arrangement etc.. Suitable arrangement shall be made for easy operation of shutters (mechanical gear operated). 6. One man-entry gate to be provided on at one side of shed (front entrance by the side of rolling shutter). 7. The bidder should submit a guarantee for 12 months of operations for the materials supplied and erected by him. 8. All designs have to be carried out as per relevant IS code.
2.8.3.3	**FRAME STRUCTURE:** Closed Storage Sheds shall be designed as frame structure with Structural Columns, Trusses, Foundations and Plinth Beam for supporting self-loads, live loads, wind loads, seismic loads etc. Contractor shall carry out the designing work considering the requirements as per IS Standard specifications and detailed design drawings along with detail calculations shall be submitted to BHEL for approval before start of work. Technical Specifications (Part-II) are tentative only for tendering purpose only, works shall be carried out as per the detail drawings to be Prepared by vendor and approved from BHEL.
2.8.3.4	**EXCAVATION:** Excavation for Column Foundations, Walls, Plinth Beam and Trenches etc. shall be made as per IS specifications. Marking of Area shall be done and Levels shall be measured and recorded before start of Excavation in presence of BHEL Engineer. In case of any discrepancy regarding measurement BHEL Engineer's decision shall be Binding.

2.8.3.5	**FILLING** Any filling/loose soil met below the foundation shall be made up with lean cement concrete 1:4:8 mix (min).
2.8.3.6	**Granular Murrum Filling:** 150 mm thick granular murrum filling shall be done as per drawings and as per relevant IS code specifications, including watering, ramming, compaction etc. below soling of column foundations in the plan area of 2m X 2m (if black cotton soil/ash/newly backfilled soil is found at the bottom level of soling), Roads, Storage Yard, Ramps etc.
2.8.3.6	**Stone Soling:** Stone soling of required thickness (250 mm to 300 mm) shall be provided as per drawing below Flooring, Ramp & Column foundations of storage shed etc. by using 80 mm size hard broken black granite/ quartzite/ gneiss/ trap stone metal including granular murrum packing, watering & compaction etc. complete, as per standard specification and instructed by BHEL Engineer. However, requirement of Stone Soling can be eliminated in case a hard strata/good stratum is met within foundation level & PCC shall be done directly in such cases. However, this can be decided as per site requirement in consultation with BHEL Site Engineer.
2.8.3.7	**Excavated Earth Filling:** Filling under floors, sides of foundations, drains, roads with 100mm/ 150mm thick layer of compacted selected earth/ river sand including watering, consolidation etc. shall be executed as per IS specification and drawings (if any). Basement and sides of the foundation wall shall be filled in with selected excavated earth in the layers not exceeding 150 mm including watering, consolidation etc. complete as per IS specification and as directed by BHEL Engineer.
2.8.3.8	**DISPOSAL:** The excess/unutilized suitable earth and debris shall be disposed & levelled to the proposed mentioned area for development. All unusable earth, debris, trees, vegetation etc. shall be disposed off at a location embarked by BHEL / Client.
2.8.3.9	**PCC:**
2.8.3.10	**PCC (1:4:8):**

	100 mm thick PCC (1:4:8) shall be provided for following: i) Below RCC Footing of Columns. ii) Plinth Beam Base. iii) Floor Filling for Plinth raising. iv) Floor Filling for Plinth Raising at Pantry and Bathroom. v) Below Ramp and Internal Wall Foundations. vi) In the Base of Soak Pit Slab. 200 mm thick PCC (1:4:8) shall be provided for the base of septic tank as per drawings and as directed by BHEL Engineer. **PCC (1:3:6):** 100 mm thick PCC (1:3:6) shall be provided in the width of approx. 750 mm around the perimeter of the Closed Sheds for Plinth Protection as per standard specifications and as directed by BHEL Engineer. **Coping (1:2:4):** 40 m thick coping of Cement Concrete (1:2:4) shall be provided over the sidewalls (230 mm thick) of the Drains in the Open Storage Yard. This shall include supplying and placing PCC at all depths below plinth level including formwork, curing, all materials, tools and plants and labour complete. Concrete of 1:4:8/ 1:3:6/ 1:2:4 grade as defined in IS- 456 with 40mm/20mm and downgraded stone aggregates as per drawing and BOQ cum Rate Schedule. Nominal mix (volumetric) shall be allowed to use as per the guidelines of IS-456 (latest edition) with min. W/C ratio & cement content as per IS stipulation for moderate condition. Concrete shall be produced by concrete mixer machine & hand mix is generally not acceptable. **Note:** However, in certain unavoidable circumstances, hand mix shall be permitted with 10% extra cement content as per the discretion of BHEL Engineer**.**
2.8.3.11	**RCC 1:2:4 shall be provided for following Works:** i) **RCC Footings:** 250 mm thick RCC (1:2:4) Footings for Columns, of size 1.5m X 1.5m with the reinforcement of 12 mm dia. bars both ways (Lateral and Longitudinal) @ 150 mm c/c spacing, shall be provided below the column pedestals as per drawings. ii) **RCC Pedestals:** RCC (1:2:4) Column pedestals of size 400mm X 400mm from top of the Column Footing (for closed sheds) up to G.L., with the reinforcement of 4 Nos. 16 mm dia at the corners and stirrups of 8 mm dia @ 200 mm c/c spacing shall be provided as per drawings. iii) **RCC Columns:** RCC (1:2:4) Column of size 300mm X 300mm, height of 3 m (from F.F.L.) from top of the RCC Footing (for Security Rooms) with the reinforcement of 4 Nos. 16 mm dia. at the corners and stirrups of 8 mm dia @ 200 mm c/c spacing shall be provided. iv) **Plinth beam for Closed Sheds:** RCC (1:2:4) plinth Beam of size 400mm X500mm WXD, with the reinforcement of 02 Nos. 20 mm dia. bars at Top,

	04 Nos. 16 mm dia. bars at bottom and 8 mm dia. Stirrups (2 Legged) @ 200 mm c/c spacing, shall be provided throughout the perimeter of the Closed Sheds along the Column Foundations as per drawings. v) **Plinth beam for Security Room:** RCC (1:2:4) plinth Beam of size 230mm X 300 mm (W X D), with the reinforcement of 02 Nos. 20 mm dia. bars at Top, 03 Nos. 16 mm dia. bars at bottom and 8 mm dia. Stirrups (2 Legged) @ 200 mm c/c spacing, shall be provided throughout the perimeter of the Security Room along the Column Foundations as per drawings. vi) **Concrete Sleepers:** Concrete sleepers (Aprrox. 4000 nos.) of size 200 mm wide x 150mm depth x 800 mm length using 1:2:4 concrete mix including moulding and reinforcement (2-10 mm dia t&b and stirrups @ c/c 200mm). vii) **RCC (1:2:4)** for Baffle Beam, Slab of Septic tank, Side racks and Ramp etc. shall be provided as per drawings and as directed by BHEL Engineer. This shall include supplying and placing RCC at all depths / levels including form work, curing, all materials, tools and plants and labour complete. Concrete of 1:2:4 grade as defined in IS- 456 with 40mm/20mm and downgraded stone aggregates as per drawing and BOQ cum Rate Schedule. Nominal mix (volumetric) shall be allowed to use as per the guidelines of IS-456 (latest edition) with min. W/C ratio & cement content as per IS stipulation for moderate condition. Concrete shall be produced by concrete mixer machine & hand mix is generally not acceptable. For Reinforcement the IS Specifications as per SP-34 (latest addition) shall be followed. HYSD- TMT Steel bars of Grade Fe-415/500 form reputed manufacturer shall be used by contractor for reinforcement purpose.
2.8.3.12	**BRICK MASONRY** Brick masonry shall be done by using best quality locally available Burnt clay bricks / Fly Ash Lime (FAL) bricks of standard size. Minimum strength of the bricks should not be less than 75 KG/SqCm. Other quality requirement shall be in line with the relevant IS Code. One-brick thick & Half-brick thick brickwork shall be constructed as specified, in Cement Mortar 1:6 & 1:4 respectively including linking, plumbing, levelling, pacing, joints, curing etc. Including all materials, tools & plants and labour complete at all level/elevation.
2.8.3.13	**FORMWORK:** The formwork should be capable of carrying the dead load of concrete, the reinforcements and the forces of vibration. The form works shall be designed by the contractor and approved by BHEL Engineer. After sufficient curing period & after attaining adequate strength of concrete the formwork shall be removed with the approval of BHEL Engineer. The item of PCC/RCC shall be deemed as completed after removal of forms and required finishing is completed.
2.8.3.14	**ROOFING & SIDE CLADDING:** BHEL approved Sheets over the roof trusses of sheds and for side cladding shall be supplied and fixed as per

	drawing including providing and fixing suitable flashing, trim closure caps, hips, ridges, Polymer Coated J or L hook, bolts, bituminous washers, GI cramp bolts, nuts, or self-tapping screws, scaffolding etc. complete, all as per latest IS . Wind ties for protection against lifting of roof by wind etc. if any as per standard Practice shall be provided by the contractor.
2.8.3.15	**STRUCTURAL WORKS:** All structural works for Columns, Roof truss, Fencing, Steel gates, doors etc. shall be carried out as per BHEL Engineer's Instructions, drawings and relevant IS Code Specifications. All Associated Fitting and Fixing materials such as foundation bolts, J / L hooks, bolts, nuts, washers, cleats, stiffeners etc. shall be paid along with the weight of Structure (Columns / Trusses etc.) and No extra payments shall be made on this account or on account of scrap generated. Design and Fabrication drawings for structure steel works i.e. Columns, Trusses, Wind Ties, Purlins etc. shall be prepared by contractor and get approved from BHEL before start of work / procurement of materials.
2.8.3.15.1	Contractor is permitted to get steel truss & other structures fabricated at workshop outside of the plant premises with prior permission of BHEL. In this case, contractor has to arrange for shop inspections periodically as required by BHEL Engineer to ensure the quality of fabrication work. Fabricated structures without inspection/ Certification by BHEL shall not be allowed for erection.
2.8.3.15.2	The trusses shall be tubular, fabricated in pieces of convenient length for transportation by truck and speedy erection at site. The base plates shall be welded to the trusses for fixing/resting the same on supports. Suitable cleats or fixing plates shall be provided on the trusses for holding the purlins and the bottom tie runners. Bolts shall be fixed in columns and posts by using templates for fixing truss. These foundation bolts, base plates, cleats etc. fixed with truss shall be paid under tonnage of truss only. Work shall be done as per approved drawings. No separate payment Shall be made for templates.
2.8.3.15.3	Structure Steel materials required shall be brought to the notice of BHEL Engineer prior to ordering and procured only after the approval of BHEL Engineer. Structural Steel materials shall be bought from the BHEL approved manufacturer only and shall be confirming to the relevant IS Code specifications; contractor shall submit the manufacturing test certificate and other relevant documents for the materials as per BHEL requirement.
2.8.3.16	**FENCING:** Fencing along the perimeter of Open Storage Yard shall be provided as per the BOQ cum Rate Schedule, Drawing and as directed by BHEL Engineer. Angle Posts shall be spaced 3 m c/c and struts at 30 m c/c and at all turnings.
2.83.17	**SANITARY & DRAINAGE WORKS:**

2.8.3.17.1	Necessary sanitary and plumbing works shall be provided with necessary water taps and all connections with supply lines/septic tank shall be provided by the contractor for BHEL Storage Sheds. The materials used and the location etc. shall be as per the directions of BHEL Engineer. Contractor shall procure the materials form the reputed manufacturers only as approved by BHEL Engineer. Prior Approval of sample from BHEL Engineer is necessary before supplying the materials at site.
2.8.3.17.2	Septic tanks with soak pit/leaching cesspool shall be provided by the contractor at the location specified by BHEL complete in all respects as per IS specification. The **tender is indicative only & any changes required at site shall be done as per the instruction of BHEL Engineer.**
2.8.3.18	**ELECTRICAL INSTALLATIONS**
2.8.3.18.1	The electrical installation shall generally be carried out in conformity with the requirements of the Indian electricity act, 1910 as amended up to date and the Indian electricity rules, 1956 framed there under and also the relevant regulations of the electric supply authority concerned as well as IS: 732-1963 (latest edition). Before commencement of work, contractor has to submit detail electrical layout drawings prepared by experienced & licensed electrical agency/engineer indicating the cable route, internal/external panels, cable sizing, fittings & fixtures etc. in line with the BOQ cum Rate Schedule.
2.8.3.18.2	Good workmanship is an essential requirement for compliance with the rules in the code. The work shall be carried out under the direct supervision of a person holding a valid certificate of competency, concerned for the type of work involved.
2.8.3.18.3	All outdoor/external lamps shall have weather-proof fittings of design approved by BHEL Engineer so as to effectively prevent the admission of moisture.
2.8.3.18.4	All main switches shall be of metal clad enclosed pattern, which shall be fixed at close proximity to the point of entry of supply.
2.8.3.18.5	Main and branch distribution boards shall be in accordance with Indian Standard IS 732-1963 “Code of practice for electrical wiring installation".
2.8.3.18.6	PVC conduit (concealed type) wiring system should be adopted throughout and all conduit pipes/channel shall be conforming to latest IS.
2.8.3.18.7	Approved and good quality copper wire with adequate current carrying capacity/voltage rating with proper insulation as per relevant IS should be used for the entire electrical wiring/installation.
2.8.3.18.8	The service connection from outside mains to the switchboard inside the building shall also be carried out by the contractor.
2.8.3.19	**EARTHING**
2.8.3.19.1	All Earthing system shall be in accordance with IS: 3043-1966 "Code of practice for Earthing".

2.8.3.19.2	The Installation and Earthing shall generally be carried out in accordance with the Indian electricity rules 1956 as amended from time to time and the relevant regulations of the electricity supply authority concerned.
2.8.3.19.3	All plugs and sockets shall be of three-pin type, one of the pins being connected to earth.
2.8.3.19.4	Bodies of all electrical appliances shall be earthed by the use of three pin plugs. The covers of the regulators if of metallic construction shall be earthed by means of a separate earth wire. A separate earth wire shall be used for earthing these appliances.
2.8.3.19.5	All earth wires and earth continuity conductors shall be of copper/ galvanized iron. They shall be either stranded or solid bars of flat rectangular strips, due care is taken to avoid corrosion and mechanical damage to it. Inter connections of earth continuity conductors and main and branch earth wires shall be made in such a way that reliable and good electrical connections are permanently ensured.
2.8.3.19.6	The neutral conductor shall not be used as earth wire.
2.8.3.19.7	Welded, bolted and clamped joints only are permissible. For stranded conductor, sleeve connectors are permissible. Bolted connectors and their screws shall be protected against any possible corrosion.
2.8.3.19.8	The path of the earth wire shall, as far as possible, be out of reach of any person and shall be visible for inspection.
2.8.3.19.9	**Earthing Pits:** The galvanized iron pipe electrodes shall be used, which is not smaller than 38MM internal diameter and shall not be less than 4M in length and shall, as far as possible, be embedded below permanent moisture level with charcoal & salt and shall be one piece only without any joints. Earthing Pits shall be provided as per relevant IS Code specifications to fulfil the functional and statutory requirements.
2.8.3.20	**DEWATERING**: It is the responsibility of the contractor to engage sufficient dewatering pump (Diesel, electrically operated) of adequate capacity for dewatering of sub-soil, rain water from excavated pit and other localized area and keep the area dry and workable till completion of entire work within their quoted rate.
2.8.3.21	**GENERAL NOTES FOR STEEL DOOR, WINDOWS, AND VENTILATORS**
2.8.3.21.1	**Steel Door**: - Pressed steel doors as per standard specification, relevant IS code and sizes shall be supplied along with frames and fixed with suitable hold fasts, fixtures and fittings.

2.8.3.21.2	**Steel Window: -** All steel Windows shall be supplied and fixed as per standard specifications of relevant IS code and instructions of BHEL Engineer with all fixtures (i.e. handles, locks, latches, hooks etc.), glazing, fittings, holdfasts etc. Complete.
2.8.3.21.3	**Rolling Shutters & Steel Ventilators: -** All rolling shutters & steel ventilators shall be supplied and fixed as per standard specifications, relevant IS code and instructions of BHEL Engineer with all fixtures (i.e. handles, locks, latches, hooks etc.), glazing, fittings, holdfasts etc. Complete.
	Note: Contractor shall arrange for shop inspection for all steel doors, windows, rolling shutters & trusses etc. if fabricated outside the plant before delivery at site for Engineer's clearance.
2.8.3.22	**PAINTING**
2.8.3.22.1	All the steel items such as doors, windows, ventilators, roof trusses, purlins, columns etc. shall be provided with one coat of red oxide primer & two coats of synthetic enamel paint of approved make, colour and quality. Paint shall be applied after fixing in position to achieve uniform finishing. Rates shall be quoted taking into account cost of painting for woodwork, steel work etc.
2.8.3.22.1	Three coats of white/color washing shall be provided uniformly on all wall surfaces as per IS specification.
2.8.3.23	PVC water tank of Syntax or any approved make shall be supplied and erected on steel staging and to be constructed on location shown as per item rate given in BOQ cum Rate schedule
2.8.3.25	**APPROVED MAKE OF MATERIALS**

Sl. No.	MATERIAL	MAKE
1	STRUCTURAL/REINF. STEEL	SAIL/ TATA / JINDAL / ESSAR STEEL / JSW / BHUSHAN STEELS / RATHI STEELS
2	PPC / OPC 43	ACC/ BIRLA/ JAYPEE/ ULTRATECH/ AMBUJA
3	ENAMEL PAINTS	JOHNSON & NICHOLSON / BERGER/ ASIAN PAINT / NEROLAC/DULUX / NIPPON
4	GI & MS PIPES	SURYA/ PRAKASH/ JINDAL/ TATA / APOLLO
5	ELECTRICAL ACCESSORIES	

a)	SWITCHES AND SOCKETS (MODULAR TYPE)	ANCHOR / MK / LK/HAVELLS / GREATWHITE
b)	WIRES / CBALES	KEI/ FINOLEX/ POLYCAB/ HAVELLS/ RR KABEL / GREATWHITE
6	ELECTRICAL EQUIPMENT	
a)	EXHAUST FANS	ALSTOM / CROMPTON/HAVELS/BAJAJ
b)	LIGHT FITTINGS	CROMPTON/PHILIPS /WIPRO/SYSKA / GREATWHITE
c)	WALL MOUNTING FANS	ORIENT/ CROMPTON/ USHA/BAJAJ
d)	CFL & FL LAMPS	PHILIPS/ OSRAM/ WIPRO/ BAJAJ/ SYSKA
e)	KWH METERS ETC	BHEL/ GE/ L&T/HAVELS
f)	MCBs & MCB DBs (10 KA)	MDS/ L&T-HAGGER/ RAJ.L/HAVELLS

Approval of BHEL Engineer is to be obtained before procurement of materials. The make of material mentioned if not available in the market or is not suiting the site conditions or the make of any material is not mentioned in the above list, equivalent make may be used after the approval from BHEL Engineer.

1.0 THE WORK WILL INVOLVE.

All civil and electrical works connected with the above-mentioned structures such as earthwork, concrete work, formwork, embedment, liaison with customer, etc

2.0 EXCUSION

All works are in contractor's scope.

3.0 CIVIL WORKS

The scope covers all civil works within the battery limits. The important works covered are as below.

Excavation of earth and backfilling including dewatering of excavations for foundations, trenches, tunnels pits, etc. till the construction of the same is completed and disposal of surplus.

Preparation and submission of detailed calculations, arrangement drawings of formwork, staging and scaffolding for all foundations as directed by the Engineer for his checking and approval.

Preparation of bar bending schedules for all foundation works with reinforcement etc and getting them approved by the BHEL Engineer.

Supply of all instruments and personnel for conducting necessary tests at site as specified/as directed by the Engineer.

Liaising with customer for approval of drawings prepared by BHEL.

4.0 GENERAL

a) The drawings enclosed with this tender are intended to give the tenderer a general idea of the type and extent of work involved. The drawings are as such only indicative and not to be considered as the exact construction drawings.
Further, this is to be noted that the drawings and the documents furnished along with this specification are the sole property of B.H.E.L. It must not be used directly or indirectly in any way detrimental to the interest of the company.

b) The scope of work will also include such other related works although they may not be specifically mentioned in the above paragraph and all such incidental items not

specified but reasonably imply and necessary for completion of the job as a whole all as desired and as directed by the engineer.

c) The detail scope of work covered above is not a comprehensive list of items of work involved. The detail scope of work may vary considerably depending on the actual construction requirements.

5.0 ALSO INCLUDED IN THE SCOPE

Unless otherwise specified, the work to be provided by the contractor for the items mentioned in the "Schedule of items" shall include but not be limited to the following.

a) Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and from the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handling over the works, except in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provide by the engineer during the course of works.

b) Furnishing samples of all materials required by the engineers for testing/inspection and approval for use in the works. The engineer for final incorporation in the works may retain the samples.

c) Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.

d) Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that are required for all works including temporary works.

e) Arranging manufacturer's supervision for items of work done as per manufacturer's specifications when so specified.

f) Establishing levels and coordinates at suitable intervals from existing grid levels and coordinates/references furnished by the owner established bench marks, setting out the locations and levels of proposed structures, constructions and marking of reference pillars and other identification works etc., The contractor shall provide the owner/BHEL such a assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used.

g) Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.

h) Bidder is expected to get conversant with latest RDSO, Core, ACTM & other railway standards and drawings. All works are to be strictly executed as per railway standards and drawings. Bidder is requested to arrange railway standards and drawings on his own and no standards will be provided by BHEL.

i) Bidder to execute the work in consultation with Railway official and BHEL official. All required approvals as required to complete the work from Railway authorities shall be in bidder's scope. No extra payment shall be made for the same.

j) All works including excavation, back filling, formwork, reinforcement, concreting, curing, finishing etc shall be done as per drawings/specifications.

k) Detailed drawings shall be provided to successful bidder progressively during construction stage.

6.0 WORK BY OTHERS

No work under the specification will be provided by any agency other than the contractor unless specifically mentioned elsewhere in the contract.

Chapter II- TECHNICAL SPECIFICATIONS & DRAWINGS FOR INFORMATION

NOTE: Contractor has to make himself well conversant with the Customer specification. In case of ambiguity between BHEL and customer specification, customer specification shall prevail.

Design Standards

The Railway Project including Project Facilities shall conform to design requirements set out in the following documents:

Indian Railways Permanent Way Manual, Indian Railway Bridge Manual, Indian Railway Schedule of Dimensions & relevant IRS Specifications referred in the Manual, Indian Railway Signalling Engineering Manual, Indian Railway Telecom Manual, AC Traction Manual, Rules for Opening Railways

Latest Version
Latest version of the Manuals, Specifications and Standards including the amendments notified/published by the Base Date shall be considered applicable.

Absence of specific provision

In the absence of any specific provision on any particular issue in the aforesaid Manuals, specifications, or Standards, the following standards shall apply in order of priority
Bureau of Indian Standards (BIS) Euro Codes or British Standards or American Standards

Any other specifications/standards proposed by the Contractor and reviewed by the Authority's Engineer.

Specifications and Standards
All Materials, works and construction operations shall conform to the following manuals:

(a) Indian Railways Permanent Way Manual
(b) Indian Railway Bridge Manual
(c) Indian Railway Schedule of Dimensions
(d) The relevant IRS Specifications
(e) Specifications of Works of concerned zonal railway
d) CPWD Specifications,
e) BHEL Specifications.

Note:

The above list is indicative and not exhaustive and bidder is expected to get conversant with latest RDSO, Core, ACTM & railway standards, BIS standards, CPWD Specifications and drawings. All works are to be strictly executed as per Railway standards and drawings. Bidder is requested to arrange Railway standards and drawings on his own and no standards will be provided by BHEL.

Chapter III- PREAMBLE FOR THE SCHEDULE OF QUANTITIES (SOQ)

1) Details of the items in this Schedule shall be read in conjunction with the corresponding Railway specifications, drawings and other documents and shall have precedence over any contrary statement mentioned anywhere in this document.

2) The work shall be carried out as per construction drawings, specifications and the description of the items in this schedule and/or Engineer's instructions. Drawings enclosed with these documents are only indicative giving some idea of the type of work involved. The layout, sizes and details of the building, structures and foundations shown in tender drawings may vary at a large extent during actual construction. Final drawings will be issued progressively during the execution of the work.

3) Items of work provided in this schedule but not covered in the specifications shall be executed strictly as per instructions of the Engineer.

4) Unless specifically mentioned otherwise in the contract, the bidder shall quote his rates for the finished items and shall provide for the complete cost towards fuel, tools, tackle, equipment, constructional plant , temporary works, labour materials, levies , taxes , transport, layout, repairs, rectification, maintenance till handing over, supervision, shops, establishments, services , temporary roads, revenue expenses, contingencies, overheads, profits and all incidental items not specifically mentioned but reasonably implied and necessary to complete the works according to the contract.

5) The rate quoted shall be inclusive of cleaning the site of any vegetation, dressing and micro leveling etc., required for commencement of site activities. No separate payment will be made towards the same.

6) The rate shall also be inclusive of carrying out survey of site to establish levels and coordinates at suitable intervals, form existing grid levels and coordinates furnished by the owner, establish bench marks, setting out the location and levels of the proposed structures, constructions and making references, pillars and other identification marks etc. No separate payment will be made towards the same.

7) The rate quoted shall be inclusive of liaising with customer for approval of drawings prepared/furnished by BHEL. BHEL will provide drawings to contractor. Contractor shall take prior approval from customer before proceeding for site work. No separate payment will be made towards the same.

8) Rates shall be quoted both in figures and in words in clear legible writing. No over writing is allowed. All scoring and cancellation should be counter signed by the bidder. In case of illegibility, the interpretation of the engineer shall be final. All entries shall be in English language.

9) Engineer's decision shall be final and binding on the contractors regarding clarification of items in this schedule with respect to the other section of the contract.

10) Incase of any discrepancy between item descriptions, relevant drawing and/ or specification clarification shall be sought at tender stage itself. Otherwise, it shall be assumed that the bidder has quoted for the more stringent requirement.

11) The price also includes dismantling of all connected temporary arrangements, back filling with earth and compacting the same to the required height and width as per drawing to ensure safety of foundation, confining the exposed height of foundation block to within 10 cm., and removal of spoil. The BHEL's Engineer shall certify where use of chisel and hammer has been necessary.

Chapter IV: Quality

1) Introduction

This part of the specification covers the sampling, testing and quality assurance requirement for all civil and structural works covered in this specification. This part of the technical specification shall be read with other parts of the technical specifications, general condition of contract and special condition of contract, which covers common QA requirements. Wherever IS code or RDSO standards have been referred they shall be the latest revisions.

The QA and QC activities in all respects as specified in the technical specifications/ drawings / data sheets /quality plans / contract documents shall be carried out at no extra cost to the owner. The contractor shall prepare detailed construction and erection methodology scheme which shall be compatible to the requirements of the desired progress of work execution, quality measures, prior approvals if any and the same shall be got approved by the BHEL and Railway(Authority's Engineer). If required, work methodology may be revised/reviewed at every stage of execution of work at site, to suit the site conditions by the contractor at no extra cost to the owner.

2) Methodology

The Contractor shall, at least 15 (fifteen) days prior to the commencement of construction, submit to the BHEL and Railway(Authority's Engineer) for review the methodology proposed to be adopted for executing the Works, giving details of equipment to be deployed, traffic management and measures for ensuring safety. The BHEL and Railway(Authority's Engineer) shall complete the review and convey its comments, if any, to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor. For the avoidance of doubt, the Parties agree that the methodology for executing critical works such as laying foundations, erection of masts and stringing of conductors shall ordinarily rely on mechanised means. For the avoidance of doubt, the Contractor shall use auger machine for excavation of foundations, and mechanised equipment for erection of steel structures, or any equivalent thereof.

3) QA and QC Manpower

The contractor shall appoint adequate work force at site. Contractor shall give details organization chart and appointed manpower details for BHEL approval /acceptance. The contractor shall appoint a dedicated, experienced and competent QA&QC in charge at site. The contractor shall nominate one overall QA coordinator for the contract detailing the name, designation, contact details and address at the time of post bid discussions. All correspondence related to Quality Assurance shall be addressed by the contractors QA coordinator to BHEL. BHEL shall address all correspondence related to Quality issues to the contractors QA coordinator.

4) Laboratory and Field Testing

The field laboratory for QA and QC activities shall be constructed and set-up by the contractor. The Laboratory shall be constructed and installed with the adequate facilities to meet the requirement of envisaged test set up as per RDSO standard requirement. Temperature and humidity controls shall be available wherever necessary during testing of samples. The contractor shall deploy and equip the field quality laboratory for meeting the field quality plan requirements.

The Contractor shall procure all documents, apparatus and instruments, fuel, Consumables, water, electricity, labour, Materials, samples, and qualified personnel as are necessary for examining and testing the Works, Materials. The cost of testing of Construction, Materials and workmanship shall be borne by the Contractor.

The contractor shall furnish a comprehensive list of testing equipment's / instrument required to meet the planned/scheduled tests for the execution of works for BHEL acceptance/ approval. The contractor shall mobilize the requisite laboratory equipment and QA&QC manpower at least 15 days prior to the planned test activity as per the schedule of tests. All equipment's and instruments in the field shall be calibrated before the commencement of tests and then at regular intervals, as per the manufacturer's recommendation and as directed by the BHEL. The calibration certificates shall specify the fitness of the equipment's and instruments within the limit of tolerance for use. Contractor shall arrange for calibration of equipment's and instruments by an NABL / NPL accredited agency and the calibration report shall be submitted to BHEL.

5) Sampling And Testing of Construction Materials

For determining that the Works conform to the Specifications and Standards, the BHEL and Railway(Authority's Engineer) shall require the Contractor to carry out or cause to be carried out tests, at such time and frequency and in such manner as specified in this Agreement, and in accordance with Good Industry Practice for quality assurance. The Contractor shall, with due diligence, carry out all the tests in accordance with the Agreement and furnish the results thereof to the BHEL and Railway(Authority's Engineer). Of the total tests for each category or type to be undertaken by the Contractor under the provisions of this Agreement and Good Industry Practice, the BHEL and Railway(Authority's Engineer) shall (a) carry out or cause to be carried out, test checks equal to about 10% (ten per cent) of the number of the tests required to be undertaken by the Contractor; and (b) witness or participate in at least 10% (ten per cent) of the number of such tests conducted or caused to be conducted by the Contractor.

In the event that results of any tests conducted as per above establish any Defects or deficiencies in the Works, the Contractor shall carry out remedial measures at its own cost and furnish a report to the BHEL and Railway(Authority's Engineer) in this behalf. The BHEL and Railway(Authority's Engineer) shall require the Contractor to carry out or cause to be carried out tests to determine that such remedial measures have brought the

Works into compliance with the Specifications and Standards, and the procedure shall be repeated until such Works conform to the Specifications and Standards.

The method of sampling for testing of construction materials and work / job samples shall be as per the relevant IS / RDSO standards in line with the requirements of the technical specification / quality plans. The contractor shall carry out testing in accordance with the RDSO standards in line with the requirements of the technical specifications and quality plans.

Where no specific testing procedure is mentioned, the tests shall be carried out as per the best prevalent engineering practices and to the directions of the Engineer. All testing shall be done in the presence of the engineer or his authorized representative in a NABL accredited / Govt. Laboratory acceptable to BHEL and Railway(Authority's Engineer).

The Contractor shall submit the following samples of Materials and relevant information to the BHEL for review:

(a) manufacturer's test reports and standard samples of manufactured Materials; and
(b) samples of such other Materials as the BHEL may require.

6) Inspection and review by the Railway

The Railway(Authority's Engineer) or any representative authorised by the Railway(Authority's Engineer) in this behalf may inspect and review the progress and quality of the construction of Works and issue appropriate directions to the Authority's Engineer and the Contractor for taking remedial action in the event the Works are not in accordance with the provisions of this Agreement.

7) External technical audit

At any time during construction, the Railway(Authority's Engineer) may appoint an external technical auditor to conduct an audit of the quality of the Works. The findings of the audit, to the extent accepted by the Authority, shall be notified to the Contractor and the Authority's Engineer for taking remedial action in accordance with this Agreement. The Contractor shall provide all assistance as may be required by the auditor in the conduct of its audit hereunder.

8) Inspection of records

The Authority shall have the right to inspect the records of the Contractor relating to the Works.

9) Inspection of Works

The Railway(Authority's Engineer),BHEL and its authorised representative shall at all times:

(a) have full access to all parts of the Site and to all places from which natural Materials are being obtained for use in the Works; and

(b) during construction at the Site and at the place of production, be entitled to examine, inspect, measure and test the Materials and workmanship, and to check the progress.

The Contractor shall give the Railway(Authority's Engineer),BHEL and its authorised agents access, facilities and safety equipment.

The contractor shall submit a monthly inspection report to the BHEL and the Contractor bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies.

10) Monthly progress reports

During the Construction Period, the Contractor shall, no later than 10 (ten) days after the close of each month, furnish to the BHEL on the progress of Works and shall promptly give such other relevant information as may be required by the BHEL and Railway(Authority's Engineer).

11) Examination of work before covering up

In respect of the work which the BHEL and Railway(Authority's Engineer) are entitled to examine, inspect, measure or test before it is covered up or put out of view or any part of the work is placed thereon, the Contractor shall give notice to the BHEL and Railway(Authority's Engineer) whenever any such work is ready and before it is covered up. BHEL and Railway(Authority's Engineer) shall then either carry out the examination, inspection or testing without unreasonable delay, or promptly give notice to the Contractor that the BHEL and Railway(Authority's Engineer) does not require to do so. Provided, however, that if any work is of a continuous nature where it is not possible or prudent to keep it uncovered or incomplete, the Contractor shall notify the schedule of carrying out such work to give sufficient opportunity, not being less than 3 (three) business days' notice, to the BHEL and Railway(Authority's Engineer) to conduct its inspection, measurement or test while the work is continuing. Provided further that in the event the Contractor receives no response from the BHEL and Railway(Authority's Engineer) within a period of 3 (three) business days from the date on which the Contractor's notice
hereunder is delivered to the BHEL and Railway(Authority's Engineer), the Contractor shall be entitled to assume that the BHEL and Railway(Authority's Engineer) would not undertake the said inspection.

12) Rejection

If, as a result of an examination, inspection, measurement or testing, any Plant, Material, design or workmanship is found to be defective or otherwise not in accordance with the provisions of this Agreement, the BHEL and Railway(Authority's Engineer) may
reject such Plant, Material, design or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the Defect and ensure

that the rejected item complies with the requirements of this Agreement.

If the BHEL and Railway(Authority's Engineer) requires a Plant, Material, design or workmanship to be retested, the tests shall be repeated on the same terms and conditions, as applicable in each case. If the rejection and retesting cause the BHEL and Railway(Authority's Engineer) to incur any additional costs, such costs shall be recoverable by the BHEL and Railway(Authority's Engineer) from the Contractor and may be deducted by the BHEL and Railway(Authority's Engineer) from any monies due to be paid to the Contractor.

The Contractor shall not be entitled to any extension of time on account of rectifying any Defect or retesting.

13) Remedial work

Notwithstanding any previous test or certification, the BHEL and Railway(Authority's Engineer) may instruct the Contractor to:
(a) remove from the Site and replace any Plant or Materials which are not in accordance with the provisions of this Agreement;
(b) remove and re-execute any work which is not in accordance with the provisions of this Agreement and the Specification and Standards; and
(c) execute any work which is urgently required for the safety of the Railway(Authority's Engineer) Project, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work which is required on account of a Force Majeure Event.

If the Contractor fails to comply with the instructions issued by the BHEL and Railway(Authority's Engineer) within the time specified in the BHEL and Railway(Authority's Engineer) notice or as mutually agreed, the BHEL and Railway(Authority's Engineer) may advise to have the work executed by another agency.

14) Quality control records

The Contractor shall hand over to the BHEL and Railway (Authority's Engineer) a copy of all its quality control records and documents before the Completion Certificate.

15) Suspension of unsafe Construction Works

Upon recommendation of the BHEL and Railway(Authority's Engineer) to this effect, or on its own volition in cases of emergency or urgency, the BHEL and Railway(Authority's Engineer) may by notice require the Contractor to suspend forthwith the whole or any part of the Works if, in the reasonable opinion of the BHEL and

Railway(Authority's Engineer), as the case may be, such work threatens the safety of the Users and or other persons on or about the Railway Project.

The Contractor shall suspend the Works or any part thereof for such time and in such manner as may be specified by the BHEL and Railway(Authority's Engineer) and thereupon carry out remedial measures to secure the safety of suspended works, the Users, other persons and vehicles on or about the Railway Project.

16) Purchase And Service

All Material shall be procured from RDSO approved vendor list.

17) Field Quality Plan

The contractor shall prepare the FQP in line with RDSO standard and take prior approval from BHEL and Railway(Authority's Engineer).

18) General QA Requirements

The contractor shall ensure that the works, BOIs and services under the scope of contract at site or at any other place of work are in accordance with the BHEL technical specification, RDSO standards, approved drawings / data sheets / quality plans and BOQ. All the works, BOIs and services shall be carried out as per the best prevalent engineering practices and to the directions of the Engineer.

The contractor shall Carried out the laboratory and field tests and carry out independent tests in the site laboratory, wherever necessary (All tests are to be strictly executed as per RDSO standards. The tests which cannot be carried out in the site laboratory shall be done at a laboratory as per RDSO standard. The test samples for such test shall be jointly selected and sealed by the engineer and thereafter these shall be sent to the concerned laboratory through the covering letter signed by BHEL engineer and Railway(Authority's Engineer). The test report along with the recommendations shall be obtained from the laboratories without delay and submitted to BHEL and Railway.

The contractor shall Maintain records of all testing, including cross referencing to items of work to which each test refers and the location from which any samples were obtained for testing.

Chapter V: Indicative Map