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VOLUME - IA

Technical Conditions of Contract (TCC) Overhead Equipment (OHE) Works, Section-MP Border-Mainpuri, Jhansi Division (Gr. 239) & Allahabad Division)Gr. 241)

FOR

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

OF

NORTH CENTRAL RAILWAY

BHARAT HEAVY ELECTRICALS LIMITED

BHEL Maharatna Company	**Technical Conditions Of Contract (TCC)** **PROJECT ENGINEERING & SYSTEMS DIVISION** **HYDERABAD**	Ref No: HY/PE&SD/Projects/TCC/2018-19/OHE Works/MP Border-Mainpuri/01 Rev. No. 00

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

FOR

Overhead Equipment (OHE) Works in Section " MP Border-Mainpuri", Jhansi Division (Gr. 239) & Allahabad Division)Gr. 241)

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	:	MP Border-Mainpuri, Jhansi Division (Gr. 239) & Allahabad Division)Gr. 241) of North Central Zone of Indian 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	:	60% to 80%
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

SCOPE OF WORK

Scope shall be as per chapter III, Scope of work, Vol IA, Part II of this TCC.

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	
3.3.2	Water supply for bidder's office, stores, canteen etc.		Yes	
3.3.3	Water supply for Living Purpose		Yes	

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
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		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 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
A. For Works			
1	Hydra	1	Need based
2	JCB	1	Need based
3	Tractor	1	Need based
4	Cable unwinding Machines, rollers etc	1 No	
5	MC4 connector tool kit containing (1) crimping plier MC4, (2) open end spanner set MC4, (3) stripping plier MC4, (4) socket wrench insert to tighten, (5) socket wrench insert to secure, inserts for both 4 sq-mm and 6-sqmm (of both pliers).	2 Set	
6	Electrical measuring Instruments		
	a) Megger-1KV	1No	
	b) HV Tester-10KV	1No	
	d) Logic probe	1No	
	e) Modbus communication check kits	1No	
	f) Digital Multi meter	3 No	
7	Tong Testers	3 No	
8	Digital power meters	1 No	
9	Phase sequence meter	1 No	
10	OFC termination kit, Splicing kits	1 Set	
11	Primary /secondary injection kit	1 No each	Need based
12	Transformer oil filtration unit	1 No	Need based
13	Earth resistance measurement kit	1 No	
14	Lugs, glands as in scope of supply	1 set	Need based
15	Transmission line stringing equipment	1 No	
16	DG Sets	1 No	
17	Cable jointing kit and associated tools	2 Set	
18	Welding equipment	1 No	
19	Flood lights	5 No	
20	Set of screw drivers	1 Set	
21	Set of Allen keys (mm & inch)	1 Set	
22	Small size hacksaw & fraksaw	1 Set	
23	Cutting pliers	2 No	
24	Nose pliers	2 No	
25	Insulation stripers	2 No	
26	Dry cable jointer	1 No	

27	Number punches	1 No	
28	Alphabet punch	1 No	
29	Embossing machine with cassettes (Numbers and alphabets)	1 No	
30	Portable drilling machine up to 1-1/2”	1 Set	
31	Soldering gun	1 No	
32	Soldering Iron	1 No	
33	Continuity tester	5 No	
34	Double ended spanner Set of sizes 10-11, 12-13, 14-15, 16-17, 17-18	2 Nos each	
35	Screwdriver Set	1 Set	
36	Crimping tool with Dye range 50-400sq-mm cable, mechanical gear power, hand operated	1 Set	
37	Crimping tool up to 6 sq-mm cable	1 set	
38	Drilling machine AC, hand operated, with bit size up to 20 mm	1 set	
39	Measuring Tape, 5m	2 Nos	
40	Measuring Tape, 50 m	2 Nos	
41	Allen Key set	1 Set	
42	Adjustable spanner 2-inch size	1 No	
43	Hammer	2 Nos	
44	Rough file kit	1 Set	
45	Cutting Pliers	2 Nos	
46	Nose Pliers	2 Nos	
47	Vacuum cleaner, of industrial type, for control room sweeping / cleaning.	1 No	
48	Blowers for cleaning the panels	2 Nos	
B. For civil works			
1	Digital Concrete Mixer 2 to 4 cum with hopper/Self-loading mobile concrete mixer (Azax)with printer	2 nos.	
2	Needle Vibrator (Needle type 40mm)	4 nos.	
3	Needle Vibrator (Needle type 25mm)	2 nos.	
4	Dewatering Pump	2 nos.	
5	Earth Compactor	2 nos.	Need based
6	Theodolite with staff	2 nos.	
7	Dumpy level with staff	1 no.	

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- T&P's by Railways and Block Provision

Traffic and Power Blocks: Indian Railway will provide traffic/power blocks or both in order to enable contractors to execute the work.
Details will be as per Clause 4.7 of annexure-A.
Total maximum block hours duration available for this contract shall be **255**.
The Contractor is entitled to execute the construction work within the block period specified. The total duration of Power Block or Traffic Block or both, as the case may be, shall not exceed 10% (ten per cent) of the period specified in this Agreement. In case such total duration exceeds 10% (ten per cent), the Contractor shall pay Damages at the rate of Rs. 10,000 (Rupees ten thousand) per hour or part thereof for the exceeded Block periods.

Special machinery/T&P's required for OHE works: Contractor shall hire all the required machinery which is essential to execute the contract and available for hiring on chargeable/free basis from Indian railways.

Details of machinery, which Indian railways will provide on hiring basis shall be as per clause 4.4 and schedule P of annexure- A.

There will be no separate payment made to contractor for hiring machinery from railways as this cost is already covered in contract price.

Annexure A

4.4 Obligations relating to machinery and equipment

4.4.1 The Authority shall upon receiving a request from the Contractor, provide the machinery and equipment specified in Schedule P on payment of hire charges at the monthly rates specified therein. The Parties further agree that for each machinery or equipment:

(a) The charges shall be payable for a day even if a machine or equipment is used for less than 8 (eight) hours, so long as it has been placed at the disposal of the Contractor and has not been withdrawn;

(b) the daily rates shall be computed for a shift of 8 (eight) hours taken as one day. By way of illustration, if the machinery or equipment is used for 16 (sixteen) hours on any day, the charges payable shall be equal to twice the daily rate; and

(c) for any machinery or equipment which can be used only during the period of a Power Block or Traffic Block, no payment shall be due or payable for the day on which such block is not provided to the Contractor. Open wagons and Ordinary passenger coaches for the purpose of formation of Reel Wagon and Deck Coach for the stringing of catenary and/or contact wire, will be provided free of cost. Time taken during transportation of material shall not be computed for the purpose of charges payable by Contractor as specified in sub clause (a) & (b) above.

4.4.2 The Contractor shall by notice of at least one week convey to the Authority particulars of the machinery and equipment required for each day of the following one month.

4.4.3 In the event that the Authority does not provide any machinery and equipment at the designated time in pursuance of the provisions of Clause 4.4.1, the Contractor shall be entitled to Damages in an amount equal twice the rates specified in Schedule P. Provided further that the Contractor shall be entitled to Time Extension in accordance with the provisions of Clause 10.4 if the number of days for which the machinery has not been provided continuously exceeds 7 (seven) and/ or the total number of days of not providing the machinery exceed 15 (fifteen) days.

4.7 Provision of Power Blocks and Traffic Blocks

4.7.1 The Authority shall provide Power Block or Traffic Block or both to enable the Contractor to undertake the construction of overhead equipment, or such other work as may be determined by the Authority's Engineer.

4.7.2 The Contractor shall, in consultation with the Authority's Engineer, submit a weekly programme of Blocks, commencing from Monday, with a notice of at least 1 (one) week and the Authority's Engineer shall convey the approved weekly programme to the Contractor no less than 3 (three) days prior to the start of such week.

4.7.3 The minimum period for which a Power Block or Traffic Block shall be provided to the Contractor shall not be less than 2 (two) hours, period being counted from the time the track is placed at the disposal of the Contractor and until it is cleared by the Contractor. Provided, however, that a Power Block or Traffic Block, as the case may be, of shorter duration may be provided with mutual consent of the Parties. Provided, however, that the Contractor may, by giving a notice of at least 7 (seven) days, require the Authority to provide 2 (two) Power Blocks or Traffic Blocks of 2 (two) hours each on the dates specified in the notice.

4.7.4 The aggregate period of Power Block and Traffic Block to be provided to the Contractor during the Construction Period is specified in Schedule O. The Contractor shall organise its work so as to complete all Construction Works within such aggregate period.

4.7.5 In the event of any change in the schedule of Power Block or Traffic Block or both, as the case may be, the Authority shall inform the Contractor by a notice of not less than 24 (twenty four) hours. Provided, however, that no such notice shall be required in case of a breakdown, accident, law and order disturbance, natural calamity or any other unusual occurrence or Emergency.

4.7.6 In the event a Power Block or Traffic Block, as the case may be, is not provided for any day in accordance with the confirmed programme, the Contractor shall be compensated by providing an additional Power Block or Traffic Block of equal time during the same week or the following week. The Parties expressly that in the event of any default in providing such additional blocks for compensating the Contractor, the Authority shall pay to the Contractor Damages at the rate of Rs.5,000 (Rupees five thousand) per day for each hour which has not been provided as required hereunder and until such hour is provided during any of the 6 (six) following weeks.

4.7.7 The Contractor shall be entitled to undertake the Construction Works within the aggregate period specified in Schedule O. Provided, however, that in the event the aggregate period utilised by the Contractor exceeds the period specified in Schedule O, the Contractor shall pay to the Authority hourly charges at the rate specified therein. Provided further that in the event the Contractor avails of an aggregate period less than the period specified in Schedule O, the Contractor shall be entitled to a bonus equivalent to 40% (forty per cent) of the hourly charges specified in Schedule O.

SCHEDULE - P

(See Clauses 4.4)

Machinery and equipment

1. The Authority shall provide the following machinery and equipment to the Contractor at the daily rates shown against each machinery and equipment:

Serial No.	Particulars of each type of machinery and equipment	Daily rate in rupees in rounded figures.
1	8 wheeler Tower Wagon	2,000
2	Diesel Loco	2,000
3	BRN wagon	1,000
4	Conventional non-ac coach	1,000
5	BRN mounted 5 MT Rail Crane	1,000

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Chapter VI- Time Schedule

6.0 TIME SCHEDULE

6.1.1
The entire scope of work as detailed elsewhere in the Tender Specification shall be completed within **18 (Eighteen) Months** from the date of commencement of work at site.

6.1.2
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.

6.1.3
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.

6.2 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.

6.3 MOBILISATION

6.3.1
The activities for this work shall be started as per directions of Construction manager of BHEL.
6.3.2
The contractor should mobilize man power in order to complete the work in **18 (Eighteen) Months**
6.3.3
Requisite Material, men and machinery should be arranged in order to complete the project within stipulated time period.
6.3.4
The contractor has to augment his resources in such a manner that following 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.

6.4 CONTRACT PERIOD

For the purpose of contract, the period shall be taken as **18 (Eighteen) 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.

6.5 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 or 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.

6.6 Project Milestones

Milestone 1: Completion of-

(i) 40TKM scope of work, up to stage* I , within 90 days from zero date of contract.

Milestone 2: Completion of-

(ii) 81TKM scope of work, up to stage I, within 229 days from zero date of contract **and**
(iii) 22TKM scope of work, up to stage III, within 229 days from zero date of contract.

Milestone 3: Completion of contract in all aspects, within 18 Months from zero date of contract.

*Stages of work shall be as follows:

1.1 **Stage I:** Mast erection, bracket erection including provision of insulators and all fittings complete for block sections including stations and yards

1.2 **Stage II:** Stringing of catenary and contact wire

1.3 **Stage III:** Completion of all OHE work including final adjustment

Chapter VII- Storage and Security

Contractor shall take all necessary measures to prevent any theft, pilferage of BHEL's supplies and as well as contractor (s) supplies. In order to achieve this following shall be required to be adhered with:

1. **Storage and security of contractor supplies:** Contractor shall be responsible for storage and security of works & supplies (Which are in his scope) till contract completion or handing over of project to Railways whichever is later.
   1.1 Contractor shall file FIR in case of any theft for record and purpose of insurance claim.
   1.2 Contractor shall liaison with insurance company and provide all necessary documents in order to facilitate insurance claim.
   1.3 Contractor shall keep sufficient security to prevent any kind of theft/damage at works during contract execution.
   1.4 In case of any theft, pilferage, damage or loss of any material, contractor shall replenish the same without any additional cost to BHEL without any time delay.

2. **Storage and security of BHEL supplies:** BHEL shall be responsible for storage and security of supplies (Which are in BHEL's scope) till handing over of the material to contractor from BHEL's store.
   2.1 Contractor shall draw materials supplied by BHEL from BHEL's store after due permission from store's in charge.
   2.2 Contractor shall be responsible for transportation (and damage etc. thereafter) of supplies from BHEL stores to works or their respective stores.
   2.3 Contractor shall file FIR in case of any theft for record and purpose of insurance claim.
   2.4 Contractor shall liaison with insurance company and provide all necessary documents in order to facilitate insurance claim.
   2.5 In case of any theft, pilferage, damage or loss of any material, contractor shall replenish the same without any additional cost to BHEL without any time delay. In case contractor fails to replenish the material within stipulated time, BHEL shall supply the material and cost of the same shall be recovered from contractor.
   In case of successful claim of insurance, same shall be passed on to the contractor.
   2.6 No extra payment for security shall be paid to contractor by BHEL as contract price is inclusive of all.
   2.7 Following are the tentative store locations of BHEL
      a) Bah (U.P)
      b) Karhal (U.P)
      c) Bhind (M.P)
      The above locations are subject to approval by Railways, finalized locations shall be informed by BHEL later.

Chapter VIII- Statutory Regulation

1. 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
OHE Works

Chapter I- Intent of Specification

1.0 INTENT OF SPECIFICATION

This specification covers the Supply, Erection, Testing & Commissioning of 25kV AC 50 Hz 1-ø, Traction Overhead Equipment ("OHE") works for the Electrification of Railway Lines of the sections Birlanagar-Etawah, Bhandai - Udi and Farrukhabad - Shikohabad including Mainpuri - Etawah of North Central Railway 386 RKM/440 TKM.

It is not the intent to specify completely herein all details of the equipment; nevertheless, the Overhead Equipment System shall be complete and operative in all respects and shall confirm to the highest standard of engineering, design and workmanship.

Chapter II- Project Description

2.0 PROJECT DESCRIPTION

2.1 TRACKS TO BE WIRED

2.1.1 The route and track length of the section to be equipped with overhead equipment are as under:

Type of OHE	Section	RKM	TKM
Conventional OHE & Tramway type OHE with contact wire height 5.80m	Birlanagar - Chambal Bridge (Gr.239)	99	109
	Chambal Bridge - Etawah (Gr. 239) & Etawah – Mainpuri (Gr. 241)	67	73
	Bhandai - Udi section (Gr.240)	113	123
	Shikohabad (Excl) - Farrukhabad (Gr.241)	107	135

2.2 POWER SUPPLY

Electric Power will be supplied to the Overhead Equipment (OHE) through 06 Traction Sub-Stations (TSS) tentatively located at Bhind, Malanpur, Bah, Fatehabad, Bhogaon & Safai. The Traction sub-station will be erected with an area close to the Railway Track. TSS is excluded from the scope of work defined in this contract. Refer to clause 3.1.9 to 3.1.12 for terminal points of this contract.

2.3 SWITCHING STATIONS, AUXILIARY TRANSFORMERS & MODIFICATION OF OVERHEAD LINES

Number of Switching Stations, Auxiliary Transformer and Overhead Line Modifications are as under:

Sl.No.	Description of Works	Unit	Qty.			Total
			Gr.239	Gr.240	Gr.241	
i.	Feeding Post/TSS	No.	2	2	2	**6**
ii.	Sectioning post (SP)	No.	3	3	4	**10**
iii.	Sub - sectioning post (SSP)	No.	7	7	7	**21**
iv.	Auxiliary transformers (5kVA, 10kVA, 25kVA) stations complete in all respect	No.	5kVA (0), 10kVA(14), 25kVA (1)	5kVA (0), 10kVA(13), 25kVA (0)	5kVA (3), 10kVA(17), 25kVA (1)	**49**
v.	Extension of LT power supply for CLS work	No.	5kVA (0), 10kVA(14), 25kVA (1)	5kVA (0), 10kVA(13), 25kVA (0)	5kVA (3), 10kVA(17), 25kVA (1)	**49**
vi.	Modification of HT & LT power lines a) 33KV Modification	Location	- -	- -	- -	**10** **03**

	b) 11Kv Modification c) 440V Modification d) 230V Modification	Location Location Location	- -	- -	- -	**18** **20**

2.4 For other details of the Site of the Project, Refer to Annexure-2 of this Specification.

Chapter III- Scope of Work

3.0 SCOPE OF WORK

The scope of work involves Supply, Erection, testing & Commissioning of Traction Overhead Equipment (OHE) including Feeder, modifications of OHE at terminal points, Modification of HT/LT Power Lines (across/along the track), Anti-theft charging and LT Supply Transformer Stations including structures and all ancillary equipment for the following section:

Type of OHE	Section	RKM	TKM
Conventional OHE & Tramway type OHE with contact wire height 5.80 m	MP Border (Chambal Bridge) - Etawah (Gr. 239) & Etawah – Mainpuri (Gr. 241)	67	73

For complete details of the scope of work, refer to Annexure-3 of this Specification.

3.1 General Conditions of this Specification

3.1.1 The Purchaser shall provide project specific drawing / documents like Approved LOP, CSD, and SED etc. for the execution of work, however any standard RDSO/CORE/Railways drawings/guidelines/specification/manual required for smooth execution of the project shall be arranged by the Contractor on his own risk and cost. The contractor shall not delay any execution activity on account of non-availability of any such standard documents with them.

Supply of the Material:

3.1.2 Contractor shall submit a material procurement plan within 10 days from the date of LOA.

3.1.3 Contractor shall ensure supply of all the materials so that milestones mentioned in this contract are achieved on time.

3.1.4 Contractor shall proceed with the ordering of supply of material after taking due Approval from the purchaser.

3.1.5 The Contractor shall be responsible for considering basic quantities of components and materials required to make up a unit of work for complete Overhead Equipment and other items of this contract.

3.1.6 The following items only shall be free issued by the Purchaser to the contractor at the location specified elsewhere in this TCC

a. 107 sq mm Hard Drawn Grooved Copper Contact Wire
b. Un-insulated Cadmium Copper Catenary Wire 65 mm2 (19/2.10 mm)
c. 5 kVA, 10 kVA, 25 kVA & 50 kVA, 25 kV/240 V 50 Hz, 1-ø Oil filled Auxiliary Transformers
d. 2Cx50sqmm, 2Cx70sqmm, 2Cx150sqmm LT Power Cables for Auxiliary Transformers
e. 3Cx185sqmm, 3Cx300sqmm HT Power Cables for Modification of HT Powers Lines across/along the track.

Services

3.1.7 The Contractor shall provide and complete the training to the personnel of the Purchaser/Authority in diagnostic, trouble shooting, repairing, operation and maintenance of the overhead equipment at work site. The number of persons to be trained shall not exceed 10 (ten) and the period of training shall be for a period of 4 (four) weeks. The training shall be completed before the issuance of the Provisional Certificate/ Completion Certificate.

Spares

3.1.8 The contractor shall retain sufficient spares at project for prompt replacement, installation or re-installation of any defective parts of OHE.

Terminal Points

3.1.9 Design and Engineering of OHE shall be excluded from the scope of the contractor. However, the contractor shall execute the project in conformity with RDSO/CORE/Railway standards/guidelines. Any discrepancy/difficulty in approved drawings/documents shall be informed to the purchaser by the contractor well in advance before executing any such work.

3.1.10 With respect to TSS/SP/SSP, the contractor scope shall be termination of feeder/return conductor up to gantry/main mast of the Feeding Station located within the boundary of TSS/SP/SSP. The contractor scope shall include Supply, Erection, Testing and Commissioning of all connector, fittings and jumpers etc. required for connection of the feeder/return conductor at the feeding station.

Stringing of cross feeders and jumper wires up to feeding stations from OHE shall, however, be done either by OHE contractor or TSS/SP/SSP contractor whosoever does the work later or as decided by the purchaser depending upon the ground situation during the course of progress of OHE/TSS/SP/SSP work. Necessary materials for the above stringing works will, however, be required to be arranged by OHE contractor in any case.

3.1.11 With respect to other OHE contractors, the contractor scope shall be as per Chainage mentioned in this specification. However, the contractor shall be responsible for supply, erection, testing & commissioning of complete OHE up to next OHE termination from the Chainage mentioned in his scope.

3.1.12 The OHE Mast foundations to be cast in two stages.

i. In 1st stage foundation shall be casted with concrete by leaving central core portion for mast erection.
ii. In 2nd stage, core portion shall be grouted with concrete after alignment of mast.
iii. The foundations, if required, for modification of HT/LT power lines along/across the track are included in the scope of the contractor.

Codes and Standards

3.1.13 The contractor shall follow latest RDSO specifications latest as on 31.10.2018 for procurement of respective materials. Wherever standard RDSO specifications are not available, the contractor shall follow relevant BIS specifications.
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3.1.14 The contractor is expected to get conversant with latest RDSO, CORE, ACTM & other railway standards/manuals/guidelines and drawings. All works shall be strictly executed as per railway standards and drawings. The contractor is requested to arrange railway standards and drawings on his own and no standards will be provided by BHEL.

3.1.15 All the items supplied by the contractor shall be as per RDSO/CORE Vendor List. In case of non-availability of vendor list for any item, the contractor shall inform the same to the purchaser for approval.

Documentation

3.1.16 The contractor shall submit the GA, Installation drawings, approved QAP, erection methodology & instructions and any other drawing applicable for equipment to be supplied by the contractor for approval/information. The contractor shall also submit any other drawing as required by the Authority for approval.

3.1.17 No later than 90 (ninety) days prior to the Project Completion Date, the Contractor shall, in consultation with the purchaser, evolve an equipment specific maintenance manual for equipment based on a new technology not currently in use in the Railways (the "Maintenance Manual") for the regular operation and maintenance of such equipment in conformity with safety requirements, Good Industry Practice and manufacturer's manuals and instructions and shall provide 10 (ten) hard copies and 2 (two) compact discs thereof to the purchaser.

3.1.18 The contractor shall submit mark-up drawings to the purchaser for preparation of "As Erected" drawings.

Packing and Dispatch

3.1.19 Packing and Dispatch of materials shall be as per RDSO/CORE/Railway standards.

Guarantee for materials

3.1.20 All materials shall be guaranteed against manufacturing defects for a period of 18 months from the date of supply or 12 months from date of erection, whichever is earlier.

Execution of Work:

3.1.21 In case of any discrepancies in the approved documents/execution of work with respect to RDSO/CORE/Railway standards, specifications and guidelines, it shall be responsibility of the contractor to inform the same to the purchaser before executing the work in order to take up with the authority.

Chapter IV- Explanatory Notes

4.0 Explanatory Notes of items mentioned in Price Bid Format for Overhead Equipment (OHE), Feeder OHE, Modification of OHE, Anti-theft charging and Modification of Power Lines across/along the track:

Item No. 1: Centering and shuttering including strutting, propping etc. and removal of form work for Foundations, footings, bases for columns (Item 4.3.1 of DSR)

Item No. 2.1: Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level: "1:2:4 (1 cement: 2 coarse sand (zone-III): 4 graded stone aggregate 20 mm nominal size) (Item 4.1.3 of DSR)"

Item No. 2.2: Providing and laying in position cement concrete of specified grade excluding the cost of cantering and shuttering - All work up to plinth level: "1:1½:3 (1 Cement: 1½ coarse sand (zone-III): 3 graded stone aggregate 20 mm nominal size). (Item 4.1.2 of DSR)

Item No. 3: "Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete up to plinth level. Mild steel and Medium Tensile steel bars (Item 5.22.1 of DSR)"

Item No. 4: Earth work in excavation by mechanical means (Hydraulic excavator) / manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.
All kinds of soil. (Item 2.8.1 of DSR)

Item No. 5: Excavation work by mechanical means (Hydraulic excavator)/ manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soils as directed, within a lead of 50 m.
Ordinary rock (Item 2.9.1 of DSR)

Item No. 6.1: Extra for every additional lift of 1.5 m or part thereof in excavation / banking excavated or stacked materials.
All kinds of soil (Item 2.26.1 of DSR)

Item No. 6.2: Extra for every additional lift of 1.5 m or part thereof in excavation / banking excavated or stacked materials.
Ordinary or hard rock (Item 2.26.2 of DSR)

Item No. 7: Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m. (Item 2.25 of DSR)

Note for Item 1 to 7:

i. Shuttering of muff of OHE foundation shall be measured in item 2 of SOQ.
ii. For purposes of computation of volume of concrete under above item, the volume of steel work embedded in the foundation block shall be ignored.

Item No. 8: Supply, Erection, Testing and Commissioning of galvanized steel structures excluding TTC, Portals and SPS

The price shall cover cost of Supply, Erection, Testing and Commissioning, at respective site / locations, as per RDSO drawing of individual RSJ Mast, rolled traction masts, B-series mast, Dwarf masts and other type of masts. For the purpose of payment, the weights of individual traction mast and masts of head span shall be determined for each type on the basis of the payable weights per meter length and per meter weights given in tables of Railways [as per respective RDSO drawing for standard types]. For special types, the payable weight per meter length will be decided by the Purchaser, at the time of approval of designs. The galvanization should be as per respective RDSO drawing/standard.

The price shall also include the cost of modification/repairing of platform shelters in case the shelter is modified/dismantled/damaged during the course of erection of a mast/portal at platforms.

The price under this item shall also be applicable for masts required for Feeder, Modification of OHE, Auxiliary Transformer Stations and Modification of power lines across/along the track etc.

Item No. 9: Supply, Erection, Testing and Commissioning of fabricated and galvanized steel structures (TTC and Portal)

The price shall cover cost of Supply, Erection, Testing and Commissioning, at respective site / locations, as per RDSO drawing of individual fabricated & galvanized steel structures (TTC & Portal). For the purpose of payment, the weights of individual traction mast and masts of head span shall be determined for each type on the basis of the payable weights per meter length and per meter weights given in tables of Railways [as per respective RDSO drawing for standard types]. For special types, the payable weight per meter length will be decided by the Purchaser, at the time of approval of designs. The galvanization should be as per respective RDSO drawing/standard.

The price shall also include the cost of modification/repairing of platform shelters in case the shelter is modified/dismantled/damaged during the course of erection of a mast/portal at platforms.

Item No. 10: Supply, Erection, Testing and Commissioning of fabricated and galvanized steel work other than masts including SPS

The price shall cover the cost of Supply, Erection, Testing and Commissioning of all galvanized and fabricated steel work including fasteners and small parts steel (SPS) other than items in item no. 8 and 9, which are required to be supplied by the Contractor. For standard fabricated steel work for which RDSO's drawings are available, the weight of steel work as specified in RDSO's drawing shall be considered for payment. However, in case the unit sectional weight of any member indicated in RDSO's drawing is not in conformity with the unit sectional weight as per the latest IS specification, the weight of the fabricated steel work shall be calculated on the basis

of latest IS Specification and the same will be considered for payment. For the non-standard fabricated steel work, the calculated weight to be considered for payment under this item shall be included in the relevant drawing based on latest IS sectional weight at the time of submitting the designs for approval of the Purchaser. The galvanization should be as per respective RDSO drawing/standard.

The price under this item shall also be applicable for supply and erection of anti-climbing/anti-monkey device required for OHE, Feeder, Modification of OHE, and Auxiliary Transformer Stations.

The price under this item shall also be applicable for small part steel of Feeder, Modification of OHE, and Auxiliary Transformer Stations. The price shall also be applicable for SPS required for modification of power lines across/along the track including MS Angle, Cross Arms, channels etc. complete with suitable clamps, bolts & nuts including drilling holes etc. and painting with primer and finish paint as required.

Notes for Item No. 8 to 10:

i. The price shall cover cost of erection, alignment, setting before grouting, wherever required, tower/steel tower/steel work for feeders for TSS/SP/SSP, drop arms, MS Angles, Channels, standard super mast and suspension brackets for feeders and return conductors, dwarf masts or stub masts for anchoring, complete with anchor plates drilled and welded in position, multiple cantilever cross arm, chairs, adopters for bracket assemblies and all other small part steel works, the erection of which shall also carried out by the contractor. The price shall also include Supply, Erection, Testing and Commissioning of galvanized bolts, nuts washers etc. wherever required as per approved design and drawings. The price shall also include the cost of repairing of platform shelters in case the shelter is dismantled/damaged during the course of erection of a mast/portal at platforms.

ii. There will be no addition for increased weight due to galvanizing or painting or weld material or reduction for holes or skew cuts. The price shall cover shifting / transportation of each masts up to individual locations.

iii. Unless specifically indicated none of the other items of work shall include the cost of supply and / or erection of small part steel work, which will invariably be paid for under item no. 10 as applicable respectively.

iv. All Galvanized / SS bolts, nuts, lock nuts and washers required for assembly and fastening of steel work mentioned against item no. 9 and mounting of the above equipment in gantries shall be supplied by the Contractor.

v. The price shall also include the straightening of masts/portal uprights bent during transit and cutting of masts/portal uprights to suit the site conditions. The payment shall be made on the basis of final lengths/weights of the masts/structures in case the same are cut/modified as indicated above before erection. In case cutting of mast or worn out galvanization, application of cold galvanization paint at the site shall be done by the contractor immediately.

Item No. 11: Supply, Erection, Testing and Commissioning of a Guy Rod Assembly

The price shall cover Supply, Erection, Testing and Commissioning of guy rod assembly of various lengths for traction masts, feeder line towers or portals or other supports with adjustments and parts to be grouted in the anchor block [The price shall not include the cost of Supply and Erection of a dwarf or stub mast with anchor plates drilled and welded in position, where required, for anchorage, and small parts steel work, complete with bolts and nuts etc., if any for attaching

the mast guy rod fittings to the mast/structure which shall be paid for separately under the relevant item]. Prices indicated against all other items should be exclusive of the price of supply and erection of guy rod, if any, which will be paid for under this item only.
The price under this item shall also be applicable for guy rod assemblies required for Feeder, Modification of OHE, Auxiliary Transformer Stations and Modification of power lines across/along the track.

Item No. 12: Supply, Erection, Testing and Commissioning of Anchoring Arrangement of traction mast with Galvanized steel stranded wire

The price shall cover Supply, Erection, Testing and Commissioning of Anchoring Arrangement with Galvanized steel stranded wire of required length for traction masts, feeder line towers or supports complete with mast guy rod fittings, Galvanized steel stranded wire of 9.3 or 9.7 m and part/s be grouted in the anchor block as per RDSO drawing. The price shall not include the cost of Supply and Erection of a dwarf or stub mast with anchor plates drilled and welded in position, where required, for anchorage, and small parts steel work, complete with bolts and nuts etc., if any for attaching the mast guy rod fittings to the mast/structure which shall be paid for separately under the relevant item. Prices indicated against all other items should be exclusive of the price of Supply and Erection of guy rod, if any, which will be paid for under this item only.

Item No. 13: Supply, Erection, Testing and Commissioning of conventional type single bracket assembly including insulators and inclined droppers

The price shall cover on a flat rate basis any bracket assembly on a traction mast or support or on drop arm and shall include those on high/low rail level platform, in the vicinity of turnouts, over bridges or over-laps and at locations with reduced encumbrance or terminating wires. The price shall include the cost of supply of all components including galvanized steel tube, solid core insulators (stay arm, bracket etc.) [after testing as per RDSO procedure before erection], dropper wires complete with bolts and nuts etc. excluding small parts steel work , if any, which shall be paid under item no. 10. The price shall cover erection of all components including solid core insulators and dropper wires, but excluding small parts steel work, if any, which shall be paid under item no. 10. However, this does not include the anti-creep arrangement at masts/structures. Erection is inclusive of testing of insulators as per RDSO specifications / procedure before erection.
The price under this item shall also be applicable bracket assembly required for Feeder, Modification of OHE.

Item No. 14: Supply, Erection, Testing and Commissioning of conventional type single bracket assembly including insulators, including droppers (For Polluted Zone)

The price shall cover on a flat rate basis any bracket assembly on a traction mast or support or on drop arm and shall include those on high/low rail level platform, in the vicinity of turnouts, over bridges or over-laps and at locations with reduced encumbrance or terminating wires. The price shall include the cost of supply of all components including galvanized steel tube, solid core insulators (stay arm, bracket etc.) [after testing as per RDSO procedure before erection], dropper wires complete with bolts and nuts etc. excluding small parts steel work , if any, which shall be paid under item no. 10. The price shall cover erection of all components including solid core

insulators and dropper wires, but excluding small parts steel work, if any, which shall be paid under item no. 10. However, this does not include the anti-creep arrangement at masts/structures. Erection is inclusive of testing of insulators as per RDSO specifications / procedure before erection.
The price under this item shall also be applicable for bracket assembly required for Feeder, Modification of OHE.

Item No. 15: Supply, Erection, Testing and Commissioning of conventional type single bracket assembly including insulators, inclined droppers (For Tramway OHE)
The price shall cover on a flat rate basis any bracket assembly on a traction mast or support or on drop arm and shall include those on high/low rail level platform, in the vicinity of turnouts, over bridges or over-laps and at locations with reduced encumbrance or terminating wires. The price shall include the cost of supply of all components including galvanized steel tube, solid core insulators (stay arm, bracket etc.) [after testing as per RDSO procedure before erection], dropper wires complete with bolts and nuts etc. excluding small parts steel work , if any, which shall be paid under item no. 10. The price shall cover erection of all components including solid core insulators and dropper wires, but excluding small parts steel work, if any, which shall be paid under item no. 10. However, this does not include the anti-creep arrangement at masts/structures. Erection is inclusive of testing of insulators as per RDSO specifications / procedure before erection.
The price under this item shall also be applicable for bracket assembly required for Feeder, Modification of OHE.

Item No. 16: Additional item for 13, 14, and 15 for supporting two OHE
The price shall cover Supply, Erection, Testing and Commissioning of all additional fittings required to support an additional OHE on a single bracket assembly including the double contact wire swivel clip.
The price under this item shall also be applicable for bracket assembly required for Feeder, Modification of OHE.

Item No. 17: Supply, Erection, Testing and Commissioning of pull-off arrangement for one OHE
The price shall cover supply of all components required for a pull-off arrangement to pull one equipment only including supply of copper conductors, small jumper (50) wire, head-span mast fittings complete with M.S. angle, equalizing plate assembly, steady-arm, catenary dropper clip, contact wire swivel clip and fittings including solid core insulators. The price shall cover erection of all components including solid core insulators [after testing as per RDSO procedure before erection], small jumper wire and conductors.
The price shall cover supply and erection of all additional fittings required including the supply of required conductors/ jumper wires, in case the pull off pulls more than one equipment.

Item No. 18: Supply, Erection, Testing and Commissioning of Copper Large span wire
The price shall cover supply of span wire, as per RDSO specification. The payable length shall be the horizontal distance between the inner faces of all traction masts/structures on which the

mast attachments are mounted. No extra shall be provided for sag. The price is applicable for all types of span wires including head span wires. Erections of a meter beyond the first decimal shall be rounded off to the nearest first decimal. The price shall not include mounting arrangement of span wires which shall be paid under item no. 120.

Item No. 19: Supply, Erection, Testing and Commissioning of suspension of one conventional OHE from head span

The price shall cover supply of a suspension assembly to carry complete all copper OHE on head spans inclusive of all dropper assemblies and from head span, cross-span steady wire attachment, steady arm/rod, catenary suspension clamps and other fittings required to make complete suspension arrangements for copper OHE on head span. The price shall cover the erection of all components, fittings, and droppers for suspension of OHE from head span. The cost of insulators shall be paid under item nos. 36 to 39, as applicable.

Item No. 20: Supply, Erection, Testing and Commissioning of Suspension /registration of contact wire only

The price shall cover supply of dropper wire and Supply, Erection, Testing and Commissioning of all fittings required for suspension/ registration of a contact wire only whether under head spans carrying other types of OHE or not or on any bracket for carrying contact wire only. The price shall include the followings: - (i) Vee clamp or double vee clamp with adjuster, or steady arm with steady wire clamp. (ii) Contact wire swivel clip. The cost of insulators shall be paid under item nos. 36 to 39, as applicable.

Item No. 21: Supply, Erection, Testing and Commissioning of conventional type OHE along with all required Components including supply of dropper wire and tower wagon shed checking

The price shall cover supply of all components including dropper wire, dropper clips, parallel clamps for jumpering and splices, and including ending cones, wherever used, all splices (where their use is approved), but excluding Contact and Catenary wire only which will be supplied by the purchaser at locations mentioned in this specification. The price shall cover erection of all components and wires and conductors including contact, catenary wires, droppers, jumpers and terminating wires, if any, but excluding small parts steel work which shall be paid under item no. 10, if any. The price shall also include the cost of painting of the setting distance of masts/structures, contact height, ATD location, temperature, isolator indication and rail level etc. on masts/structures. The price shall also include the cost of stenciling of location number on masts/portal upright in the manner as directed by the purchaser. The price shall not include termination of conductors, which will be paid under item no. 29 and 30, as applicable.

The price under this item shall also be applicable for same work required for Feeder, Modification of OHE.

Item No. 22: Supply, Erection, Testing and Commissioning of tramway type OHE along with all required Components including supply of dropper wire

The price shall cover supply of all components including dropper wire, dropper clips, parallel clamps for jumpering and splices, and including ending cones, wherever used, all splices (where

their use is approved), but excluding Contact and Catenary wire only which will be supplied by the purchaser. The price shall cover erection of all components and wires and conductors including contact, catenary wires, droppers, jumpers and terminating wires, if any, but excluding small parts steel work which shall be paid under item no. 10, if any. The price shall also include the cost of painting of the setting distance of masts/structures, contact height, ATD location, temperature, isolator indication and rail level etc. on masts/structures. The price shall also include the cost of stenciling of location number on masts/portal upright in the manner as directed by the purchaser. The price shall not include termination of conductors, which will be paid under item no. 29 and 30, as applicable.

Note for item no. 21 and 22:

i. For the purpose of payment against Item no. 21 and 22, the length of overhead equipment, which shall include terminating wires, shall be measured from the center lines of the traction masts/structures at which the two ends of each tension length of over-head equipment are anchored.
ii. The length shall be the difference between the actual Chainage of the two traction masts/structures at which the ends of each tension length are anchored or by the sum of the actual spans between the same two points whichever is higher as included in the "as erected" layout plans. For purpose of progress payment reference to layout plans as approved shall be made. The price under Item no. 21 and 22 does not cover the cost of Supply and Erection of cut in insulator /section insulator assembly which shall be paid for under item no. 36 to 41, as applicable.

Item No. 23: Supply, Erection, Testing and Commissioning of all Aluminum 25 KV feeder/return conductor

The price shall cover Supply, Erection, Testing and Commissioning of Hard-drawn stranded All Aluminum conductor feeder/return conductor (along or across the tracks) as per RDSO Specifications including 3 kV disc Insulators along with all necessary accessories, fittings, bolts, nuts, washer, clamps, connectors complete with bolts and nuts etc. The price shall not include the cost of suspension assembly (which will be paid for under item no. 37) and termination (which will be paid for under item no. 31) and small part steel work (which will be paid for under item no. 10). The price shall also cover on a flat rate basis, the cost of supply of splices to the extent required.

Item No. 24: Supply, Erection, Testing and Commissioning of 150 Sq. mm copper Feeder wire

The price shall cover Supply, Erection, and Testing and Commissioning of 150 Sq. mm copper feeder wire, as per RDSO specification. The price shall cover supply of all associated components including ending cones and erection of a 150 Sq. mm. wire per meter, including ending cones, suspension arrangement of 9 Ton suspension insulator assembly (which will be paid under item no. 37) and other components. The price shall be applicable for all types of feeder wires.

Item No. 25: Supply, Erection, Testing and Commissioning of insulated 65 Sq. mm cadmium catenary copper wire (Under over line Structures)

The price shall cover Supply, Erection, Testing and Commissioning of insulated catenary wire as per latest RDSO specification & supply of all associated components including ending cones, splice, special droppers and erection of a 65 Sq. mm. catenary wire including all the other components. The payable length shall be the horizontal distance between the inner faces of all traction masts/structures on which the mast attachments are mounted. No extra shall be provided for sag. The contractor shall follow latest Railway Board letter no. 2003/RE/161/1/Vol-III/Pt. dated 19.06.2017 for supply of Insulated Catenary wire or latest guidelines.

Item No. 26: Supply, Erection, Testing and Commissioning of earth wire

The price shall cover Supply, Erection, Testing and Commissioning of earth wire made of 7/4.09 mm steel reinforced aluminum conductor (RACCOON) excluding termination (which shall be paid under item no. 33) and shall include cost of fittings on structures for supporting the earth wire including bonding of the earth wire to the structure and the structure to earth electrodes or a non-track circuited running rail or impedance bond. The price shall include Supply and Erection of disc insulators, cut-in-insulator to isolate sections of earth wire and the cost of small part steel works (which will be paid under item no. 10) complete with bolts and nuts to attach the earth wire mast clamp to masts/structures, if any.

Note for item nos. 23, 24, 25, and 26:

i. The prices under these items shall not include terminations, which will be paid for under item nos. 31, 32, 33, as applicable. The prices under these items shall also not include the connection (a) between feeders, or return conductors and (b) of feeders, or return conductors to a bus bar, overhead equipment or isolator switch shall be paid for under item no. 45 to 48, as applicable. The prices under these items shall also not include cut-in insulators and suspension insulators which shall be paid for under item no. 36 to 39, as applicable.

ii. For the purpose of payment against items, the length of feeders, return conductors or earth wire shall be measured from the center lines of the mast/structure at which the two ends of each length of feeder or conductor run are anchored, by adding actual spans. In case of feeders/return conductors crossing a track, the length shall be measured between the faces of traction masts/structures at which the two ends of the cross feeder or return conductors are anchored, as indicated in the as erected structure erection drawings for traction masts/structures. No payment will be made for the extra length of the conductor/s on account of sag or scrap.

iii. For purposes of progress payment reference to "As Approved" drawings shall be made. However, the price under this item shall be adjusted according to the final length of OHE indicated in the "As Erected" layout plan/drawings.

Item No. 27: Supply, Erection, Testing and Commissioning of 3 pulley type regulating equipment with counter weight assembly for conventional type OHE

The price shall cover Supply, Erection, Testing and Commissioning of 3 pulley type **(**Modified type) regulating equipment with counter-weight assembly suitable for conventional type OHE, as per RDSO drawing including 9 ton adjuster with double strap assembly and normal/anti-theft guide tube assembly, the supply of regulating equipment and stainless steel wire rope, required for the regulating equipment and small part steel work, if any. The price shall also cover adjustment of the entire regulating equipment. The price shall not include Supply and Erection of termination, which will be paid for under item no. 29 and 30. Price shall include the cost of

provision of steel tube on hexagonal tie rod as per RDSO maintenance instruction. The price shall cover marking/ painting of temperature and 'Y' measurement on OHE masts at BWA locations including cost of paint.
The price under this item shall also be applicable for 3 pulley regulating equipment assembly required for Feeder, Modification of OHE.

Item No. 28: Supply, Erection, Testing and Commissioning of 3 pulley type regulating equipment with counter weight assembly for tramway type OHE
The price shall cover, Supply, Erection, Testing and Commissioning of 3 pulley type **(**Modified type) regulating equipment with counter-weight assembly suitable for tramway type OHE, as per RDSO drawing including 9 ton adjuster with double strap assembly and normal/anti-theft guide tube assembly, the supply of regulating equipment and stainless steel wire rope, required for the regulating equipment and small part steel work, if any. The price shall also cover adjustment of the entire regulating equipment. The price shall not include Supply and Erection of termination, which will be paid for under item no. 29 and 30. Price shall include the cost of provision of steel tube on hexagonal tie rod as per RDSO maintenance instruction. The price shall cover marking/ painting of temperature and 'Y' measurement on OHE masts at BWA locations including cost of paint.
The price under this item shall also be applicable for 3 pulley regulating equipment assembly required for Feeder, Modification of OHE.

Item No. 29: **Supply, Erection, Testing and commissioning of materials for termination of single conductor of overhead equipment or a terminating wire for conventional and tramway type OHE including insulators**
The price shall cover supply of all material necessary for the termination of single conductor of overhead equipment or terminating wire on a traction mast or structure, including appropriate mast anchor fittings, clevis assembly, adjuster, anchor double straps, ending clamp for the catenary or contact wire or terminating wire and fittings including 9 ton insulator [after testing as per RDSO procedure before erection], assembly and terminating wire, if any. The price shall cover erection of all materials including the 9 ton insulator assembly and terminating wire, if any. The price under this item shall also be applicable for modification of OHE.

Note for item no. 29:
In case of "V" type anchorage is adopted for terminating a single conductor such an arrangement would be counted as two off under this item, for the purpose of payment.

Item No. 30: Supply, Erection, Testing and Commissioning of materials for termination of Double Overhead equipment Conductor including insulators
The price shall cover supply of all materials necessary for the yoked termination of two overhead equipment conductors on a traction mast or structure, including appropriate mast anchor fittings, clevis assembly, adjusters, ending clamps for catenary and contact wires, anchor double strap assembly, equalizing / compensating plate and fittings including 9 ton insulator assembly and the termination wire, if any, as per RDSO drawing latest. The price shall cover erection of all

materials including the 9 ton insulator [after testing as per RDSO procedure before erection] assembly.
The price under this item shall also be applicable for modification of OHE.

Item No. 31: **Supply, Erection, Testing and Commissioning of materials for termination of all Aluminum 25 KV feeder/return conductor including insulators**
The price shall cover supply of all materials required for the termination of an All-Aluminum 25 KV feeder/return conductor (SPIDER), including appropriate mast anchor fittings adjuster, strain clamp end fitting including 3 KV cut-in-insulator and 9 ton insulator assembly. The price shall cover Supply and Erection of all materials including the 9 ton insulator [after testing as per RDSO procedure before erection] assembly and 3 KV cut-in-insulator.

Item No. 32: Supply, Erection, Testing and Commissioning of materials for termination of 150 Sq. mm Copper Feeder Wire
The price shall cover supply of all materials necessary for the termination of 150 Sq. mm feeder conductors on a traction mast or structure, including appropriate mast anchor fittings , clevis assembly, adjusters, ending cone, ending clamps for feeder , anchor assembly & 9 ton insulator assembly including termination wire, if any, as per RDSO drawing latest. The price shall cover erection of all materials including the 9 ton insulator [after testing as per RDSO procedure before erection] assembly and re-tensioning of OHE and adjusting of droppers as per standard.

Item No. 33: **Supply, Erection, Testing and Commissioning of materials for termination of an earth wire**
The price shall cover Supply, Erection, Testing and Commissioning of all materials required for the termination of an earth wire including appropriate mast anchor fittings, adjuster, terminal clamp and fittings.

Note to Item nos. 29 to 33:
i. Small parts steel work complete with bolts and nuts wherever required will be paid for under item no. 10 as applicable and shall not be included in this item.
ii. The prices shall not include the cost of jumper connection (i) between feeders or return conductors and (ii) or feeders or return conductors to a bus bar, overhead equipment or isolator switch which will be paid for under item no. 45 to 48.
iii. The prices under these items shall also include the cost of double eye distance rod, if provided for any type of terminations.

Item No. 34: Supply, Erection, Testing and Commissioning of anti-creep arrangement with 65 sq. mm catenary wire for Conventional and tramway type OHE
The price shall cover supply, erection, testing and commissioning of all materials for anti-creep including adjusters, mast anchor fittings at its terminations on either side on structures, ending clamps and fittings including 9 ton insulator assembly and small parts steel work, if any. The price shall cover erection of all materials including 9 ton insulator assembly (which shall be paid under item nos. 36 to 39, as applicable).but excluding 65 sq. mm catenary wire which will be supplied by the purchaser assembly and excluding small parts steel work, if any, which will be paid under item no. 10.

The price under this item shall also be applicable for modification of OHE.

Note for Item No. 34:

i. The price shall not include the cost of any additional cut-in or suspension insulator which will be paid for under item no. 36, 37, as applicable.
ii. In case the anti-creep extends beyond one span on either side of anti-creep center, payment for the Supply and Erection of extra length shall be paid additionally at the rate of 20% of the rate for item no. 34 for each extra span.

Item No. 35: Supply, Erection, Testing and Commissioning of additional fittings at a turn out, diamond crossing and Overlap

The price shall cover on flat rate basis supply of additional components and fittings required at turnouts, crossings or overlaps (insulated or un-insulated), knuckle or crossing equipment at a turnout, or a diamond crossing and parallel clamps / bimetallic parallel clamp for jumper connections between two sets of overhead equipment conductor at a turnout, diamond crossing, overlaps or neutral section and including jumper wire. The price shall cover erection of all materials including jumper wire, and all adjustments required at turnouts, crossings, overlaps and neutral sections. The price shall also cover erection of potential equalizer jumpers at insulated overlaps and neutral sections. The price shall not include extra bracket assemblies, overhead equipment, termination of overhead equipment and cut-in-insulators in the case of insulated overlap and neutral section which will be paid for under relevant items of these explanatory notes. The price under this item shall also be applicable for modification of OHE.

Note for Item No. 35:

A cross-over shall be paid for as 2 off of item no. 35, special configuration of OHE commonly known as half overlap shall be paid for as 1 off under this item. This shall apply in case of half overlap used in changing over from regulated to unregulated equipment or unregulated to regulated equipment.

Item No. 36: Supply, Erection, Testing and Commissioning of a cut - in - insulator

The price is applicable to the provision of an additional 9 ton cut-in-insulator on a flat rate basis such as in a head span, cross span or in span wire or an overhead equipment conductor at an insulated overlap, anti-creep not provided for in other items. The price shall cover supply of all components, required for the cut in insulator assembly, including the appropriate terminal fitting for the conductor including the 9 ton insulator. The price shall cover erection of all components, including the 9 ton insulator (after testing as per RDSO's procedure before erection). The price shall also be applicable as an adjustment price for non-provision of insulators under item no. 30. The price under this item shall also be applicable for cut-in Insulators required for Feeder OHE, modification of OHE.

The price is applicable for Supply, Erection, Testing and Commissioning of cut-in-insulators only for items where it is not included.

Item No. 37: Supply, Erection, Testing and Commissioning of a suspension insulator

The price shall cover supply of 9 ton suspension insulator assembly including insulator, for suspension of an all-aluminum 25kV feeder (single or double SPIDER) or 150 Sq. mm. Copper

Feeder wire, 130 sq.mm or 65 sq.mm overhead equipment conductor or 19/2.79mm all aluminum catenary or any other similar type of suspension. The price shall cover supply of all components, required for the suspension assembly including the suitable suspension clamp, clevis including bolts and nuts etc. but excluding small parts steel work, if any, which shall be paid under item no. 10. The price shall cover erection of all components, including the 9 ton insulator assembly but excluding small parts steel work, with bolts and nuts etc., if any. The price shall include the cost of provision of a flat armor tape only to be used in connection with suspension of 'SPIDER' conductor.

This price under this item shall also be applicable for Suspension Insulators required for Feeder OHE, modification of OHE, Auxiliary Transformer Stations.

The price is applicable for Supply, Erection, Testing and Commissioning of suspension insulators only for items where it is not included.

Item No. 38: Supply, Erection, Testing and Commissioning of 25 KV solid core Post insulator assembly

The price is applicable to the supply of a 25kV Post Insulator to support copper or aluminum jumper/bus-bar complete with cap, nut, bolt washer etc. The price shall cover supply of all components and fittings / angle iron (outrigger) to support the jumpers including supply of Post Insulator [after testing as per RDSO procedure before erection] with bolts and nuts etc. and excluding supply of small part steel works, if any, which shall be paid under item no. 10. The price shall cover erection of all components required for the assembly, including post insulator, but excluding small parts steel work with bolts and nuts etc., if any.

The price under this item shall also be applicable for Post insulators required for Modification of OHE.

The price is applicable for Supply, Erection, Testing and Commissioning of post insulators only for items where it is not included.

Item No. 39: Supply, Erection, Testing and Commissioning of 11 kV Post Insulator with insulator

The price shall cover, on a flat rate basis for supply of all necessary fittings for erection of 11 KV post insulator to support return conductor, Aluminum or copper bus bars or return conductor jumper connections including 11 KV post insulator [after testing as per RDSO procedure before erection] and small parts steel work (which shall be paid under item no. 10) with bolts and nuts etc. if any. The price includes the erection of all the fittings including 11 kV Post Insulator.

Item No. 40: Supply, Erection, Testing and Commissioning of conventional type section insulator assembly including Insulator for OHE:

The price shall cover supply, erection, testing and commissioning of all components required for a standard section insulator assembly complete with solid core insulator (serving both the overhead equipment conductors) including special droppers for supporting the equipment and all terminal fittings for conductors, the section insulator assembly and the 9 tone insulator assembly on the catenary and dropper wires as required. The price shall cover erection and adjustment of all components including section insulator assembly, 9 tone insulator on the catenary and droppers [includes use of 9 Tone insulators after testing as per RDSO procedure before erection].

The price under this item shall also be applicable for Suspension Insulators required for Feeder OHE, modification of OHE.

Item No. 41: Supply, Erection, Testing and Commissioning of conventional type section insulator assembly including Insulator for tramway type OHE

The price shall cover supply, erection, testing and commissioning of all components required for a standard section insulator assembly complete with solid core insulator (serving both the overhead equipment conductors) including special droppers for supporting the equipment and all terminal fittings for conductors, the section insulator assembly and the 9 tone insulator assembly on the catenary and dropper wires as required. The price shall cover erection and adjustment of all components including section insulator assembly, 9 tone insulator on the catenary and droppers [includes use of 9 Tone insulators after testing as per RDSO procedure before erection].

Note for item no. 40, 41:

The Supply and Erection of bracket assembly shall be paid under item nos. 13 to 16. No adjustment of price due to non-provision of steady arm, in this case, shall be made.

Item No. 42: Supply, Erection, Testing and Commissioning of Ceramic/ beaded Glass fiber type (PTFE) short neutral section assembly

The price shall cover Supply of Ceramic/Glass fiber or PTFE type short neutral section assembly and erection and adjustment of Glass Fiber or PTFE type short neutral sections, which will be supplied by the Contractor. The price would cover fittings for contact and catenary wire as necessary including supply of required dropper wire.

Item No. 43: Supply, Erection, Testing and Commissioning of 25 kV Single Pole Isolators without earth contact assembly

The prices shall cover Supply, Erection, Testing and Commissioning of single pole isolators of approved make, complete with arcing horns, operating rods, operating rod guides, operating rod insulator, post insulators, mounting base and integral & pad locks.

The price shall not include Supply and Erection of small parts steel work (which shall be paid under item no. 10) complete with bolts and nuts etc. for support of isolators and for support of operating rods on gantries/masts, and insulator to support jumper and jumper connectors.

The price under this item shall also be applicable for single pole isolators required for modification of OHE.

Note for Item No. 43:

The Price under item no. 43 do not include, the cost of Supply and Erection of (i) any post insulator to support jumpers / bus bars, which shall be paid for under item no. 38, flexible jumper connection, which will be paid for under item nos. 45 to 48, as applicable, and (iii) bus bar / bus rod terminals which will be paid for under item no. 56, 57, as applicable. The price does not include also the cost of Supply and Erection of an aluminum/copper bus bar or a copper bus rod the cost of which will be paid for under item no. 58, 59, as applicable.

Item No. 44: Additional Items for Supply, Erection, Testing and Commissioning of an earth contact assembly in an isolator

The prices shall cover Supply, Erection, Testing and Commissioning of an earth contact assembly including copper connection between earth contact assembly and the structure in an isolator for isolator switches of approved make.

Item No. 45: **Supply, Erection, Testing and Commissioning of 105 sq.mm. large copper jumpers**

The price shall cover the supply of Large jumper wire size 105 Sq.mm as per RDSO's specification and on a flat rate basis, the supply of all components and fittings required for providing a flexible copper large jumper connection, including supply of parallel clamps, bi-metallic and Aluminum Copper Al-Cu strips, wherever required, and bolted type terminal connectors where ever required.

The price shall also cover the erection of the complete jumper assembly including jumper wire. The price shall not, however, be applicable for jumper connections already including under other items, but shall be applicable for any jumper of 105 Sq.mm connections in any combination between feeders, isolators etc. Continuity jumper at Boom anchor anti-creep will be payable under this item.

Item No. 46: **Supply, Erection, Testing and Commissioning of 50 sq.mm. small copper jumpers**

The price shall cover supply of Small jumper wire size 50 sq.mm. as per RDSO specification, and on a flat rate basis, the supply of all components and fittings required for providing a flexible small copper jumper connection, including supply of parallel clamps, bi-metallic and Aluminum Copper Al-Cu strips, wherever required, and bolted type terminal connector where ever required. The price shall also cover the erection of the complete jumper assembly including jumper wire. The price shall not, however, be applicable for jumper connections already including under other items, but shall be applicable for any small jumper connection in any combination required for isolators etc. Anti-theft jumper for connecting out-of-run OHE with the in running OHE at insulated/un-insulated over-lap locations and also anti-creep locations at polluted zone wherever considered necessary will be payable under this item.

Item No. 47: **Supply, Erection, Testing and Commissioning of an aluminum feeder jumper**

The price shall cover on a flat rate basis the Supply, Erection, Testing and Commissioning of an aluminum jumper complete with all components and fittings required for providing jumper connection, including parallel clamps, bimetallic ALCU strips wherever required, and terminal or tee clamps at either end. The price shall be applicable for any aluminum jumper/connections in any combination between feeders, return conductors, overhead equipment, isolators and outgoing bus bars or switching stations and booster stations. Jumper connections for 25 KV feeders at angle tower traction sub-station or at feeding stations will also be paid under this item.

Item No. 48: **Supply, Erection, Testing and Commissioning of a large copper jumper 160 sq.mm with accessories**

This jumper shall be provided between 36 mm Aluminum bus and the copper cross feeder at SP/SSP/FP locations. The price shall cover the supply of 160 sq.mm. flexible copper jumper wire, made of annealed stranded 100% pure copper conductor as per RDSO's specification including all components and fittings required for providing a flexible copper jumper (160 Sq. mm) and connection between 36 mm Aluminum bus and cross feeder including Terminal connector, parallel clamps, Al-Cu bimetallic strips, fasteners. The price shall also cover the erection of the complete jumper assembly including jumper wire.

Item No. 49: Supply, Erection, Testing and Commissioning of structure bond

The price shall cover supply of all materials including mild steel flat required to provide a structure bond connecting a traction mast or structures to the nearest non-track circuited rail, or earth electrode, including all fastenings at both ends. The price shall include shaping and drilling of the bond and erection of all materials including the bond. The price shall also include provision of heat shrinkable PVC tube for structure bond under track-circuited rail. This would also cover connections or earthing terminals of equipment like L.T. transformers with structures and then to Rails as per relevant drawing. The cost also includes the painting with black enamel color to bonds.

The price under this item shall also be applicable for structures bonds required for Feeder, Auxiliary Transformer Stations, and modification of OHE and modification of power lines along/across the track.

Item No. 50: Supply, Erection, Testing and Commissioning of longitudinal / inter Rail bond

The price shall cover the supply of all materials including mild steel flats, fasteners etc. required to provide longitudinal bond connecting 2 rails at the rail joint at the locations to be specified by the Purchaser. The price shall include shaping and drilling of the bond and erection of all materials including the bonds. The cost also includes the painting with black enamel color to bonds.

Item No. 51: Supply, Erection, Testing and Commissioning of transverse and special bond

The price shall cover supply of all materials including mild steel flats, fasteners etc. required to provide transverse bond connecting rails of the same/adjacent tracks at the locations to be specified by the Purchaser. The price shall also cover the supply of all materials including mild steel flat to provide special bonds at a level crossing, foot over/road over bridge/protective screen etc. The price shall include shaping and drilling of the bond and erection of all materials including bond. The cost also includes the painting with black enamel color to bonds

Item No. 52: Supply, Erection, Testing and Commissioning of single earth electrode

The price shall cover Supply, Erection, Testing and Commissioning of an earthing station as per relevant RDSO Drawing with a single pipe electrode of GI pipe embedded into the ground by driving or otherwise as per relevant IS complete with protective concrete box its cover and suitable for directly connecting two mild steel flats of minimum size of 50mm x 6mm. This includes excavation and provision of charcoal and salt as per site requirement. The Price shall also include where an earth electrode is embedded by excavation in rocky area and extra volume is to be filled with charcoal and salt. The price shall cover Supply and Erection of all additional materials required for embedding the earth pipe.

The price under this item shall also be applicable for Earth Electrode required for feeder, modification of OHE, Auxiliary Transformer Stations and Modification of power lines across/along the track.

Item No. 53: Supply, Erection, Testing and Commissioning of earth bus

The price shall cover the supply of all materials including 50 mm x 6 mm mild steel flats for providing earth bus as per RDSO Specification/Earthing Guidelines. The price shall also cover erection of earth bus either buried at a depth of 300 mm below ground level painted with 2 coats of red oxide zinc chromate primer and 2 finishing coats of bitumen as per the particulars specified or fixed on wooden gutties on walls. The Price shall include connecting the earth bus to earth electrodes and to various floor-or-wall-mounted equipment or structures to be earthed and also connections to non-track-circuited rails, wherever required it shall also cover the cost of making recesses in concrete foundation blocks or floor or cubicles and covering them up. The connection of earth strips to each other shall be made either by riveting or by welding. The connection of earth strips to various equipment, structures or fencing post shall be made with G.I. bolts and nuts and spring washer/ lock-nuts.

Item No. 54: Supply, Erection, Testing and Commissioning of Copper Strip 25mm x 3mm

The price shall cover Supply, Erection, Testing and Commissioning of 25mm x 3mm copper strips to connect the earth terminals of equipment like L.T. supply transformers to the main masts on which they are mounted. The price shall cover all fastenings required for fixing the copper strips along any structure member.

Item No. 55: Supply, Erection, Testing and Commissioning of 8SWG SI Wire

The price shall cover Supply, Erection, Testing and Commissioning of 8 SWG G.I wire per Meter, used for earthing of equipment, fencing etc.

Item No. 56: Supply, Erection, Testing and commissioning of 36 mm x 28 mm Al. Tubular bus bar

The price shall cover Supply, Erection, Testing and Commissioning of 36 mm X 28 mm Aluminum bus bar, including bending, shaping and clamping on to insulators, connectors or equipment terminals.

The price under this item shall also be applicable for feeder, modification of OHE.

Item No. 57: Supply, Erection, Testing and Commissioning of 25kV Solid Copper Bus bar dia 18 mm

The price shall cover Supply, Erection, Testing and commissioning of solid copper bus bar 18 mm including bending and shaping.

The price under this item shall also be applicable for feeder, modification of OHE.

Item No. 58: Supply, Erection, Testing and commissioning of connectors/terminals spice suitable for 36 mm x 28 mm Al. Tubular bus bar

The price shall cover Supply, Erection, Testing and Commissioning of bus bar junctions, connectors of various types including fasteners for bus bar connections.

The price under this item shall also be applicable for feeder, modification of OHE.

Item No. 59: Supply, Erection, Testing and Commissioning of 25kV Copper Bus bar Connectors & Terminal complete

The price shall cover Supply, Erection, Testing and Commissioning of solid copper bus-bar junctions and connectors of various types specified, including bolts, nuts, etc., required at junctions or terminations of solid copper bus-bars.

The price under this item shall also be applicable for feeder, modification of OHE.

Item No. 60: Transfer of equipment from one mast or support to another

The price shall cover transfer of overhead equipment to a new support from the old mast or support and consequent final adjustment to overhead equipment required such as re-spacing of droppers, levelling etc. The price shall also cover fabrication & provision of new droppers, required if any, with supply of dropper wire. The steel work and bracket assembly for the new mast or structure will be paid for under appropriate items of these explanatory notes. This also includes supply of dropper wire & clips if any to maintain proper profile of OHE & shall cover dismantling of existing bracket assembly/assemblies including SPS. The price shall also include the necessary adjustment of the OHE termination arrangement including regulating equipment, required due to consecutive transfer of OHE as per the new alignment of track.

The price shall also cover re-adjustment of the head span polygon to enable the additional equipment to be suspended from the head span.

The price shall cover for temporary slewing or lowering of erected OHE adjusted and /or unadjusted to ground for special works, at the request of the Purchaser and restoration and re-adjustment of the equipment after completion of special works. Additional components or materials used during such restoration or re-adjustment will be paid as per rates of respective items in this contract.

Item No. 61: Dismantling of overhead equipment including SPS, DA, and cantilever but without structure

The price shall cover cost of dismantling of overhead equipment including section insulator, anti-creep arrangement, removal & dismantling of cantilever assemblies, etc. everything available at site and associated small parts steel work but excluding structures & terminations. The contact and catenary wires so dismantled shall be cut / rolled on drums as per the directives of representative of the purchaser. The price shall cover cost of dismantling of termination assembly including dismantling of mast fittings and other associated small parts steel work.

Item No. 62: Dismantling of OHE Portal/TTC boom / masts / uprights by cutting including SPS

The price shall cover dismantling of structures / portal upright & boom / TTC Mast & boom etc. by cutting the upright at ground level including breakage of foundation at the level of 200 mm below formation and removing them to safe place.

Item No. 63: Splicing and extension of Anchor over Head Equipment

The price shall cover splicing of terminated overhead equipment for extension and consequent adjustment of the affected equipment. The price shall include the cost of Supply and Erection of all material such as catenary and contact wire splices for extension of OHE by splicing or equalizing plate and accessories for extension of OHE using single large span wire. The dismantled equipment (excluding portions embedded in concrete) shall be returned to the Purchaser's Engineer as mentioned above. The cost of dismantling of overhead equipment would be paid for under item nos. 61, 62, as applicable for the whole length of the anchoring span irrespective of the physical position of the splices. The extended overhead equipment shall be deemed as starting from the centerline of the structure preceding the old terminating structure and the extended overhead equipment shall be paid for under appropriate items of these explanatory notes.

Item No. 64: Dismantling of regulating equipment with counterweight assembly

The price shall cover cost of dismantling of complete regulating equipment assembly including counter weight, dismantling of mast fittings, guide tube and other associated small parts steel work.

Item No. 65: Dismantling of Bracket assembly

The price shall include dismantling of brackets only including SPS from the existing / redundant structure.

Item No. 66: Dismantling of guy rod assembly

The price shall cover cost of dismantling of guy rod assembly including dismantling of mast fittings and other associated small parts steel work.

Item No. 67: Dismantling of an anti-creep arrangement

Price shall include the cost of dismantling of Anti-creep assembly and associated fittings including Anti-creep wire, 9 T insulator and anchor fittings in 2 spans, and anchor SPS and guy rod assemblies at two structures complete.

Item No. 68: Dismantling of Section Insulator Assembly

The price shall cover cost of dismantling of Section Insulator assembly including dismantling of mast fittings and other associated small parts steel work.

Item No. 69: Dismantling of Isolator Assembly

The price shall cover cost of dismantling of Isolator assembly including dismantling of mast fittings, insulators and other associated small parts steel work.

Item No. 70: Dismantling of a post/pin insulator

The price shall cover cost of dismantling of a pedestal pin insulator including dismantling of jumper connections, if any and associated small parts steel work.

Item No. 71: Supply, Erection, Testing and Commissioning of Caution Board

The price shall cover Supply, Erection, Testing and Commissioning, wherever required, of enameled caution boards (Staff/Public/25kv/OHE Restriction/Live Wires etc.) including GI mounting clamps, as per relevant RDSO drawings and specifications with nut and bolts etc.
The price under this item shall also be applicable for Caution Boards required for modification of OHE, Feeder, Auxiliary Transformer Stations, and Overhead Power Lines Modifications across/along the track.

Item No. 72: Supply, Erection, Testing and Commissioning of Engine Stop, Unwired, and Power Block Limit Board etc.
The price shall cover Supply, Erection, Testing and Commissioning of Engine Stop, Unwired, Power Block Limit Board etc., wherever required, including GI mounting clamps, as per relevant RDSO drawings and specifications with nut and bolts etc.

Item No. 73: Supply, Erection, Testing and Commissioning of shock treatment chart
The price shall cover Supply, Erection, Testing and Commissioning of Shock treatment chart framed in glass with clear visibility including mounting accessories as per relevant RDSO Drawing and specification.

Item No. 74: Supply, Erection, Testing and Commissioning of Enamel Number Plates on Structures
The price shall cover Supply, Erection, Testing and Commissioning of Enamel Number Plates on Structures including mounting accessories as per relevant RDSO drawing and specification.

Item No. 75: Supply, Erection, Testing and Commissioning of Enamel Number Plates on Equipment
The price shall cover Supply, Erection, Testing and Commissioning of Enamel Number Plates on Equipment including mounting accessories as per relevant RDSO drawing and specification.

Item No. 76: Supply of White Sun mica/Acrylic Sectioning Diagram for station, duly framed
The price shall cover Supply, Erection, Testing and Commissioning of Sectioning diagram of suitable size duly framed & dimensions including mounting accessories as per the instructions of Railway supervisor.

Item No. 77: Supply of Sectioning Diagram Board for TPC, Traffic Control, OHE Depot, AEE Office etc.
The price shall cover Supply, Erection, Testing and Commissioning of Sectioning diagram of suitable size duly framed & dimensions including mounting accessories as per the instructions of Railway supervisor for TPC, Traffic Control, OHE Depot, AEE Office etc.

Item No. 78: Supply, Erection, Testing and Commissioning of Protective Screen
The price shall cover on per track basis on both sides of ROB/FOB, the cost of all material required for fabrication of protective screen including angle, Tee, expanded metal (Jali), GI sheet, nuts, bolts, paints etc. The price shall also include the labor cost for fabrication, erection and painting at various locations. The fabrication and erection work shall be done as per relevant RDSO drawing with latest Modifications.

Item No. 79: Supply, Erection, Testing and Commissioning of approved make retro-reflective Number Plate

The price shall cover Supply, Erection, Testing and Commissioning, wherever required, of retro-reflective Number Plate including GI mounting clamps, as per relevant RDSO drawings and specifications with nut and bolts etc.

Item No. 80: Hiring charge of 6/5 kVA 220 V Single phase D.G. set including starter, distribution board containing MCB, Ammeter, Voltmeter, Buzzer, 3 Nos. color light bulb & Kit Kat Fuse with operator and maintenance.

Item No. 81: Running cost of D.G. Set with supply of fuel and other consumables @ 10 hrs per day

Item No. 82: Supply, erection, Oil filtration, testing & commissioning of 5 KVA Auxiliary Transformer (AT) including LV Box (Excluding supply of 5kVA AT)

The price shall cover Supply, Erection, and Testing and Commissioning of 5 kVA, 25 KV / 240 V AC LT supply transformer (excluding 5 kVA LT Supply Transformer which shall be free issued by the purchaser at locations specified in this contract) complete assembly with additional LV box as per RDSO specification. The price shall cover with terminal connectors and fittings on a mast or gantry for connection to 25kV OHE. The price shall cover Supply and Erection of all the connectors and fittings including lugs and glands required at LV side. The price shall also cover oil filtration and pre-commissioning tests as approved by the Railways. The Contractor shall make his own arrangement for oil filtration equipment's; as well as power supply required for the same. All necessary tools, equipment, instruments required for carrying out oil filtration/checks/tests and commissioning shall be arranged by the Contractor. Required oil should be supplied for topping up the oil of 'AT' at the time of commissioning.

Item No. 83: Supply, erection, Oil filtration, testing & commissioning of 10 KVA Auxiliary Transformer (AT) including LV Box (Excluding supply of 10kVA AT)

The price shall cover Supply, Erection, and Testing and Commissioning of 10 kVA, 25 KV / 240 V AC LT supply transformer (excluding 10kVA LT Supply Transformer which shall be free issued by the purchaser at locations specified in this contract) complete assembly with additional LV box as per RDSO specification. The price shall cover with terminal connectors and fittings on a mast or gantry for connection to 25kV OHE. The price shall cover Supply and Erection of all the connectors and fittings including lugs and glands required at LV side. The price shall also cover oil filtration and pre-commissioning tests as approved by the Railways. The Contractor shall make his own arrangement for oil filtration equipment's; as well as power supply required for the same. All necessary tools, equipment, instruments required for carrying out oil filtration/checks/tests and commissioning shall be arranged by the Contractor. Required oil should be supplied for topping up the oil of 'AT' at the time of commissioning.

Item No. 84: Supply, erection, Oil filtration, testing & commissioning of 25 KVA Auxiliary Transformer (AT) including LV Box (Excluding supply of 25kVA AT)

The price shall cover Supply, Erection, and Testing and Commissioning of 25 kVA, 25 KV / 240 V AC LT supply transformer (excluding 25kVA LT Supply Transformer which shall be free issued by the purchaser at locations specified in this contract) complete assembly with additional LV box as per RDSO specification. The price shall cover with terminal connectors and fittings on a mast or gantry for connection to 25kV OHE. The price shall cover Supply and Erection of all the connectors and fittings including lugs and glands required at LV side. The price shall also cover oil filtration and pre-commissioning tests as approved by the Railways. The Contractor shall make his own arrangement for oil filtration equipment's; as well as power supply required for the same. All necessary tools, equipment, instruments required for carrying out oil filtration/checks/tests and commissioning shall be arranged by the Contractor. Required oil should be supplied for topping up the oil of 'AT' at the time of commissioning.

Item No. 85: Supply, Erection, Testing and Commissioning of 25 KV DO Fuse Switch Assembly including insulator & Arcing horn for 'AT'

The price shall cover supply as per RDSO specification and erection of 25kV DO fuse switch complete with all mounting accessories and terminal connectors & Arcing horns required including the supply of 25kV solid core insulator. The price shall not include erection of small parts steel work which shall be paid under item no. 10.

Item No. 86: Excavation of Cable Trench size-1.2m deep & 30cm wide in normal soil & placing bricks on laid cable in cross position side by side

Excavation of cable trench 30cm x 120cm size in all types of soil for laying of cable and back filling with excavated soil. This shall include supply & placing of bricks in cross position side by side without gap on cable in cable trench after embedding the cable in sand layer as per IS - 1255 latest. Provision of cable markers at a distance of 15/30m and on every turning.

Item No. 87: Excavation of Cable Trench by horizontal direct drilling (HDD) work (boring size up to 125mm dia) up to 1.2m depth from the formation level of Track/road with RCC/DWC/HDPE Pipe

The price shall cover excavation of cable trench by horizontal direct drilling (HDD) work (boring size up to 125mm dia) up to 1.2m depth from the formation level of Track/road with RCC/DWC/HDPE Pipe in all types of soil. Provision of cable markers at a distance of 15/30m and on every turning.

Item No. 88: Laying and Termination of LT Cables – 2C x 150sqmm

This includes laying and termination of LT cables 2C x 150sqmm, AL XLPE of 1.1kv grade including termination accessories (lugs, glands etc.). The cable shall be free issued by the purchaser to the contractor at locations specified in this contract. Cables are to be laid as per IS-1255. If any different voltage grade cable found crossing at the same location appropriate protection should be taken during laying of cable and a gap of minimum 30 cm should be maintained. This includes provision of wooden cable cleat with MS clamps where ever it is required. Clamps are to be made from MS flat size 40 x 5/6 mm painted with red oxide and silver paint.

Item No. 89: Laying & Termination of LT Cables –2C x 70sqmm

This includes laying and termination of LT cables of 1.1kv grade including termination accessories (lugs, glands etc.). The cable shall be free issued by the purchaser to the contractor at locations specified in this contract. Cables are to be laid as per IS-1255. If any different voltage grade cable found crossing at the same location appropriate protection should be taken during laying of cable and a gap of minimum 30 cm should be maintained. This includes provision of wooden cable cleat with MS clamps where ever it is required. Clamps are to be made from MS flat size 40 x 5/6 mm painted with red oxide and silver paint.

Item No. 90: Laying & Termination of LT Cables – 2C x 50sqmm

This includes laying and termination of LT cables of 1.1kv grade including termination accessories (lugs, glands etc.). The cable shall be free issued by the purchaser to the contractor at locations specified in this contract. Cables are to be laid as per IS-1255. If any different voltage grade cable found crossing at the same location appropriate protection should be taken during laying of cable and a gap of minimum 30 cm should be maintained. This includes provision of wooden cable cleat with MS clamps where ever it is required. Clamps are to be made from MS flat size 40 x 5/6 mm painted with red oxide and silver paint.

Item No. 91: Supply, Erection, Testing and commissioning of 65 mm dia long GI pipe with GI flat clamp & required hardware

Price shall include the cost of Supply, Erection, Testing and Commissioning of long GI Pipe required for cabling on poles from Auxiliary Transformers.

Item No. 92: Supply, Erection, Testing and commissioning of 100 mm dia long GI pipe with GI flat clamp & required hardware

Price shall include the cost of Supply, Erection, Testing and Commissioning of long GI Pipe required for cabling on poles from Auxiliary Transformers.

Item No. 93: Supply, Erection, Testing and commissioning of Control and Distribution panel with Auto changeover switch 155 A capacity (3 sources for CLS supply for 25 KVA AT as per latest RDSO specification

The price shall include the cost of supply of 155 Amp rated, Automatic Changeover cum Control & Distribution Panel for color light signaling supply including termination accessories as per RDSO Specification and erection in approved manner at the nominated place including termination of cables in the panel. The testing and commissioning of the panel shall be done as per the above specification.

Item No. 94: Supply, Erection, Testing and commissioning of Control and Distribution panel with Auto changeover switch 63 A capacity (3 sources for CLS supply for 10 KVA AT as per latest RDSO specification

Price shall include the cost of supply of 63 A rated, Automatic Changeover cum Control & Distribution Panel for color light signaling supply including termination accessories as per RDSO Specification and erection in approved manner at the nominated place including termination of

cables in the panel. The testing and commissioning of the panel shall be done as per the above specification.

Item No. 95: Supply, Erection, Testing and commissioning of Control and Distribution panel with Auto changeover switch 25 A capacity (3 sources for CLS supply for 5 KVA AT as per latest RDSO specification

Price shall include the cost of supply of 25 A rated, Automatic Changeover cum Control & Distribution Panel for color light signaling supply including termination accessories as per RDSO Specification and erection in approved manner at the nominated place including termination of cables in the panel. The testing and commissioning of the panel shall be done as per the above specification.

Item No. 96: Erection of steel tubular or rail pole strut in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling and secured with holding clamps, bolts, nuts, etc. as required (At each pole)

The price shall cover complete works as mentioned in Item No. 11.4 of Delhi Analysis of Rates (E&M)-2018.

Item No. 97: Supply, Erection, Testing and Commissioning of 9m/11m long galvanized RSJ pole with base plate in provided foundation (payable as per approved unit weight)

The price shall cover supply of 9m/11m long galvanized RSJ Pole with base plate in provided foundation required for modification of Overhead power lines across/along the track.

Item No. 98: Supply, Erection, Testing and commissioning of galvanized stay set for 33 kV overhead lines complete with 19/ 20 mm dia X 1.8 meter long stay rod, anchor plate of size 45 cm X 45 cm X 7.5 mm thick, thimble, stay clamps, turn buckle (20 mm X 600 mm), 7/ 4.00 mm dia G.I. stay wire and 33 kV strain insulator etc. in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling etc. as required.

The price shall cover complete works as mentioned in Item No. 13.14 of Delhi Analysis of Rates (E&M)-2018.

Item No. 99: Supply, Erection, Testing and commissioning of galvanized stay set for 11 kV overhead lines complete with 19/ 20 mm dia X 1.8 meter long stay rod, anchor plate of size 45 cm X 45 cm X 7.5 mm thick, thimble, stay clamps, turn buckle (20 mm X 600 mm), 7/ 4.00 mm dia G.I. stay wire and 11 kV strain insulator etc. in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling etc. as required.

The price shall cover complete works as mentioned in Item No. 13.1 of Delhi Analysis of Rates (E&M)-2018.

Item No. 100: Supply, Erection, Testing and commissioning of stay set complete (galvanized) with 19/20 mm dia X 1.8 meter long stay rod, anchor plate of size 45 cm X 45 cm X 7.5 mm,

thimble, stay clamps, turn buckle (20 mm X 60 cm), 7/ 4.00 mm dia G.I. stay wire and strain insulator etc. in cement concrete 1:3:6 (1 cement : 3 coarse sand: 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling etc. as required. (For LT Cables)

The price shall cover complete works as mentioned in Item No. 12.1 of Delhi Analysis of Rates (E&M)-2018.

Item No. 101: Supply, Erection, Testing and Commissioning of channel for 1.1/11/33 KV OH line, two channel 100 x 50 x 6 mm, 1.5m long having stud angle 50 x 50 x 6, 1.5m long with top piece 100 x 50 x .45 long with clamps, anti-climbing device etc.

The price shall cover channels, angles, clamps, and anti-climbing device including all accessories and hardware for modification of overhead power lines across/along the track.

Item No. 102: Supply, Erection, Testing and commissioning of 11 kV disc insulator for 11 kV overhead lines with galvanized insulator fittings, ball and socket type and complete with galvanized strain clamps, bolts, nuts, washers etc. as required.

The price shall cover complete works as mentioned in Item No. 13.11 of Delhi Analysis of Rates (E&M)-2018.

Item No. 103: Supply, Laying, Testing and Commissioning of 3.5 x 120sqmm, Al XLPE 1.1 KV grade armored cable in trench & raising on pole.

The price shall cover supply, laying, termination, testing and commissioning of 3.5C x 120sqmm, Al XLPE 1.1 KV grade armored cable in trench & raising on pole including supply of all termination accessories including Cable ties, lugs, glands etc.

Item No. 104: Supply, Laying, Testing and Commissioning of 4C x 16sqmm, Cu XLPE 1.1 KV grade armored cable in trench & raising on pole.

The price shall cover supply, laying, termination, testing and commissioning of 4C x 16sqmm, Al XLPE 1.1 KV grade armored cable in trench & raising on pole including supply of all termination accessories including Cable ties, lugs, glands etc.

Item No. 105: Supply, Laying, Testing and Commissioning of 3.5 C x 50sqmm, Al XLPE 1.1 KV grade armored cable in trench & raising on pole.

The price shall cover supply, laying, termination, testing and commissioning of 3.5C x 50sqmm, Al XLPE 1.1 KV grade armored cable in trench & raising on pole including supply of all termination accessories including Cable ties, lugs, glands etc.

Item No. 106: Supply, Laying, Testing and Commissioning of 2C x 2.5sqmm, Cu XLPE 1.1 KV grade armored cable in trench & raising on pole.

The price shall cover supply, laying, termination, testing and commissioning of 2C x 2.5sqmm, Cu XLPE 1.1 KV grade armored cable in trench & raising on pole including supply of all termination accessories including Cable ties, lugs, glands etc.

Item No. 107: Supply, Erection, Testing and Commissioning of HDPE pipe of approximate 150mm nominal inner dia shall be laid under the track at the depth of 1200 mm from the formation level by method horizontal direct drilling (HDD) of suitable size. The HDPE pipe shall be as per IS-14930 part-II or latest. The item includes restoration of ballast and soil in original position.

Item No. 108: Supplying and making cable route marker with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) of size 60 cm X 60 cm at the bottom and 50 cm X 50 cm at the top with a thickness of 10 cm including inscription duly engraved as required.
The price shall cover complete works as mentioned in Item No. 7.9 of Delhi Analysis of Rates (E&M)-2018.

Item No. 109: Supplying and fixing cable route marker with 10 cm X 10 cm X5 mm thick G.I. plate with inscription there on, bolted /welded to 35 mm X 35 mm X 6 mm angle iron, 60 cm long and fixing the same in ground as required.
The price shall cover complete works as mentioned in Item No. 7.10 of Delhi Analysis of Rates (E&M)-2018.

Item No. 110: Supply, Erection, Testing and Commissioning of 11 KV, 3 x 185sqmm out door heat shrinkable cable termination Kit with required accessories.
The price shall cover supply, erection and termination of 33 kV, 3x185sqmm outdoor heat shrinkable cable termination Kit with required accessories.

Item No. 111: Supply, Erection, Testing and Commissioning of 33 KV, 3 x 300sqmm out door heat shrinkable cable termination Kit with required accessories.
The price shall cover supply, erection and termination of 33 kV, 3x300sqmm outdoor heat shrinkable cable termination Kit with required accessories.

Item No. 112: Dismantling of overhead lines comprising of copper/ aluminum overhead conductor, G.I. wire, cross arms, insulators etc. as required.
The price shall cover complete works as mentioned in Item No. 12.40 of Delhi Analysis of Rates (E&M)-2018.

Item No. 113: Dismantling of pole/ street light standard/ strut embedded in cement concrete foundation etc. as required.
The price shall cover complete works as mentioned in Item No. 12.42 of Delhi Analysis of Rates (E&M)-2018.

Item No. 114: Supply, Erection, Testing and commissioning of outdoor LED lamp fitting complete.
The price shall cover supply and installation of LED lamp fittings complete with all accessories required for Platform Area lighting.

Item No. 115: Supplying & erection of control panel for platform lightning complete with all accessories

The price shall cover Supply, Erection, Testing and Commissioning of control panels required for platform area lighting complete with all the accessories including nuts, bolts etc. as per RDSO/CORE/Railway Specifications and guidelines.

Item No. 116: Supply and fixing of GI pipe 150mm dia 'B' class 3m length of each pipe along the pole for protection of cables, pipe may be provided in excavated trench, wall, post and on structure with suitable MS clamps including bolt and nuts. The GI pipe should be embossed ISI marking. The GI pipe shall be conforming to IS-1239.

Item No. 117: Laying of cable and Excavation of Trench 1200 mm deep and 600 mm (350 + 250 mm) width from the formation level and a bed of sand cushion for a height of 250 mm shall be provided and cable shall be placed in mid of the sand, well burnt bricks shall be laid width wise above the cable (9 bricks/m for single cable) after this the excavated earth should be filled back dully ramming for consolidation throughout the length of cable trench bringing it into original position. 2 Nos. cables of 11/33 kV, 3 Core above 120 mm2 to 400 mm2 will be laid, and the spacing between both cables should be 200 mm. This will include the laying of loose coil and raising of cable on pole etc. The Price shall cover supply of all necessary cable accessories (Cable ties, tags etc.)

Item No. 118: Cutting/Dismantling of existing erected rail/tubular pole of height 9 to 12 m, from top of desired length and disconnecting related fittings like clamps, brackets, insulators etc. Stacking and handing over to the purchaser. Transportation will be done by contractor on his own cost. Before cutting the pole existing light fitting etc. to be removed and after cutting the pole same may be fitted on required height.

Item No. 119: Supply, Erection, Testing and Commissioning of loop in out MS box made up of MS sheet 300 x 250 x 100, 2 mm thick CRS pressed steel sheet with opening and locking arrangement and the box shell be welded and also the fixed on the street light pole with suitable MS clamps made of MS flat of size not less than 50 x 6 mm.

Item No. 120: Supply, Erection, Testing and Commissioning of mounting arrangement of span wire

The price shall cover supply of all components including adjusters, terminal fittings and mast attachments required to attach a span wire or a head-span wire or a cross span wire or a steady span wire or a support span wire (as specified in item no.18) for supporting contact wire only, at both ends, to traction masts/structures or special brackets. The price of solid core insulators shall be paid under item nos. 36, 37, 38, 39, as applicable and small parts steel work shall be paid under item no. 10, if any.

Item No. 121: Design, Supply, Fabrication, Erection and Painting of Height Gauge at level crossings (for clear span up to 7.3m and / or above 7.3m up to 12.2m)

The price shall cover supply of Height Gauges duly fabricated painted complete in all respect. However, provision of particular type of Height Gauge at various level crossings shall be decided and advised by the purchaser during execution of work. The Contractor shall procure the structures/Steel required for the work accordingly. Price shall cover supply of various steel sections conforming to IS 2062/2011, IS 808/1989, Fabrication at site or supply duly fabricated from CORE/IS approved sources for structures & SPS. Price shall cover supply of bolts, nuts & washers etc. necessary for fastening the components of Height Gauge. Price shall cover cost of painting of Booms & upright with Red Oxide / Zinc Chromate to IS: 2074 as first coat and 2nd coat with enamel paint to IS: 2933-1975 Black and white color alternatively 300 mm wide band. Crash Barrier and Rail Barricading shall be provided as required and as per provision in drawings. The price shall cover cost of erection, alignment and setting while grouting of upright and side supports. The price shall cover labor charges required for welding / fabrication of side supports / uprights and other components at site.

Note for Item No. 121:

i. For the purpose of payment against this item for all the components (upright, boom, side supports, crash barrier / Barricading etc.), weight of structures/ fabricated steel works will be calculated according to standard unit weight of respective sections for required quantity. Contractor will be required to submit Bill of materials for each type of Height Gauge along with Black weight thereof for approval by the purchaser before claiming the payment.
ii. In case of any dispute in unit weights, the matter will be decided by the purchaser and decision taken in the matter will be final and binding on to the contractor.
iii. No crane / tools & Plants will be provided by purchaser for fabrication, erection or transportations of Height Gauge or black steel required for the work.
iv. Prices for foundation works (CC & RCC) shall be admissible under items 1 to 7, as applicable.

Item No. 122: Supply, Erection, Testing and Commissioning of Danger Plate on a Height Gauge

The price shall cover supply of Danger Boards as per RDSO drawing including necessary Bolts, Nuts, Washers etc. and erection thereof on the boom of each Height Gauge

Chapter V- 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. 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) Quality control system

The Contractor shall establish a quality control mechanism to ensure compliance with the provisions of this Agreement (the "Quality Assurance Plan" or "QAP") in accordance with ISO-9001.

The Contractor shall submit to the Railway and BHEL and take approval its Quality Assurance Plan from Railway which shall include the following:
(a) Organization, duties and responsibilities, procedures, inspections and documentation;
(b) quality control mechanism including sampling and testing of Materials, test frequencies, standards, acceptance criteria, testing facilities, reporting, recording and interpretation of test results, approvals, check list for site activities, and proforma for testing and calibration in accordance with the Specifications and Standards and Good Industry Practice; and
(c) internal quality audit system.

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 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 15days 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

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.

6) Methodology

The Contractor shall, at least 15 (fifteen) days prior to the commencement of Construction, submit to the railway for review and approval the methodology proposed to be adopted for executing the Works, giving details of equipment to be deployed, traffic management and measures for ensuring safety.

7) Inspection and review by the Railway

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

8) Inspection of Works and Test

The BHEL, Railway 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 production, manufacture and 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 of manufacture of Materials.

For determining that the Works conform to the Specifications and Standards, the Railway and BHEL 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 Railway and BHEL. 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 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.

9) Inspection of records

The Railway and BHEL shall have the right to inspect the records of the Contractor relating to the Works.

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 Railway and BHEL a monthly report on the progress of Works and shall promptly give such other relevant information as may be required by the Railway.

11) Purchase And Service

All Material shall be procured from RDSO approved vendor list.

12) Field Quality Plan

The contractor shall prepare the FQP in line with RDSO standard and take prior approval from BHEL and Railway.

13) Quality control records

The Contractor shall hand over to the BHEL a copy of all its quality control records and documents before the Completion Certificate.

14) 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. 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.

Volume IA
Part III
Technical Specification
OHE Mast Foundation

Chapter I: Scope of Work

1.0 SCOPE OF WORK

The work to be performed under the scope of this tender mainly consists of but not limited to scope of OHE foundations.

OHE foundation including Excavation, backfilling, formwork, foundation with M15 concrete (as per IS:456:2000) including nominal reinforcement etc , all complete as per drawings & RDSO, Core, ACTM & other railway standards, .

Foundation shall be completed with M15 concrete by leaving central core for erection of mast.

Any temporary activities required to complete the work.. Making templates etc. for execution work is in contractor scope.

All approvals from statutory and local authorities etc is in contractor's scope.

The plot for construction area/ fabrication yard/ field office/ construction stores has to be developed by the contractor of its own. All the infrastructure facilities which include roads, approaches, drainage system, pavements etc. shall be developed & provided by the contractor of its own.

2.0 THE WORK WILL INVOLVE.

All civil, structural and architectural works connected with the above-mentioned structures such as earthwork, concrete work, embedment, grouting etc.

3.0 EXCLUSION

All works are in contractor's scope.

4.0 CIVIL WORKS

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

a) 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.

b) 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.

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

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

5.0 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.

6.0 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 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) Soil bearing pressure shall be determined by dial gauge type penetrometers at every 250m. Dial gauge type penetrometers shall be made available by contractor at each foundation site as to facilitate cross check at each individual location.

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

i) 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.

j) 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.

k) All works of the OHE foundation including excavation, back filling, formwork, nominal reinforcement, concreting, curing, finishing etc shall be done as per drawings.

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

7.0 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:

For civil works:
(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

Bidder to note that above list is not exhaustive and other railway standards as required for OHE foundation works shall be applicable for the works.

In case of any contradiction in the various codal provisions, the order of precedence shall be as follows:-

aa) Provisions of RDSO tender document
bb) IRS Codal provisions
cc) IRC Codal provisions
dd) IS (BIS) Codal provisions

RDSO standards

104	Volume chart and equivalent chart of foundations (Side bearing, Side gravity and W.B.C.)	TI/DRG/CIV/ FND/RDSO	00001/04/0 SH-1	B
105	Volume chart and equivalent chart of foundations (Side bearing, Side gravity and W.B.C.)	TI/CIV/FND/ RDSO	00001/12/0 SH-1	A
106	Volume chart and equivalent chart of foundations (NG type)	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-2	B
107	Volume chart and equivalent chart of foundations (NG type)	TI/CIV/FND/ RDSO	00001/12/0 SH-2	A
108	Volume and equivalent chart of foundations for Dry black cotton soil (NBC type) (For 16500 & 11000kgf/ m²)	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-3	B
109	Volume and equivalent chart of foundations for Dry black cotton soil (NBC type) (For 16500 & 11000kgf/ m²)	TI/CIV/FND/ RDSO	00001/12/0 SH-3	A
110	Volume chart and equivalent chart of New pure gravity foundations (500 mm exposed)	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-4	B
111	Volume chart and equivalent chart of New pure gravity foundations (500 mm exposed)	TI/CIV/FND/ RDSO	00001/12/0 SH-4	A
112	Volume and equivalent chart of New foundations for Dry black cotton soil only (8000 kg/m²)(NBC type) 2.5 M depth	TI/DRG/CIV/ FND/RDSO/	00001/04/0 SH-5	B
113	Volume and equivalent chart of foundations for Dry black cotton soil only (8000 kg/m²) NBC type 2.5 m depth	TI/CIV/FND/ RDSO	00001/12/0 SH-5	A
114	Volume and equivalent chart of foundations (For 8000 kg/m² Direct load)	ETI/C	0058 Sh.6	B
115	Special BFB portal for 5 tracks (General arrangement)	-do-	0026 Sh.1	C
116	Protective screen of foot-over bridge and road over-bridge.	-do-	0068	H

1	2	3	4	5
117	Chart for portal foundation	-do-	0005/68	
118	Muff for OHE structures	-do-	0007/68	E
119	Structures muff for sand cored foundations	-do-	0012/69	E
120	9.5 m Standard traction mast (fabricated `K' series)	-do-	0018-2	D
121	Remote Control Cubicle at Stn, Foundation, RCC slab, Building plant & Steel door	-do-	0067	B
122	9.5 m long standard traction mast (fabricated with bottom plates `B' series)	ETI/C	0071	E
123 (a)	Details of OHE foundation in soft rock (Bearing capacity 45,000 Kgf/m²).	ETI/C	0059	C
123 (b)	Details of OHE foundation in Hard rock (Bearing capacity 90,000 Kgf/m²).	ETI/C	0060	D

Note:

The above list is indicative and not exhaustive and bidder is expected to get conversant with latest RDSO, Core, ACTM & 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.

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, 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 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) 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.

8) 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.

9) In case 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.

10) 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.

11) Central core shuttering of OHE foundation shall also be measured in item 8.0 of SOQ.

12) All the line items shall be executed as per CPWD specifications.

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 Work

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