

# **VOLUME - IA**

**Technical Conditions of Contract (TCC) for “Supply &  
Installation of Concrete Cable marker, cable jointing chamber  
and associated civil works”**

**FOR**

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

**OF**

**NORTH CENTRAL RAILWAY**

**BHARAT HEAVY ELECTRICALS LIMITED**

 Maharashtra Company	<b>Technical Conditions Of Contract (TCC)</b> <b>PROJECT ENGINEERING &amp; SYSTEMS</b> <b>DIVISION</b> <b>HYDERABAD</b>	Ref No: HY/PE&SD/SC-PROJECTS/2020-21/TCC/S&T Mod /Miscellaneous/01 Rev. No. 00		
<b>COPYRIGHT AND CONFIDENTIAL</b> The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.	<b>TECHNICAL CONDITIONS OF CONTRACT (TCC)</b>  <b>FOR</b>  <b>“Supply &amp; Installation of Concrete Cable marker, cable jointing chamber and associated civil works”</b> <b>FOR</b>  <b>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</b>			
<b>Revisions:</b> Refer to record of revisions	Prepared By:	Checked by	Approved By:	Date
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**Technical Conditions of Contract (TCC) for Supply & Installation of Concrete Cable marker,  
cable jointing chamber and associated civil works**

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<b>Sl. No.</b>	<b>Description</b>	<b>Chapter No</b>
<b>Volume-IA</b>	<b>Part-I: Contract specific details</b>	
1	Project Information	Chapter I
2	Scope of Works	Chapter II
3	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter III
4	T&Ps to be deployed by Contractor	Chapter IV
5	Time Schedule	Chapter V
6	Storage & Security	Chapter VI
7	Special Payment Conditions	Chapter VII
8	Statutory Regulations	Chapter VIII
<b>Volume-IA</b>	<b>Part-II : Technical Specifications</b>	
1	Technical specification	Chapter I
2	Quality	Chapter II
3	Documentation Requirement	Chapter III
4	Indicative Map	Chapter IV

# **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	:	Section Shikohabad-Farrukhabad (Including Mainpuri-Etawah), Allahabad Division 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 <sup>0</sup> C b) Minimum : 2 <sup>0</sup> C
12	Average Relative Humidity	:	40 %
13	Climatic Condition	:	Tropical Climate

**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 because of Contractor's non-familiarization of local conditions.**

## **Chapter II- Scope of Work**

2.0 **SCOPE OF WORK:** Scope of work for this tender shall be Supply & Installation of Concrete Cable marker, cable-jointing chamber and associated civil works. Detailed scope shall be as per chapter I, Vol IA, Part II of this TCC.

**Chapter III- Facilities in the scope of BHEL/Contractor**

S. No.	Description <b>PART I</b>	Scope / to be taken care by		Remarks
		BHEL	Bidder	
<b>3.1</b>	<b>ESTABLISHMENT</b>			
<b>3.1.1</b>	<b>FOR CONSTRUCTION PURPOSE:</b>			
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	
<b>3.1.2</b>	<b>FOR LIVING PURPOSES OF THE BIDDER</b>			
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	
<b>3.2.0</b>	<b>ELECTRICITY</b>			
<b>3.2.1</b>	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	
<b>3.3.0</b>	<b>WATER SUPPLY</b>			
<b>3.3.1</b>	For construction purposes		Yes	

**Technical Conditions of Contract (TCC) for Supply & Installation of Concrete Cable marker, cable jointing chamber and associated civil works**

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S. No.	Description <b>PART I</b>	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.3.2	<u>Water supply for bidder's office, stores, canteen etc.</u>		Yes	
3.3.3	<u>Water supply for Living Purpose</u>		Yes	
3.4.0	<b>LIGHTING</b>			
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	<b>COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER</b>			
a	Téléphone, fax, internet, intranet, e-mail etc.		Yes	
3.6.0	<b>COMPRESSED AIR wherever required for the work</b>		Yes	
3.7.0	<b>Demobilization of all the above facilities</b>		Yes	
3.8.0	<b>TRANSPORTATION</b>			
a	For site personnel of the bidder		Yes	
b	For bidder's equipment and consumables (T&P, Consumables etc.)		Yes	

**Technical Conditions of Contract (TCC) for Supply & Installation of Concrete Cable marker, cable jointing chamber and associated civil works**

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Sl. No	Description <b>PART II</b> <b>3.9.0 CONSTRUCTION FACILITIES</b>	Scope / to be taken care by		Remarks
		BHEL	Bidder	
<b>3.9.1</b>	<b>Engineering works for construction:</b>			
a	Providing the construction drawings for all the works covered under this scope			<b>Not Applicable</b>
b	Drawings for construction methods			<b>Not Applicable</b>
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 has to be deployed by Contractor**

**LIST OF TOOLS AND PLANT:**

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

S.No.	Description	Minimum Quantity	Remarks
<b>A. For S&amp;T(C&amp;I works)</b>			
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 b) HV Tester-10KV d) Logic probe e) Modbus communication check kits f) Digital Multi meter	1No 1No 1No 1No 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	2No	

**Technical Conditions of Contract (TCC) for Supply & Installation of Concrete Cable marker, cable jointing chamber and associated civil works**

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25	Insulation stripers	2No	
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 because of this reason.

## **Chapter V- Time Schedule**

### **5.1 TIME SCHEDULE**

5.1.1 The entire work for this tender as detailed elsewhere in the Tender Specification shall be completed within **180 Days** from the date of commencement of work at site.

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

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

### **5.2 COMMENCEMENT OF CONTRACT PERIOD**

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

### **5.3 MOBILISATION**

5.3.1 The activities for this work shall be started as per directions of Construction manager of BHEL.

5.3.2 The contractor should mobilize manpower in order to complete the work in **180 Days**.

5.3.3 Requisite Material, men and machinery should be arranged in order to complete the project within stipulated time.

5.3.4 The contractor has to augment his resources in such a manner that 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.

<b>Sl No</b>	<b>Activity</b>	<b>Tentative schedule</b>	
		<b>Start</b>	<b>Finish</b>
1	Mobilization for Site Establishment and commencement of work	<b>Zero Date (D)</b>	
2	Marking/identification of locations as per approved drawings and technical specifications	<b>D</b>	<b>D + 15</b>
3	Supply of cable-jointing chamber and concrete cable route marker as per approved drawings and technical specifications	<b>D + 15</b>	<b>D + 45</b>
4	Installation of cable-jointing chamber and cable route marker as per approved drawings and technical specifications	<b>D + 45</b>	<b>D + 165</b>
5	Finishing and Completion of works as per contract specifications and conditions	<b>D + 165</b>	<b>D + 180</b>

#### **5.4 CONTRACT PERIOD**

For the purpose of contract, the period shall be taken as **180 Days** 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 labor as per site requirement without any extra cost to BHEL.

#### **5.5 PROTECTION OF WORK**

The contractor shall have total responsibility for protecting his works until 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.

#### **5.6 GUARANTEE PERIOD**

The guarantee period of twelve months shall commence from the date of completion of all works as certified by the BHEL site engineer

#### **5.7 SCHEDULE MILESTONES**

**5.7.1 Milestone I:** (i) Supply and installation of 2250 Nos of cable route markers in 105 Days from zero date of contract as per approved drawings and technical specifications.

(ii) Supply and installation of 64 Nos of cable-jointing chambers in 105 Days from zero date of contract as per approved drawings and technical specifications.

**5.7.3 Milestone II:** Completion of total works as per the tender specification in 180 Days from zero date of contract.

## **Chapter VI- 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 & supply except supply items mentioned in Annexure-I of price bid document of NIT 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.
  - 1.5 Contractor shall handover the supply items mentioned in Annexure-I of price bid document of NIT to BHEL store. These items shall be issued (Except spares) on free item basis by BHEL whenever required for erection /Installation work.
- 2. Storage and security of BHEL supplies (Not Applicable in this tender):**
  - 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 is the tentative store location of BHEL
    - a) Bhind (M.P)

The above location is subjected to approval by Railways, finalized locations shall be informed by BHEL later.
  - 2.8 The contractor shall be responsible for the storage & security of the materials till the same is erected /incorporated in the work and finally handed over to Railways, even though payments are made against supply for the materials against the Purchase order. The contractor shall rectify/ replace all such materials, if they are being stolen, damaged or lost for any reason whatsoever before erection / incorporation in the work after being paid against supplies of the same against the Purchase order.

## **Chapter VII- Special Payment Conditions**

1. Payment for the work shall be done as per actual measurement and certification by BHEL Engineer at site.
2. Payment shall be made separately for works being carried out in the state of Madhya Pradesh and Uttar Pradesh. For this purpose, separate measurement book will be maintained and bidder shall provide two (02) separate GST registration in respective states.

## **Chapter VIII- Statutory Regulation**

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

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

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

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

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

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

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

# **Volume IA**

## **Part II**

# **Technical Specification**

## **Chapter-I: Technical Specification**

### **1.0 INTENT OF SPECIFICATION:**

This specification governs the requirements of supply, installation, erection, excavation, and (or) laying of different works involved in ongoing railway electrification project at North Central railway division.

Railsys Engineers Pvt. Ltd., Mumbai executing S&T (signaling and telecommunication) modification work as part of Railway electrification job.

The below scope of items are required to fulfil the completeness of the S&T modification work by Railsys Engineers Pvt. Ltd.,. Hence, bidder scope of work involves supply, erection/installation or execution in closed co-ordination with RailSys Engineers Pvt. Ltd.,

### **2.0 TECHNICAL REQUIREMENTS:**

**Name of the Work:** Supply of bricks, cable markers, jointing chambers and associated civil works such as excavation of pit, back filling, installation etc. at Gr. 239 (Birlanagar to Etawah), Gr. 240 (Bhandai to Uri Mod) & Gr. 241 (Shikohabad to Farrukhabad & Etawah to Mainpuri) sections and stations of North central Region.

#### **A) Cable Markers**

1. **Name of the Work:** Excavation of pit, Supply & Installation of Cable Markers at Gr. 239 (Birlanagar to Etawah), Gr. 240 (Bhandai to Uri Mod) & Gr. 241 (Shikohabad to Farrukhabad & Etawah to Mainpuri) sections and stations of North central Region.
2. **Scope of work:** The broad responsibility of the contractor under the scope of work for this tender shall be as under:
  - a. Excavation of pit, Supply, Installation, Painting of Cable Route Marker, including transportation of materials to respective site & to various section/site of above mentioned site as per direction of site Engineer-in-charge.
  - b. The contractor shall paint the Marker with color at site. The paint shall be from reputed brand as per railway practice.
  - c. The contractor shall be responsible for transportation/shifting of cable route markers to be desired locations as directed by site engineer.
  - d. Location of installation of cable route marker shall be decided by the concerned Engineer-In-Charge of the Cable link at the time of execution.
  - e. The contractor shall submit the sample of cable route marker complete as required with color paint & written matter for approval before start of work.
  - f. All the work associated with supply and Installation of Markers, complete in all respect shall be carried out by contractor for which nothing shall be paid extra.
  - g. The work is to be carried out as per applicable Norms/Standards and in such a manner that all premises always look Neat & Clean. Similarly, the waste disposal is also carried out in totally sealed manner without affecting the Environment.

## **Technical Conditions of Contract (TCC) for Supply & Installation of Concrete Cable marker, cable jointing chamber and associated civil works**

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- h. Cable route marker shall be as per "Typical drawing for RCC cable marker" Drg no. SG/SWR/067. Script will be given by Engineer-in-charge.
- i. Installation of Cable route marker Drg for Concrete cable marker SDO/Cable laying/020
- j. Painting of cable route marker at site including writing letters with paint.
- k. The contractor shall use his own Skilled / Unskilled Manpower, T&P and any other petty material/consumables / equipment required for the execution/completion of work unless specified.
- l. The cable markers shall be provided at an interval of 20 Mtrs. within station limits and 50 Mtrs. outside station limits throughout the cable route, diversions and also at every track/road/crossing. The joint indicators/markers shall be provided at all types of cable joints. The cable Markers provided shall be of standard RCC/stone type with letters "SIG" / "TELE" / "OFC" as per the instructions of site engineer engraved and suitably painted with standard paint as per drawing attached. Cable Markers shall also be provided at each Joint Pit / Pull Chamber with/ without a joint respectively.
- m. Digging of pit to a depth of 800mm of size 300mmX300mm, casting of concrete foundation as per RDSO Drg. No. SG/SWR/067 and SDO/Cable Laying/020 and Placing of RCC cable markers on top of the foundation and refilling the pit and consolidating it by ramming.
- n. Refilling of the cable trenches with the earth and placing and concreting of cable markers at an interval of 20 M within station limit and 50 Mtrs in the block section, throughout the cable route and also on either side of track crossings along the cable route shall be done. RCC cable markers to be preferred. The cable marker shall be concreted to a depth of 0.60 M in case of concrete marker. The grouting of concrete marker shall be for 30 Cm to avoid theft and shall be provided with cement coping as per RDSO Drg No: SDO/cable laying/020 & SWR Drg SG/SWR/067.
- o. The detailed procedure for undertaking digging work in the vicinity of signalling, electrical and telecommunication cable is issued as JPO vide RB Lt no 2003/Tele/RCIL/1Pt IX dtd 24.06.13 should be followed.
- p. Concrete Markers Telecom : RCC markers with body in Orange, Letters Engraved : White Note. For signalling Cable the Lettering shall be SWR SIG For Telecom the lettering shall be SWR OFC or SWR Quad or SWR OFC & Quad as the case may be. The letters shall be of about 75mmx 35 mm size.
- q. Cable Markers for OFC: The cable markers shall normally be provided at the distance of every 50 meters on the HDPE Duct route and also at places or corners wherever the route of the HDPE Duct changes. The joint indicators shall be provided at all types of cable joints. The cable markers and joint markers provided shall be of standard concrete type as per approved drawing, letters engraved, suitably painted, fixed over standard trench as per site conditions. The design of route indicator shall be got approved from Railway in advance.
- r. Progress of excavation, installation, etc. shall be closely co-ordinate to ensure that the pit remains open for minimum possible time.

**B) Jointing Chamber**

1. **Name of the Work:** Excavation, Supply & Installation of Jointing Chamber at Gr. 239 (Birlanagar to Etawah), Gr. 240 (Bhandai to Uri Mod) & Gr. 241 (Shikohabad to Farrukhabad & Etawah to Mainpuri) sections and stations of North Central Region.
2. **Scope of work:** The broad responsibility of the contractor under the scope of work for this tender shall be as under:
  - a. Excavation, supply, Installation of Jointing Chamber, including transportation of materials to respective site & also to various section/site as per direction of site Engineer-in-charge.
  - b. The contractor shall be responsible for transportation/shifting of Jointing Chamber to be desired locations.
  - c. Location of installation of Jointing Chamber shall be decided by the concerned Engineer-In-Charge of the Cable link at the time of execution.
  - d. The contractor shall submit the sample of Jointing Chamber complete as required & written matter for approval before start of work.
  - e. All the work associated with supply and Installation of Jointing Chamber, complete in all respect shall be carried out by contractor for which nothing shall be paid extra.
  - f. The work is to be carried out as per applicable Norms/Standards and in such a manner that all premises always look Neat & Clean. Similarly, the waste disposal is also carried out in totally sealed manner without affecting the Environment.
  - g. The contractor shall use his own Skilled / Unskilled Manpower, T&P and any other petty material/consumables / equipment's required for the execution/completion of work unless specified.
  - h. Digging of pit of suitable for jointing chamber of size 1.2 mts dia, 60cm height and 50 mm thickness with 2 pieces top cover and bottom cover with holes for drainage (Reinforcement drawing will be as per the DRN no. OFC/2009/17- Annexure-2.11.
  - i. This includes backfilling and ramping of the trench after the cable laying and consolidation of the soil as well as disposal of the soil as per the plan or advised by Railway engineer at site. Filling of river sand complete in the jointing chamber including transportation of the jointing chamber to site at every km in the section.
  - j. Pre cast RCC chamber: For fixing pre cast RCC chamber, first a pit of size 2 m x 2m x 1.8 m depth is required to be dug. Pre cast RCC chamber consists of three parts (i) round base plate in two half of 140 cm dia and 5 cm thickness (ii) full round RCC joint chamber with dia of 120 cm and height of 60 cm and thickness of 5 cm (iii) round top cover will be in two halves with dia of 140 cm and thickness of 5 cm having one handle for each half in centre and word „OFC“ engraved on it. Pre cast RCC chamber (which is coming in part) should be placed in the pit and parts should be fixed by applying cement mortar. After, fixing the pre cast RCC joint chamber, the joint chamber is filled with clean sand before closing. Lastly, back filling of joint chamber pit with excavated soil should be carried out up to normal ground level and compacted.

## **Chapter II- Quality**

### **5.0 Introduction**

This part of the specification covers the sampling, testing and quality assurance requirement for all S&T 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 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.

### **5.1 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.

### **5.2 Quality Assurance And Supervision**

The contractor shall follow the annexure-1 for the S&T works only and submit documents & take approval from BHEL and Railway as per annexure-1.

### **5.3 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.

#### **5.4 Purchase And Service**

All Material shall be procured from RDSO/CORE approved vendor list.

#### **5.5 Field Quality Plan**

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

#### **5.6 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 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.

#### **5.7 Special Quality and inspection requirements**

- 5.7.1 Ensure that the procurement of materials and equipment are from the authorised sources and are duly inspected by the nominated agencies.
- 5.7.2 Inspect and accept all materials received at site proposed to be incorporated in works.
- 5.7.3 Inspect the quality of the works with regard to workmanship, compliance with the specifications and all necessary testing required for acceptance of any item of work.
- 5.7.4 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.
- 5.7.5 Assist the contractor at any time during audit and inspection for the S&T's quality of the works by Railway.
- 5.7.6 Prepare methodology for executing the works, to be submitted 15(fifteen) days prior to the commencement of construction for Railway review.
- 5.7.7 Preparation of Field quality assurance plan and field inspections as and when required by Railway / BHEL.
- 5.7.8 Preparation and submission of documents for Railways/BHEL approval/review.

**ANNEXURE 01**

**QUALITY ASSURANCE AND SUPERVISION**

**11.1 Quality of Materials and workmanship**

11.1.1 The Contractor shall ensure that the Construction, Materials and workmanship are in accordance with the requirements specified in this Agreement, Specifications and Standards and Good Industry Practice.

11.1.2 The Contractor warrants that all Materials shall be new, unused, not reconditioned and in conformity with Specification and Standards, Applicable Laws and Good Industry Practice, and that the Contractor shall not use any materials which are generally recognised as being deleterious under Good Industry Practice.

**11.2 Quality control system**

11.2.1 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.

11.2.2 The Contractor shall, within 30 (thirty) days of the Appointed Date, submit to the Authority’s Engineer its Quality Assurance Plan which shall include the following:

- (a) organisation, 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.

11.2.3 The Authority’s Engineer shall convey its comments to the Contractor within a period of 21 (twenty-one) days of receipt of the QAP stating the modifications, if any, required, and the Contractor shall incorporate those in the QAP to the extent required for conforming with the provisions of this Clause 11.2.

11.2.4 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 and workmanship in accordance with the Quality Assurance Plan.

11.2.5 The cost of testing of Construction, Materials and workmanship under this Article 11 shall be borne by the Contractor.

**11.3 Methodology**

The Contractor shall, at least 15 (fifteen) days prior to the commencement of construction, submit to the 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 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, wiring trains for stringing of conductors and mechanised equipment for erection of steel structures, or any equivalent thereof.

**11.4 Inspection and review by the Authority**

The Authority or any representative authorised by the Authority 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.

**11.5 External technical audit**

At any time during construction, the Authority 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.

**11.6 Inspection of records**

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

**11.7 Inspection of Works**

11.7.1 The Authority's Engineer 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.

11.7.2 The Contractor shall give the Authority's Engineer and its authorised agents access, facilities and safety equipment for carrying out their obligations under this Agreement.

11.7.3 The Authority's Engineer shall submit a monthly inspection report (the "Inspection Report") to the Authority and the Contractor bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. For the avoidance of doubt, such inspection or submission of Inspection Report by the Authority's Engineer shall not relieve or absolve the Contractor of its obligations and liabilities under this Agreement in any manner whatsoever.

**11.8 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 Authority and the Authority's Engineer a monthly report on the progress of Works and shall promptly give such other relevant information as may be required by the Authority's Engineer.

**11.9 Samples**

The Contractor shall submit the following samples of Materials and relevant information to the Authority's Engineer for review:

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

**11.10 Tests**

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

11.10.2 In the event that results of any tests conducted under this Clause 11.10 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 Authority's Engineer in this behalf. The 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.

**11.11 Examination of work before covering up**

In respect of the work which the Authority's Engineer is 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 Authority's Engineer whenever any such work is ready and before it is covered up. The 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 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 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 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 Authority's Engineer, the Contractor shall be entitled to assume that the Authority's Engineer would not undertake the said inspection.

#### **11.12 Rejection**

11.12.1 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 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.

11.12.2 If the 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 Authority to incur any additional costs, such costs shall be recoverable by the Authority from the Contractor and may be deducted by the Authority from any monies due to be paid to the Contractor.

11.12.3 The Contractor shall not be entitled to any extension of time on account of rectifying any Defect or retesting as specified in this Clause 11.12.

11.12.4 No examination, inspection, measurement or testing of any Plant, Material, design or workmanship by the Authority's Engineer or its failure to convey its observations or to examine, inspect, measure or test shall relieve the Contractor of its obligations and liabilities under this Agreement in any manner nor shall the Authority be liable for the same in any manner.

#### **11.13 Remedial work**

11.13.1 Notwithstanding any previous test or certification, the 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 Project, whether because of an accident, unforeseeable event

11.13.2 If the Contractor fails to comply with the instructions issued by the Authority's Engineer under Clause 11.13.1, within the time specified in the Authority's Engineer's notice or as mutually agreed, the Authority's Engineer may advise the Authority to have the work executed by another agency. The cost so incurred by the Authority for undertaking such work shall, without prejudice to the rights of the Authority to recover Damages in accordance with the provisions of this Agreement, be recoverable from the Contractor and may be deducted by the Authority from any monies due to be paid to the Contractor.

#### **11.15 Quality control records**

The Contractor shall hand over to the Authority's Engineer a copy of all its quality control records and documents before the Completion Certificate is issued

#### **11.16 Video recording**

During the Construction Period, the Contractor shall provide to the Authority for every calendar quarter, a video recording, which will be compiled into a 3 (three) hour digital video disc or any substitute thereof, covering the status and progress of Works in that quarter. The video recording shall be provided to the Authority no later than 15 (fifteen) days after the close of each quarter after the Appointed Date.

#### **11.17 Suspension of unsafe Construction Works**

11.17.1 Upon recommendation of the Authority's Engineer to this effect, or on its own volition in cases of emergency or urgency, the Authority may by notice require the Contractor to suspend forthwith the whole or any part of the Works if, in the reasonable opinion of the Authority's Engineer or the Authority, as the case may be, such work threatens the safety of the Users and or other persons on or about the Railway Project.

11.17.2 The Contractor shall, pursuant to the notice under Clause 11.17.1, suspend the Works or any part thereof for such time and in such manner as may be specified by the Authority and thereupon carry out remedial measures to secure the safety of suspended works, the Users, other persons and vehicles on or about the Railway

## **Technical Conditions of Contract (TCC) for Supply & Installation of Concrete Cable marker, cable jointing chamber and associated civil works**

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Project. The Contractor may by notice require the Authority's Engineer to inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked. Upon receiving the recommendations of the Authority's Engineer, the Authority shall either revoke such suspension or instruct the Contractor to carry out such other and further remedial measures as may be necessary and reasonable and the procedure set forth in this Clause 11.17 shall be repeated until the suspension hereunder is revoked.



### Chapter III: Indicative Map

