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VOLUME - IA


Technical Conditions of Contract (TCC) S&T Outdoor
works and services, Gr. 240, Agra Division
FOR

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

OF
NORTH CENTRAL RAILWAY

BHARAT HEAVY ELECTRICALS LIMITED

Technical Conditions of Contract (TCC) for S&T Outdoor works and services

 <p>बीएच ई एल BHEL Maharatna Company</p>	<p>Technical Conditions Of Contract (TCC) PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD</p>	<p>Ref No: HY/PE&SD/Projects /TCC/2020-21/S&T Outdoor /02</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Rev. No.</td> <td style="width: 30%;">00</td> </tr> </table>	Rev. No.	00								
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<p>COPYRIGHT AND CONFIDENTIAL 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.</p>	<p>TECHNICAL CONDITIONS OF CONTRACT (TCC)</p> <p>FOR</p> <p>S&T Outdoor works and services “Gr. 240, Agra Division”</p> <p>FOR</p> <p>RAILWAY ELECTRIFICATION PROJECT IN BHANDAI-UDI, BIRLANAGAR-ETAWAH</p> <p>AND SHIKOHABAD-FARRUKHABAD INCLUDING MAINPURI-ETAWAH, SECTION OF AGRA, JHANSI AND ALLAHABAD DIVISIONS OF NORTH CENTRAL RAILWAY</p> <p>UNDER RE PROJECT LUCKNOW, TOTAL RKM 386/440TKM</p>											
<p>Revisions: Refer to record of revisions</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 100%;">Prepared By:</td> </tr> <tr> <td>Yash Pal Singh</td> </tr> </table>	Prepared By:	Yash Pal Singh	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 100%;">Checked By:</td> </tr> <tr> <td>D. Nagaraju</td> </tr> </table>	Checked By:	D. Nagaraju	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 100%;">Approved By:</td> </tr> <tr> <td>K Ravi Kumar</td> </tr> </table>	Approved By:	K Ravi Kumar	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 100%;">Date</td> </tr> <tr> <td>06-10-2020</td> </tr> </table>	Date	06-10-2020
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Technical Conditions of Contract (TCC) for S&T Outdoor works and services

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Volume IA

Part I

Contract specific details

Technical Conditions of Contract (TCC) for S&T Outdoor works and services

Chapter I- Project Information

1.0 Project Details

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

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

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

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Chapter II- Scope of Work

SCOPE OF WORK

The work to be performed under the scope of this tender mainly consists of but not limited to complete scope of Signalling & Telecommunication outdoor civil works and services.

For detailed scope of works, please refer chapter I, technical specifications of volume IA, part II

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Chapter III- Facilities in the scope of BHEL/Contractor

S. No.	Description	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	

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S. No.	Description PART I	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	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	

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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			Drawing schedule shall be submitted by bidder and approved by BHEL during kick off meeting
b	Drawings for construction methods			Drawing schedule shall be submitted by bidder and approved by BHEL during kick off meeting
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	

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Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
k	Coordination for inspection & checking and getting clearance from customer		Yes	
l	Preparation of formats for completion of activities		Yes	

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

LIST OF TOOLS AND PLANT:

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

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

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.

Technical Conditions of Contract (TCC) for S&T Outdoor works and services

Chapter V- Time Schedule

5.1 TIME SCHEDULE

5.1.1

The entire work as detailed elsewhere in the Tender Specification shall be completed within **06 (Six) Months (04 Months for supply, installation and testing + 02 Months for commissioning, demobilization and handing over)** from the date of commencement of work at site.

5.1.2

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

5.1.3

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

5.2 COMMENCEMENT OF CONTRACT PERIOD

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

5.3 MOBILISATION

5.3.1

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

5.3.2

The contractor should mobilize man power in order to complete the work in **06 (Six) Months (04 Months for supply, installation and testing + 02 Months for commissioning, demobilization and handing over)**

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 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.

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5.4 CONTRACT PERIOD

For the purpose of contract, the period shall be taken as **06 (Six) Months (04 Months for supply, installation and testing + 02 Months for commissioning, demobilization and handing over)**. Completion of the work shall be as per BHEL Bar Charts revised from time to time. In order to expedite the work, the contractor has to deploy manpower as per site requirement without any extra cost to BHEL.

5.5 PROTECTION OF WORK

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

If disagreement 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 Project Milestones

Milestone I: 50 % of the works (Gross bill value) shall be completed at the end of 60 Days from the date of commencement of work.

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

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Chapter VII- Statutory Regulation

7.0 TAXES, DUTIES, LEVIES

7.1. For All types of works

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

7.2 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of Price Bid. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

7.3 GST: For All types of works excepting works covered under sl no 8.2

7.4 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

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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

Technical Conditions of Contract (TCC) for S&T Outdoor works and services

Chapter I- Detailed Scope of Work

1.0 LOCATION

- 1.1 Project Engineering & Systems Division (PE&SD), BHEL Hyderabad is identified to execute Railway electrification work of Bhandai-Udi, Birlanagar-Etawah and Farrukhabad-Shikohabad including Mainpuri-Etawah of North Central Railway.
- 1.2 The proposed project site is located in Madhya Pradesh and Uttar Pradesh states.

The preliminary layout plan is indicated as Annexure-A for information.
- 1.3 The S&T works are proposed at different locations of the project.

2.0 SCOPE OF WORK

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

S&T works including Excavation, backfilling, formwork, foundation work, super structure, cable laying, testing, commissioning, earthing and other services. etc , all complete as per drawings & RDSO, Core, ACTM & other railway standards, .

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.

Explanatory notes provided are for the information of contractor. Explanatory notes are not comprehensive and may vary considerably depending on the actual requirements, Railway practice and direction of Engineer-in-charge. Contractor is expected to fully aware of all the RDSO standards and railway practices of works execution.

3.0 EXCLUSION:

All works are in contractor's scope.

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4.0 S&T WORKS

The scope covers all S&T works within the battery limits. The important works covered are as below.

- a) Excavation of trench, laying of cables, earthing, testing & commissioning of cables, jointing etc.
- b) Preparation and submission of detailed calculations, drawings as directed by the Engineer for his checking and approval.
- c) 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

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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) Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.
- h) Bidder is expected to get conversant with latest RDSO, Core, ACTM & other railway standards and drawings. All works are to be strictly executed as per railway standards and drawings. Bidder is requested to arrange railway standards and drawings on his own and no standards will be provided by BHEL.
- i) Bidder to execute the work in consultation with Railway official and BHEL official. All required approvals as required to complete the work from Railway authorities shall be in bidder's scope. No extra payment shall be made for the same.
- j) All works of excavation of trench, laying of cables, earthing, testing& commissioning of cables, jointing etc shall be done as per drawings/specifications.

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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.

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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 Signaling Engineering Manual, Indian Railway Telecom Manual, AC Traction Manual.

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 works:

- (a) Indian Railway Signaling Engineering Manual
- (b) Indian Railway Telecom Manual
- (c) Indian Railways Permanent Way Manual
- (d) Indian Railway Bridge Manual
- (e) Indian Railway Schedule of Dimensions
- (f) The relevant IRS Specifications
- (g) Specifications of Works of concerned zonal railway

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Bidder to note that above list is not exhaustive and other railway standards as required for S&T 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

Explanatory Notes for line items

1. Supply and installation of OFC cable joint enclosure including all accessories with contractor's tools and plants as per TEC No. G/OJC-01/03 Jan 99 or latest and splicing of optical fiber cables (24 Fiber) and testing. (OFC cable is free supply by BHEL)
2. Supply, installation of thermo shrinkable jointing kits including all accessories with contractor's tools and plants as per RDSO Spec. No. IRS. TC77-2012, Rev 3 /Amdt.1 to 3 (or latest RDSO specification) suitable for 6 quad cable. (6 quad cable is free supply by BHEL.)
3. Excavation of pit of size 1mtr X 1.5mtr and depth 1mtr for providing coil at joint locations/ location box/ points signals, culverts, bridges and at LC gates etc., This includes back filling and ramming of trench in layers after laying the coil and consolidation / compaction as per the direction of Engineer-in-charge.
4.a. Testing OFC Cable : This work includes carrying out the joint test with railway engineer & BHEL representatives. The work includes submission of OTDR readings etc for OFC cable laid. The contractor shall submit as made 5 sets of cable route plans, jointing details, EMC details as per railway practice along with one set of AUTO CAD drawings in softcopy
4.b. Testing Quad cable : This work includes carrying out the joint test with railway engineer & BHEL representatives. The work includes submission of measurement of loop resistance, Insulation test, EMC test etc for Quad cable laid . The contractor shall submit as made 5 sets of cable route plans, jointing details, EMC details as per railway practice along with one set of AUTO CAD drawings in softcopy.
5. Excavation trench 0.35 M wide 1.2 M deep in all categories of soils such as black cotton/ hard / murram / hardy soft rock. Back filling the trench with earth in layers and compaction as per the direction of Engineer-in-charge to the level of surrounding ground after laying cables. Laying of cable covered in separate item

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<p>6. <i>Laying of various sizes and types of cables in trenches:</i> Laying of Signaling / power / telecom / quad/OFC cable of various sizes in the excavated trench/through pipes. This includes loading/unloading & transportation of cables to site from BHEL stores. Wherever several cables are to be laid, separation of cables should be done as advised by site engineer. This includes unwinding of cable drum using proper jigs without causing damage to cable. in case cables are to be laid through pipes, laying is covered in this item and supply of pipe shall be covered in separate item.</p>
<p>7. <i>Excavation of cable trench of 1 m. depth & 300 mm. wide</i> for the track crossing, road crossing, level crossing, platform etc & refilling in layers and compaction as per direction of Engineer-in-charge after laying DWC/GI pipe with suitable joints/collars .This does not include provision of Tiles etc in case of Platform. DWC/GI pipe is covered in separated item.</p>
<p>8. <i>Digging of cable trench</i> to a depth of not less than 30 cm and width 15 cm as per direction of Engineer-in-charge. In rocky terrain, concreting the trench with 150mm thick concrete in the ratio 1:2:4 and back filling with excavated soil as per direction of Engineer-in-charge after laying cable. (Cement, sand & metal are to be supplied by the contractor) This is applicable for concrete platforms/metal tar/cement roads. Laying of cable covered in separate item.</p>
<p>9. <i>General concreting work</i> with mixture of cement ,coarse sand and stone of aggregate 25 mm size having 1:3:6 ratio scattered at different locations in the yard and midsection and plastering of top in fine plaster of cement and sand of 1:4 ratio (bridge approach , culverts, LC gate area etc and wherever directed by the engineer-in-charge) payment shall be done for the concrete quantity measured and no separate payment shall be done for plastering/finishing.</p>
<p>10. <i>Track crossing by Horizontal Directional Drilling (HDD) boring method</i> and as advised by the engineer at site. This includes supply and insertion /pushing of suitable HDPE / GI pipe of suitable dia (of 100mm to 200mm) as per RDSO guidelines and Engineer-in-charge. confirming to relevant IS/RDSO standards heavy class in the Bore drilled with coupler between two pipes .All the joints of casing pipes should be tightened leak proof. (6 Quad cable, HDPE duct suitable for OFC Blowing are part of BHEL supply).</p>
<p>11. <i>Blowing of armoured Optical Fiber Cable</i> into duct by using blowing machine and associated works. Before blowing the duct integrity shall be tested on laid HDPE Duct. If any defect shall be found during duct integrity test, the entire length of HDPE duct from one chamber to another chamber is to be replaced by Contractor at free of cost. (HDPE Duct with accessories are free issue by BHEL).</p>
<p>12. <i>Laying and fixing/joining of RCC pipe</i> of class NP2 (cross section may be either single circular section or set of two semicircular split section as per the site requirement) in already made trench with all accessories at TSS/SP/SSP locations etc. (Cost of pipe, collar are covered in separate item).</p>

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13. **Supply of RCC pipes** 150mm dia of class NP2 (cross section may be either single circular section or set of two semicircular split section as per the site requirement) along with required collars/joining accessories as per Specn. **No. IS/458/1971** or latest for use near OHE Substation etc for cable protection.

14. **Laying and fixing of HDPE pipe / duct** with all accessories in already made trench as per the RDSO standards and direction of Engineer-in-charge.

15. **Perforation (24 to 36 perforation in a pipe) and Fixing of GI pipes** for entry of cable on girder bridges, RCC bridges, drains, culverts, rocky places tunnels/deep cutting or at places as advised by the engineer in charge of the work & concreting the ends with brick channeling at both ends as per drg. The pipes are to be fixed on the bridges by suitable bridge fixtures or MS clamps or brick support at an interval of 3.0 mts (max) or as per approved drawing and directives of Railway Engineers. On masonry bridges or in rocky place if required the entire length of the pipe by cement, sand and 15-25 mm chips. All the fixing materials nut & bolts, clamps, materials for construction of pillars. cost of GI pipe and MS channel are covered in separate items.

16. **Supply and installation of GI pipe 100 mm dia** class "B" ISI marked with all accessories including bends and other items as required for laying of the 6 Quad cables through in it. (6 quad cable is free supply by BHEL.)

17. **Supply of Mild steel channel** for trough/GI pipe fixing on girder bridge as per RDSO drg.no. RDSO/ TCDO/ COP-13.

18. **Excavation of cable pit** without damaging existing working cables, laying& insertion of new extra cables. Closing of excavated cable trench/ Pit & plastering of foundation etc. under instruction from site Engineer.

19. **Supply and installation of DWC pipe** in already excavated trench with one snap fit coupler and 'O' ring conforming to **RDSO/SPN/204/2011 Ver. 1.1** or latest RDSO specification , Non-metallic, corrugated, multiwalled, normal duty, pliable, without protection against chemical attack and Non flame propagating in 6 meter length of **size 120 mm outer dia& 102 mm inner dia.**(Permitted tolerance in dia = +/- 2 mm).

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20. **Supply and installation of Emergency socket Box** on released rails (2.8 mtr long each) for fabrication of EC (Emergency Communication) sockets and Installation of emergency socket box including socket on the rail post in the section and yard at every one km. distance as per tapping chart supplied by the survey team. This will include wiring and termination of quad cable on the socket box mounted at 1 m height, clamped with 2 nos. U-Clamps, provision of concrete foundation of rail post in such a way that the rail post is one meter above the earth level. The concreting shall be in ratio of 1:3:6 of cement, sand and stone chips. The contractor shall jointly test with BHEL engineer for its satisfactory operation. This includes painting of Emergency socket post with alternate yellow and black strip of 6" width and painting of the socket box with grey colour paint and painting of arrows on the telephone posts/ cable markers to show the nearest Emergency socket as instructed by the engineer at site. Rail posts and MS pipes of required lengths for fixing Emergency sockets will also be supplied and installed by the Contractor.

21. **Centering and shuttering work** shall be done as per DSR item 5.9.1

22. **Reinforcement for RCC work** work shall be done as per DSR item 5.22.6

23. **Demolishing cement concrete** work shall be done as per DSR item 15.2.2

24. **Demolishing R.C.C. work** shall be done as per DSR item 15.3

25. **Dismantling tile work** shall be done as per DSR item 15.23.1

26. **Demolishing brick work** shall be done as per DSR item 15.7.4

27. **Providing and laying in position cement concrete (1:2:4)** work shall be done as per DSR item 4.1.3

28. **Brick work** with common burnt clay work shall be done as per DSR item 6.1.2

29. **Plaster work** shall be done as per DSR item 13.2.2

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30. Supplying & placing Bricks: Contractor to supply & place second class country made bricks on top of the laid cable in open trench for protecting the cable. For which there is no sand / any concreting is required in between bricks. Contractor to ensure the total laid cables with in a trench are completely covered by bricks by placing adjacent to each other. (The trenching and back filling, laying of cables, supply of cables etc., are covered in other line items)

31. Placing Bricks: Contractor to place second-class country made bricks on top of the laid cable in open trench for protecting the cable. For which there is no sand / any concreting is required in between bricks. Contractor to ensure the total laid cables with in a trench are completely covered by bricks by placing adjacent to each other. (The trenching and back filling, laying of cables, supply of cables, supply of Bricks etc., are covered in other line items)

Note:

1. 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.
2. Explanatory note shall be read and correlated to the relevant item of BOQ.

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

PREAMBLE TO THE SCHEDULE OF QTS. (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 vegetations, 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, from 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.

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- 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.

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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.

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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

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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.

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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

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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

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Railway(Authority's Engineer) may advise to have the work executed by another agency.

14) Quality control records

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

15) Suspension of unsafe Construction Works

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

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

16) Purchase And Service

All Material shall be procured from RDSO approved vendor list.

17) Field Quality Plan

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

18) General QA Requirements

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

The contractor shall Carried out the laboratory and field tests and carry out independent tests in the site laboratory, wherever necessary (All tests are to be strictly executed as per RDSO standards. The tests which cannot be carried out in the site laboratory shall be done at a laboratory as per RDSO standard. The test samples for such test shall be jointly selected and sealed by the engineer and thereafter these shall be sent to the concerned laboratory through the covering letter signed by BHEL engineer and Railway(Authority's

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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.

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Chapter V: Indicative Map

