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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.	TECHNICAL SPECIFICATION FOR ENGAGING SAFETY CONSULTANCY SERVICES			
	PROJECT: THE ELECTRIFICATION OF RAILWAY LINES OF THE BIRLANAGAR-ETAWAH, BHANDAI-UDI AND FARRUKHABAD-SHIKOHABAD INCLUDING MAINPURI-ETAWAH OF NORTH CENTRAL RAILWAY 386RKM/440TKM			

Revisions: Refer to record of revisions	Prepared by :	Checked by :	Approved by :	Date :
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1.0 INTENT OF SPECIFICATION

Bharat Heavy Electrical Limited (BHEL), a Govt. of India Undertaking, invites proposals for engaging “**Safety Consultant**” for the Electrification of Railway Lines of the sections Birlanagar-Etawah, Bhandai - Udi and Farrukhabad - Shikohabad including Mainpuri - Etawah of North Central Railway 386 RKM/440 TKM.

It is not the intent to specify completely herein all details of the work; nevertheless, the consultant shall work in conformity with the contract and to the highest standard of engineering, design and workmanship.

2.0 DEFINITIONS

‘**Purchaser**’ means BHEL.

‘**Consultant**’ means Safety Consultant being appointed under this contract.

‘**Contractor**’ means other sub-contractors being engaged by the Purchaser for execution of this Railway Electrification Project.

‘**Authority**’ means Railway Authorities engaged for execution of project like RE-Lucknow, CORE-Allahabad, RDSO-Lucknow, RITES, Zonal Railway and Railway’s PMC etc.

3.0 PROJECT INFORMATION

The Electrification of Railway Lines of Birlanagar - Etawah section (Gr.239), Bhandai - Udi section (Gr.240) & Shikohabad - Farrukhabad and Etawah - Mainpuri section (Gr.241) of Jhansi, Agra & Allahabad Division of North Central Railway under RE Project, Lucknow Total 386 RKM/440 TKM.

3.1 Climatic Data:

Temperature	: Min 4°C, Max 65°C, Mean Temp 35°C (for OHE)
Rainfall	: Approx. 70cm Annually (Monsoon Rain: June to September and Casual Rain: December to January). Thunderstorms during Monsoon.
Humidity	: Maximum is nearly 60% to 80%.
Wind Pressure	: 155 kgf/sqm As per latest IS 875-1987

3.2 Overhead Equipment:

Design, supply, erection, testing and commissioning of 25 KV, 50 Hz, AC Overhead equipment including Foundations, Structures and all ancillary equipment etc. as per following details along with PTFE neutral section, insulated catenary wire under over line structure, Height Gauges at level crossing gate, Protective screens on over line structure, Structure arrangement on bridge piers, feeder wire, all types of caution, warning, instruction and protection boards at required locations, anti-theft charging arrangement, Traction Station Working Rule along with sectioning diagram at required locations (TPC, Traffic control, OHE Depot, AEE office etc.), Safety items (i.e. key box, First aid

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box, shock treatment chart, Collar ring, men at work board etc.) at required locations, construction of contractor's depot & sidings and all necessary documentation for EIG sanction and CRS Inspection. Breakdown attention till CRS inspection.

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

Type of OHE	Section	Railway Division	RKM	TKM
Conventional OHE & Tramway type OHE with contact wire height 5.80m	Birlanagar (Excl) - Etawah (Excl) section (Gr.239),	Jhansi, Division	115	128
	Bhandai (Excl) – Udi (Excl) section (Gr.240)	Agra Division	113	123
	Shikohabad (Excl) – Farrukhabad (Excl) and Etawah (Excl) - Mainpuri (Incl) section (Gr.241)	Allahabad Division	158	189

3.3 25 KV Sectioning Post (SP) and Sub-sectioning post (SSP) (Switching Post):

Design, supply, erection, testing and commissioning of single phase, 25 KV, 50 Hz, AC Switching Stations (SP/SSP) including Foundations, Structures and all ancillary equipment etc. as per following details along with Earth work, construction of buildings, fencing, retaining wall, Internal Wiring with switch/fittings/equipment, Battery Set, All types of caution, warning, instruction, protection, location/Name and schematic diagram boards, earthing stations, Safety items (i.e. Fire fighting equipment, First Aid box, Shock treatment chart, key box etc.), manning till stabilization of SCADA (At least for a period of 06 months from commissioning) and all necessary documentation for EIG sanction and CRS Inspection, breakdown maintenance till CRS inspection.

3.4 Traction sub-stations (TSS):

Design, supply, erection, testing and commissioning of single phase, 220/132/25 KV, 50 Hz, AC Traction Sub Station (TSS), Feeding Post (FP), Shunt Capacitor Bank, series reactor, ABT meter along with all associated equipment, including Foundations, Structures and all ancillary equipment, Earth mesh/electrode, Buried rail and connections etc. as per following details along with Earth work, construction of buildings, approach road, Laying of Cross Track along with sleepers & fastenings, points & crossings, ballast main work, retaining wall, Fencing, internal wiring, yard lighting, arrangement for water supply, All types of caution, warning, instruction, protection, location/Name and schematic diagram boards, Safety items (i.e. Firefighting equipment, First Aid box, Shock treatment chart, key box etc.), manning till stabilization of SCADA (At least for a period of 06 months from commissioning) and all necessary documentation for EIG sanction and CRS Inspection. Breakdown attention till CRS inspection.

3.5 25 KV Auxiliary transformer stations:

Design, supply, erection, testing and commissioning of single phase Auxiliary Transformer Station of different capacity as per following details, complete with all structures and fittings etc. along with anti-climbing device and all types of caution, warning, instruction, protection boards and location/Name boards, junction box and all necessary documentation for EIG sanction and CRS Inspection. Breakdown attention till CRS inspection.

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3.6 Supervisory control and data acquisition system (SCADA)

Design, supply, erection, testing and commissioning of Standard Supervisory Control and Data Acquisition (SCADA) equipment as per RDSO Specification No TI/SPC/ RCC/ SCADA /0130 (Rev-2) with latest amendments in the proposed electrified section. The scope of the work also covers supply of SCADA system at RCC, SCADA software, SCADA equipment at controlled stations, Low maintenance batteries at RCC, Dual UPS (W/o Batteries) at RCC, Modular Furniture at RCC for workstations, GPS receiver, Web server for Railway SLDC/SLDC and supervision of operation and maintenance of the SCADA system, as per specification. Comprehensive maintenance (preventive maintenance and break down attention) contract of SCADA system for 04 years after expiry of 36 months guarantee period as per tender paper for control of Traction Sub -Stations and Switching Stations for 25 kV A.C. Single phase, 50 C/S, Electric Traction of electrified section. Comprehensive maintenance covers maintenance of SCADA system complete with all software, RCC equipment, RTUs including replacement of defective parts and accessories or up gradation of SCADA systems, software & RTUs etc. during the currency of contract as mentioned in the Specifications. SCADA site, if required, may be shifted to other suitable locations as per site condition.

3.7 Modification of HT/LT Power Line and Crossings:

Existing Overhead HT/LT Power Lines shall be replaced by Underground cables.

3.8 Extension of LT power supply for CLS Work:

Work involves laying of cable at 1 meter depth covered with sand and brick, protection of exposed part of cable with GI pipe, wiring at station area, Installation and commissioning of CLS panel of requisite capacity and extending AT supply to S&T installations. Breakdown maintenance till CRS inspection.

3.9 Extension/Augmentation of electrical power supply arrangements:

Augmentation of power supply works includes all general supply works from state electricity authority supply point to service building/quarters metering panel. It includes liaising with state electricity authorities for releasing of new power connection or augmentation of existing connection duly providing new transformer/substation wherever required, new panel with metering arrangements, laying of HT/LT cables in trench as well as on surface of required size as per requirement and site condition, necessary earthing arrangement, distribution panel with MCCB and laying of cables up to metering panel of service building and quarters. The contractor needs to design the system and get approval from authority through authority engineer. All equipment/cable etc. shall be approved make as approved by authority.

Tentative number of TSS/FP/SP/SSP, Auxiliary Transformer (AT) and Overhead Line Modifications are as under:

Sl.No.	Description of Works	Unit	Qty.			Total
			Gr.239	Gr.240	Gr.241	
i.	Feeding Post/TSS	No.	2	2	2	6
ii.	Sectioning post (SP)	No.	3	3	4	10
iii.	Sub - sectioning post (SSP)	No.	7	7	7	21

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iv.	Remote Control Centre: - All the switching station will be provided remotely controlled from the Remote Control Centre through SCADA	No.	JHS	AGRA	ALD	3
v.	Auxiliary transformers (5Kva, 10KVA, 25KVA) including cabling to Aux. loads	No.	5kVA (0), 10kVA(14), 25kVA (1)	5kVA (0), 10kVA(13), 25kVA (0)	5kVA (3), 10kVA(17), 25kVA (1)	49
vi.	Modification of HT & LT power lines					
	a) 33KV Modification	Location	-	-	-	10
	b) 11Kv Modification	Location	-	-	-	03
	c) 440V Modification	Location	-	-	-	18
	d) 230V Modification	Location	-	-	-	20

3.10 Signalling System:

All signaling works including design of signaling plan, route control chart or selection/control table, panel diagram, wiring/circuit diagram, cable route chart, cable core diagram, termination and equipment position diagram etc. as part of the modification to the existing signaling system along with supply, installation, testing and commissioning shall be executed in accordance with the provision of IRSEM and signal and Interlocking principles issued in the form of typical designs.

In addition to above, augmentation of existing service building to accommodate additional signaling equipment/racks etc. shall be carried out if required. Glued joints if any required for single rail track circuit shall be provided. The released materials shall be transported to the railway depot within the site, as nominated by the Authority's Engineer.

3.11 Telecommunication System:

a. Where optical fiber cable (OFC) and quad cable already exist in the section

Where optical fiber cable (OFC) and quad cable already exist in the section, scope of work includes supply, trenching and laying of 6 quad cables, jointing of quad cables for provision of emergency sockets in the section and SP/SSP/TSS /LC gates etc., transferring the existing communication circuits including block on new cables, supply and installation of power supply equipment, batteries and other telecom equipment, supply and installation of SDH and PD MUX equipment and their networking with the existing OFC link for augmenting existing OFC equipment at stations in the section, supply, installation and testing and commissioning of HQ and way station control equipment for giving various control phones at stations, SP/SSP/TSS etc., augmentation of existing service buildings as required, provision of cable huts and service buildings, protection of telecom lines entering 25 KV sub-station /switching posts, and protection against surge and lightning. The scope also includes masonry works for erection and installation of telecom equipment and all types of painting as per Railway Telecom Manual and standard practices. Supply of spares to the extent of 10% (minimum 1) of each type of equipment like SDH, PDMUX, control phones, emergency sockets etc.



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All the materials not limited to above as required for execution of the telecom works to suit 25 KV has to be provided by the Contractor in accordance with the Good Industry Practice. The Contractor shall transport the released materials railway depot nominated by the Authority's Engineer.

b. Where OFC and quad cable does not exist in the section.

Where OFC and quad cable does not exist in the section, scope of work includes supply, trenching and laying of OFC and 6 quad cables, jointing of quad cables, splicing of OFC cable, provision of emergency sockets in the section and SP/SSP/TSS /LC gates etc., transferring the existing communication circuits including block on new cables, supply and installation of power supply equipment, batteries and other telecom equipment, supply and installation of SDH and PD MUX equipment and their networking with the existing OFC link or forming new link if OFC is not existing in the section, commissioning of quad cable system, supply, installation and testing and commissioning of HQ and way station control equipment for giving various control phones at stations, SP/SSP/TSS etc., provision of cable huts and service buildings, protection of telecom lines entering 25 KV sub-station /switching posts, protection against surge and lightning. The scope also includes masonry works for erection and installation of Telecom equipment and all types of painting as per Railway Telecom Manual and Good Industry Practice. Supply of spares to the extent of 10% (ten percent) (minimum 1) of each type of equipment like SDH, PDMUX, and control phones, emergency sockets, etc.

All the materials not limited to above as required for execution of the Telecom works to suit 25 KV has to be provided by the Contractor. On completion of above works, testing and commissioning of entire system in totality shall be carried out by the Contractor. The Contractor shall transport the released materials to railway depots nominated by the Authority's Engineer.

c. Modification in Passenger Amenities Work:

The detailed scope of work includes Provision of modification in existing Passenger amenities systems i.e, PA system, Train indication board, clock, etc. to suit 25 KV RE standard work involving trenching, laying of PIJF Cable on platforms where ever required, supply & fixing of PVC conduit, supply & laying of twin core screened cable through conduit and its protection, earthing and protective works.

The scope also includes masonry works for erection and installation of Telecom equipment and all types of painting as per railway Telecom manual and good industry practice. The entire work should be suitable for 25KV charging the scope also includes provision of spares as indicated in the table.

On completion of above works, testing and commissioning of entire system in totality shall be carried out by the Contractor. The Contractor shall transport the released materials to railway depots nominated by the Authority's Engineer

Some main associated works pertaining to S&T in narrative form are as under:-

A. Signalling:-

Sl.No.	Description of Works	Unit	Qty.			Total
			Gr.239	Gr.240	Gr.241	
1.	Modification to Existing RRI/PI/MACLS/Provision of MACLS at semaphore Stations.	-	-	-	-	-
1.1.	EI/RRI Stations	No.	0	03	0	03
1.2.	PI Stations	No.	01	0	02	03
1.3.	MACLS Stations	No.	05	0	04	09



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1.4.	Provision of MACLS at semaphore stations	No.	0	0	0	0
2.	Signaling Cable	Km.	147.5	73.5	103.5	324.5
3.	Modification of Existing MACLS mid-section interlocked LC gate	No.	0	0	0	0
	Provision of MACLS at semaphore LC gates	No.	0	0	03	03
4.	Track Circuit	No.	02	02	02	06
	Track modification	No.	70	52	84	206
5.	Handle type token lease Block instrument Diado.	No.	0	0	0	0
	Modification of Token Instt. (NBT)	Pair	06	0	08	14
6.	Integrated Power Supply (IPS)	No.	06	0	07	13
7.	Single section digital axle counter	Set	0	04	0	04
8.	Earthing for signaling and apparatus cases etc.	No.	350	300	200	850
9.	Maintenance free earthing	No.	30	15	30	75
10.	Modification of Data Loggers	No.	01	0	02	03
11.	Electric point operating machine	No.	02	02	0	04
12.	Universal fail safeblock interface equipment	Pair	0	04	0	04

B. Telecommunications:-

Sl.No.	Description of Works	Unit	Qty.			Total
			Gr.239	Gr.240	Gr.241	
1.	Optic Fiber Cable	Km	125	123	170	418
2.	6 Quad & PIJF Cable	Km	50	55	170	275
3.	C.T. Box 10 pair	Nos.	25	20	60	105
4.	C.T. Box 20 pair	Nos.	25	20	50	95
5.	Emergency socket box	Nos.	35	35	180	250
6.	4 way equipment	Nos.	30	25	35	90
7.	Earthing	Nos.	65	50	85	200
8.	V.F. Transformer	Nos.	60	60	250	370
9.	Emergency control room equipment	Nos.	0	0	0	0
10.	DTMF head quarter equipment	Nos.	2	2	2	6

3.12 Civil Works:

Civil works include building works (staff quarters, service building, tower wagon shed and siding, platform shed) raising height of FOB/ROB and any other work necessary for completion of the electrification works.

3.12.1 Staff quarter:

Construction and development of staff colony comprising of following types of staff quarters including electrical internal wiring with allied work, electrical power supply arrangement with transformer/main distribution supply, sewerage system, water supply arrangement, augmentation of water supply, provision of bore well with electrical pump and pump house, approach road, levelling

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and earth filling of land, Brick boundary wall, development of lawn, rain water harvesting, street lighting arrangement etc. Total length of brick boundary wall will be approximately 1050 meter while total Length of Road will be approximately 1600 meter. The Type of boundary wall shall be of brick masonry. The height of boundary wall will be 1.5 meter. The width of concrete road will be 3.5 meter & average earth filling is approximate 1.0 meter & contractor has to provide bore well with electrical pump for Railway quarters which are being constructed. Telecom PIJF cable is to be supplied and laid and wiring to be done for provision of Railway Auto Telephone required for Type-II, Type-III and type-IV quarters.

3.12.2 Tower Wagon shed and siding and Cross Track for TSS:

Construction of tower wagon shed and siding including inspection pit, earthwork, approach road, water supply arrangement, ballast supply and its spreading, permanent way work with all Contractor's permanent way material for M+7 sleeper density with 60 Kg (90 UTS) rail and sleeper (Drg. No. T/2496), track connection with main line including thermite welding, insertion of glued joint, internal electrical wiring with allied works and electrical power supply arrangement with transformer/main distribution supply.

3.12.3 Service buildings:

Construction of service buildings including electrical internal wiring with allied work, electrical power supply arrangement with transformer/main distribution supply, sewerage system, water supply arrangement, augmentation of water supply, provision of bore well with electrical pump and pump house, approach road, levelling and earth filling of land, boundary wall, street lighting arrangement etc. Total length of boundary wall will be approximately 1000 meter while total Length of CC Road will be approximately 1500 meter. The Type of boundary wall shall be of brick masonry. The height of boundary wall will be 1.5 meter. The width of concrete road will be 3.5 meter & average earth feeling is approximate 1.0 meter. While for TSS Total length of RCC Retaining wall will be approximately 1800 meter while total Length of CC Road will be approximately 3000 meter. The Type of retaining wall shall be of RCC. The height of retaining wall will be 1.0 meter. The width of concrete road will be 4.0 meter & average earth feeling is approximate 1.0 meter. Contractor has to provide bore well with electrical pump for service building which are being constructed. Provision of Railway Auto Telephone including wiring and supply of PIJF cable is also included in the scope.

3.12.4 Modification of platform shed:

Modification of platform shed up to specified height including material required for this work, adhering approved cover over platform drawing in connection with railway electrification works. The platform sheds are not required to be lifted. Existing shed are to be modified as per SOD, height required is 4110 mm from Rail level at a horizontal distance 1676mm from centre of track. The existing roof is made of AC/Metallic sheets.

3.12.5 Tree Plantation:

Neem, Gulmohar, Ashok and Peepal trees to be planted at different locations.

3.12.6 Subordinate rest house:

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Construction of service buildings including electrical internal wiring with allied work, electrical power supply arrangement with transformer/main distribution supply, sewerage system, water supply arrangement, augmentation of water supply, provision of bore well with electrical pump and pump house, approach road, levelling and earth filling of land, boundary wall, street lighting arrangement etc. Total length of boundary wall is 300 meter& Total Length of Road is 300 meter. The Type of boundary wall will be of brick/ stone masonry. The height of boundary wall will be 1.5 meter. The width of concrete road will be 3.6 meter& average earth feeling is approximate 1.0 meter& contractor have to provide bore well with electrical pump for subordinate rest house & camp office which is to be constructed. Telecom PIJF cable is to be supplied and laid and wiring to be done for provision of Railway Auto Telephone.

3.12.7 Camp office for Railway Staff

Construction of service buildings including electrical internal wiring with allied work, electrical power supply arrangement with transformer/main distribution supply, sewerage system, water supply arrangement, augmentation of water supply, provision of bore well with electrical pump and pump house, approach road, levelling and earth filling of land, boundary wall, street lighting arrangement etc. Total length of boundary wall is 300 meter& Total Length of Road is 300 meter. Type of boundary wall will be of brick/ stone masonry. The height of boundary wall will be 1.5 meter. The width of concrete road will be 3.6 meter& average earth feeling is approximate 1.0 meter& contractor has to provide bore well with electrical pump for subordinate rest house & camp office which is to be constructed. Telecom PIJF cable is to be supplied and laid and wiring to be done for provision of Railway Auto Telephone.

3.12.8 Railway Electrification siding & Depot

Construction of Railway Electrification siding & Depot including earthwork, approach road, water supply arrangement, ballast supply and its spreading, permanent way work with all Contractor's permanent way material for M+7 sleeper density with 60 Kg (90 UTS) rail (Rail shall be supplied by Railway) and sleeper (Drag. No. T/2496), track connection with main line including thermite welding, insertion of glued joint, internal electrical wiring with allied works and electrical power supply arrangement with transformer/main distribution supply.

Civil Works shall be as under:

Sl.No.	Description of Works	Unit	Qty.			Total
			Gr.239	Gr.240	Gr.241	
1.	Route Kilometer (RKM)	RKM	115	113	158	386
2.	Steepest Gradient		1:100	1:100	1:100	
3.	Sharpest curvature		6°	6°	6°	
4.	Bridges					
4.1	Road Over Bridges	No.	-	-	-	-
4.2	Foot Over Bridges	No.	-	-	-	-
5.	Level Crossings	No.	27	20	22	70
6.	Main Civil Works					
6.1	Foundation for bridge Masts	No.	20	24	24	68
6.2	Height Gauges for level crossing	SET.	55	40	45	140



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6.3	Protective screen for FOBs & ROBs	SET	02	0	12	14
6.4	Modification to platform shelters	Meter	231	0	200	431
6.5	Staff Quarters	No.	Type-II 10, Type- III-04, Type-IV- 01	Type-II- 10, Type- III-06, Type-IV- 02	Type-II- 16, Type- III-06, Type-IV- 02	57
6.6	Permanent Way Siding	No.	01	01	01	03
7.	Electrical Structure	No.				
7.1	OHE & PSI Depot	No	02	02	01	05
7.2	OHE Depot	No	-	-	-	-
7.3	Sub-stations	No	02	02	02	06
7.4	SP/SSPs	No	10	10	10	30
7.5	Office for DEE/TrD. & AEE/TrD.	No	0	0	01	01
7.6	Modification to existing RC Centre	No	01	01	01	03
7.7	RCC Depot and RRD	No	-	-	-	-
7.8	DSK/RE Depot.	No	-	-	-	-
7.9	Tower Wagon Shed	No	02	02	01	05
8.	S&T Structures					
8.1	TCI Office	No.	1	0	0	1
8.2	CSI Office	No.	1	0	0	1
8.3	ASTE Office	No.	0	0	0	0
8.4	Relay Room	No.	0	0	0	0
8.5	Equipment Room	No.	05	0	03	8
8.6	Battery Room	No.	0	0	3	3
8.7	Repeater Room	No.	2	0	1	3

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4.0 SPECIFICATIONS AND STANDARDS

The Purchaser shall provide project specific drawing / documents for safety review by the consultant; however, any standard RDSO/CORE/Railways drawings/guidelines/specification/manual required for review of the drawings / documents shall be arranged by the Consultant on his own risk and cost. The consultant shall not delay review of drawing / documents on-account of non-availability of any such standard documents with them.

4.1 Construction

The Consultant shall comply with the Specifications and Standards as mentioned below for construction of the Railway Project. It includes verification and validation of system installed and independent certification for maintenance and operation system during its life cycle.

4.1.1 For civil works:

- a. Indian Railways Permanent Way Manual
- b. Indian Railway Bridge Manual
- c. Indian Railway Schedule of Dimensions
- d. The relevant IRS Specifications referred to in the above documents listed at (a), (b) and (c)
- e. Specifications of Works of concerned zonal railway
- f. In case of any contradiction in the various codal provisions, the order of precedence shall be as follows:-
 - i. Provisions of this Specification.
 - ii. IRS Codal provisions
 - iii. IRC Codal provisions
 - iv. IS (BIS) Codal provisions

4.1.2 For signalling and telecommunication works:

- a. Indian Railway Signal Engineering Manual for signalling; and
- b. Indian Railway Telecom Manual for telecommunication works.

4.1.3 For electrification works:

- a. Indian Railways Manual AC Traction, Volume-II Part-I and Volume-II Part- II.
- b. Manual of Standards & Specification for Railway Electrification
- c. Indian Railways Schedule of Dimension

4.1.4 Deviations from the Specifications and Standards

Notwithstanding anything to the contrary contained in above clause, the following Specifications and Standards shall apply to the Railway Project, and for purposes of this Agreement, the aforesaid Specifications and Standards shall be deemed to be amended to the extent set forth below: In case of new developments in designs, comments of Research Designs and Standards Organization (hereinafter called RDSO's) and decision of Authority to implement the same basic drawings /designs/employment schedules will be submitted by the contractor to the Authority. If the RDSO's drawings/ designs/employment schedule is not revised, Contractor need not submit drawings/ designs/ employment schedules to the Railway Electrification. In the event of Contractor suggesting any alteration/deviation in standard drawings, he shall submit the retraced drawings with full calculations and justification of the change to the Authority. The Authority if convinced of the need of the alteration shall approach RDSO for necessary approval. In case of any ambiguity in the interpretation of design and drawing, the decision of the Authority shall be final and conclusive. Any software developed for design will be provided to Authority for verification, validation and further use.

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4.2 Design Standards

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

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

4.3 Latest Version

Latest version of the Manuals, Specifications and Standards including the amendments notified/published by 31.10.2018 shall be considered applicable.

4.4 Terms used in Manuals

The terms ‘Inspector’, ‘AEE’, ‘DE’ used in the Manuals shall be deemed to be substituted by the term “**Authority’s Engineer**”; to the extent it is consistent with the provisions of the Agreement.

4.5 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

- i. Bureau of Indian Standards (BIS)
- ii. Euro Codes or British Standards or American Standards
- iii. Any other specifications/standards proposed by the Contractor and reviewed by the Authority’s Engineer.

4.6 Alternative Specifications and Standards

The requirements specified in the Manuals are the minimum. The Contractor shall, however, be free to adopt international practices, alternative specifications, materials and standards to bring in innovation in the design and construction provided they are better or comparable with the standards prescribed in the Manuals. The specifications and techniques which are not included in the Indian Railway Manuals/ RDSO specifications shall be supported with authentic specifications and standards specified in Cl.No.4.5 above. Such a proposal shall be submitted by the Contractor to the Authority. In case, the Authority is of the opinion that the proposal submitted by the Contractor is not in conformity with any of the international standards or codes, then he shall record his reasons and convey the same to the Contractor for compliance.

5.0 GENERAL CONDITIONS OF THIS SPECIFICATIONS

5.1 The Consultant shall necessarily include in its recommendations guiding/supporting drawings, as applicable, for the safety at work site.

5.2 The Consultant shall extend all necessary support to the contractor/purchaser for approval of the safety recommendations by the purchaser/Authority.

5.3 The consultant shall be responsible for and shall bear and pay the costs for any alteration/re-review of works arising due to any incorrect safety recommendation for the designs and drawings reviewed by him, whether such designs and drawings have been approved by the Purchaser or not.

5.4 Time Schedule:

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- a. The consultant shall submit recommendations for safety for approval by the Authority within 15 days from the date of LOA.

Issuance of Safety Certificate:

- a. In case of no observations related to safety aspects on designs, a certificate of compliance shall be issued within 2 days from the submission of Safety Report.
 - b. In case of any observations related to Safety aspects on designs, a certificate of compliance shall be issued within 2 days from the compliance of the observations by the contractor/purchaser.
- 5.5** by submitting the safety recommendations by the consultant to the purchaser, the Consultant shall be deemed to have represented that it has determined and verified that the design and engineering, including field construction criteria related thereto, are in conformity with the Safety of the Project, Specifications and Standards, Applicable Laws and Good Industry Practice;
- 5.6** In the event the Consultant fails to submit recommendations/Review reports, the purchaser may cause the payment for the affected works to be withheld under and in accordance with the provisions of this agreement.
- 5.7** Format of recommendation report and compliance certificate shall be decided mutually by BHEL, consultant and railways.
- 5.8** The contract period shall be 15 (Fifteen) months from the date of commencement of work.
- 5.9** If, because of reasons attributable either to the Consultant and/or the purchaser and/or Force Majeure conditions, the scope of work, as defined elsewhere in the specification are not completed within the contract period, suitable extension of the contract completion time will be given in the manner prescribed in clause no. 2.11 of "General Conditions of the Contract. During such extended period of the contract, the consultant is bound to complete the balance works left out at the end of the original contract period.
- 5.10** The date of commencement of work shall be mutually agreed date between the Consultant and the Purchaser engineer to start the work. In case of discrepancy, the decision of the Purchaser engineer shall be final and binding.
- 5.11** The Consultant shall extend all the necessary support in case of any conflict due to safety recommendations during actual erection/construction/installation of the works. In addition, shall submit revised recommendations immediately so that there is no hold up / delay in erection works.
- 5.12** The Consultant shall be required to visit the Site/the Contractor/the Purchaser/the Authority, as required, in order to facilitate safety related work and submission/approval of the recommendations etc.
- 5.13** The Consultant shall not have any conflict of interest. The Consultant also agree that any assignments completed at least three years prior to the appointment hereunder shall not be reckoned for the purposes of conflict of interest.
- 5.14** For the avoidance of doubt, the Safety Consultant shall be independent of the design and implementation team for this project which means the consultant should not have/shall not have any agreement with any contractor/sub-contractor/consultant (including Proof Consultant) for any design work of this project.

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(The Consultant shall be required to give an undertaking that the consultant is neither engaged nor shall engage with any of the contractors/sub-contractors/consultants (including Proof consultant) for this project appointed by the Purchaser or its contractors for any designing and engineering related works of this project before entering into agreement of this contract.)

6.0 SCOPE OF WORK

The scope of the Safety Consultant is:

- To submit Safety Recommendation within 15 days of LOA to the purchaser's Project Manager W.r.t. Health, Safety, Environment and designs. The safety recommendations shall be submitted after thorough study of scope of work of different disciplines (Electrical, S&T, and Civil) applicable for the project in accordance with Applicable Laws and Good Industry Practice.
- To carry out the Safety Audit of the design and construction of the Project and to submit safety report to the Purchaser for compliance.

The safety audit shall be carried out by the Safety Consultant in respect of all such design details (Refer List of Drawing under Project Scope) that have a bearing on safety of Users as well as pedestrians and animals involved in or associated with accidents.

The Safety Consultant shall visit Project Site at least once in every month and submit its report to the Purchaser's Project Manager within 10 days from the last day of his visit to Site.

The recommendations/observations of the Safety Consultant shall be incorporated in the design/construction of the Railway Project.

- To submit to the Purchaser's Project Manager, a certificate of compliance to this effect for the Reviewed Design/construction every month.

6.1 List of Drawings under Project Scope:

The list of drawings mentioned under this clause are minimum, any other drawing required by the Purchaser/Authority shall be included in project scope.

The consultant shall submit the list of all such design drawings that shall have a bearing on safety of Users as well as pedestrians and animals involved in or associated with accident along with safety recommendations.

List of Drawings

Sl.No.	Section	Description of Drawing / Document for Safety Review	Quantity
A	Civil Engineering	P-way drawings / documents	8 Locations
		Tower Wagon shed, OHE Depot, Service buildings including all facilities like roads, drains, boundary etc.	3 Groups
		Modification of Platform sheds dwg / documents	2 Locations



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Sl.No.	Section	Description of Drawing / Document for Safety Review	Quantity
		Subordinate rest house and Camp house for railway staff	6 Locations
		Staff Quarters including all facilities like roads, drains, boundary wall etc.	5 Locations
B	Signal Engineering	Signalling Interlocking plans, Station/Gate working rule diagram, Route Control Chart, Cable courage plan, Circuit diagram, Equipment sizing, Track circuit diagram	20 Stations/LC Gates
		Panel / VDU diagram, Cable core chart, Power supply diagram, Equipment layout & details including cable troughs required, Cable termination Rack diagram	
		Bonding Plan, Earthing Schemes, Lightning & surge protection diagram, Inter equipment wiring diagram	
		Miscellaneous Schemes like Fuse details	
		All other miscellaneous drawings	
C	Telecom Engineering	Location & Connectivity of all equipment's and cables, Schematic and wiring diagrams, Cable core plan and numbering scheme	3 Groups
		Cable route diagram, Layout of equipment's in racks, in rooms etc.	
		Third party interfacing (SCADA, PA system etc.,) cable list and its interconnection charts	
		Miscellaneous schemes like Fuse details, Channelling plan, OFC repeater location diagram etc.	
		All other miscellaneous drawings	
D	Electrification Works (OHE)	LOP, CSD, SED	440 TKM
		Bonding Plans, SPS drawings, Profile Diagrams(if applicable)	
		AT drawings, Power Supply Arrangements at stations/LC gates, Modification of OH Lines drawings	
		All other miscellaneous drawings	
E	TSS/SP/SSP including Civil	GA drawings, Control Room Layouts, Cross Sectional Drawings, Foundation drawings, retaining wall drawings, Super Structure, layout of building	37 Locations
		Cable Trench/Run Layouts, Auxiliary Power Supply Arrangements, Earthing Calculation and Layouts, Feeder Arrangements, Structure Assembly and Layouts	

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Sl.No.	Section	Description of Drawing / Document for Safety Review	Quantity
F	General	Fencing, Door, Anti-climbing device drawings, Illumination drawings, Oil Drain Arrangements	
		SCADA Drawings	
		Other miscellaneous drawings	
		GA drawings of sub-stations, Power Supply arrangements and service building drawings, illumination drawings	10 Locations
		Engineering Scale Plan	
		Brief particular of tractions installations	1 Set

RECORD OF REVISIONS

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