



2025

BHARAT HEAVY ELECTRICALS LIMITED SOLAR BUSINESS DIVISION, BENGALURU TENDER DOCUMENT

Name of Works: Design, Supply, Manufacturing, Installation & Commissioning of 40-meter Radio Tower & RSSI survey including warranty support for 03 years for KAVACH Project in SWR Bengaluru Division.

Name: A K Jaiswal

Designation: Manager/WCC

BHEL- SBD, Bengaluru



NOTICE INVITING TENDER

1. BHEL/ SBD (A Govt. of India Enterprise) invites Tender for engaging a Contractor for **“Design, Supply, Manufacturing, Installation & Commissioning of 40 meter Radio Tower & RSSI survey including warranty support for 03 years for KAVACH Project in SWR Bengaluru Division”**.
2. The enquiry has been floated through e-procurement and offers shall be accepted through e-procurement only. BHEL shall neither entertain offers through hard copy nor provide any due date extension on account of the same. Interested vendors who do not have login ID and password are requested to register themselves on <https://eprocurebhel.co.in> through “Online Bidder Enrolment” link available on the portal.
3. Class-III, SHA2 2048 BIT – Signing & Encryption, Digital Signature Certificate (DSC) is required for bidders for authentication purpose (log in and bid submission). Vendors, who do not possess the DSC, are requested to obtain the same. The procedure for obtaining DSCs is detailed in the “Seller Manual” available on the above-mentioned website.

Tender reference No: 229778

For all clarifications/ issues related to the tender, please contact:

(i) Commercial:

Mr. AK Jaiswal, Manager / Works Contract Cell,
CBU 2ND Floor, BHEL-SBD,
Prof CNR Rao Circle, IISc Post, Malleswaram, Bengaluru- 560 012

E-MAIL: ajaiswal@bhel.in

Ph. No. +91-080-2218-2246 Or

Mr. TG Pragadeesh, Sr. Manager / Works Contract Cell,
CBU 2ND Floor, BHEL-SBD,
Prof CNR Rao Circle, IISc Post, Malleswaram, Bengaluru- 560 012

E-MAIL: pragadeeshtg@bhel.in

Ph. No. +91-080-2218-2232

(ii) Technical:

Mr. Umale Kapil Umakant, Dy. Engineer/TCAS
BHEL-SBD, Prof CNR Rao Circle, IISc Post, Malleswaram, Bengaluru- 560 012

E-MAIL: kapilumale@bhel.in

Ph. No. +91-080-22182396 Or

Mr. Mohan J, Manager/TCAS
BHEL-SBD, Prof CNR Rao Circle, IISc Post, Malleswaram, Bengaluru- 560 012

E-MAIL: mohan.j@bhel.in

Ph. No. +91- 8277345968



TENDER DOCUMENT

PART – A

VOLUME - I

1.	GENERAL INFORMATION
2.	SCOPE OF WORK
3.	PRE- QUALIFICATION CRITERIA
4.	OTHERS ELIGIBILITY CRITERIA
5.	PRICE VARIATION CLAUSE
6.	PAYMENT TERMS
7.	ANNEXURES



1.	General Information	
1.1.	Tender Reference Number:	229778
1.2.	Name of the work:	RSSI survey works using RF prediction method, Tower Foundation, tower fabrication, tower erection including survey, soil investigation, design, drawings, testing, supply, transportation, storage, painting, earthing and fencing as per RDSO/SWR approved 40-meter tower drawings along with 03 years support towards warranty in Reach-8 SWR Bengaluru Division (36 RKM)
1.3.	Tender System	Single Stage, Two Part Bid Part – A: Techno-Commercial & PQR Part – B: Price Bid
1.4.	Tender Type	Works Contract
1.5.	Estimated Value of Contract	Rs. 1,42,18,087.5/- plus GST
1.6.	Duration of Contract	Zero date will be provided by BHEL based on clearance from SWR 1. RSSI Survey within 01 month from Zero date 2. Radio tower supply and I & C – 06 months from RSSI survey completion 3. Field testing along with other Kavach equipment – 11 months after I & C 4. Warranty support - 03 years (Three years) after successful completion of field testing & acceptance by BHEL & RDSO/SWR.
1.7.	Qualifying Requirement	As per NIT Terms & Conditions
1.8.	Earnest Money Deposit to accompany Tender	Rs 2 Lakhs (refer clause 2.2 in Vol II for Modes of deposit for EMD) To be deposited in the form of a crossed Demand Draft/NEFT favoring BHEL-SBD, Bengaluru. If submitted through DD, the DD in original should reach to the office of undersigned within 7 days of Part A bid opening. NEFT favoring BHEL-SBD/ QR-CODE for EMD Submission as per BHEL SBD account details at PG no. 15 of NIT PART A Vol II
1.9.	Security Deposit	10 % of the contract value
1.10.	LD/Penalty Terms	LD shall be applicable for sl no. 1 & 2 of clause 1.6 above in duration of contract after 07 months from zero date as per BHEL GCC clause 2.7.9
1.11.	PVC/ORC	Not applicable
1.12.	Cost of Tender documents	NIL
1.13.	Issue of tender documents	As per Enquiry / RFQ / Notification on www.bhel.com & https://eprocurebhel.co.in
1.14.	Pre- BID Meeting	As per Enquiry / RFQ / Notification on www.bhel.com & https://eprocurebhel.co.in
1.15.	Last date for Issue of tender documents	As per Enquiry / RFQ / Notification on www.bhel.com & https://eprocurebhel.co.in
1.16.	Last date for submission of tender doc	As per Enquiry / RFQ / Notification on www.bhel.com & https://eprocurebhel.co.in
1.17.	Date and time of opening of Tender (Part-A)	As per Enquiry / RFQ / Notification on www.bhel.com & https://eprocurebhel.co.in
1.18.	Tender Submission Place	Online at https://eprocurebhel.co.in
1.19.	Tender Opening Place	Online at https://eprocurebhel.co.in
1.20.	Dealing Officer (For any Clarifications)	Ajeet Kumar Jaiswal, Manager – Works Contract Cell Contact No.: 080-2218-2246 Email: ajaiswal@bhel.in
1.21.	Reverse Auction	<i>“BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) for this tender. RA shall be conducted among the techno-commercially qualified bidders. Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered for RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed price bid along with applicable loading, if any, shall be considered for</i>



		<i>ranking”.</i>
1.22.	Bid participation note	BHEL Banned/debarred contractors/ vendors (or) Contractors/Vendors who had been issued show cause notice/Risk and Cost notice/ action due to non-performance has been initiated by BHEL are NOT allowed/ not eligible for participating in this NIT. However even submitted will be rejected without any prior notice. The tender envelope submitted by such a firms/ bidder will not be considered for evaluation and no communication in this regard will be entertained.
2.	SCOPE OF WORK	
2.1.	RSSI survey works using RF prediction method for Kavach Radio Tower for location finalization, Survey using train borne equipment and quarterly RF Audit survey, Tower Foundation, tower fabrication, tower erection including survey, soil investigation, design, drawings, testing, supply, transportation, storage, painting, earthing and fencing as per RDSO/SWR approved 40-meter tower drawings for 05 no's of towers along with 03 years support towards warranty in Reach-8 SWR Bengaluru Division. Refer Technical specs BHEL DOCUMENT NUMBER: EN-TS-05-52-209-K-001, Comprehensive Planning of TCAS (KAVACH) Towers, RDSO TECHNICAL ADVISORY NOTE, Tower drawings and BOQ and BOQ for detailed scope of work.	
3.	PRE- QUALIFICATION CRITERIA	
3.1.	Refer Clause 3.40 PRE-QUALIFICATION CRITERIA of BHEL DOCUMENT NUMBER: EN-TS-05-52-209-K-001. (1.b Values are inclusive of GST) All the documents to be furnished with documentary proof as per Technical PQC requirement.	
3.2.	Average Annual Financial turnover during the last 3 years ending 31st March of the previous financial year, should be at least Rs.42.65 Lakhs Excl. of GST. Audited Balance sheet and profit& Loss account/ Turn over Certificate from Chartered Accountant with ITR to be enclosed for the FY 22-23, FY 23-24 & FY 24-25. In case audited Balance sheet and profit& Loss account OR Turn over Certificate from Chartered Accountant with ITR of FY 24-25 not available, the same shall be enclosed for FY 21-22.	
4.	OTHERS ELIGIBILITY CRITERIA	
4.1.	The bidder shall also mention the PAN Number issued by Income Tax Department, copy of the PAN card or PAN number allotment letter shall be submitted along with the tender documents.	
4.2.	A copy of GST to be submitted.	
4.3.	Bidder to submit declaration for obtaining the essential license under Contract Labor (Regulation & Abolition) Act 1970 after award of work. Form-5 will be issued to successful bidder by BHEL for applying the license. Successful bidder has to get the endorsement in the license for the areas and nature of work which they will be performing as part of the contract.	
4.4.	Bidder should have independent ESI Employer code under ESI Act 1948. Photocopy of letter from ESI Corp. to establish that bidder is independently registered as an employer under ESI to be produced.	
4.5.	Bidder should have independent PF code under Employee Provident Fund and Miscellaneous Provisions Act 1952. Photocopy of letter from PF Commissioner's Office to establish that bidder is independently registered as an employer PF to be produced.	
4.6.	There should be no litigation or charge under investigation / enquiry / trial against the Tenderer, or conviction in a court of law or suspension or blacklisting by any organization on any ground. During the course of work, if any such information comes to light, the contract may be terminated.	
4.7.	The opinion / decision of BHEL regarding the bid shall be final and conclusive. BHEL reserves the right to reject any or all the bids at any time without assigning any reason.	
4.8.	In case the bidder has a relative employed in BHEL, the authority inviting tender shall be informed of this fact in writing at the time of submission of tender, failing which the tender may be disqualified, or if such fact comes to light subsequently, the contract may be terminated.	
4.9.	If the bidder gives wrong information in his tender or creates conditions favorable for the acceptance of his tender, BHEL reserves the right to reject such tender at any stage.	
4.10.	Benefit (related to Prior Turn Over and Experience criteria) for MSME / NSIC bidders NOT available in this Works contract.	
4.11.	Benefits of prior turnover and prior experience relaxed criteria for Start-ups is not applicable for this tender.	
5.	PRICE VARIATION CLAUSE: Not Applicable	
6.	PAYMENT TERMS	
6.1.	i) No advance payment is applicable for this tender. ii) Payment will be made Through NEFT on completion of each milestone on successful completion &	



	certification by BHEL In charge. iii) Payment time line shall be 45 days for Micro & Small Enterprises (MSEs), 60 Days for Medium Enterprises and 90 days for Non-MSME bidders from date of certification of invoice/bill.
6.2.	Refer BHEL DOCUMENT NUMBER: EN-TS-05-52-209-K-001 clause 3.38 PAYMENT SCHEDULE enclosed with this NIT.
6.3.	GST will be reimbursed to the contractor after the contractor pays GST, files return and submits a proof of the same to BHEL. GST TDS will be done @ 2%. Income Tax TDS will be done as applicable.
7.	Annexures
7.1	Refer Technical specs BHEL DOCUMENT NUMBER: EN-TS-05-52-209-K-001, Comprehensive Planning of TCAS (KAVACH) Towers, RDSO TECHNICAL ADVISORY NOTE, Tower drawings and BOQ for detail scope of work. and BOQ for detail scope of work
7.2	TECHNO-COMMERCIAL BID APPLICATION- ANNEXURE – II
7.3	Bidder Information – Annexure III
7.4	CHECKLIST OF ENCLOSURES – Annexure IV
7.5	Declaration by Bidder-I – Annexure V
7.6	Declaration by Bidder-II – Annexure VI
7.7	Unpriced BID- Annexure VII
7.8	PPP-MII Format- Annexure VIII
7.9	Deviations Sheet- Annexure IX
7.10	Border Sharing format Annexure-D (I & ii)
7.11	Conflict of Interest among Bidders/ Agents



7.2 ANNEXURE – II TECHNO-COMMERCIAL BID APPLICATION

To,

Manager / WCC
Bharat Heavy Electricals Limited
Solar Business Division,
IISc Post, Malleswaram,
Bengaluru – 560 012

Dear Sir,

I / We hereby offer to carry out the work **“RSSI survey works using RF prediction method, Tower Foundation, tower fabrication, tower erection including survey, soil investigation, design, drawings, testing, supply, transportation, storage, painting, earthing and fencing as per RDSO/SWR approved 40-meter tower drawings along with 03 years support towards warranty in Reach-8 SWR Bengaluru Division (36 RKM)”**.

I /We have carefully perused the all the clauses mentioned in NIT and agree to abide with the same.

1. Notice Inviting Tender – Part A Volume I
2. Notice Inviting Tender – Part A Volume II
3. Technical specification, FQP, drawings – Part A
4. Price Bid Format - Part – B

I/ We further agree to execute all the works referred to in the said documents.

I declare that, there was never / is no litigation or charge under investigation / enquiry / trial against me / us, nor conviction in a court of law or suspended or blacklisted by any organization on any grounds.

Signature of Tenderer
Date:



7.3 ANNEXURE – III: BIDDER INFORMATION

S. No.	DETAILS REQUIRED	Requirement fulfilled (Yes / No / NA/ Value/Tick)										
1	Name of the Company											
2	Name of Authorized Signatory											
3	Type Under MSE (tick mark category) OWNERSHIP STATUS (SC/ ST OR WOMEN-OWNED OR OTHERS)	<table><tr><td>1. MICRO</td><td></td></tr><tr><td>2. SMALL</td><td></td></tr><tr><td>3. SC/ST owned</td><td></td></tr><tr><td>4. Women Owned</td><td></td></tr><tr><td>5. Others (excluding SC/ST/Women owned)</td><td></td></tr></table>	1. MICRO		2. SMALL		3. SC/ST owned		4. Women Owned		5. Others (excluding SC/ST/Women owned)	
1. MICRO												
2. SMALL												
3. SC/ST owned												
4. Women Owned												
5. Others (excluding SC/ST/Women owned)												
4	Name of Contact person for this tender											
5	Email-id of contact person											
6	Contact number											
7	Bank Account Details (Name of Bank, Branch and Account Number). Cancelled Cheque to be enclosed											
8	Details of Relatives employed in BHEL, Name Designation and Unit - Clause 4.8	If no relative: Write NIL										
	Relative 1											
	Relative 2											
	Relative 3											



7.4 ANNEXURE – IV: CHECKLIST OF ENCLOSURES

S. No.	DETAILS REQUIRED	Requirement fulfilled (Yes / No / NA/ Value)	Whether proof / document enclosed (YES / NO)
1	Documentary Evidence as per Clause 3.1		
2	Average turnover of last 3 years - Clause 3.2		
3	PAN No. - Clause 4.1		
4	GST certificate should be submitted (under Cl. 4.2)		
5	ESI -Clause 4.4		
6	PF- Clause 4.5		
7	Non-Disclosure Agreement		
8	EMD Details (DD No., Amount, Date & Bank)		
9	PPP-MII Format to be enclosed - Annexure VIII		
10	Boarder sharing (Applicable Annexure-D (i) or D(ii) to be submitted in letter head)		



7.5 ANNEXURE – V: BIDDER DECLARATION - I

S. No.	DETAILS REQUIRED	Requirement fulfilled (Yes / No / NA/ Value)
1	I have carefully read the Tender Terms and Conditions and I submit my agreement for the same.	
2	I have completely understood the scope of work and submit my agreement to carry out the work as per mentioned in Tender document.	
3	I have quoted rates for the total scope of work mentioned in the tender document	
5	I have understood and accepted the payment terms of BHEL as per Cl.6	
6	I am responsible for the safety of workmen deployed and agree to fulfil the requirements as per tender terms	
7	I agree to participate in the tender and carry out the work (if awarded) ethically and submit my agreement to various requirements in this contract.	
8	I have carefully read the Tender Terms and Conditions and I submit my agreement for the same.	
9	Signed and submitted the deviations sheet	



7.6 ANNEXURE – VI, BIDDER DECLARATION - II

I, -----, aged-----Yrs., S/o -----,

Residing at -----

Hereby declare as follows:

- (i) That my nationality is _____.
- (ii) That I am a major and eligible to enter into contract / my firm / my company is competent to enter into an agreement.
- (iii) I shall employ only such personnel who have not been found unfit for employment in Organizations such as Central / state / Public undertaking by the Police Authorities.
- (iv) I shall not employ persons against whom Criminal cases are pending or under investigation.
- (v) I shall also not employ persons found guilty of offences involving moral turpitude for executing work in BHEL contracts.
- (vi) That there are no Criminal cases/Civil/Labor pending or under investigation against me or my firm or company.
- (vii) I have not been found guilty of offences involving moral turpitude nor any of the company directors / partners of my firm have been found guilty of offences involving moral turpitude.
- (viii) Neither I nor my firm nor my company has been declared insolvent in the past.
- (ix) I have taken due care and efforts to furnish only information which are true in the tender document.
- (x) I shall employ labor who is more than 18 years of age and less than 58 years and having sound physical and mental health.
- (xi) I shall keep Photograph / identity proof / residential proof of the laborers to be employed against this tender and arrange for police verification.
- (xii) I shall employ and deploy suitable qualified personnel for supervision of the work in each shift and additionally as required for monitoring compliance to process requirements and compliance to contract terms & conditions.

[Signature with Name & seal of the Tenderer]

Date :

Place :



**SOLAR BUSINESS DIVISION,
Bengaluru - 560 012**

**TENDER
DOCUMENT
(PART – A)
Vol. I**

Validate		Print		Help		Percentage BoQ		
Tender Inviting Authority: GM								
Name of Work: Design, Supply, Manufacturing, Installation & Commissioning of 40-meter Radio Tower & RSSI survey including warranty support for 03 years for KAVACH Project in SWR Bengaluru Division								
Contract No: 229778								
Name of the Bidder/ Bidding Firm/ Company :								
<p align="center">PRICE SCHEDULE</p> <p>(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)</p> <p>Notes:</p> <p>1. Rates of Below mentioned items referred in BOQ is firm.□</p> <p>2. CONTRACTOR SHOULD QUOTE PERCENTAGE (%) ABOVE/BELOW (OR) AT PAR WITH RESPECT TO TOTAL AMOUNT.</p> <p>3. QUOTED PERCENTAGE (%) IS APPLICABLE ON ALL ITEM RATES UNIFORMLY.</p> <p>4. GST Extra applicable (on Total Quoted Price/Rate).</p>								
NUMBER #	TEXT #	NUMBER #	TEXT #	NUMBER	NUMBER #	TEXT #		
Sl. No.	Item Description	Quantity	Units	Estimated Rate in Rs. P	TOTAL AMOUNT Without Taxes in Rs. P	TOTAL AMOUNT In Words		
1	2	4	5	6	53	55		
1	RSSI survey works for Kavach tower installation including measurement of GPS & GSM Signal Strength. RDSO approved 40 m Kavach Radio Tower Design, fabrication, supply and I&C including warranty support for 03 years.							
1.01	Site survey for tower erection RSS Signals strength measurement for approval and obtaining approval of the same for radio survey. - RSSI survey for Train borne equipment for 36 RKM - Payment will be made after successful acceptance of reports by RDSO/SWR officials	1	AU	710904.38	710904.380	INR Seven Lakh Ten Thousand Nine Hundred & Four and Paise Thirty Eight Only		
1.02	Carrying out survey by train or by trolley or by foot in the block section to assess the radio signal strength and prepared RF audit and RF survey Reports for finalization of location of towers. -RSSI survey for Location of Towers for 36 RKM -Payment will be made after successful acceptance of reports by RDSO/SWR officials	1	AU	1421808.75	1421808.750	INR Fourteen Lakh Twenty One Thousand Eight Hundred & Eight and Paise Seventy Five Only		
1.03	Completion of foundation □	5.00	Nos	426542.60	2132713.000	INR Twenty One Lakh Thirty Two Thousand Seven Hundred & Thirteen Only		
1.04	Supply of tower super-structure material	5.00	Nos	426542.60	2132713.000	INR Twenty One Lakh Thirty Two Thousand Seven Hundred & Thirteen Only		
1.05	Erection of tower with Aviation Lamp	5.00	Nos	426542.60	2132713.000	INR Twenty One Lakh Thirty Two Thousand Seven Hundred & Thirteen Only		
1.06	Completion of fencing, earthing and all other associated tower works.	5.00	Nos	568723.500	2843617.500	INR Twenty Eight Lakh Forty Three Thousand Six Hundred & Seventeen and Paise Fifty Only		
1.07	Submission of post commissioning RSSI	5.00	Nos	284361.80	1421809.000	INR Fourteen Lakh Twenty One Thousand Eight Hundred & Nine Only		
1.08	Acceptance by RDSO □	5.00	Nos	142180.90	710904.500	INR Seven Lakh Ten Thousand Nine Hundred & Four and Paise Fifty Only		
1.09	Carrying out survey by train in the block section to assess the RF signal strength for assessing its quality and carrying out RF audit of station KAVACH. (UNIT TO BE READ AS NUMBERS= Per Stationary Kavach Per Quarter) - RSSI survey for Station Kavach for 05 Stations - Payment will be made after successful acceptance of reports by RDSO/SWR officials + Warranty support for 3 years from commissioning date (Clearing of Vegetation on monthly basis,maintenance of tower and quarterly surveys)	12.00	Quarterly	59242.03	710904.360	INR Seven Lakh Ten Thousand Nine Hundred & Four and Paise Thirty Six Only		
Total in Figures					14218087.490	INR One Crore Forty Two Lakh Eighteen Thousand & Eighty Seven and Paise Forty Nine Only		
Quoted Rate in Figures			Select		0.000	INR Zero Only		
Quoted Rate in Words		INR Zero Only						

GST extra as applicable



7.8 ANNEXURE- VIII, PPP-MII Format

FORMAT FOR VERIFICATION OF LOCAL CONTENT UNDER PREFERENCE TO MAKE IN INDIA ORDER
(To be submitted with the offer)

[Applicable for procurement value from Rs. 5.00 Lac to Rs. 10.00 Crore]

Self-certification giving the percentage of local content, in line with PPP-MII order, if applicable [to be submitted on the letter head of the issuer.]

Item Name : **RSSI survey works for Kavach tower installation including measurement of GPS & GSM Signal Strength. RDSO approved 40 m Kavach Radio Tower Design, fabrication, supply and I&C including warranty support for 03 years.**

Enquiry No. : **229778**

Project/Site location: **SWR Bengaluru Division**

Applicable percentage of Local Content.....(**Bidder to indicate local content in percentage**)

We have read and understood the provisions of “Public Procurement (Preference to Make in India) Order, 2017” dated 15/06/2017, its revision dated 28/05/2018 and any subsequent modifications/Amendments, if any [hereinafter, “PPP-MII Order”] issued by Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Government of India.

In line with the provisions of the PPP-MII Order, We, M/s. **[Enter the name of the Bidder]** [hereinafter, “Local Supplier”] submits self-certification to M/s. Bharat Heavy Electricals Limited [hereinafter, BHEL] regarding Local Content in Goods/Services/Works to be supplied by the Local Supplier **Kavach tower installation with survey works** (Enter the name of the Equipment/Item for Project), wherein we have agreed to abide by the terms and conditions of the PPP-MII Order.

Details of location at which local value addition will be made is as follows:

We also understand, false declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

For and on behalf of, Date:

Authorized Signatory

(With Company Seal & Signature)

Note: This is a guiding format. In case the bidder submits the certificate in a format different from the above, the same may be considered provided it meets the intent and purpose, as may be ascertained by BHEL.



7.9 ANNEXURE -IX: DEVIATION SHEET

Sl No.	Volume	Part/Clause Sl no.	NIT requirement	Bidder's Deviation

Total No. of deviations proposed by the Bidder- _____ nos.

BIDDER'S SIGN & SEAL:

Note: The Offers should be in full conformity with the terms and conditions of this tender. Incorrect and incomplete tenders are liable to be rejected. Deviations, if any, should only be mentioned as per format for Non-Technical Deviations (i.e. General Terms & Conditions, Commercial Terms etc.) & Technical Deviations (i.e. Scope of Work, Modalities of Contract etc.). BHEL at its discretion whether to give any further chance to a bidder in case of any deviation or reject the same offer.



Annexure-D (i)

7.10: Border Sharing format
(Compliance to be submitted in the bidder's letter head)
(as applicable)

Sub: Compliance to Government of India order OM No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020 regarding restrictions under Rule 144 (XI) of the General Financial Rules (GFRs), 2017

Item Name :	RSSI survey works for Kavach tower installation including measurement of GPS & GSM Signal Strength. RDSO approved 40 m Kavach Radio Tower Design, fabrication, supply and I&C including warranty support for 03 years.
Enquiry No. :	229778
Project :	BHEL SBD, KAVACH Project in SWR Bengaluru Division

We M/s. _____ (name of the bidder company) have read the clauses pertaining to Department of Expenditure's (DoE) Public Procurement Division Order (Public procurement no 1,2 & 3 vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder of a country which shares a land border with India.

We hereby certify that **we are not from such a country** and eligible to be considered for this tender.

(Note: Non-compliance of above said GoI Order and its subsequent amendment, (if any), by any bidder(s) shall lead for commercial rejection of their bids by BHEL)

For and behalf of _____ (Name of the bidder)

(Signature, date & seal of authorized representative of the bidder)

Annexure-D (ii)

(Compliance to be submitted in the bidder's letter head)
(as applicable)

Sub: Compliance to Government of India order OM No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020 regarding restrictions under Rule 144 (XI) of the General Financial Rules (GFRs), 2017

Item Name :	RSSI survey works for Kavach tower installation including measurement of GPS & GSM Signal Strength. RDSO approved 40 m Kavach Radio Tower Design, fabrication, supply and I&C including warranty support for 03 years.
Enquiry No. :	229778
Project :	BHEL SBD, KAVACH Project in SWR Bengaluru Division

We M/s. _____ (name of the bidder company) have read the clauses pertaining to Department of Expenditure's (DoE) Public Procurement Division Order (Public procurement no 1,2 & 3 vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder of a country which shares a land border with India.

We are from such a country which shares a land border with India & have been registered with the Competent Authority as specified in above said order. We hereby certify that we fulfil all requirements in this regard and are eligible to be considered. **Evidence of valid registration by the Competent Authority is attached.**

(Note: Non-compliance of above said GoI Order and its subsequent amendment, (if any), by any bidder(s) shall lead for commercial rejection of their bids by BHEL)

For and behalf of _____ (Name of the bidder)

(Signature, date & seal of authorized representative of the bidder)



7.11 ANNEXURE -XI
CONFLICT OF INTEREST AMONG BIDDERS/ AGENTS

“A bidder shall not have conflict of interest with other bidders. Such conflict of interest can lead to anti-competitive practices to the detriment of Procuring Entity's interests.

The bidder found to have a conflict of interest shall be disqualified.

The bidder notes that a conflict of interest would said to have occurred in the tender process and execution of the resultant contract, in case of any of the following situations:

- (i) If its personnel have a close personal, financial, or business relationship with any personnel of BHEL who are directly or indirectly related to the procurement or execution process of the contract, which can affect the decision of BHEL directly or indirectly;
- (ii) The bidder (or his allied firm) provided services for the need assessment/ procurement planning of the Tender process in which it is participating;
- (iii) Procurement of goods directly from the manufacturers/ suppliers shall be preferred. However, if the OEM/ Principal insists on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer/ supplier could bid directly but not both. In case bids are received from both the manufacturer/ supplier and the agent, bid received from the agent shall be ignored. However, this shall not debar more than one Authorized distributor (with/ or without the OEM) from quoting equipment manufactured by an Original Equipment Manufacturer (OEM) in procurements under a Proprietary Article Certificate.
- (iv) A bidder participates in more than one bid in this tender process. Participation in any capacity by a Bidder (including the participation of a Bidder as a partner/ JV member or sub-contractor in another bid or vice-versa) in more than one bid shall result in the disqualification of all bids in which he is a party. However, this does not limit the participation of an entity as a sub-contractor in more than one bid if he is not bidding independently in his own name or as a member of a JV.

The Bidder declares that they have read and understood the above aspects, and the bidder confirms that such conflict of interest does not exist and undertakes that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s), in this regard. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the Bidder is found having indulged in above activities, the same will be considered as a violation of the tender conditions, and suitable action shall be taken by BHEL as per extant policies/ guidelines.

Date:



TENDER DOCUMENT

PART – A

VOLUME - II

1.	INSTRUCTION TO BIDDER
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3.	SECURITY DEPOSIT (SD) :
4.	NON DISCLOSURE AGREEMENT
5.	CONFIDENTIALITY
6.	STATUTORY REQUIREMENTS
7.	PERIOD OF CONTRACT
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11.	LEGAL JURISDICTION:
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16.	REVERSE AUCTION
17.	CONCILIATION CLAUSE – Annexure IA
18.	MAKE IN INDIA CLAUSE
19.	GOODS & SERVICE TAX (GST) REGISTRATION & COMPLIANCE
20.	FORCE MAJEURE
21.	NO INTEREST PAYABLE TO CONTRACTOR
22.	INTIMATION OF CHANGE OF NAME/ RE-CONSTITUTION OF THE ORGANIZATION
23.	INSURANCE
24.	LIMITATION ON LIABILITY
25.	THIRD PARTY NON-DISCLOSURE AGREEMENT (NDA) FORMAT
26.	EFT FORMAT
27.	GCC



1.	INSTRUCTION TO BIDDER
1.1.	Tender is a two-part bid system. The tender documents consist of Part - A and Part - B as detailed below: a. Part 'A': Techno-commercial Bid duly sealed and signed to be uploaded at the web-portal (https://eprocurebhel.co.in) on or before the due date. b. Part 'B': Price Bid to be quoted in prescribed format available on web portal (https://eprocurebhel.co.in) on or before the due date.
1.2.	Envelope 1: Techno-Commercial Offer a. Documents to be uploaded at NIC web portal (https://eprocurebhel.co.in): i. Earnest Money Deposit (EMD) either in the form of DD or UTR Number (if paid through EFT) at the space provided. ii. Duly completed tender documents volume I&II(Part-A) sign and Sealed. iii. Each and every page of tender documents should be sealed signed. iv. Documents satisfying PQR/Eligibility Criteria as per relevant clause of NIT. v. Any other documents as per Tender requirements. vi. Each and every page of tender documents should be sealed & signed by the tenderer vii. Any other documents as per Tender requirements. b. The tenderer shall not indicate the price or rate in this Envelope. Envelope 2: Part 'B': Online Price-Bid. i. To be submitted online at NIC web portal (https://eprocurebhel.co.in)
1.3.	The tenderer shall expressly accept all the terms and conditions of the Tender. The tender which does not comply with the BHEL's Terms & Conditions may be rejected as Non-responsive/non-conforming and non-acceptable.
1.4.	The techno-commercial offer will be opened on the due date. The tenders meeting our techno-commercial requirements will be considered for online initial sealed bid auction at a later date for which eligible vendors will be intimated in due course.
1.5.	The tender forms duly filled in all respects shall be signed on each page by the tenderer. Any alteration, erasing will render the tender invalid. Corrections, over writing, cutting(s) etc. are not permitted. All entries in the tender document should be in one ink. All the columns in the tender form should be filled without leaving any column blank in any page of the tender. In case any of the relevant columns are left blank, the tender can be rejected. However, alteration neatly carried out and duly attested over with the full signature of the tenderer is permitted.
1.6.	The tenderer should submit the tender documents intact without detaching any page or pages
1.7.	Before making the offer, the bidders are advised to carefully go through the terms and conditions, which form part of the Agreement.
1.8.	Tender documents consisting of Part 'A' Volume I & II duly sealed and signed and Part 'B' shall be uploaded duly on or before the said Date and Time. Part 'A' Volume I & II of tender form i.e. PQR and Techno-commercial Bid will be opened on specified Tender Due Date and Time. Bidders who qualify the PQR & Techno-commercial Bid will be intimated to participate in R.A.
1.9.	BHEL reserves the right to assess the capacity and capability of the parties for pre-qualification. The company also reserves the right to accept or reject any or all the tenders or any part thereof at any stage of process without assigning any reason whatsoever. The company has no obligation to accept the lowest tender. Offer of the Tenderer if prima-facie found not comparable with the quantum of work envisaged and the bid is a desperate effort to be L1, then the offer is liable to be rejected. BHEL's decision in this regard shall be final and binding.
1.10.	PRICE BID - The tenderers are required to submit their quotation for all the items listed in the Price Bid format given along with the tender documents. The price should be quoted for each activity after careful study of the actual job requirement so that, in case the contract is awarded, contractor should not express any difficulties in execution of the contract.
1.11.	Contractor to ensure payment of Minimum Wages payable as per statutory provisions of the Appropriate Govt.



1.12.	VALIDITY OF RATES: The rates quoted should be valid for 90 days initially from the date of opening of the Techno-Commercial bid. (Part-A)
1.13.	The rates shall include the payments on account of Employee contribution to PF, PF Admin. Charges, EDLI, Employer contribution to ESI, Gratuity, Bonus as per statutory requirement, applicable taxes, as per the directives issued by BHEL from time to time.
1.14.	BHEL reserves the right to reject any bid, which is technically unacceptable and unworkable. Further BHEL also reserves the right to reject any or all tenders without assigning any reasons thereof.
1.15.	BHEL reserves the right to cancel the contract at the initial stage or during the contract period without assigning any reason to the tenderer.
1.16.	Wherever prescribed formats are specified for the tenderers use, he shall use the same for making his Claims.
1.17.	Tender document should be complete in all respects.
1.18.	Successful tenderers shall enter into an Agreement on a non-judicial stamp paper of Rs.100/- as a token of having accepted the rates, terms and conditions of the contract as per the Proforma given by BHEL.
1.19.	The Offers should be in full conformity with the terms and conditions of this tender. No contradictions are acceptable. Incorrect and incomplete tenders are liable for rejection.
1.20.	Tenders not submitted in the prescribed forms are liable for rejection.
1.21.	BHEL reserves the right to accept or reject any tender in part or full at their discretion without assigning any reason.
1.22.	If a tenderer deliberately gives wrong information in his tender or creates conditions favorable for the acceptance of his tender, then BHEL reserves the right to reject such tender at any stage.
1.23.	If the tenderer indulges in any unethical practice for securing the contract, the offer of such tenderer shall be rejected.
1.24.	Any written communication required to be sent to the contractor in writing shall be sent at the address mentioned on the tender form or to any other address subsequently intimated by contractor in writing to BHEL SBD for the contract purposes.
1.25.	Evaluation of Bids
1.26.	Techno-Commercial Bid & PQR: The techno-commercial bid & PQR will be evaluated based on the eligibility criteria and on acceptance of NIT terms and conditions of BHEL. Only qualified bids will be eligible for price-bid opening.
1.27.	Evaluation of Price-Bids: Evaluation of the L-1 offer shall be computed on overall lowest cost to BHEL basis (Grand Total Price for all the items indicated in Price Bid minus tax credit, if, any)
1.28.	Compensation to Contractor: No compensation to contractor shall be given for prior completion/ early closure or any negative/ positive variation in contract value.
1.29.	In the course of evaluation, if more than one bidder happens to occupy the L-1 status, effective L- will be decided by soliciting discounts from the respective L-1 bidders. In case more than one bidder happens to occupy L-1 status even after soliciting discounts, the L-1 bidder will be decided by a toss/draw of lots, in the presence of respective L-1 bidder (s) or their representative (s). Ranking will be done accordingly. BHEL's decisions in such situations shall be final and binding
2.	EARNEST MONEY DEPOSIT (EMD): APPLICABLE as per NIT Vol I Clause 1.8-General Information of Tender.
2.1	Earnest Money Deposit (EMD) is to be paid by tenderers for securing fulfilment of any obligations in terms of the NIT. Earnest Money Deposit as indicated in the NIT (Ref. General Information) is to be submitted along with tender documents Part – A.
2.2	Modes of deposit The EMD may be accepted only in the following forms: (i) Cash deposit as permissible under the extant Income Tax Act (before tender opening) (ii) Electronic Fund Transfer credited in BHEL account (before tender opening) (iii) Banker's cheque/ Pay order/ Demand draft, in favor of BHEL (along with offer)



	(iv) Insurance Surety Bonds (v) Fixed Deposit Receipt issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL and duly discharged on the back)
2.3	Forfeiture of EMD EMD by the Tenderer will be forfeited as per NIT conditions, if: i) After opening the tender and within the offer validity period, the tenderer revokes his tender or makes any modification in his tender which is not acceptable to BHEL. ii) The Contractor fails to deposit the required Security deposit or commence the work within the period as per LOI/ Contract EMD by the tenderer shall be withheld in case any action on the tenderer is envisaged under the provisions of extant “Guidelines on Suspension of business dealings with suppliers/ contractors” and forfeited/ released based on the action as determined under these guidelines.
2.4	EMD given by all unsuccessful tenderers shall be refunded normally within fifteen days of award of work.
2.5	EMD shall not carry any interest.
2.6	EMD of successful tenderer will be retained as part of Security Deposit.
3.	SECURITY DEPOSIT (SD) : The total amount of Security Deposit will be 10 % of the contract value
3.1.	Security Deposit means the security provided by the Contractor towards fulfilment of any obligations in terms of the provisions of the contract.
3.2.	The total amount of Security Deposit will be 10 % of the contract value. EMD of the successful tenderer shall be converted and adjusted towards the required amount of Security Deposit.
3.3.	Modes of deposit: The balance amount to make up the required Security Deposit may be accepted in the following forms: i. Cash (as permissible under the extant Income Tax Act) ii. Local cheque of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favor of BHEL iii. Bank Guarantee from Scheduled Banks/ Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL iv. Fixed Deposit Receipt issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL) v. Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL) vi. Electronic Fund Transfer credited in BHEL account. vii. Insurance Surety Bonds (Note: BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith)
3.4.	Collection of Security: At least 50% of the required Security Deposit, including the EMD should be collected before start of the work. Balance of the Security Deposit can be collected by deducting 10% of the gross amount progressively from each of the running bills of the Contractor till the total amount of the required Security Deposit is collected. If the value of work done at any time exceeds the contract value, the amount of Security Deposit shall be correspondingly enhanced and the additional Security Deposit shall be immediately deposited by the Contractor or recovered from payment/s due to the Contractor. The recoveries made from running bills (cash deduction towards balance SD amount) can be released against submission of equivalent Bank Guarantee in acceptable form, but only once, before completion of work, with the approval of the authority competent to award the work. Note:50% of the Security Deposit shall be collected from the contractor, before start of the work or 14 days from contract date whichever is later. The interest period shall start after the lapse of above period



	as per applicable rates)
3.5.	Security Deposit shall be released to the Contractor upon fulfilment of contractual obligations as per terms of the contract.
3.6.	The Security Deposit shall not carry any interest.
3.7.	Bidder agrees to submit performance security required for execution of the contract within the time period mentioned. In case of delay in submission of performance security, enhanced performance security which would include interest (Repo rate + 4%) for the delayed period, shall be submitted by the bidder. Further, If performance security is not submitted till such time the first bill becomes due, the amount of performance security due shall be recovered as per terms defined in NIT/contract, from the bills along with due interest.
4.	NON DISCLOSURE AGREEMENT. The contractor shall sign a Non-Disclosure Agreement (NDA) as per BHEL format (Copy enclosed) in compliance to Information Security Management System.
5.	CONFIDENTIALITY: The contractor and his representatives shall, at all times, undertake to maintain and ensure complete confidentiality and integrity of all data, information, software, drawings & documents, etc. belonging to BHEL and also of the systems, procedures, reports, input documents, results and any other company documents discussed and/or finalized during the course of execution of the order/contract.
6.	STATUTORY REQUIREMENTS:
6.1.	While quoting the rate, the tenderers are advised to take note of minimum wages payable to workmen.
6.2.	The tenderer will be required to comply with all the statutory provisions such as Minimum Wages prevailing at the time of payment or arrears thereof Bonus, PF, EDLI, ESI, Applicable Tax, declared Holidays, leave, etc. The contractor shall submit the documentary evidence of payment on account of submission of statutory payments made to the concerned agencies before clearance of bill of next month.
6.3.	The Contractor shall comply with the provisions of the Factories Act 1948, Contract Labour (Regulation and Abolition) Act 1970, ESI Act, Employees Provident Fund and Miscellaneous Act 1952, Minimum Wages Act 1948, Payment of Gratuity Act 1972, Industrial Disputes Act, 1947, Employers Liability Act 1938, Inter State Migrants Workmen (Regulation of employment and conditions of Service) Act 1979, Employees Compensation Act (...), Maternity Benefit Act 1961, and or any other Laws and Rules that may be applicable from time to time to the workers engaged by him. The contractor, when required by the Company shall produce the registers and records for verification and comply with other directions issued by the company for compliance of the statutory provisions.
6.4.	The contractor shall fully indemnify the loss if any caused to BHEL due to any default or non-observance of any of the laws, or any omission or commission or inability on the part of the contractor or his representative.
6.5.	The contractor shall, keep and produce for inspection at all times, forms, registers and other records required to be maintained under various statutes in order to enable scrutiny by the Company whenever required.
6.6.	The contractor shall produce to the Company, the documentary proof of payment of the said statutory dues. Non-observance of the provisions will be construed as default by the Tenderer in making such payment, and payment of his bill will be deferred.
6.7.	The Income tax as applicable will be deducted from the bill of the contractor.
6.8.	Each contractor will be required to maintain the daily attendance of his labors in the prescribed Performa for accounting payment of minimum wages, deduction towards ESI & PF Contributions, payment of Bonus, leave etc.
6.9.	The contractor will have to follow the provisions of Payment of Bonus Act 1965 and Rules 1975, and is liable to pay Bonus to his workers
6.10.	The contractor will have to extend paid National Holidays and Festival Holidays to their workmen as per the provisions of the relevant Act and the Rules thereof. However, if due to exigencies of work the contractor engages his workmen on National Holidays or Festival Holidays contractor shall pay additional wages as prescribed under the provisions of the Act.
6.11.	COMPLAINT WITH BOCW ACT: The contractor shall get registered and comply with the provisions of BOCW Act along with the allied rules and pay cess as per Cess Act along with allied rules. As applicable. The contractor shall also indemnify BHEL from all consequences/liabilities / penalties in case of non-compliance of the provisions of BOCW Act along with the allied rules and cess act.



7.	<u>PERIOD OF CONTRACT</u>
7.1.	Duration of contract is as mentioned in the General Information of NIT
8.	<u>FAILURE TO COMPLY WITH CONTRACT</u>
8.1.	Notwithstanding anything contained in any other clause, BHEL reserves the right to terminate the contract due to any failure on the part of the Tenderer in discharging his obligations under the contract or in the event of his becoming insolvent or going into liquidation. The decision of the BHEL about the failure on the part of the Tenderer shall be final and binding on the tenderer.
8.2.	In case of any damage to the existing building, structures, materials, tools, furniture and fixtures, machines etc., caused from contractor's end, the cost of its repairs or replacement will be recovered from the contractor. If there is any work stoppage in any area of the Plant due to the fault of the tenderer, the tenderer is liable to compensate the same.
8.3.	<p>A) Breach of contract and Termination: In case of breach of contract, 10% of the contract value shall be recovered from the contractor. This 10% of the recovery amount is other than the penalty/LD amount mentioned elsewhere in the contract. In case of breach of contract, wherever the value of security instruments like performance bank guarantee available with BHEL against the said contract is at least 10% of the contract value, the same be encashed. In case the value of the security instruments available is less than 10% of the contract value, the balance amount be recovered from other financial remedies (i.e. available bills of the contractor, retention amount, etc. with BHEL) or legal remedies be pursued. The balance scope shall be got done independently without Risk & Cost of the failed supplier/ contractor.</p> <p>B) Following cases shall be considered as terms of breach of contract:</p> <ul style="list-style-type: none">i. Contractor/ supplier's poor progress of the work vis-à-vis execution timeline as stipulated in the Contract, backlog attributable to contractor/ supplier including unexecuted portion of work/ supply does not appear to be executable within balance available period considering its performance of executionii. Withdrawal from or abandonment of the work by contractor before completion of the work as per contract.iii. Non-completion of work/ Non-supply by the Contractor/ supplier within scheduled completion/delivery period as per Contract or as extended from time to time, for the reasons attributable to the contractor/ supplier.iv. Termination of Contract on account of any other reason (s) attributable to Contractor/ Supplier. If at any time the Contractor defaults in proceeding with the work with due diligence and continues to do so or commit any default in complying any of the tender terms and conditions even after the notice in writing is given, BHEL may, without prejudice to any other right to remedy which shall have accrued or shall accrue thereafter to BHEL, to terminate the contract by giving 30 days' notice in writing. The notice will be deemed to have been served as and when sent to the address given in the tender.v. Assignment, transfer, subletting of Contract without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.vi. Non-compliance to any contractual condition or any other default attributable to Contractor/ Supplier. <p>C) The following sequence shall be applicable for recoveries from contractor/ supplier, who has breached the contract:</p> <ul style="list-style-type: none">i. Dues available in the form of Bills payable to contractor/ supplier, Security deposits, Bank Guarantees against the same contract in BHEL SBD.ii. Dues payable to contractor/ supplier against other contracts in BHEL SBD or any other units/regions of BHEL shall be considered for recovery from the Unpaid Bills/Running Bills/SD/BGs/Final Bills of contractor/ supplier.iii. In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor/supplier.
9.	<u>SUB-CONTRACTING</u>
9.1.	The contractor shall not sub-contract or transfer or assign the contract in full or any part thereof to any other person or firm or company without the previous express written approval of BHEL.
10.	<u>LAWS GOVERNING THE CONTRACT</u>
10.1.	The contract will be governed by the Laws of India for the time being in force and as amended or made from time



	to time.
10.2.	All disputes shall be settled in accordance with the Laws of India for the time being in force and as amended from time to time.
10.3.	All disputes arising out of or in relation to this contract or Agreement shall be settled by mutual discussions and in the event of failure such disputes shall be referred to the Arbitrator.
11.	LEGAL JURISDICTION:
11.1.	In respect of all matters arising out of or pertaining to the contract, the cause of action thereof shall be deemed to have arisen only at Bengaluru, where BHEL – SBD is situated. All legal proceedings pertaining to the above matters or dispute shall be instituted only in courts having territorial jurisdiction over the place where BHEL-SBD is situated and no other court shall have the jurisdiction.
11.2.	CARTEL FORMATION: The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.
12.	SETTLEMENT OF DISPUTES If any dispute or difference of any kind whatsoever shall arise between BHEL and the Supplier/Vendor, arising out of the contract for the performance of the work whether during the progress of contract termination, abandonment or breach of the contract, it shall in the first place referred to Designated Engineer for amicable resolution by the parties. Designated Engineer (to be nominated by BHEL for settlement of disputes arising out of the contract) who within 60 days after being requested shall give written notice of his decision to the contractor. Save as hereinafter provided, such decision in respect of every matter so referred shall forthwith be given effect to by the Supplier/Vendor who shall proceed with the work with all due diligence, whether he or BHEL desires to resolve the dispute as hereinafter provided or not. If after the Designated Engineer has given written notice of this decision to the party and no intention to pursue the dispute has been communicated to him by the affected party within 30 days from the receipt of such notice, the said decision shall become final and binding on the parties. In the event the Supplier/Vendor being dissatisfied with any such decision or if amicable settlement cannot be reached then all such disputed issues shall be resolved through conciliation in terms of the BHEL Conciliation Scheme 2018 as per Clause 17.
13.	ARBITRATION
13.1.	Except as provided elsewhere in this contract, in case Parties are unable to reach an amicable settlement (whether by Conciliation to be conducted as provided in Clause 17 herein above or otherwise) in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or, in any manner touching upon the Contract (hereinafter referred to as the 'Dispute'), then, either Party may, refer the disputes to Arbitral Institution "Arbitration & Conciliation Centre, Bengaluru (Domestic and International)" and such dispute to be adjudicated by Sole Arbitrator appointed in accordance with the Rules of the said Arbitral Institution.
13.2.	A Party willing to commence arbitration proceeding shall invoke Arbitration Clause by giving notice to the other party in terms of section 21 of The Arbitration and Conciliation Act, 1996 (hereinafter referred to as the 'Notice') before referring the matter to arbitral institution. The Notice shall be addressed to the Head of the Region, Power Sector/ Unit, BHEL, executing the Contract and shall contain the particulars of all claims to be referred to arbitration with sufficient detail and shall also indicate the monetary amount of such claim including interest, if any.
13.3.	After expiry of 30 days from the date of receipt of aforesaid notice, the party invoking the Arbitration shall submit



	that dispute to the Arbitration & Conciliation Centre, Bengaluru (Domestic and International) and that dispute shall be adjudicated in accordance with their respective Arbitration Rules. The matter shall be adjudicated by a Sole Arbitrator who shall necessarily be a Retd. Judge having considerable experience in commercial matters to be appointed/nominated by the respective institution. The cost/expenses pertaining to the said Arbitration shall also be governed in accordance with the Rules of the respective Arbitral Institution. The decision of the party invoking the Arbitration for reference of dispute to Arbitration & Conciliation Centre, Bengaluru (Domestic and International) for adjudication of that dispute shall be final and binding on both the parties and shall not be subject to any change thereafter. The institution once selected at the time of invocation of dispute shall remain unchanged.
13.4.	The fee and expenses shall be borne by the parties as per the Arbitral Institutional rules.
13.5.	The Arbitration proceedings shall be in English language and the seat and venue of Arbitration shall be in Bengaluru, Karnataka only.
13.6.	Subject to the above, the provisions of The Arbitration & Conciliation Act, 1996 and any amendment thereof shall be applicable. All matters relating to this Contract and arising out of invocation of Arbitration clause are subject to the exclusive jurisdiction of the Court(s) situated at Bengaluru, Karnataka only.
13.7.	Notwithstanding any reference to the Designated Engineer or Conciliation or Arbitration herein, the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree. Settlement of Dispute clause cannot be invoked by the Contractor, if the Contract has been mutually closed or 'No Demand Certificate' has been furnished by the Contractor or any Settlement Agreement has been signed between the Employer and the Contractor.
13.8.	It is agreed that Mechanism of resolution of disputes through arbitration shall be available only in the cases where the value of the dispute is less than Rs. 10 Crores.
13.9.	In case the disputed amount Claim, Counter claim including interest is Rs. 10 crores and above, the parties shall be within their rights to take recourse to remedies other than Arbitration, as may be available to them under the applicable laws after prior intimation to the other party. Subject to the aforesaid conditions, provisions of the Arbitration and Conciliation Act, 1996 and any statutory modifications or re-enactment thereof as amended from time to time, shall apply to the arbitration proceedings under this clause.
13.10.	In case, multiple arbitrations are invoked (whether sub-judice or arbitral award passed) by any party to under this contract, then the cumulative value of claims (including interest claimed or awarded) in all such arbitrations shall be taken in to account while arriving at the total claim in dispute for the subject contract for the purpose of clause 13.9. Disputes having cumulative value of less than 10 crores shall be resolved through arbitration and any additional dispute shall be adjudicated by the court of competent jurisdiction.
13.11.	In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable: In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through AMRCD (Administrative Mechanism for Resolution of CPSEs Disputes) as mentioned in DPE OM No. 05/0003/2019-FTS-10937 dated 14-12-2022 as amended from time to time.
14.	COMPENSATION:
14.1.	"BHEL shall recover the amount of compensation paid to victim(s) by BHEL towards loss of life / permanent disability due to an accident which is attributable to the negligence of contractor, agency or firm or any of its employees as detailed below. a) Victim: Any person who suffers permanent disablement or dies in an accident as defined below. b) Accident: Any death or permanent disability resulting solely and directly from any unintended and unforeseen injurious occurrence caused during the manufacturing/ operation and works incidental thereto at BHEL factories/ offices and precincts thereof, project execution, erection and commissioning, services, repairs and maintenance, trouble shooting, serving, overhaul, renovation and retrofitting, trial operation, performance guarantee testing undertaken by the company or during any works / during working at BHEL Units/ Offices/



	townships and premises/ Project Sites. c) Compensation in respect of each of the victims: (i) In the event of death or permanent disability resulting from Loss of both limbs: ₹10,00,000/- (Rupees Ten Lakhs) (ii) In the event of other permanent disability: ₹7,00,000/- (Rupees Seven Lakhs) d) Permanent Disablement: A disablement that is classified as a permanent total disablement under the provision to Section 2 (l) of the Employee's Compensation Act, 1923."
15	PENALTY/ LIQUIDATED DAMAGES (LD): Refer NIT Vol I Clause 1.10 of General Information for LD/Penalty terms
16	REVERSE AUCTION- Terms and conditions (Refer forms) "BHEL shall be resorting to Reverse Auction (RA)-2024-Doc. No. AA:SSP:RA:00 dated 05.12.2024(Guidelines as available on www.bhel.com) for this tender. RA shall be conducted by BHEL assigned agency. Refer Clause 10 for Reverse Auction Process in RA 2024 guidelines.
17	CONCILIATION CLAUSE – Annexure IA Any dispute, difference or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties, and so notified in writing by either Party to the other Party (the "Dispute") shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure as per BHEL Conciliation Scheme 2018. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in - "Procedure for conduct of conciliation proceedings" (as available in https://www.bhel.com/bhel-conciliation-scheme-2018-0). Note: Ministry of Finance has issued OM reference No. 1/2/24 dated 03.06.2024 regarding "Guidelines for Arbitration and Mediation in Contracts of Domestic Public Procurement. In the said OM it has been recommended that Government departments/ Entities/agencies are to encourage mediation under the Mediation Act. 2023. Entities/agencies are to encourage mediation under the Mediation Act. 2023. The said Act has not yet been notified by the Government. Therefore, the clause "Settlement of Disputes" shall be modified accordingly as and when the Mediation Act 2023 gets notified.
18	MAKE IN INDIA CLAUSE I. For this procurement, Public Procurement (Preference to MAKE IN INDIA) Order 2017 Dated 15.06.2017, 28.05.2018, 29.05.2019, 04.06.2020 and subsequent orders issued by the respective Nodal Ministry shall be applicable. Even if issued after issue of this NIT but before finalization of contract WO against this NIT. II. In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and/ or local content in respect of this procurement same shall be applicable.
19	GOODS & SERVICE TAX (GST) REGISTRATION & COMPLIANCE A. Response to tenders for indigenous supplier will be entertained only if the vendor has a valid GST registration number (GSTIN) which should be clearly mentioned in the offer. If the dealer is exempted from GST registration, a declaration with due supporting documents need to be furnished for considering the offer. Dealers under composition scheme should declare that he is a composition dealer supported by the screen shot taken from GST portal. The dealer has to submit necessary documents if there is any change in status under GST. B. Supplier shall mention their GSTIN in all their invoices (incl. Credit notes, debit notes) and invoices shall be in the format as specified/prescribed under GST laws. Invoices shall necessarily contain invoice number (in case of multiple numbering system is being followed for billing like sap invoice no, commercial invoice no etc., then the invoice no. Which is linked/uploaded in GSTN network shall be clearly indicated), billed to party (with GSTIN) & shipped to party details, item description as per po, quantity, rate, value, applicable taxes with nomenclature (like IGST, SGST, CGST & UTGST) separately, HSN/ SAC code, place of supply etc. C. All invoices shall bear the HSN code for each item separately (harmonized system of nomenclature)/ sac code (services accounting code). D. Invoices will be processed only upon completion of statutory requirement and further subject to following: a. Vendor declaring such invoice in form GST anx-1 b. Receipt of goods or services and tax invoice by BHEL E. As the continuous uploading of tax invoices in GSTN portal (in GST anx-1) is available for all (i.e. Both small & large) tax payers under proposed new GST return system, all invoices raised on BHEL may be uploaded immediately in GST portal on



	<p>dispatch of material /rendering of services. The supplier shall ensure availability of invoice in GST portal before submission of invoice to BHEL. Invoices will be admitted by BHEL only if the invoices are available in GSTN portal (in BHEL'S GST anx-2).</p> <p>F. In case of discrepancy in the data uploaded by the supplier in the GSTN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue credit note or debit note (details also to be uploaded in GSTN portal) for the shortages or rejections in the supplies or additional claims, within the calendar month informed by BHEL.</p> <p>G. In cases where invoice details have been uploaded by the vendor but failed to remit the GST amount to GST department (form pmt-08 or form GST ret-01 to be submitted) within stipulated time, then GST paid on the invoices pertaining to the month for which GST return not filed by the vendor will be recovered from the vendor along with the applicable interest (currently 24% P.A) and all subsequent bills of the vendor will not be processed till filing of the GST return by the vendor</p> <p>H. In case GST credit is denied to BHEL due to non-receipt or delayed receipt of goods and/ or tax invoice or expiry of timeline prescribed in GST law for availing such ITC, or any other reasons not attributable to BHEL, GST amount claimed in the invoice shall be disallowed to the vendor.</p> <p>I. Where any GST liability arising on BHEL under reverse charge (RCM), the vendor has to submit the invoices to BHEL well within the timeline prescribed in GST law, to enable BHEL to discharge the GST liability. If there is a delay in submission of invoice by the vendor resulting in delayed payment of GST by BHEL along with interest, then such interest payable or paid shall be recovered from the vendor.</p> <p>J. GST TDS will be deducted as per section 51 of CGST act 2017 and in line with notification 50/2018 – central tax dated 13.09.2018. GST TDS certificate which will be generated in GST portal subsequent to vendor accepting the TDS deduction in the GST portal, will be issued to the vendor.</p>
20	<p>FORCE MAJEURE</p>
	<p>20.1 "Force Majeure" shall mean circumstance which is:</p> <ul style="list-style-type: none">a) beyond control of either of the parties to contract,b) either of the parties could not reasonably have provided against the event before entering into the contract,c) having arisen, either of the parties could not reasonably have avoided or overcome, andd) is not substantially attributable to either of the parties <p>And</p> <p>Prevents the performance of the contract,</p> <p>Such circumstances include but shall not be limited to:</p> <ul style="list-style-type: none">i) War, hostilities, invasion, act of foreign enemies.ii) Rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war.iii) Riot, commotion or disorder by persons other than the contractor's personnel and other employees of the contractor and sub-contractors.iv) Strike or lockout not solely involving the contractor's personnel and other employees of the contractor and sub-contractors.v) Encountering munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the contractor's use of such munitions, explosives, radiation or radio- activity.vi) Natural catastrophes such as earthquake, tsunami, volcanic activity, hurricane or typhoon, flood, fire, cyclones etc.vii) Epidemic, pandemic etc. <p>20.2 The following events are explicitly excluded from Force Majeure and are solely the responsibilities of the non-performing party: a) any strike, work-to-rule action, go-slow or similar labour difficulty (b) late delivery of equipment or material (unless caused by Force Majeure event) and (c) economic hardship.</p> <p>20.3 If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within 15 (fifteen) days after the occurrence of such event.</p> <p>20.4 The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The Time for Completion shall be extended by a period of time equal to period of delay caused due to such Force Majeure event.</p> <p>20.5 Delay or non-performance by either party hereto caused by the occurrence of any event of Force Majeure shall not</p> <ul style="list-style-type: none">i) Constitute a default or breach of the Contract.ii) Give rise to any claim for damages or additional cost expense occasioned thereby, if and to the extent that such delay or



	<p>non-performance is caused by the occurrence of an event of Force Majeure.</p> <p>20.6 BHEL at its discretion may consider short closure of contract after 1 year of imposition of Force Majeure in line with extant guidelines. In any case, Supplier/Vendor cannot consider deemed short-closure after 1 year of imposition of Force Majeure</p>
21	<p>NO INTEREST PAYABLE TO CONTRACTOR</p> <p>Notwithstanding anything to the contrary contained in any other document comprising in the Contract, no interest shall be payable by BHEL to Contractor on any moneys or balances including but not limited to the Security Deposit, EMD, Retention Money, RA Bills or the Final Bill, or any amount withheld and/or appropriated by BHEL etc., which becomes or as the case may be, is adjudged to be due from BHEL to Contractor whether under the Contract or otherwise.</p>
22	<p>INTIMATION OF CHANGE OF NAME/ RE-CONSTITUTION OF THE ORGANIZATION</p> <p>In the event of the organization (Proprietorship/Partnership/Company) undergoing any change of name or reconstitution, prior intimation of the same shall be given to BHEL. Upon such changes coming into effect, the same is to be intimated to BHEL immediately with supporting documents as applicable.</p>
23	<p>INSURANCE:</p> <p>i. BHEL/their customer shall arrange for insuring the materials/properties of BHEL/customer covering the risks during transit, storage, erection and commissioning.</p> <p>ii. It is the sole responsibility of the contractor to insure his materials, equipment, workmen etc. against accidents and injury while at work and to pay compensation, if any, to workmen as per Workmen's compensation Act. The work will be carried out in a protected area and all the rules and regulations of the client /BHEL in the area of project which are in force from time to time will have to be followed by the contractor.</p> <p>iii. If due to negligence and or non-observation of safety and other precautions by the contractors, any accident/injury occurs to the property / manpower belong to third party, the contractor shall have to pay necessary compensation and other expense, if so decided by the appropriate authorities.</p> <p>iv. The contractor will take necessary precautions and due care to protect the material, while in his custody from any damage/ loss due to theft or otherwise till the same is taken over by BHEL or customer. For lodging / processing of insurance claim, the contractor will submit necessary documents. BHEL will recover the loss including the deductible franchise from the contractor, in case the damage / loss is due to carelessness / negligence on the part of the contractor. In case of any theft of material under contractor's custody, matter shall be reported to Police by the contractor immediately and copy of FIR and subsequently police investigation report shall be submitted to BHEL for taking up with insurance. However, this will not relieve the contractor of his contractual obligation for the material in his custody.</p>
24	<p>LIMITATION ON LIABILITY:</p> <p>"Notwithstanding anything to the contrary in this Contract or LOA or Work Order or any other mutually agreed document between the parties, the maximum liability, for damages, of the contractor, its servants or agents, shall under no circumstances exceed an amount equal to the Price of the Contract or the Work Order. Neither party shall be liable to the other for any indirect or consequential loss or damage, including but not limited to loss of use, loss of profits, or loss of contracts, or special, punitive, exemplary losses whatsoever, arising out of or in connection with this contract. This shall not be applicable on the recoveries made by Customer from BHEL on account of Contractor, any other type of recoveries for workmanship, material, T&P etc. due from the contractor."</p>
25	Third Party Non-Disclosure Agreement (NDA) format
26	EFT Format
27	GCC (enclosed with NIT). In case of any conflict between the General Conditions of Contract and NIT Terms, provisions contained in the NIT terms shall prevail. Provisions contained in the Scope of works terms (Technical Specs) shall prevail over NIT Vol I and Vol II.



Reverse Auction Form

Event Information

The “BHEL” has contracted to conduct this online bidding event. Service Provider shall answer all questions relating to the bidding process and conduct of the Reverse Auction Event.

1. Scheduled Date & Time of the event:

WILL BE INTIMATED BY

Any change in the scheduled time will be duly informed to you in advance.

2. Contact Information

“BHEL-SBD”

A. General Contract Related Queries

Name:

Designation:

Tel Nos.

E-mail ID:

Mobile No:

“Service Provider”

Software Related Queries/ Process related Queries

Name:

Designation:

Tel Nos.

E-mail ID:

TO BE INTIMATED LATER



Process Compliance Form

To
Service Provider,

-----.

Sub: Agreement to the Process related Terms and Conditions

Dear Sir,

This has reference to the Terms & Conditions for the Reverse Auction mentioned in the bid document for ----- (Items)
against BHEL Tender No. dated

This letter is to confirm that:

- 1) The undersigned is authorized official of the company.
- 2) We have studied the Reverse Auction Terms & Conditions and the Business rules governing the Reverse Auction as mentioned in your letter and confirm our agreement to them.
- 3) We also confirm that we have taken the training on the auction tool and have understood the functionality of the same thoroughly.

We, hereby confirm that we will honor the Bids placed by us during the auction process.

With regards

Signature with company seal -

Name –

Company / Organization –

Designation within Company / Organization –

Address of Company / Organization –



THIRD PARTY NON-DISCLOSURE AGREEMENT

I, _____ on behalf of the _____ (Name of Company),

acknowledge that the information received or generated, directly or indirectly, while working with BHEL on contract is confidential and that the nature of the business of the BHEL is such that the following conditions are reasonable, and therefore:

I warrant and agree as follows:

I, or any other personnel employed or engaged by our company, agree not to disclose, directly or indirectly, any information related to the BHEL. Without restricting the generality of the foregoing, it is agreed that we will not disclose such information consisting but not necessarily limited to:

- Technical information: Methods, drawings, processes, formulae, compositions, systems, techniques, inventions, computer programs/data/configuration and research projects.

- Business information: Customer lists, project schedules, pricing data, estimates, financial or marketing data,

On conclusion of contract, I, or any other personnel employed or engaged by our company shall return to BHEL all documents and property of BHEL, including but not necessarily limited to: drawings, blueprints, reports, manuals, computer programs/data/configuration, and all other materials and all copies thereof relating in any way to BHEL's business, or in any way obtained by me during the course of contract. I further agree that I, or any others employed or engaged by our company shall not retain copies, notes or abstracts of the foregoing.

This obligation of confidence shall continue after the conclusion of the contract also.

I acknowledge that the aforesaid restrictions are necessary and fundamental to the business of the BHEL, and are reasonable given the nature of the business carried on by the BHEL. I agree that this agreement shall be governed by and construed in accordance with the laws of country.

I enter into this agreement totally voluntarily, with full knowledge of its meaning, and without duress.

Dated at....., this.....day of20 .

Name

Company

Signature



BHARAT HEAVY ELECTRICALS LIMITED,
Solar Business Division, Malleswaram,
Bengaluru - 560 012

TENDER
DOCUMENT
(PART – A)
Vol II

Bank Detail (For EMD/SD submission as applicable):

Bharat Heavy Electricals Limited Solar Business Division Prof. CNR Rao Circle Malleswaram Bengaluru-560012

1	Name of the Beneficiary:	Bharat Heavy Electricals Limited
2	Name of the Bank & Branch:	IDBI Bank Limited, Trade Finance
3	Address of the Branch:	Trade Finance IDBI House,58, 1 st Floor, Mission road, Bengaluru-560027
4	Bank Telephone No:	080-2227 9576
5	NEFT IFSC code	IBKL0000377
6	Account Type:	Current
7	Account No.	008103000003605
8	RTGS IFSC code:	IBKL0000377

QR-CODE for EMD/SD Submission



**Electronic Funds Transfer (EFT) OR
Paylink Direct Credit Form**

Please Fill up the form in **CAPITAL LETTERS** only.

TYPE OF REQUEST(Tick one): ☐ CREATE ☐ CHANGE

BHEL Vendor / Supplier Code:	
Company Name :	
Permanent Account Number(PAN):	
Address	

City:		PINCODE		STATE	
-------	--	---------	--	-------	--

Contact Person(s)	
Telephone No:	
Fax No:	
e-mail id:	

1 Bank Name:	
2 Bank Address:	
3 Bank Telephone No:	
4 Bank Account No:	
5 Account Type: Savings/Cash Credit	
6 9 Digit Code Number of Bank and branch appearing on MICR cheque issued by Bank	
7 Bank swift Code(applicable for EFT only)	
8 Bank IFSC code(applicable for RTGS)	
9 Bank IFSC code(applicable for NEFT)	

- A I hereby certify that the particulars given above are true, correct and complete and that I, as a representative for the above named Company, hereby authorise BHEL, SBD, Bangalore to electronically deposit payments to the designated bank account.
- B If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information, I would not hold BHEL / transferring Bank responsible.
- C This authority remains in full force until BHEL, SBD, Bangalore receives written notification requesting a change or cancellation.
- D I have read the contents of the covering letter and agree to discharge the responsibility expected of me as a participant under ECS / EFT.

Date:

Authorised Signatory:

Designation:

Telephone NO. with STD Code

Company Seal

Bank Certificate

We certify that _____ has an Account No _____ with us and we confirm that the bank details given above are correct as per our records.

Date:

(.....)

Place:

Signature

In case of any query, please call Purchase Officer/ Contract Executive concerned at BHEL-SBD

BHEL DOCUMENT NUMBER: EN-TS-05-52-209-K-001

KAVACH PROJECT
(The Indian Railway Automatic Train Protection System)

BHEL CONTRACT

RSSI Survey, Radio Tower Design, Fabrication, Erection & Commissioning for 40 meter towers including warranty support and quarterly RF audit survey for 03 years

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DOCUMENT DESCRIPTION:

**Design, Supply, Manufacturing, Installation &
 Commissioning of 40 meter Radio Tower & RSSI
 survey including warranty support for 03 years for
 KAVACH Project in SWR Bengaluru Division.**

**Baiyyappanahalli -Whitefield Panel Cabin (Ex) & Doddbele - Kyatsandra (Ex) sections of South Western Railway
 (Reach-08)**

APPLICATION : Stationary KAVACH System

OEM/VENDOR  : Bharat Heavy Electricals Limited

END CLIENT  : Indian Railways

		GC / Indian Railway APPROVAL	
		<input type="checkbox"/>	C. Notice of No Objection
		<input type="checkbox"/>	B. No Objection with comments
		<input type="checkbox"/>	A. Objection. A complete resubmission is required
Revision:	Rev 00		
Date of Issue:	22.09.2025		
Status:	For Approval		
Author(s):	Umale Kapil Umakant	MOHAN J	
Reviewer(s):	VER 1 (Verifier): Madhushree P VER 2 (Verifier): G V Raghavendra Babu	Name of Validator /Safety Manager (VAL/SM):	G Sobha Rani
Project Manager (PM):	Ritesh R	Project Assessor (ASR)	B Arora -GM
Additional Info			

BHEL DOCUMENT NUMBER: EN-TS-05-52-209-K-001		
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Approval

Approved by	Name	Date	Signature
Reviewer 1 [VER]	Madhushree P		
Reviewer 2 [VER]	G V Raghavendra Babu		
Quality Manager [QM]	Rajnish Chaudhury		
Validator [VAL]	G Sobha Rani		
Project Manager [PM]	Ritesh R (DGM)		

BHEL DOCUMENT NUMBER: EN-TS-05-52-209-K-001		
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History

Revision	Date	Description/Modification	Author/Authors
00	22.09.2025	Design, Supply, Manufacturing, Installation & Commissioning of Radio Tower & RSSI survey for KAVACH Project in SWR Bengaluru Division	Umale Kapil Umakant Mohan J




KAVACH PROJECT
(The Indian Railway Automatic Train Protection System)
BHEL CONTRACT
 RSSI Survey, Radio Tower Design, Fabrication, Erection & Commissioning for 40 meter
 towers including warranty support and quarterly RF audit survey for 03 years

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1 INTRODUCTION

KAVACH is an indigenously developed Automatic Train Protection (ATP) system meant to provide protection to the trains against Signal Passing at Danger (SPAD), excessive speed and collisions. KAVACH provides continuous update of Movement Authority (distance up to which the train is permitted to travel without danger). Hence during unsafe situations when brake application is necessitated, and the crew has either failed to do so, or is not in position to do so, automatic brake application shall take place. KAVACH has additional features to display information like speed, location, distance to signal ahead, Signal aspects etc. in Locomotive cab and generation of Auto and Manual SOS messages (Distress messages) from Locomotive as well as from the Station unit in case of emergency situation. The Communication between Stationary KAVACH and Loco KAVACH units shall be Safety Integrity Level-4(SIL4) certified as per the CENELEC standards for railways.

1.1 PURPOSE OF THIS DOCUMENT

This specification covers the technical requirements towards Design, Fabrication, Supply, Erection (Including Civil works) & Commissioning of Radio Tower & RSSI survey for Kavach system at SWR reach 8 as required for complying with relevant IEC/ EN/ IS standards.

1.2 GENERAL INSTRUCTIONS:

The supplier shall submit the offer / bids in two parts:

Part 1: Techno-commercial bid (without pricing). Unpriced price bid to be enclosed in the technical bid.

Part 2: Price bid

1.3 SCOPE OF THE PROJECT

The scope of this project includes Design, Fabrication, Supply, Erection (Including Civil works) & Commissioning of Radio Tower & RSSI survey for Kavach system at SWR reach 8 as per the specification.

Brief Summary of Scope:

- Vendor has to visit the site premises and understand the requirement and submit the tender quote.
- RSSI Survey and Supply of Radio Tower -5 Nos
- Supply of required accessories – 5 SET (as indicated in specification but not limited to, vendor has to consider additional accessories required if any for successful Erection & Commissioning of Radio Towers and cost for the same shall be considered in the quote).

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- Associated Civil & Mechanical works – 5 SET (like construction of Base foundation (Concrete pedestal), earth pit with relevant earthing materials, drilling, grouting, fabrication works at site, tool & tackles etc. but not limited to, vendor has to consider additional works required if any for successful Erection & Commissioning of Radio Towers and cost for the same shall be considered in the quote).
- Zero date will be provided by BHEL based on clearance from SWR
- 1. RSSI Survey within 01 month from Zero date
- 2. Radio tower supply and I & C – 06 months from RSSI survey completion
- 3. Field testing along with other Kavach equipment – 11 months after I & C
- 4. Warranty support - 03 years (Three years) after successful completion of field testing & acceptance by BHEL & RDSO/SWR

1.3.1 NORMS AND STANDARDS

Table 1: Norms and Standards

Reference	Title	Edition
IRS: S23	Electrical signalling and interlocking equipment	
RDSO/SPN/144	Safety and reliability requirement of electronic signalling equipment	
IS: 9000	Basic environmental testing procedures for electronic and electrical items	
EN 45545-2	Railway applications – Fire protection on railway vehicles	
EN 50155 standard	Specifies requirements for the design, the manufacturing, the documentation and testing of any electronic equipment installed on-board of rolling stock	–
EN 61010-1 2010 standard	specifies general safety requirements for the following types of electrical equipment and their accessories, wherever they are intended to be used	–
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests	–
RDSO-SRS	KAVACH-RDSO/SPN/196/2020 Version 4.0 d3 or its latest	
ELRS/SPEC/S1/0015	Reliability of electronics used in rolling stock application	
EN 50121-4	Railway Applications -Electromagnetic Compatibility (EMC)	
IEC 60571:2012	Railway applications - Electronic equipment used on rolling stock	
IS:800-2007, IS:17740-2022 & IS:875 Part 3 - 2015.	Design Standards for Radio Towers	
FCC, OSHA, IEEE	RF Emission / EM radiation - Maximum Permissible Exposure Limits	

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1.3.2 INPUT DOCUMENTS

Table 2: Input Documents

Title
SRS: System Requirement Specification of KAVACH (The Indian Railway Automatic Train Protection System) - RDSO/SPN/196/2020 Version 4.0 d3 or its latest along with its associated annexures
IS:800-2007, IS:17740-2022 & IS:875 Part 3 -2015 - Design Standards for Radio Towers
IS 3043 (1987): Code of practice for earthing
IS 1367 (Part 3): Technical supply conditions for threaded steel fasteners: Part 3 mechanical properties of fasteners made of carbon steel and bolts, screws and studs (Fifth Revision)
IS 12427 - 2001-Fasteners for Transmission Towers
IS 2062: Hot Rolled Medium and High Tensile Structural Steel
IS 4000: Code of practice for high strength bolts in steel structures
IS 1239: Steel Tubes, Tubulars and Other Steel Fittings
IS 2062: Hot Rolled Medium and High Tensile Structural Steel
FCC, OSHA, IEEE Standards : RF Emission / EM radiation - Maximum Permissible Exposure Limits

1.3.3 REFERENCED DOCUMENTS

Table 3: Referenced Documents

Title	Version
System Requirement Specification of KAVACH (The Indian Railway Automatic Train Protection System) - RDSO/SPN/196/2020 Version 4.0 d3 or its latest along with its associated annexures	4.0 Amdt -3

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1.4 ABBREVIATIONS AND ACRONYMS

Table 4: Abbreviations and Acronyms

Abbreviation/ Acronym	Definition/Description
DMI	DMI Driver Machine Interface
AI	AI Analog input
AO	AO Analog output
ARP	Address resolution protocol, network protocol for assigning the network addresses to hardware addresses
COM	Communication module
CRC	Cyclic redundancy check
DI	Digital input
DO	Digital output
EMC	Electromagnetic compatibility
EN	European standard
ESD	Electrostatic discharge
EI	Electronic Interlocking
ISO	International Organization for Standardization
SM-OCIP	Station Master-Operation cum Indication Panel
LP-OCIP	Loco Pilot- Operation cum Indication Panel
OEM	Original Equipment Manufacturer
TSR	Temporary speed restriction
NMS	Network Monitoring System
SIL	Safety integrity level
SC/OC	Short-circuit/Open-circuit
TCAS	Train collision avoidance system
ATP	Automatic Train Protection
RDSO	Research Designs & Standards organization
FET	Field Effect Transistor

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1.5 TERMS AND DEFINITIONS

The following table describes or defines terms which are used within this document to get a better understanding or if the term is used in a specific way to avoid misunderstandings.

Table 5: Terms and Definitions

Term	Definition/Description
PM	Project manager
RQM	Requirements manager
DES	Designer
VER	Verifier
VAL	Validator
TST	Tester
INT	Integrator
IMP	Implementor

1.6 IMPERATIVE TERMS

Use of the words 'shall', 'should', 'may' and 'will' within this document observe the following rules: The word 'shall' in a text expresses a mandatory definition. The words 'should' and 'may' in a text express a non-mandatory definition. 'Should' is used, when a non-mandatory provision is recommended, otherwise 'may' is used. The word 'will' in a text expresses a definition in cases a simple futurity is required. 'Will' is also used to express a task (done by an individual or an organization), which is not controlled by this document

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2.0 DETAILED ACTIVITIES UNDER SCOPE:

2.1 Within 15 days of issue Purchase Order, bidder has to support BHEL towards collection of all sectional details from Railway and submit detailed technical planning for the work, indicating details of equipment to be installed at each location. Also submit detailed time program of work in line with the Time schedule for execution of the work, mentioned in Scope of the work.

2.2 Preparation of necessary documentation for all the works mentioned above as per established practice and instructions of Engineer. Coordination with approving agencies for approval of these documents.

Preparation of documents for PCSTE/GM/CRS inspection of tower works along with BHEL. Compliance of observations made by the sanctioning authority.

RSSI survey for UHF network to be provided as communication backbone for Kavach. After the survey, the draft report shall be submitted by the bidder to BHEL & Railway, which will have the GPS coordinates of proposed Tower locations, Heat map of Radio signal strength, and any other parameter as desired by Railway. Final survey report shall be finalized with the approval of BHEL & Railway. RSSI survey must be conducted with utmost care using latest available data, with adequate resolution and assuming the worst seasonal condition. Cost of any infructuous tower work due to defective RSSI survey or wrong initial location of the tower shall be borne by the bidder. However, bidder shall not be liable for any subsequent change in radio propagation due to change in physical features of the area or new permanent structures (except vegetation/jungle/weather).

2.3 Coordination with other vendors/contractors carrying out signaling, Civil, OFC work or other works for successful commissioning of Kavach system. This includes amicably settling any disputes that arise. The decision of Engineer form Zonal railways & BHEL in case of any such dispute shall be final and binding on the contractor.

Railways shall process for obtaining Wireless Operating License (WOL) and Standing Advisory .

Committee on Radio Frequency (SACFA) clearances and their renewal up to the completion of the Work. However, Contractor shall make ready the necessary documentation and make corrections in it as desired by Railway. Contractor shall coordinate with the respective authorities for expediting the issue of WOL and SACFA clearances/licenses. The railway will make the necessary payment required for obtaining and renewing WOL and SACFA clearances.

2.4 Provide a dedicated Graduate Engineer Liaisoning executive at Headquarters for monitoring and reporting of daily progress of work and Liaisoning with field officials of Railway and BHEL and other necessary coordination work.


2.5 Warranty, including maintenance of the system for 03 years from the date of commissioning.

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3.0 DETAILED SCOPE OF WORK:

3.1 Survey and Design

- a. RSSI Signal strength survey should be done by bidder to assess the strength of Radio Communication in the nominated Kavach section using RF Prediction method. An expert agency shall be appointed for this purpose and survey report shall be submitted to Railway at the initial stage of the project. After the survey, bidder has to submit the draft survey report to Railways, the final survey report shall be prepared after incorporating the observations of Railway on the draft survey report. Report shall be considered final only after the same is accepted /approved by Railways
- b. After the survey, the bidder will propose the installation arrangements for radio towers including the location for tower erection (tower drawings shall be the standard RDSO drawing no. RDSO/TC/TOWER/L/40/180/T/6.5 or as decided by Engineer), type of RF cable along with dB loss, specification of radio modem along with forward and reverse power, power supply arrangement, surge protection arrangement, fencing arrangements etc (Antenna, modem, RF cables under BHEL scope). in accordance with RDSO specification. As RDSO/SPN/196/2020 version 4 or latest and advisory Note Technical Advisory Note SIG0TCAS(TAN)/01/2021 Ver 2.0 dated 11.10.2021 or latest or latest as on date of tender opening. The scheme for installation will be approved jointly by BHEL and by the competent authority in Railways.
- c. Provision of 40-meter towers shall be the responsibility of the tenderer as per schedule. The final location of each tower shall be determined based on the results of the finalized UHF RSSI survey report.
- d. 40m height towers already existing at stations may be utilized for mounting UHF antennas. However, in proximity to airports or within zones regulated by the Airports Authority of India (AAI) or DGCA, height restrictions must be strictly adhered to. In such cases, the use of lower-height towers i.e., Shorter Towers (15–30m) or alternate mounting structures (e.g., building rooftops or specially designed monopoles) may be considered, subject to achieving required RSSI levels and approval of Competent Authority.
- e. Site-specific Radio Signal Strength (RSSI) surveys should take into account these constraints, and suitable mitigation measures (such as increasing antenna gain or optimizing azimuth and tilt) should be adopted to ensure reliable communication without violating aviation safety norms.
- f. Bidder shall get the RSSI survey carried out to finalize the location for installation of TCAS

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tower adhering to the stated guidelines and in agreement with Electrical, S&T and Civil engineering department and furnish details to Railways for necessary approval. Survey shall be conducted by agency approved-by Railway. The maps used for the RSSI survey shall be recent and resolution of the maps shall be 10 meters or better. RSSI survey shall be done by the bidder or by third party engaged by the bidder having sufficient experience and expertise in conducting such survey. In case the site for tower erection is not accessible by train, the bidder will arrange suitable vehicle for the survey of tower locations.

- g. The antennas for the stationary communication system at stations, auto huts, and mid-section interlocked gate units shall be with a **minimum received signal strength (RSSI) of –70 dBm or better**, along with a **fade margin of at least 30 dB** at the receiver.
- h. The radio towers are required to be planned to have radio coverage as specified in RDSO specification RDSO/SPN/196/2020 Ver 4.0 or latest /TAN.
- i. The tower should be located in such a way that the entire automatic signaling section has radio signal coverage as per RDSO Specification/guidelines.
- j. The bidder’s scope includes installation of necessary antenna (2 transmitting and 2 receiving supplied by BHEL), radio cables along with interfaces, all radio and OFC modems (supplied by BHEL), Outdoor Cabinets (ODC), surge protection devices for radios (supplied by BHEL), EMI filters (supplied by BHEL), along with necessary power supply arrangement for, modem etc.
- k. The installation at tower should be as per RDSO issued Technical advisory Note SIG0TCAS(TAN)/01/2021 Ver 2.0 dated 11.10.2021 or latest
- l. During the course of trials, if there are any weak communication spots identified, the bidder is responsible for making necessary alteration in antenna installations at tower (such as change of cable type, connector, antenna type etc will be provided by BHEL) to improve the radio signal strength to desirable limits as mentioned in RDSO/SPN/196/2020 version 4 or latest and Technical advisory Note SIG0TCAS(TAN)/01/2021 Ver 2.0 dated 11.10.2021 or latest. The installation of equipment’s and protection system need to be submitted by bidder to Railway for approval.
- m. **WPC and SACFA clearance:** The frequency of the operation for Kavach will be defined by RDSO. Railways shall process for obtaining Wireless Operating License (WOL) and Standing Advisory Committee on Radio Frequency (SACFA) clearances and their renewal. Payment of License, Royalty, SACFA fee etc., up to Final Acceptance Certificate shall be made by Bidder and reimbursed by Railway /BHEL on actuals (excluding penalty for delay due to Bidder). Application shall be filed by Railway with Wireless Planning Commission, Ministry of Telecommunication.

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n. Required WPC, SACFA and any other regulatory authority clearances shall be obtained by the Railway, however the necessary documentation and liaisoning for the same shall be the responsibility of the bidder on behalf of BHEL. No separate payment shall be made for this activity.

o. Documentation Submission Requirements

Softcopy: Typically, one set of the test report must be submitted in an editable digital format (PDF is standard; AutoCAD/DWG for drawings where applicable), ensuring easy archival and electronic distribution.

Hardcopy: Multiple hardcopy sets are usually required; for example, six sets to SWR (Zonal railways) and at least one to the BHEL.

Both softcopy and hardcopy must include all diagrams, measurement data, narrative summaries, and compliance checklists as mandated by the project/contract specification.

Softcopy and hardcopy documentation of radio survey reports must be provided to both BHEL and Zonal Railways, as per standard engineering and contract documentation protocols for railway projects. This ensures compliance, traceability, and accessibility of technical information for all stakeholders.

General Guidelines

All submitted documents must clearly denote project name, contract/reference number, and contractor identification to ensure traceability.


Diagrams and text must use standard English and SI/metric units throughout.

Timelines for submission should align with contract milestones or as specifically requested by BHEL or Zonal Railways.

Typical Distribution Model

Artifact Type	Format	Typical Qty for SWR	Typical Qty for BHEL	Comments
Report/sDrawings/other doumentations	Softcopy	1	1	PDF (and DWG if needed)
Report/Drawings/other doumentations	Hardcopy	6	1	Binders with full annexures

Compliance Note

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Providing both formats ensures all regulatory, contractual, and stakeholder needs are met for project auditability, future upgrades, and inter-departmental coordination

3.2 Documentation

The bidder shall support BHEL towards supply of all necessary documents as per Railway’s requirement without any additional cost. This shall include following. All the installation drawings pertaining to a section/station shall be supplied in a good quality folder for each section/ station/shed. During installation, a folder containing all the drawings, testing procedures, commissioning procedure shall be kept at the stations and required number of copies in soft and hard as per the instruction of railways shall be handed over & one set of soft & two set of hard copies to be handed over to BHEL.

3.3 Facilities provided and works to be done by Railway:


- 3.3.1. Space for housing Kavach and other equipment to be installed as part of the contract.
 - 3.3.2. Space for Towers and area for earthing arrangement and Power supply to aviation lights.
 - 3.3.3. Providing requisite drawings of existing installations and other section/station specific details available with Railways.
 - 3.3.4. Approval of design documentation submitted by the contractor
- Processing of statutory sanction documentation submitted by the contractor and Kavach OEM
- Obtaining Wireless Operating License (WOL) and Standing Advisory Committee on Radio Frequency (SACFA) clearances (Necessary Liaisoning to be done by contractor).
- 3.3.5. Provision of power supply for the work, at locations where Railway supply is available (At locations where power supply is not available, contractor shall make his own arrangement at his own cost)

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3.4 KAVACH Radio Tower Project Execution Timeline

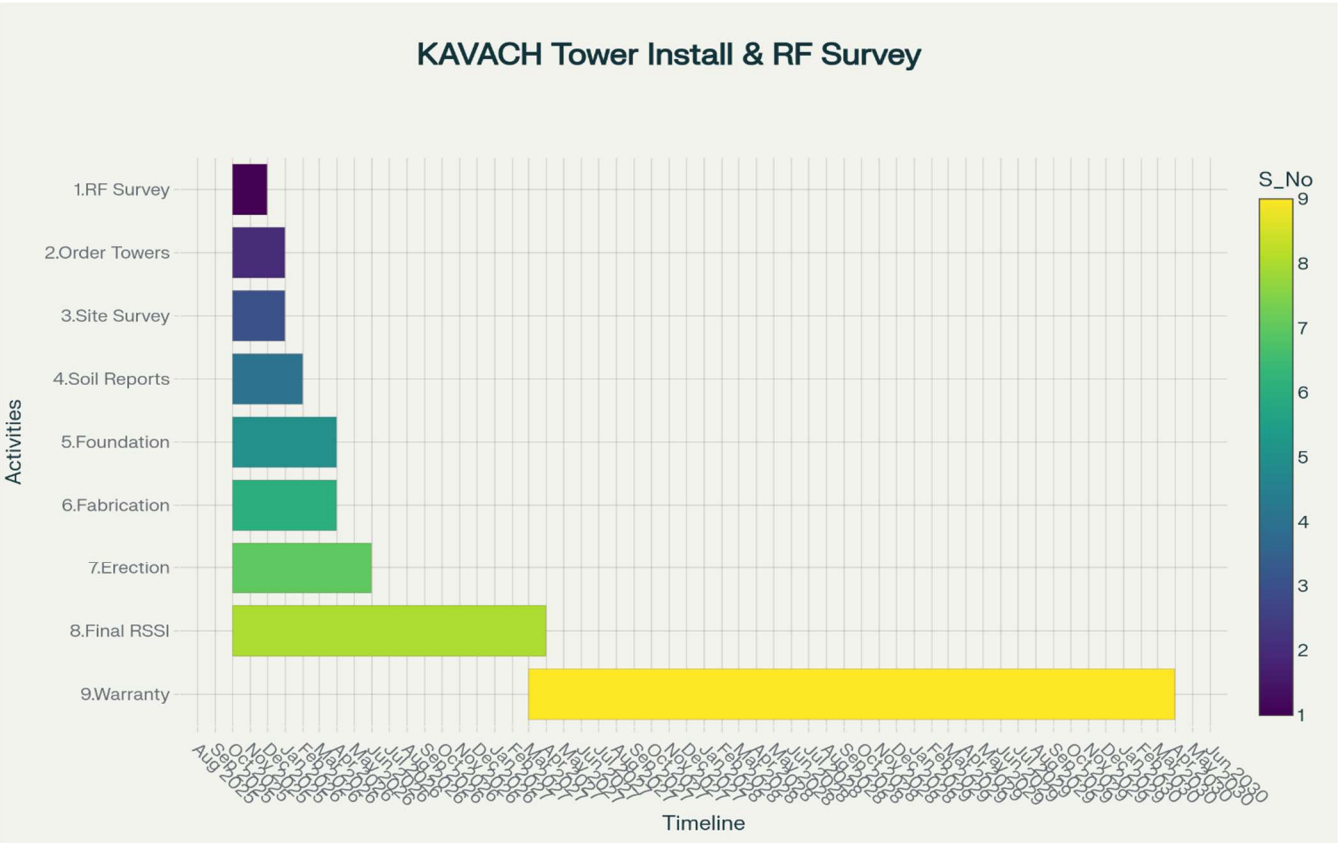
The schedule for supply, installation, and commissioning of the KAVACH Radio Tower system for each railway section is organized with milestone deadlines from the date of LOA (“D”).

S.No.	Activity	Completion Timeline
1	Radio signal strength survey (RSSI graphs), GPS & GSM survey for nominated KAVACH section	D + 1 month or earlier
2	Order towers, submit tower (foundation & superstructure) design (170 KMPH, FOS 2.0), QAP/RITES	D + 2 months or earlier
3	Tower location/cable survey & soil testing, submit tower location drawings	D + 2 months or earlier
4	Submit soil test reports for foundations	D + 3 months or earlier
5	Complete tower foundation work & all material tests (sand, cement, steel, compressive)	D + 5 months or earlier
6	Complete tower fabrication and RITES inspection	D + 5 months or earlier

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S.No.	Activity	Completion Timeline
7	Complete tower erection, painting, earthing, box; submit test reports (verticality, tightness)	D + 7 months or earlier
8	Submission of final RSSI graphs+ field trial testing	D + 18 months or earlier
9.	Warranty (After succesfull acceptance from BHEL/IR) Quarterly RF audit survey.	D + 18 months +3 YEARS

Tentative Chart:



KAVACH_RadioTower & RSSI Site Survey Specification

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3.5 Study of Local Conditions

- a) The bidder may carry out a site inspection to assess the local conditions.
- b) Prospective bidders are encouraged to thoroughly review the Tender Document. Any bid submitted will be considered as having been made after a comprehensive evaluation of the document, with complete awareness of its implications. It is assumed that the bidder has clarified all queries and interpretations with the appropriate authorities within the Indian Railway Administration. Unless specifically addressed in the bid, all conditions and specifications will be considered accepted. Non-compliance with any of these instructions may lead to the bid being disregarded without further communication.
- c) The tender document clearly outlines the scope of work to be carried out by the bidder. It is essential that bidders familiarize themselves with local site conditions, existing signalling systems, and any other relevant factors that could influence the contract’s execution and associated costs. Once the bid is accepted by BHEL, no requests for changes in pricing or timelines will be considered due to local conditions or external factors. The bidder will not be entitled to make claims related to arrangements made independently. The bidder shall be responsible for arranging approach roads or access routes and must bear all associated expenses, including road taxes, payments for right of way to third parties, and costs for construction of such approach roads.
- d) The bidder may carry out a study or survey of the signalling systems and practices currently implemented in Indian Railways and make an independent assessment of the work involved. It is the bidder’s responsibility to provide any equipment, design, or components necessary to ensure the complete and effective functioning of the system (excluding BHEL Scope of supply). If the bidder wishes to conduct a field visit prior to submitting their offer, they may seek permission from BHEL & Zonal Railways. While permission may be granted, all expenses related to the visit shall be borne solely by the bidder.
- e) The complete KAVACH system shall be commissioned in accordance with RDSO Specification No. RDSO/SPN/196/2020 Version 4.0 or the latest version, along with Technical Advisory Note SIG0TCAS(TAN)/01/2021 Version 2.0 dated 11.10.2021 or as updated.
- f) KAVACH shall operate through dependable radio communication between the Stationary KAVACH and Loco KAVACH units. This communication will be facilitated via radio towers installed at Stationary KAVACH locations. It must be ensured that adequate signal strength is maintained across the entire mandatory communication zone. To verify the quality of radio communication, a Radio Signal Strength Survey (RSSI) shall be conducted by

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the bidder, who may engage a specialized agency for the task. A detailed survey plan must be submitted to the Railways for approval. Based on the survey results, the optimal locations and tower heights will be determined, ensuring that communication is not hindered by terrain, buildings, or other obstacles.

g) If signal repeaters are required to maintain radio signal strength within the prescribed limits as specified in RDSO Specification No. RDSO/SPN/196/2020 Version 4.0 or the latest version, they shall be provided by the bidder (excluding BHEL scope of supply). The RSSI survey report, along with the proposed tower heights for each location, must be submitted for Railway approval in consultation with BHEL prior to tower installation. The current scope of work involves the installation of five radio towers of 40 meter height. Should additional towers be needed—due to survey findings or directives from RDSO or Zonal Railways—payment for these will be on a prorated basis, based on the unit price rates initially quoted by the bidder. The rates for extra towers are fixed and will not change. The bidder is required to perform all work at the original unit prices offered and must consider all necessary aspects for successful installation and operation of the Kavach radio towers as per RDSO and Zonal Railways/SWR requirements and final acceptance. The final decisions made by RDSO or Zonal Railways/SWR will be binding, and the bidder must comply accordingly.

h) The survey must include identification of technically and logistically feasible tower locations, finalized in coordination with the BHEL team & Electrical, Signal & Telecommunication (S&T), and Civil Engineering departments of Railways. If any identified site is not accessible by train, the bidder shall arrange alternative means of transportation.

3.6 Tower Design and Erection Process

i. Submission of Tower Site Plan

The bidder must submit a detailed plan indicating the proposed tower locations.

ii. Soil Testing


Safe Bearing Capacity (SBC) testing must be conducted following the South-Central Railway (SCR) Civil Engineering standards, under the supervision of the designated Authority Engineer from Railways & BHEL. – Reports to be submitted

iii. Testing Agency

All soil and structural tests must be carried out by laboratories accredited by NABL. - Reports to be submitted

iv. Foundation Design for SBC ≥ 100 kPa

Use standard RDSO-approved drawings:

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- **With water table:** RDSO/TC/TOWER/40/100/FWT (2 sheets)
- **Without water table:** RDSO/TC/TOWER/40/100/FNWT (3 sheets)

v. Foundation Design for SBC < 100 kPa

- Design must be done by a qualified structural agency.
- Design should be proof-checked by IITs, CPRI, or equivalent institutions and approved by Zonal Railways -SWR.
- Alternatively, the soil may be improved to meet 100 kPa SBC for using standard foundations.
 - Reports/Documents to be submitted for above all.

vi. Tower Superstructure

A 40-meter tower must be constructed in accordance with RDSO Drawing No. **RDSO/TC/TOWER/L/40/180/T/6.5 (8 sheets).**

vii. Pile Foundation

Pile foundations are to be considered only if fully justified. These must be reviewed and endorsed by the appointed Safety Consultant. -Reports to be submitted

viii. Cyclonic Zones

- Towers must be designed as per IS 875 (Part 3):2015 or latest, to withstand 6.5 m² Effective Projected Area (EPA) and wind speeds up to 180 km/h.
- Until RDSO provides an official design for such conditions, use:
 - **2024-PACS-SPIRE 407RH PLUS-001**
- Design must be proof-checked by IIT/CPRI, and evaluated by the Safety Consultant based on site specifics.

Reports to be submitted for above all

ix. New Designs

In case a new tower design is needed due to site limitations, it must be proof-checked and approved by Zonal Railways.

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x. Aviation Lamps

Install 24V DC aviation warning lights in accordance with Technical Advisory Note **SIG0TCAS(TAN)/01/2021 Ver. 2.0 dated 11.10.2021 or latest revision.**

xi. Lightning Protection

Provide as per approved tower protection design.

xii. Earthing

- Install three maintenance-free earth electrodes for tower legs and one for the tower equipment box.
- Interconnect all electrodes with 25 mm x 5 mm GI strips.
- Lay the strip in trenches at least 40 cm deep; joints should be welded, and electrode ends fixed using nut-bolt connections.

- Reports to be submitted for above all

xiii. Tower Equipment Boxes

Two tower boxes shall be installed at each site to house the necessary communication hardware.

xiv. Soil Consolidation – Tower Area (Inside Fencing)

Consolidate soil in 15 cm layers. A 100 mm layer of 20 mm metal aggregate should be compacted on top, placed at least 100 mm below the top of the foundation.

xv. Soil Consolidation – Outer Area (7 m x 7 m Around Tower)

The surrounding soil must be raised by at least 250 mm above natural ground level.

xvi. Antenna Mounts

Must be installed as per the technical specifications provided by the 4G LTE-R/KAVACH OEM/BHEL.

xvii. Tower Painting

Apply one coat of primer followed by two coats of paint with alternating orange and white bands. The top and bottom bands must be in dark orange, complying with civil aviation guidelines.

3.7 Execution Process

i. UHF Equipment Installation

Each Station, IBS (Intermediate Block Section), ABS (Automatic Block Section), and Level Crossing (LC) Gate

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shall be equipped with UHF Transmitter/Receiver units, as per RDSO specifications. The bidder shall install antennas accordingly (Supplied by BHEL).

ii. Power Supply Arrangements

The bidder shall ensure proper power supply infrastructure is provided for the aviation lamp, and associated components.

iii. Dual Power Supply Provision

Wherever technically feasible, components under bidder scope to provide dual (diverse path) power supplies to ensure continuous operation.

iv. Reconnaissance Surveys

Surveys must be carried out to evaluate:

- **Construction feasibility**, including geological and soil characteristics
- **Radio Signal Strength** at multiple antenna heights for each proposed location

v. Finalization of Tower Locations

Tower sites shall be finalized in coordination with BHEL and the Civil, Electrical, and S&T departments of Zonal Railways. All design calculations and drawings must be submitted and proof-checked by institutions **like IITs or CPRI for Railway approval.**

vi. Fencing and Soil Preparation


Fencing is part of the tower installation work. The ground within the tower area must be compacted and stabilized using appropriate engineering techniques prior to fencing.

vii. Geotechnical Reports

For every tower site, the bidder shall provide geotechnical investigation reports, including SBC (Safe Bearing Capacity), from **NABL**-accredited laboratories.

viii. Construction Approval

Execution can begin only after obtaining Railway approval with a **“Site-Specific Fit for Construction”** clearance.

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ix. **Approved Materials**

Only Railway-approved brands/makes shall be used, as listed in Dy.CE/Works/SC letter No. **SCR-HQ0ENGG(SOR)/1/2020-DyCE/WORKS/SCR dated 11.09.2024.**

x. **Tower Foundation Steel**

Steel used in tower foundations shall be of high yield strength (**minimum Fe500 grade**), conforming to IS 1786:2008 standards.

xi. **Superstructure Materials**

Tower superstructure components must be galvanized. All bolts and nuts used shall be of high tensile strength, of **grade 8.8 or 9.6.**

xii. **UTES Inspection**

UTES will conduct inspections for tower superstructure fabrication only. Fabrication must follow the approved Quality Assurance Plan (QAP). Inspection charges to be borne by bidder.

xiii. **Scope of Work**

- a. If weak signal zones are detected during the warranty period, the bidder shall rectify the issue by adjusting antenna orientation, selecting a different antenna type, or replacing cables as needed, to ensure compliance with the signal strength levels specified in RDSO/SPN/196/2020 Version 4.0 or latest.
- b. Clearances from WPC (Wireless Planning and Coordination) and SACFA (Standing Advisory Committee on Radio Frequency Allocation) shall be obtained by the Railways. However, the bidder must provide all necessary technical documentation to support the application. The radio frequency used shall be in the UHF band (406–470 MHz) as per RDSO guidelines.
- c. The bidder shall bear the cost of license fees, royalties, SACFA application charges, and related expenses up to the issuance of the Final Acceptance Certificate (FAC). These amounts will be reimbursed by the BHEL & Railways on actuals, excluding any penalties incurred due to delays attributable to the bidder. The application for frequency allocation will be filed by the Railways with the Wireless Planning Commission, Ministry of Telecommunications.
- d. Other essential components such as filters, painting, fencing, aviation lamps, and earthing must also be provided as part of the complete system. Vegetation within the tower site area must be cleared on a monthly basis during the warranty period to ensure site maintenance.

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3.8 GENERAL INSTRUCTIONS

3.8.1 All installation work must adhere to the specifications detailed herein. The **field supervisor or executive engineer** of Railways, BHEL will make final decisions on execution based on actual site conditions, including trenching methods and soil type, and these decisions shall be binding on the bidder.

3.8.2 Work must follow **approved Railway drawings** and conform to relevant standards such as the **Signal Engineering Manual, RE Manual, Block Manual, and Schedule of Dimensions**, which form an integral part of the contract. The bidder is solely responsible for executing all work in compliance with these standards.

3.8.3 Approved drawings can be obtained from the office of **Zonal Railways in coordination with BHEL**.

3.9 – REFERENCE SOURCES FOR SPECIFICATIONS AND DRAWINGS

The following documents and standards shall be referred for specifications and technical drawings:

- 1. **IRS and RDSO Specifications & Drawings** – Issued by Director General, RDSO, Lucknow.
- 2. **TEC Standards** – Published by Telecommunications Engineering Centre, New Delhi.
- 3. **BSS, ISS and other Indian Standards** – Available from Indian Standard Institution, New Delhi.
- 4. **Railway Rules, Codes & Guidelines** – From the Ministry of Railways, Government of India.
- 5. **Central Government Acts and Laws** – Obtainable from the Ministry of Information, New Delhi.
- 6. **Installation Manuals for S&T Equipment (25KV, 50Hz).**
- 7. **Electrified Section Standards** – Published by RDSO.
- 8. **General & Subsidiary Rules** – Pertaining to Indian Railways and South Western Railway.

Note: Any necessary specifications or drawings not already available can be obtained through Dy.CSTE/Projects/Zonal Railways. All work should adhere to the latest standards, guidelines, and drawings. In case of a conflict or ambiguity, the decision of the railway authorities will be final.

3.10 – ADDITIONAL REQUIREMENTS

- a) All KAVACH-related materials must be supplied only by bidder in consultation with BHEL after RDSO approval and inspection. Certification details (RDSO/ISA) must be submitted to the Railway.
- b) The bidder is accountable for supporting BHEL in testing and commissioning. Reports must be submitted to RDSO and the Railway for approval.

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c) Spares should be supplied as per the schedule of quantities. A comprehensive list of systems forming part of Stationary KAVACH, RIU, and Loco KAVACH must be provided.

d) Bidder to support BHEL for Complete system technical documentation submission to Zonal Railways/RDSO

e) All required test and maintenance tools (excluding BHEL Scope of supply), as specified in the tender, are to be maintained by bidder till completion of entire work..

f) The bidder must offer a **03-year warranty after completion of field trial testing and successful acceptance by RDSO.**

g) The bidder must factor in all installation-related costs, even for items not explicitly mentioned but essential for completing the work. All supplied materials should be of high quality.


Minimum Technical Manpower Requirements:

Designation	Qualification & Experience	No. of Persons
Site Engineer	ITI/Diploma + min. 3–5 years in signaling installation or maintenance. Age ≤ 50 (extendable to 65 in special cases).	Project Dependent

Note: Ex-Railway personnel with relevant experience are eligible even if qualifications are relaxed. Misrepresentation of qualifications or experience may lead to disqualification.

3.11 Deployment of Qualified Engineers:

The bidder must submit the **CVs of all Engineers and staff** intended to be deployed for the project execution along with the bid. These same personnel must remain assigned to the project throughout its duration. Any proposed change in staff must be **pre-approved by BHEL**. The details of all proposed Engineers and staff should be presented in the following format:

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S.No.	Name	Designation	Educational Qualification	Technical Qualification	Languages Known	Speak	Read	Write	Experience	Remarks

3.12 – COMPLETION PERIOD

Timely execution of the entire scope of work is critical. The complete project must be executed and finalized within **07 months (including survey)** from the **Zero Date**. Non compliance to same to timeline will result in levy of L.D @ 0.5 % of the contract value per week to maximum of 10 % of the contract value as per the BHEL policy in practice.The bidder is required to deploy a sufficient number of skilled engineers and qualified personnel to carry out surveying, designing, installation, testing, and commissioning of all systems and equipment at the designated sites.

Zero date will be provided by BHEL based on clearance from SWR

- 1. RSSI Survey within 01 month from Zero date
- 2. Radio tower supply and I & C – 06 months from RSSI survey completion
- 3. Field testing along with other Kavach equipment – 11 months after I &C (This includes submission of post RSSI graphs by 10 months from zero date).
- 4. Warranty support - 03 years (Three years) after successful completion of field testing & acceptance by BHEL & RDSO/SWR

3.13 TRAINING

The bidder shall provide support to SWR if insisted by Indian Railways officials.

3.14 LONG-TERM AVAILABILITY OF SPARES AND SUPPORT

3.14.1

The bidder must give a written undertaking (with the tender) to supply the quoted components/modules at the same

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rate through the warranty period. Beyond that, rates will be mutually agreed. The manufacturer must ensure spares are available for at least **15 years**. If discontinuing any part/component, BHEL & the Railways must be informed at least **6 months in advance**, enabling advance procurement. Seamlessly upgradeable replacements are acceptable.

3.14.2

The bidder must also supply, on payment, all necessary maintenance spares, tools, and additional equipment needed for future expansions during the lifecycle.

3.14.3

The bidder commits to spare parts availability for **15 years** and must maintain inventory to supply **consumable parts ex-stock**. For other components, supply must be within **6 months** of order. If production ends, the bidder must inform BHEL & the Railways in time and provide, at no cost, technical drawings and blueprints if requested.

3.14.4

The bidder must maintain adequate inventory of spare modules to replace defective ones. In emergencies, if the bidder lacks spares, Railways may issue spares on **loan**, which must be returned within **3 months**.

3.14.5

To ensure long-term maintenance support, the bidder must set up the following in India during the contract:

- Minimum **10% stock** of all cards/modules/subsystems used.
- Availability of **OEM/BHEL-certified maintenance engineers**.
Failure to prove readiness may result in **encashment of performance security**.

3.14.6

The bidder must submit a **legally binding commitment** to support spare parts availability for 15 years. Non-compliance may lead to legal action in an Indian court.

3.14 ADDRESS CHANGE NOTIFICATION

The bidder must promptly inform BHEL & Railways in writing of any change in address. BHEL & Railways shall not be liable for any loss or inconvenience due to failure in this regard.

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3.15 WORK EXECUTION PROGRAM

3.15.1

Time is a critical factor, and the entire work must be completed within the tender-specified duration.

3.15.2

The bidder must deploy sufficient managers, technicians, and equipment to ensure timely and satisfactory completion.

3.15.3

A detailed execution plan must be prepared prior to LOA and submitted within 30 days of LOA. It must include a PERT or GANTT chart and is subject to approval by the BHEL & Railways Engineer-in-Charge.

3.15.4

Railway may revise the approved schedule at any point. Any slippage must be justified by the bidder and may lead to penalties if unjustified.

3.15.5

The bidder is fully accountable for executing the work per the approved plan, drawings, and specifications. Non-compliance will attract contractual penalties.

3.15.6

Execution must not disrupt train movement. No compensation will be provided for delays or precautions arising from train operations.


3.15.7

No logistical support like roads or temporary crossings will be provided. Existing roads within Railway limits may be used.

3.16 INSPECTION OF MATERIAL (INSPECTION CHARGES TO BE BORNE BY BIDDER)

3.16.1

All equipment, components, and materials listed under RDSO-approved categories must be procured only from firms approved by RDSO and must comply with IRS/RDSO/TEC specifications. These items are to be inspected by RDSO. For items categorized under RDSO-recommended sources, procurement must be from RDSO approved/recommended firms and must also follow the relevant specifications, with RDSO inspection. For items lacking RDSO/TEC specifications, or where no RDSO-approved sources exist, or where RDSO does not conduct

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inspections by policy, the inspection will be done by RITES or another Railway-authorized representative, as designated by CSTE/Projects/Zonal Railways.

3.16.2

RDSO/RITES shall inspect all the components which forms part of radio tower I&C as per the approved RDSO tower designs.

3.16.3

All KAVACH system materials must undergo inspection either by RDSO or by RITES / authorized Railway representatives, following RDSO’s guidance.

3.16.4

All equipment provided by the bidder—such as Station KAVACH, LC/IB/ABS KAVACH units, Loco KAVACH equipment, Brake Interface Units, power supplies, lab models, etc (excluding BHEL scope of supply). —must carry RDSO approval.

The bidder must bear all costs related to inspections carried out by RDSO, RITES, or the Consignee as per prevailing rules. Any testing or analysis by third-party agencies (e.g., for towers) must also be borne by the bidder. Materials from firms banned by Indian Railways & BHEL must not be used under any circumstances.

3.16.5

Even if materials pass inspection by RDSO or Railway authorities, the consignee reserves the right to reject them upon delivery if found to be damaged or defective.

3.16.6

All materials and workmanship must be of high quality and expected to deliver long-lasting, trouble-free performance.

3.17 STORES – RECEIPT AND ACCOUNTAL

3.17.1

A proper receipt and requisition process shall be maintained between the bidder, BHEL and the Railway’s authorized representative.

3.17.2

The bidder must issue a receipt when drawing materials and obtain one when returning items in coordination with BHEL. All such transactions will be with the railway’s consignee.

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3.17.3

All drawn materials must be accounted for—either installed or returned to the railway’s consignee.

3.18 LOADING / UNLOADING AND TRANSPORTATION

3.18.1

The bidder must deliver materials to the consignee depot and transport them to site at their own expense, including loading/unloading.

3.18.2

Direct site delivery may be allowed with prior approval and proper accounting. Empty drums and surplus items must be returned to the nominated depot. An Indemnity Bond as per BHEL/IR format must be submitted.

3.18.3

The bond is released after work commissioning and return of surplus materials. The bidder is responsible for material security until commissioning.

3.18.4

Transit insurance costs are to be borne by the bidder.

3.19. MATERIAL SECURITY

Once materials are handed over, the bidder is fully responsible for their safety, even if stored on Railway premises. The bidder must safeguard them against theft or damage. Loss or damage will be recovered from the bidder, and defective material must be returned to the consignee without extra charge.

3.20. RETURN OF SURPLUS STORES

The bidder must return all surplus materials at their own cost. A register must be maintained for all materials issued, used, or returned.

3.21. RETURN OF RELEASED STORES

Released items must be returned in an organized manner with proper handling during removal and transport.

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3.22. PACKING AND FORWARDING

3.22.1

Packing must comply with RDSO/SPN/196/2020, Version 4.0 or latest.

3.22.2

All items must be securely packed for transit, at the bidder's cost, to prevent damage.

3.22.3

All packaging is non-returnable and deemed included in the bid cost.

3.22.4

Each package must be clearly marked with content, quantity, bidder name, station name, consignee, and Railway details.

3.22.5

Improper or unmarked packages may be rejected by the inspecting officer and must be removed within 7 days by the bidder.

3.23 FREIGHT AND INSURANCE

All costs related to transportation and insurance to the worksite shall be borne by the bidder.

3.24. CONSIGNEE’S RIGHT OF REJECTION

3.24.1

Even after prior inspection, the consignee may reject any consignment not meeting specifications or damaged in transit.

3.24.2

The Railway may reject any material deemed inferior, even if cleared by RDSO/RITES. Such items must be promptly replaced at the bidder's cost.

3.24.3

Rejected materials must be removed within 7 days. If not, the Railway may dispose of them at the bidder’s risk and recover applicable charges.

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3.25 SUPERVISION AND LABOR


- a. The bidder must deploy adequate and qualified personnel at the work site. All activities must follow current Railway practices.
- b. The bidder or their representative must remain at the work site throughout the work duration. An authorized representative, approved by the Railway, must always be available at the site and have the necessary authority to receive and implement instructions from Railway officials. The Railway may inspect the work periodically. The bidder shall carry out all installation and erection activities using their own workforce until the work is completed and tested.
- c. The bidder’s site supervisor must follow instructions from the Engineer-in-Charge or their designated representative. The bidder is responsible for ensuring compliance.
- d. If the site supervisor disregards instructions or fails to execute the work satisfactorily, the Railway may stop the work or demand the supervisor’s replacement, and the bidder must comply.
- e. The bidder is responsible for arranging accommodation for their staff during installation, testing, and commissioning. If drinking water is available at the site, the Railway may provide it, but this is not guaranteed.

3.26 COMPLIANCE WITH LABOR LAWS

- i. The bidder shall not employ workers below 18 years of age.
- ii. The bidder must comply with the Contract Labour (Regulation & Abolition) Act, 1970, and the associated Central Rules of 1975, including obtaining a valid labour license from the appropriate authority. A copy of the license must be provided to the Railway.
- iii. All labour laws must be followed strictly. Any violations or denial of labour rights will result in serious action against the bidder. Contract work can only proceed with a valid labour license.
- iv. The bidder must comply with the Payment of Wages Act and Minimum Wages Act, as outlined in Clauses 54 and 55 of the Indian Railways General Conditions of Contract. Labour details and wage payments must be registered on the Shramik Kalyan portal.

The process includes:

- a. One-time registration of the bidder on the portal after receiving the Letter of Acceptance (LoA).
- b. Once approved, the bidder can log in using their PAN number and manage all future LoAs.
- c. LoA and contract details must be uploaded to the portal within 15 days for engineer approval.
- d. Labour details and monthly wage payments must be regularly updated.
- e. It is mandatory for the bidder to ensure accurate and timely updates of all labour-related information.

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3.27 SAFETY OF WORK, TRAINS, AND PERSONNEL

- a. The bidder must follow all Railway safety rules and ensure that their staff also comply.
- b. No flammable materials may be stored at or near the site without prior Railway approval and necessary licenses.
- c. Bidder’s staff must not operate Railway equipment related to train safety. Any issues must be reported to Railway personnel. The bidder is responsible for damages caused by negligence.
- d. Work must not obstruct train operations unless approved by the Railway. Any work near or on the track must be supervised by authorized Railway personnel. Protective measures like barricading or fencing must be implemented as required.
- e. The bidder is responsible for the safety of all their vehicles and staff. Any damage to Railway property or personnel due to their work will be their liability.
- f. Adequate safety measures must be taken for workers on Railway premises.
- g. Appropriate ladders, ropes, and slings must be used for elevated work. Extra caution is required when working near power lines.
- h. If the Railway finds safety arrangements inadequate, the bidder must rectify the issue immediately. The Railway is not obligated to provide such instructions, and the bidder retains full responsibility for site safety.
- i. The bidder must supply and maintain personal protective equipment (PPE) for all workers. Lead-based paints are prohibited unless in paste or ready-mixed form. Respiratory protection must be provided when spraying paint.
- j. In passenger areas, especially platforms, free space must be maintained, and all excavations covered for safety.
- k. The bidder is liable for any accidents and must indemnify the Railway for losses.
- l. No compensation will be provided to the bidder for losses due to accidents, idle labour, or damaged materials.
- m. Signal aspects and point settings during testing must only be changed under authorized supervision. No interference with traffic is allowed without Railway approval.
- n. The bidder is accountable for any damages resulting from their workers’ negligence.

3.28 EMERGENCY WORKS

In case of emergencies or failures requiring immediate action, the Railway may deploy its own resources if the bidder cannot act swiftly. Costs incurred will be recovered from the bidder.

3.29 NIGHT WORK

If necessary to meet deadlines, the Engineer may instruct the bidder to work at night. No extra payment will be made for night work. The bidder must provide adequate lighting and ensure safety during such operations.

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3.30 MAINS POWER SUPPLY

Testing will be done using Railway-supplied power. For installation activities requiring long durations of power use, the Railway may provide 230V supply if available, at a standard charge. If not available, the **bidder must arrange alternative power at their own cost.**

3.31 COMPLIANCE WITH ENGINEER’S INSTRUCTIONS

The bidder must ensure timely implementation of all instructions from the BHEL & Railways Engineer. Parts needing inspection before use must be kept separate and not used until approved. Rejected or altered parts must be re-inspected before use.

3.32 INSPECTION OF WORKS

- 3.32.1. The Railway’s Engineer can inspect the work at any stage. If any work or material is found defective or substandard, it must be rectified by the bidder at no extra cost.
- 3.32.2. The bidder must provide all tools and assistance for inspections at no additional cost. Requests for inspection must be made in writing a day in advance.
- 3.32.3. Completed installations will undergo checks. The bidder must address any defects found. The system will be finally accepted after joint inspection.
- 3.32.4. Costs for rectifying substandard or rejected work will be borne by the bidder.
- 3.32.5. Samples for testing may be collected during execution at the bidder’s cost.
- 3.32.6. Cable trench inspection (depth, brickwork, filling) must be jointly conducted and recorded before laying cables.
- 3.32.7. A Site Order Book shall be maintained, where BHEL & Railway instructions are recorded. The bidder is responsible for noting and acting on these.
- 3.32.8. Daily progress and material release records must be jointly signed and produced during inspections.
- 3.32.9. The bidder must arrange for an installation quality audit by the OEM or its authorized representative, who must certify adherence to OEM standards.

3.33 PROGRESS REPORTING

- 3.34.1. The bidder must submit periodic progress reports, including manpower, equipment, and work status. Format and frequency will be mutually agreed upon post-award.
- 3.34.2. Monthly progress meetings will be held between the Railway, BHEL and the bidder. Issues and corrective actions must be documented and signed by both parties.

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3.34 MODIFICATIONS

3.34.1. The bidder must correct any errors, omissions, or discrepancies in the supplied drawings at their own expense, even if such drawings were approved earlier.

3.34.2. Modifications due to changes in project scope (like new lines, LC gate interlocking, etc.) must be implemented by the bidder throughout the warranty period.

3.35 FINAL ACCEPTANCE CERTIFICATE

3.35.1.

The **Final Acceptance Certificate (FAC)** will be issued by the Railway Engineer only after:

- The system has been operational for **at least 6 months post-PAC**,
- Smooth and stable performance is ensured during this period, and
- A **joint verification** and **successful commissioning** is confirmed by the site supervisor, BHEL and Engineer-in-Charge.

This includes submission and Railway approval of the **Application Safety Case**, verified by an RDSO-approved **Independent Safety Assessor (ISA)**.

FAC marks the **official completion** of the work, and the **Performance Bank Guarantee (PBG)** may be released.

3.35.2.

After the FAC is issued, no claims by the bidder will be entertained unless submitted **in writing prior to FAC issuance**.

Even after the FAC is issued, both the Railway/BHEL and the bidder remain responsible for any contractual obligations that remain unfulfilled or pending.

3.35.3.

During the **warranty period**, if any problem arises due to design, equipment, components, or workmanship, the bidder must fix it **using their own materials at their own cost**.

- Railway-approved spares supplied under the contract may not be used for this purpose without **explicit permission**.
- If such spares are used due to exceptional circumstances, they must be replaced by the bidder within 3 months.

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- Failure to replace them within the timeline will result in a **penalty of ₹1500 per day by railways and same will be passed on to bidder.**

3.36. CLEARANCE OF SITE

3.36.1.

The bidder shall, at their own expense, clean the site, set out all work, and provide necessary manpower and materials to enable inspection by the Railway. Any errors found must be corrected at the bidder’s cost.

3.36.2.

Upon completion of work in any section, the bidder must remove all debris and obstructions as directed by the Railway.

- Special attention must be given to avoid loose earth or ballast accumulation on platforms, drains, tracks, or nearby paths.
- If the site is not cleaned **within 15 days** of completion, the Railway will do so at the bidder’s cost. Written notice will be given before taking such action.

3.37 MAINTENANCE OF WORKS

Throughout the execution and until the end of the maintenance period (as defined in the tender), the **bidder is responsible** for ensuring the works remain in **good, safe, and functional condition**.

- Any damage or defect not caused by Railway documents, natural events, or civil unrest must be repaired by the bidder at their own cost.
- The bidder is also liable to compensate the Railway or any third party for losses or damages due to their negligence.
- The bidder shall conduct **preventive maintenance** as per the maintenance schedule outlined in the **KAVACH maintenance manual on behalf of BHEL**, which must be **approved by RDSO or the Railway**.

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3.38 PAYMENT SCHEDULE FOR RSSI SURVEY + 40 METRE RADIO TOWER DESIGN,FABRICATION INSTALLATION,COMMISSIONING WORKS INCLUSIVE OF 03 YEARS WARRANTY AS PER RDSO/SWR SPECIFICATION

S N s	Description of item	Unit	Qty	BOQ rate in %
1	Site survey for tower erection RSS Signals strength measurement for approval and obtaining approval of the same for radio survey. - RSSI survey for Train borne equipment for 36 RKM - Payment will be made after successful acceptance of reports by RDSO/SWR officials	AU	1	5%
2	Carrying out survey by train or by trolley or by foot in the block section to assess the radio signal strength and prepared RF audit and RF survey Reports for finalization of location of towers. -RSSI survey for Location of Towers for 36 RKM -Payment will be made after successful acceptance of reports by RDSO/SWR officials	AU	1	10%
3	Completion of foundation	Nos	5	15%
4	Supply of tower super-structure material	Nos	5	15%
5	Erection of tower with Aviation Lamp	Nos	5	15%
6	Completion of fencing, earthing and all other associated tower works.	Nos	5	20%
7	Submission of post commissioning RSSI	Nos	5	10%
8	Acceptance by RDSO	Nos	5	5%
9	Carrying out survey by train in the block section to assess the RF signal strength for assessing its quality and carrying out RF audit of station KAVACH. (UNIT TO BE READ AS NUMBERS= Per Stationary Kavach Per Quarter) - RSSI survey for Station Kavach for 05 Stations -Payment will be made after successful acceptance of reports by RDSO/SWR officials + Warranty support for 3 years from commissioning date (Clearing of Vegetation on monthly basis,maintenance of tower and quarterly surveys)	Quarterly	12	5%

Total-100%

Note: Payment schedule mentioned above are standard terms defined as per the Reach 8 Kavach execution works. Same will be followed for the Kavach tower works executing bidders.


The current SWR scope calls for installation of 05 towers of 40 meters height in the given Reach -8, any increase in quantity as result of Radio survey reports/recommendation from RDSO/SWR to meet the successful implementation of Kavach functionally. The additional quantity of towers as approved by RDSO/SWR will be paid on prorated basis based on the unit rate of tower quoted initially by the bidder.

Payment terms for the additional quantity will be as per above schedule.

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3.39 ATTACHMENTS

- 1.Tower Drawing: . [RDSO/TC/TOWER/L/40/180/T/6.5](#) or as decided by Engineer
- 2.Advisory Note: [Technical Advisory Note SIG0TCAS\(TAN\)/01/2021 Ver 2.0 dated 11.10.2021 or latests](#)
- 3. [Approved material list](#): Dy.CE/Works/SC letter No. SCR-HQ0ENGG(SOR)/1/2020- DyCE/WORKS/SCR dated 11.09.2024.
- 4. [2024-PACS-SPIRE 407RH PLUS-001](#)

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3.40 PRE-QUALIFICATION CRITERIA:

SL	BHEL Qualification requirement	Documents to be submitted for evaluation
1.a	<p>Bidder must be approved survey agency of Railways for RSSI survey works OR</p> <p>Bidder must have sufficient expertise & experience of successfully completing RSSI survey for KAVACH for Indian Railways/Kavach approved OEM’s in past 3 years. Works may be carried out by bidder directly or through their channel partners having sufficient expertise & experience of successfully completing for RSSI survey works. The channel partner for survey should be kept engaged till end of the warranty period.</p>	<p>Bidder to submit following documents as proof:</p> <p>1.RSSI Survey completion reports certified by Indian Railways.</p> <p>2.If the survey is carried by channel partner, agreement/MOU copies between bidder & survey agency valid till end of warranty period shall be furnished.</p>
1.b	<p><i>For Tower Design.</i></p> <p>Bidder must be OEM for Tower Design, Fabrication and Installation of minimum 40 meter approved by Railways in the field of LTE Technology or Kavach Technology or any other S&T works on Indian Railways in the last seven years as on the date of opening of Technical Bid.</p>	<p>Supporting documents such as empanelment letter from RDSO or Railways/Work completion certificates against the PO executed from Indian railways or Kavach OEM/PO for work under execution from Indian Railways or Kavach OEM</p>
1.c	<p>Bidders who wish to participate should be OEM and have executed works of Tower Design, Fabrication and Installation of 25 meter & above in the field of Telecom or Kavach Technology or any other S&T works during last five years as per below, as on the date of opening of Technical Bid.</p> <p>1. One similar work of value not less than Rs 134.22 Lakhs of estimated value (OR)</p> <p>2. Two similar works of value not less than Rs 83.89 lakhs each of estimated (OR)</p> <p>3. Three similar works of value not less than Rs 67.11 lakhs each of estimated value</p>	<p>Bidder to submit following documents as proof of completion/execution of work:</p> <p>1.P.O copy form Zonal railways/RDSO/Kavach OEM/any other Govt Department/PSU</p> <p>2. Work Completion certificates/Invoice copy.</p> <p>Valid work experience certificates issued by a Government department/organization shall be accepted. Certificates issued by a public listed company will also be acceptable if the company has an average annual turnover of ₹500 crore or more during the last three financial years (excluding the current one), is listed on NSE/BSE, and has been registered for at least 5 years before the date of submission of proposal. The certificate must be issued by an authorized official of the company.</p> <p>If a certificate from a public listed company is submitted, the Contractor must also provide a copy of the work order, bill of quantities, bill-wise payment details (certified by a Chartered</p>

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1.d	The proposed subcontractor should not be banned by Indian Railways.	Accountant), TDS certificates for payments received, and a copy of the final/last bill to support the certificate
	Quotation from bidders banned by Indian railways will not be considered for evaluation.	Declaration from bidder regarding that they are not banned by Indian railways is required. BHEL will cross verify the same with Indian Railways for their acceptance/approval

Prepared by

Approved by

TABLE OF DIAGONAL & HORIZONTAL MEMBER

MKD.	SIZE OF MEMBER	BOLT DIA(mm)	NOS. OF BOLT	GRADE OF BOLT
D1	PIPE #114.3x4.5	16	4	8.8
D2	PIPE #114.3x4.5	16	4	8.8
D3	PIPE #114.3x4.5	16	4	8.8
D4	PIPE #114.3x4.5	16	4	8.8
D5	PIPE #114.3x4.5	16	4	8.8
D6	PIPE #114.3x4.5	16	4	8.8
D7	PIPE #88.9x4.0	16	3	8.8
D8	PIPE #88.9x4.0	16	3	8.8
D9	PIPE #88.9x3.2	16	3	8.8
D10	PIPE #88.9x3.2	16	3	8.8
D11	PIPE #88.9x3.2	16	3	8.8
D12	PIPE #88.9x3.2	16	3	8.8
D13	PIPE #88.9x3.2	16	3	8.8
D14	PIPE #88.9x3.2	16	3	8.8
D15	PIPE #60.3x2.9	16	3	8.8
D16	PIPE #60.3x2.9	16	3	8.8
H1	PIPE #114.3x4.5	16	4	8.8
H2	PIPE #60.3x2.9	16	2	8.8
H3	PIPE #60.3x2.9	16	2	8.8
H4	PIPE #60.3x2.9	16	2	8.8
H5	PIPE #60.3x2.9	16	2	8.8
H6	PIPE #60.3x2.9	16	2	8.8
H7	PIPE #60.3x2.9	16	2	8.8

NOTE: IN CASE OF DISCREPANCY IN DETAILS ELSEWHERE, DETAILS PROVIDED ABOVE TABLE SHALL PREVAIL.

DISCLAIMER:

THE RESPONSIBILITY OF PRINCIPLE ACS ENGINEERING INDIA PVT. LTD. ONLY TO THE TECHNICAL CONTENT OF THIS DRAWING. CO-RELATION OF THIS DOCUMENT WITH SITE DATA, ALL PROCEDURAL / LEGAL / OPERATIONAL MATTERS WOULD BE RESPONSIBILITY OF THE CLIENT. PRINCIPLE ACS SHALL NOT BE IN ANY WAY BE RESPONSIBLE FOR THE CONSEQUENTIAL EFFECTS (IF ANY) DUE TO THE USAGE OF THIS DRAWING CONTENT AND SHALL NOT BE LIABLE TO CARRY OUT ANY POST IMPLEMENTATION STUDIES INCLUDING DAMAGE STUDIES (IF ANY).

GENERAL NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS, EXCEPT OTHERWISE SHOWN. NO DIMENSION SHOULD BE SCALED FROM THIS DRAWING.
- NO SNOW LOADS HAVE BEEN CONSIDERED IN THIS DESIGN.
- THIS DESIGN IS SUITABLE FOR BASIC WIND SPEED 50M/S (180 KMPH) FOR CYCLONIC REGION IN RED REGION (AS PER BASIC WIND SPEED MAP OF INDIA), APPLICABLE IN AREA WITHIN 50KM FROM COAST LINE. THE K4 FACTOR AS PER IS 875 PART 3 IS TAKEN AS 1.3 FOR CYCLONIC REGION.
- RECENT COAL PROVISIONS ARE BEING REFERRED TO FOR VARIOUS PARAMETERS. HOWEVER, THEY SHALL BE APPLICABLE AS REVISED FROM TIME TO TIME IN FUTURE.
- ALL THREE CIP MEMBER TOPS TO MATCH FOR PERFECT LEVELS BEFORE STARTING ERECTION OF SUBSEQUENT TOWER MEMBERS.
- FABRICATION TO BE PLANNED SUCH THAT THERE IS NO WELDING AFTER GALVANISATION.
- ALL FLANGE BOLTS SHALL BE WITH TWO NUTS AND TWO WASHERS. ALL OTHER BOLTS SHALL BE WITH ONE NUT AND 1 WASHER.

STANDARDS OF MATERIALS

- THE STEEL MATERIALS & HARDWARE SHALL CONFORM WITH FOLLOWING:
 - PIPES SHALL CONFORM TO IS 1161: 2014 WITH Tst-310/240 (HT/MS) FOR MAIN LEG MEMBERS & 240 WPA (MS) FOR DIAGONAL AND HORIZONTAL MEMBERS.
 - STRUCTURAL STEEL CHANNELS, ANGLES, PLATES & FLATS ETC. SHALL CONFORM TO IS 2062:2001 WITH GRADE DESIGNATION F-250 A, QUALITY AS PER IS 2062.
 - BOLTS AND NUTS FOR MAIN STRUCTURE CONNECTIONS SHALL BE OF 8.8 GRADE AS PER IS 12427: 2001 AND IS 1367 (PART 3): 2002.
 - BOLTS AND NUTS FOR LADDER AND ACCESSORIES SHALL BE OF 5.8 GRADE AS PER IS 12427: 2001 IS 1367 (PART 3): 2002.
 - U BOLT CLAMPS TO CONFORM TO IS 2062 AND IS 1367.
 - ALL 'U' BOLTS & 'T' BOLTS SHALL HAVE DOUBLE NUTS.
- HOT DIP ZINC GALVANISATION FOR ALL TOWER MEMBERS SHALL CONFORM TO IS 4759: 1996 & AVERAGE THICKNESS OF COATING SHALL BE AS PER TABLE BELOW.

ARTICLE & THICKNESS	MEAN COATING
STRUCTURAL STEEL PIPES	610 G/SQ.M.
ALL OTHER STEEL MEMBERS	1000 G/SQ.M.
STRUCTURAL BOLTS $\geq 10mm$	500 G/SQ.M.
STRUCTURAL BOLTS $\leq 10mm$	450 G/SQ.M.

10. DESIGN SPECIFICATIONS SHALL BE AS PER TABLE BELOW

DESCRIPTION	SPIRE 407RH PLUS
TOWER HEIGHT	40M
BASIC WIND SPEED	180 KMPH
OPERATIONAL WIND SPEED (ANSI TIA-222G: 2008)	135 KMPH
ANTENNA LOADING (EFFECTIVE PROJECTED AREA)	6.50 SQM
CENTRE OF DIPOLE ANTENNA - ELEVATION	37.6M
4 UNITS OF COPLANAR DIPOLE ANTENNAS 3.08M X 0.046M Ø	
CENTRE OF LITE ANTENNA - ELEVATION	33.6M
4 UNITS OF LITE ANTENNAS 2.60M X 0.35M	
DESIGN STANDARDS - TOWER	IS 800:2007 & IS 17740:2022
DESIGN STANDARDS - FOUNDATION	IS 456: 2000 IS 11233: 1985
ULRUL LOAD, LIVE LOAD, WIND LOADS	IS 875:2015
SWAY LIMITS/DEFLECTION	A RELATIVE HORIZONTAL DEFLECTION OF 15 PERCENT OF HEIGHT OF TOWER FROM ITS BASE
CYCLONIC REGION FACTOR K4	1.3 WITHIN 60 KM BELT FROM COASTAL REGION
MEAN PROBABLE DESIGN LIFE	50 YEARS
TERRAIN CATEGORY	2
TOPOGRAPHY CATEGORY	1 (FLAT TERRAIN)
WIND DIRECTIONALITY FACTOR	0.9
AREA AVERAGING FACTOR; COMBINATION FACTOR	1.0
FACTOR OF SAFETY	2.0
ROLL EQUIPMENT PLATFORM (EPF) Ø 3M	1 NO.
REST / HALF EQUIPMENT PLATFORM (RPF) Ø 11.6M	1 NO.
WORK PLATFORMS (WPF) IN TOP 10M HEIGHT	2 NOS
FENCING	3M HT BETWEEN TOWER LEGS

- WELDING SHALL BE GMAW WELDING/MIG WELDING WITH WELD THICKNESS AS SPECIFIED IN DRAWINGS. WELDING ROD/SPOOL TO CONFORM TO IS 6419.
- TOLERANCES FOR CONCRETING, STEEL FABRICATION AND ERECTION SHALL BE ENSURED AS PER RELEVANT CODES FOR DIFFERENT COMPONENTS.
- AFTER GALVANISATION, PRIMA COAT OF ZINC CHROME RED OXIDE CONFORMING TO IS-104 IS TO BE APPLIED FOLLOWED BY TWO OR MORE COATS OF SYNTHETIC ENAMEL PAINTS IN ACCORDANCE WITH IS 1477 PART 1 AND IT TO REMAIN IN GOOD CONDITION BEFORE THE NEXT COAT PAINTING AS PER PAINTING SCHEDULE. PAINTING SHALL BE DONE IN BANDS OF ORANGE AND WHITE.
- BOTTOM MOST NUTS SHALL BE LOCKED WITH EITHER TACK WELDING OR SUITABLE THREADLOCK CHEMICAL.
- LIGHTNING ARRESTOR SHALL BE OF GALVANISED ROD.
- AIRCRAFT WARNING LIGHTS (ACLW) SHALL BE OF LOW INTENSITY WITH INPUT VOLTAGE OF 24VOLTS/48VOLTS/110VOLTS+15% CONFORMING TO ICAO STANDARDS -P RATING 65 AS PER IS CODE 13847 PART -1: 1993.
- EARTHING STRIP SHALL BE OF SIZE 25X8.
- THREE EARTHINGS SHALL BE DONE FOR BODY EARTHING, EQUIPMENT EARTHING & ONE SPARE SLOT.

THE DESIGN HAS BEEN STRUCTURALLY CHECKED BY RASO AND POUND OK.

DESIGN CHECKER	DRAWING CHECKER	STRUCTURAL CHECKER	SCHEMATIC CHECKER	APPROVE
By	By	By	By	By
Asst. Engineer	Asst. Engineer	Asst. Engineer	Asst. Engineer	Asst. Engineer
SSE/D/BAS	JER/BAS	ABE/SB-D	DOS	EG
		BAS	VIBAS	BAS

LIST OF DRAWINGS

DRAWING NO.	SHEET NO.	DESCRIPTION
2024-PACS-SPIRE 407RH PLUS-001	001	GENERAL ARRANGEMENT DRAWING
2024-PACS-SPIRE 407RH PLUS-002	002	ELEVATION OF TOWER & CONNECTION DETAIL
2024-PACS-SPIRE 407RH PLUS-003	003	CONNECTION DETAILS
2024-PACS-SPIRE 407RH PLUS-004	004	CONNECTION DETAILS
2024-PACS-SPIRE 407RH PLUS-005	005	LADDER DETAILS
2024-PACS-SPIRE 407RH PLUS-006	006	EPF DETAILS
2024-PACS-SPIRE 407RH PLUS-007	007	EPF DETAILS
2024-PACS-SPIRE 407RH PLUS-008	008	CAS- IN PART DETAILS & WPF DETAILS
2024-PACS-SPIRE 407RH PLUS-009	009	ANTENNA ARRANGEMENT, ACLW DETAILS & LIGHTNING PROTECTION DETAILS

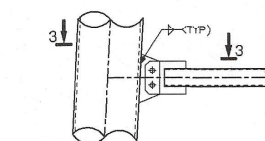
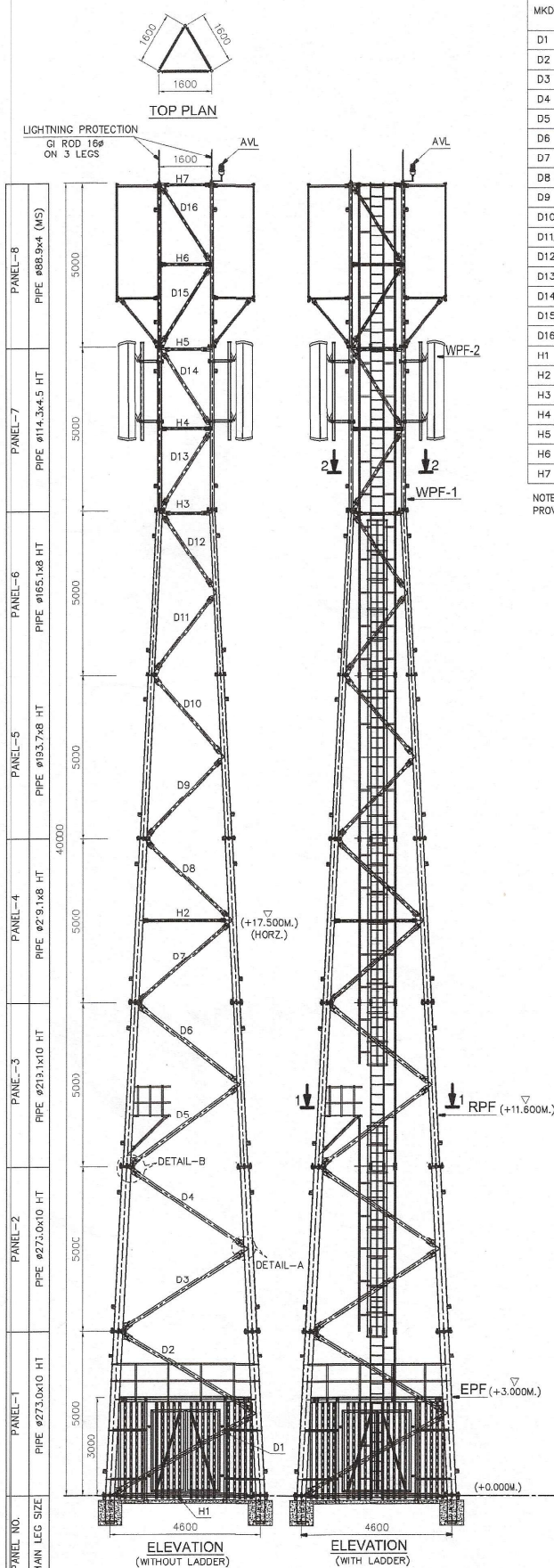
SUBMITTED FOR APPROVAL	INFORMATION	REFERENCE	RECORD	FABRICATION

LTE / KAVACH TOWER-TUBULAR LATTICE-3 LEGGED
40M-180KMPH WIND SPEED 6.5 SQM EPA FOR CYCLONIC REGION

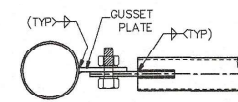
PrincipleACS
Mobile, Engineering And Services

CONSULTANT:
Principle ACS Engineering India Pvt. Ltd.
Hyderabad, India

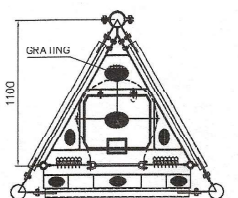
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CHECKED AND VERIFIED	A.R.J		
APPROVED	P.M	SCALE - 1:40	
DATE	12.07.2024	2024-PACS-SPIRE 407RH PLUS-001	001



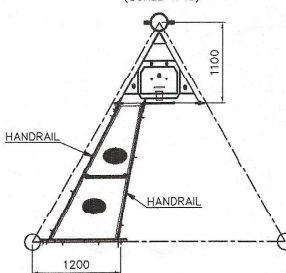
CONNECTION ARRANGEMENT (SCALE 1:15)



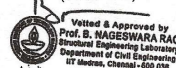
SECTION 3-3 (SCALE 1:15)



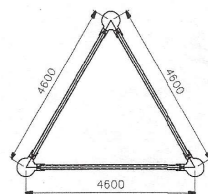
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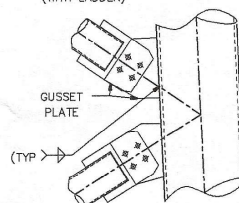
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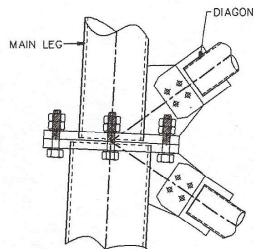
Validated & Approved by
Prof. B. NAGESWARA RAO
Department of Civil Engineering
IIIT Kharagpur, Kharagpur - 751 024



BOTTOM PLAN



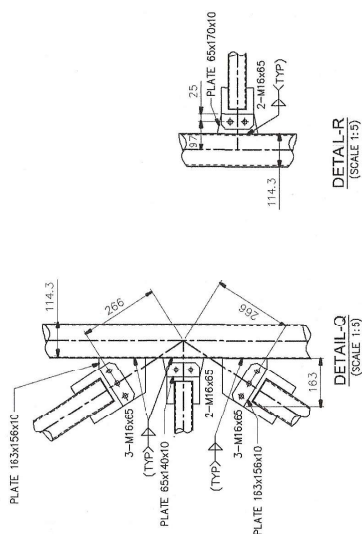
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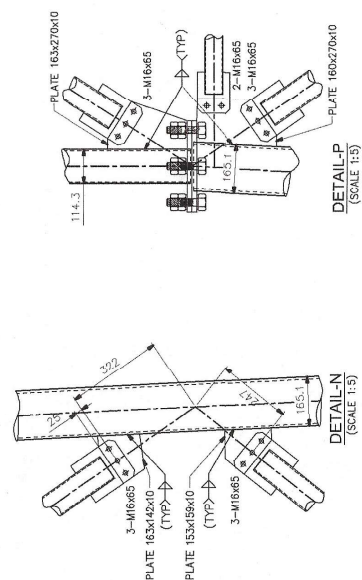
DETAIL - B (SCALE 1:15)

DISCLAIMER:

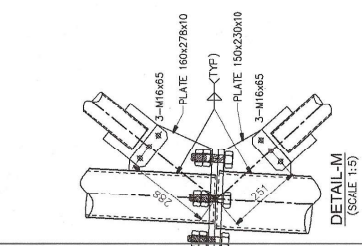
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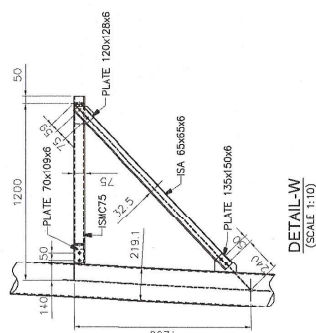
DETAIL-R
(SCALE 1:5)



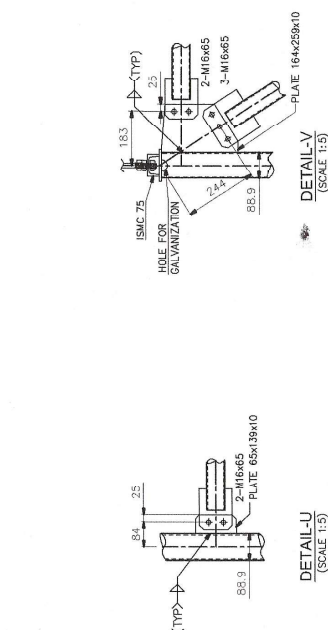
DETAIL-P
(SCALE 1:5)



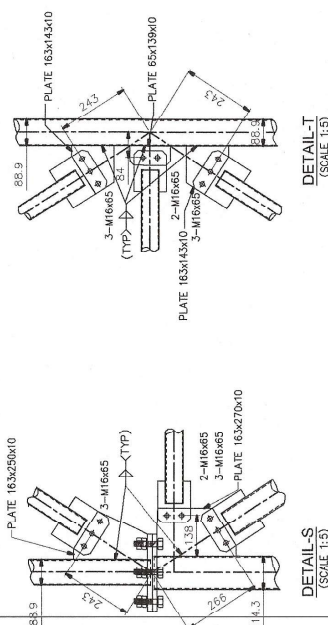
DETAIL-M
(SCALE 1:5)



DETAIL-W
(SCALE 1:10)



DETAIL-V
(SCALE 1:5)



DETAIL-S
(SCALE 1:5)

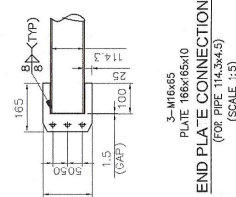
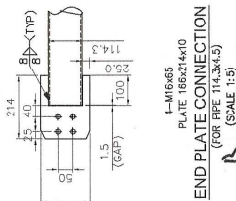
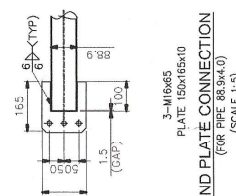


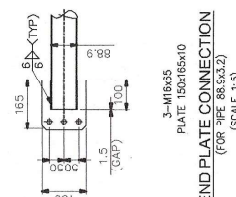
PLATE 166X165X10
END PLATE CONNECTION
(FOR PIPE 114.3x4.5)
(SCALE 1:5)



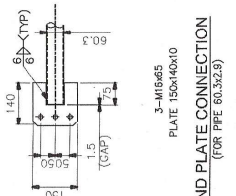
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(FOR PIPE 114.3x4.5)
(SCALE 1:5)



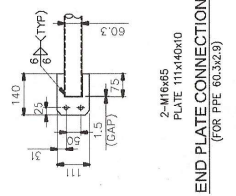
END PLATE CONNECTION
(FOR PIPE 88.9x4.0)
(SCALE 1:5)




END PLATE CONNECTION
(FOR PIPE 88.9x3.2)
(SCALE 1:5)



END PLATE CONNECTION
(FOR PIPE 60.3x2.9)

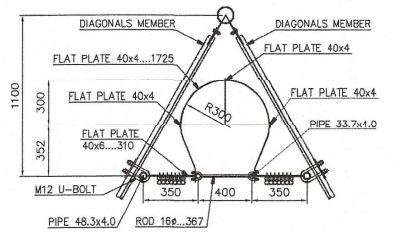
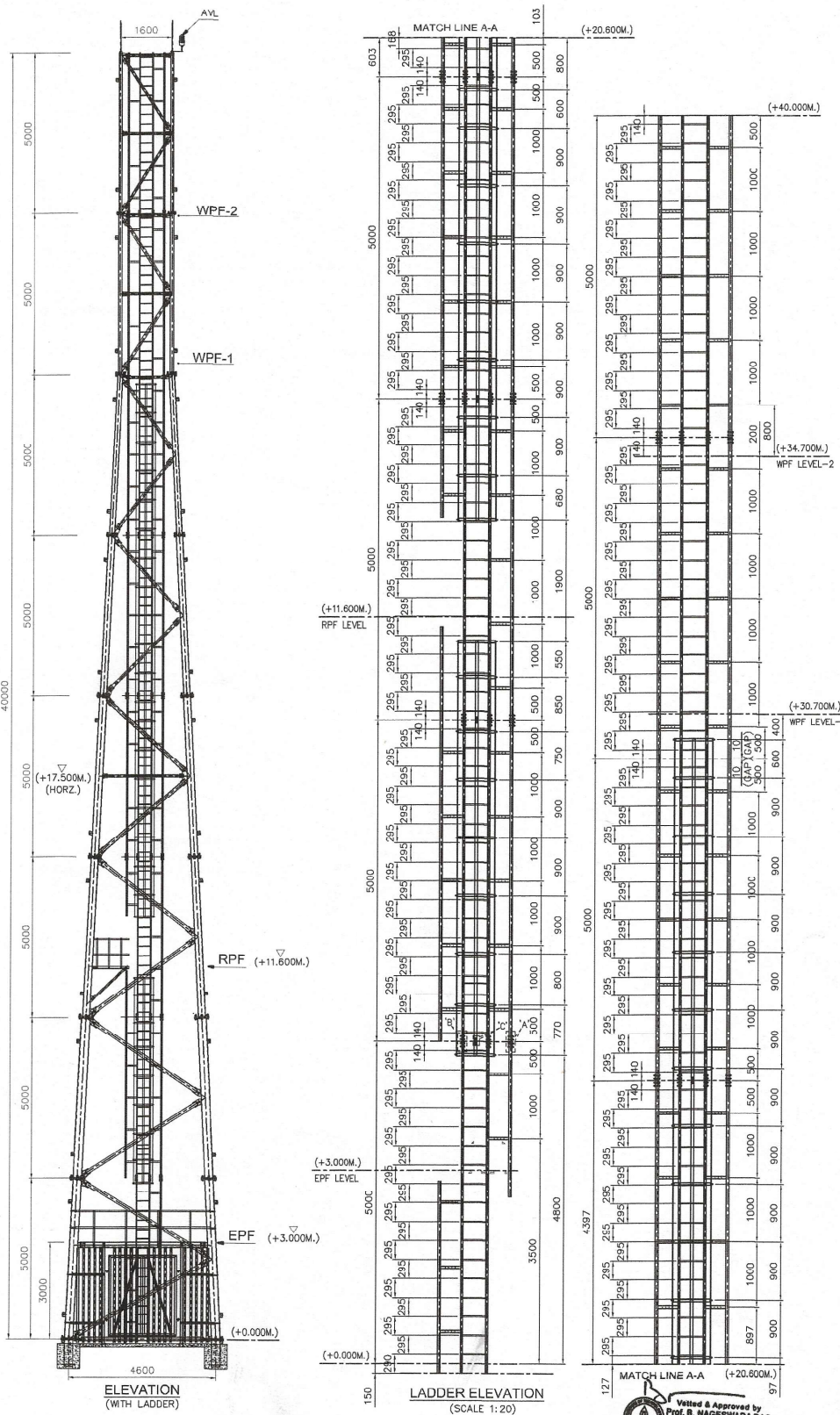


END PLATE CONNECTION
(FOR PPE 60.3x2.9)

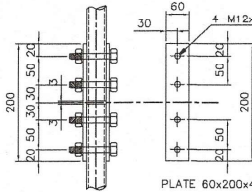
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LITE / KAVACH TOWER-TUBULAR LATTICE-3 LEGGED 40M-180KM/PH WIND SPEED. 6.5 SQM EPA FOR CYCLOCLONIC REGION					
<div style="display: flex; align-items: center; justify-content: center;">  </div>					
CONSULTANT: Principle ACS Engineering India Pvt. Ltd. Hyderabad, India					
DRAWN		M.B		SPIRE 407RH PLUS	
CHECKED	A.R.J	CONNECTION DETAILS			
VERIFIED	P.M	SCALE - 1:40			
APPROVED		SHEET REV. SIZE			
DATE: 12.07.2024	2024-PACS-SPIRE	407RH PLUS-001		004	0 A3

DESIGN CHECKED BY Anasthina	DRAWING CHECKED BY AKK	SCRUTINISED A CHECKED BY msd	SCRUTINISED A RECOMMENDED BY Rao	APPROVED BY [Signature] 22/08/2022
SSE/D / BAS	SE/2 / BAS	ADE/SB-I / BAS	DAS-VII / BAS	ED / BAS

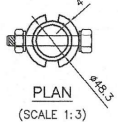
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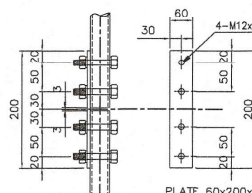
LADDER ASSEMBLY
(SCALE 1:10)



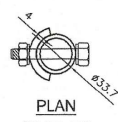
DETAIL-A
(SCALE 1:5)



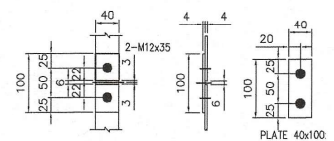
PLAN
(SCALE 1:3)



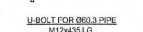
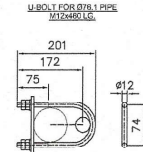
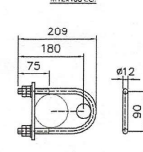
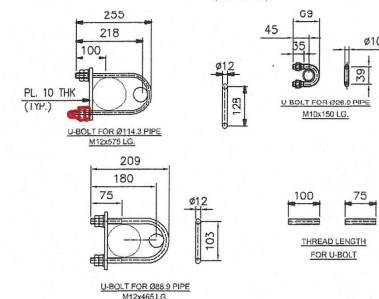
DETAIL-B
(SCALE 1:5)




PLAN
(SCALE 1:3)



DETAIL-C
(SCALE 1:5)



		M2x25x55 LG.			
SUBMITTED FOR	APPROVAL <input checked="" type="checkbox"/>	INFORMATION	REFERENCE	RECORD	FABRICATION
<p>LTE / KAVACH TOWER-TUBULAR LATTICE-3 LEGGED 40M-180KMPH WIND SPEED_6.5 SQM EPA FOR CYCLONIC REGION</p>					
<p style="text-align: center;">  Principle ACS Audits Engineering and Services </p> <p style="text-align: center;">CONSULTANT: Principle ACS Engineering India Pvt. Ltd. Hyderabad, India</p>					
DRAWN	M.B	SPIRE 407RH PLUS LADDER DETAILS			
CHECKED AND VERIFIED	A.R.J				
APPROVED	P.M	SCALE -- 1:40		SHEET	REV./SIZE
DATE	12.07.2024	2024-PACS-SPIRE 407RH PLUS--001		005	0 A3

3

11

De

C

8

A

The diagram shows a triangular platform with a central 'MAIN LAUNDR' area. The platform is surrounded by a 'PLATFORM HANDRAIL'. The dimensions are as follows:

- Top horizontal side: 4250
- Left vertical side: 1000
- Right vertical side: 1000
- Top horizontal side (inner): 625
- Left vertical side (inner): 625
- Right vertical side (inner): 625
- Top horizontal side (outer): 1000
- Left vertical side (outer): 1000
- Right vertical side (outer): 1000
- Top horizontal side (total): 1000 + 1000 + 1000 = 3000
- Left vertical side (total): 1000 + 1000 + 1000 = 3000
- Right vertical side (total): 1000 + 1000 + 1000 = 3000
- Top horizontal side (total): 1000 + 1000 + 1000 = 3000
- Left vertical side (total): 1000 + 1000 + 1000 = 3000
- Right vertical side (total): 1000 + 1000 + 1000 = 3000

VIEW F-F

(SHOWING PLATFORM HANDRAIL)
(SCALE 1:20)

TABLE OF DIAGONAL & HORIZONTAL MEMBER

WKO.	SIZE OF MEMBER	BOLT DIA(mm)	NOS. OF BOLT	GRADE OF BOLT
D1	PIPE $\phi 114.3 \times 4.5$	16	4	8.8
D2	PIPE $\phi 114.3 \times 4.5$	16	4	8.8
D3	PIPE $\phi 114.3 \times 4.5$	16	4	8.8
D4	PIPE $\phi 114.3 \times 4.5$	16	4	8.8
D5	PIPE $\phi 114.3 \times 4.5$	16	4	8.8
D6	PIPE $\phi 114.3 \times 4.5$	16	4	8.8
D7	PIPE $\phi 88.9 \times 4.0$	16	3	8.8
D8	PIPE $\phi 88.9 \times 4.0$	16	3	8.8
D9	PIPE $\phi 88.9 \times 3.2$	16	3	8.8
D10	PIPE $\phi 88.9 \times 3.2$	16	3	8.8
D11	PIPE $\phi 88.9 \times 3.2$	16	3	8.8
D12	PIPE $\phi 88.9 \times 3.2$	16	3	8.8
D13	PIPE $\phi 88.9 \times 3.2$	16	3	8.8
D14	PIPE $\phi 88.9 \times 3.2$	16	3	8.8
D15	PIPE $\phi 60.3 \times 2.9$	16	3	8.8
D16	PIPE $\phi 60.3 \times 2.9$	16	3	8.8
H1	PIPE $\phi 114.3 \times 4.5$	16	4	8.8
H2	PIPE $\phi 60.3 \times 2.9$	16	2	8.8
H3	PIPE $\phi 60.3 \times 2.9$	16	2	8.8
H4	PIPE $\phi 60.3 \times 2.9$	16	2	8.8
H5	PIPE $\phi 60.3 \times 2.9$	16	2	8.8
H6	PIPE $\phi 60.3 \times 2.9$	16	2	8.8
H7	PIPE $\phi 60.3 \times 2.9$	16	2	8.8

NOTE: IN CASE OF DISCREPANCY IN DETAILS ELSEWHERE, DETAILS PROVIDED ABOVE TABLE SHALL PREVAIL.

SUBMITTED FOR	APPROVAL	INFORMATION	REFERENCE	RECORD	FABRICATION
	✓				

LTE / KAVACH TOWER-TUBULAR LATTICE-3 LEGGED
40M-180KMPH WIND SPEED 6.5 SQM EPA FOR CYCLONIC REGION

CONSULTANT:

CONSULTANT:
Principle ACS Engineering India Pvt. Ltd.

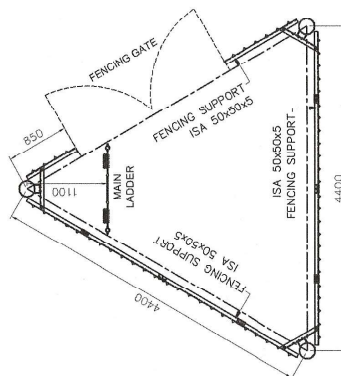
Hyderabad, India

407RH PLUS

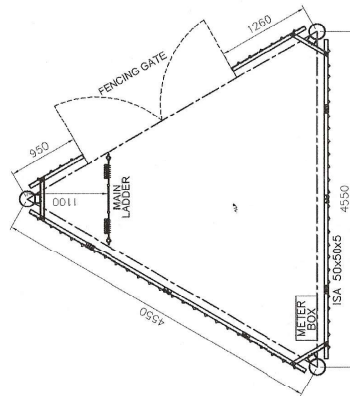
407RH PLUS TAILS OF EPF

APPROVED	P.M	SCALE - 1:40	SHEET	REV / SIZE
DATE	12.07.2024	2024-PACS-SPIRE	407RH PLUS-001	006 0 A3


VIEW 2-2
(SCALE 1:20)



VIEW C-C
(SCALE 1:20)

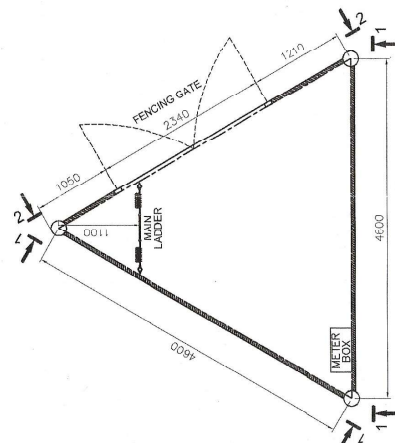


VIEW B-B
SCALE 1:20

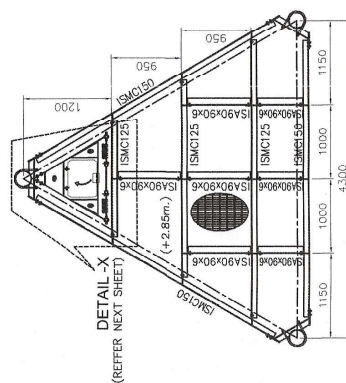


Vetted & Approved by
Prof. B. NAGESWARA RAO
 Structural Engineering Laboratory
 Department of Civil Engineering
 IIT Madras, Chennai - 600 036

ELEVATION OF FENCING ARRANGEMENT

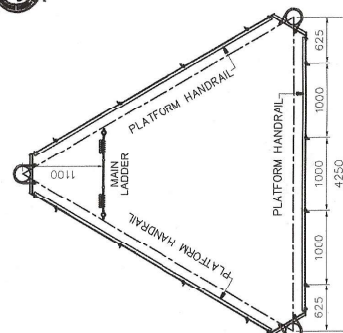


VIEW A-A
SCALE 1:20

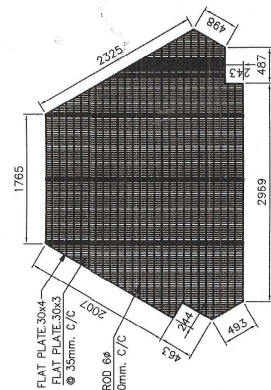


VIEW D-D
(TRANSFORM ARRANGEMENT')

VIEW E-E
(SHOWING PLATFORM HANDRAIL)



VIEW E-E
PLATFORM HANDRAIL)



PLATING AREA
(8.2m²)

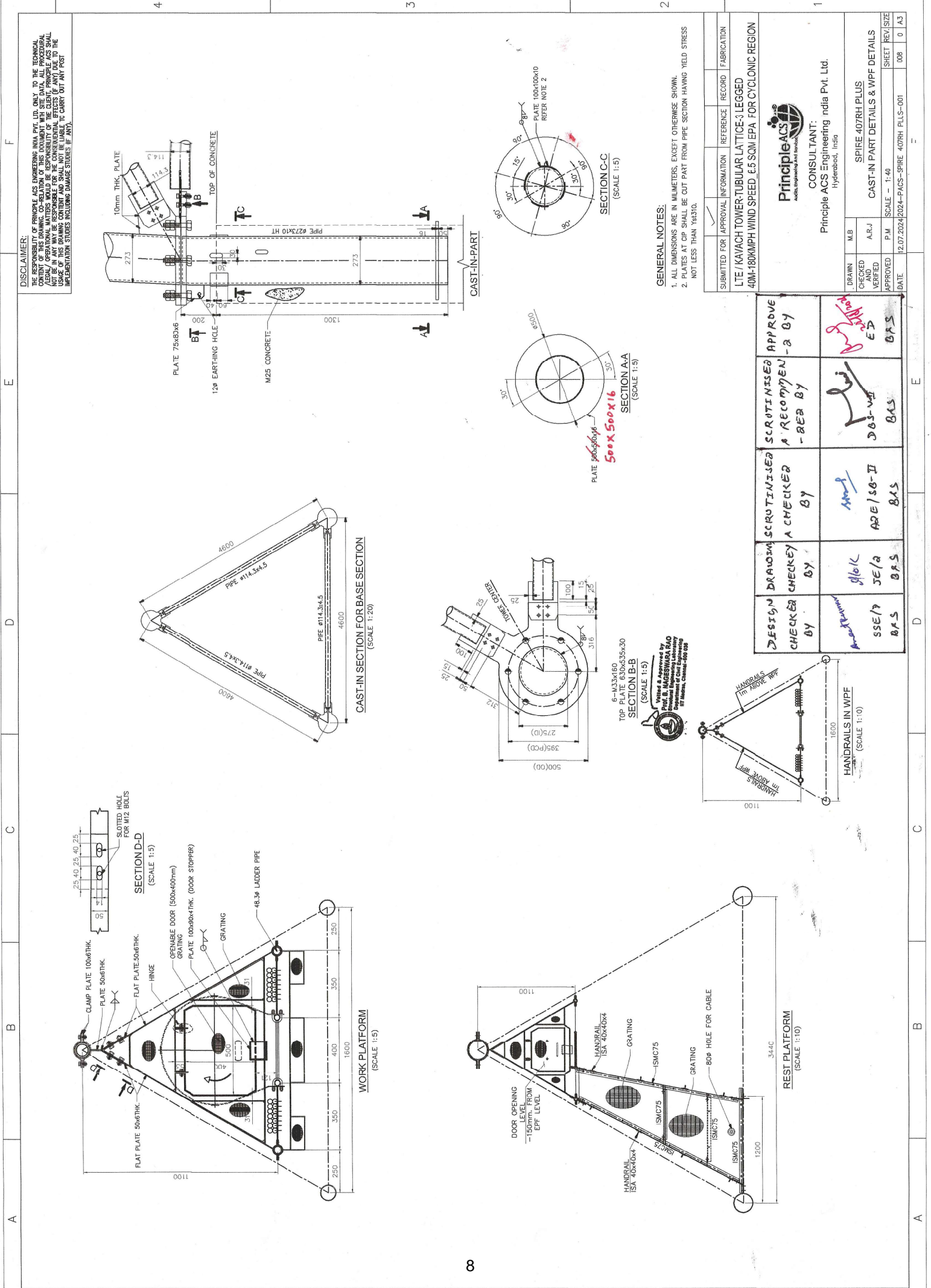
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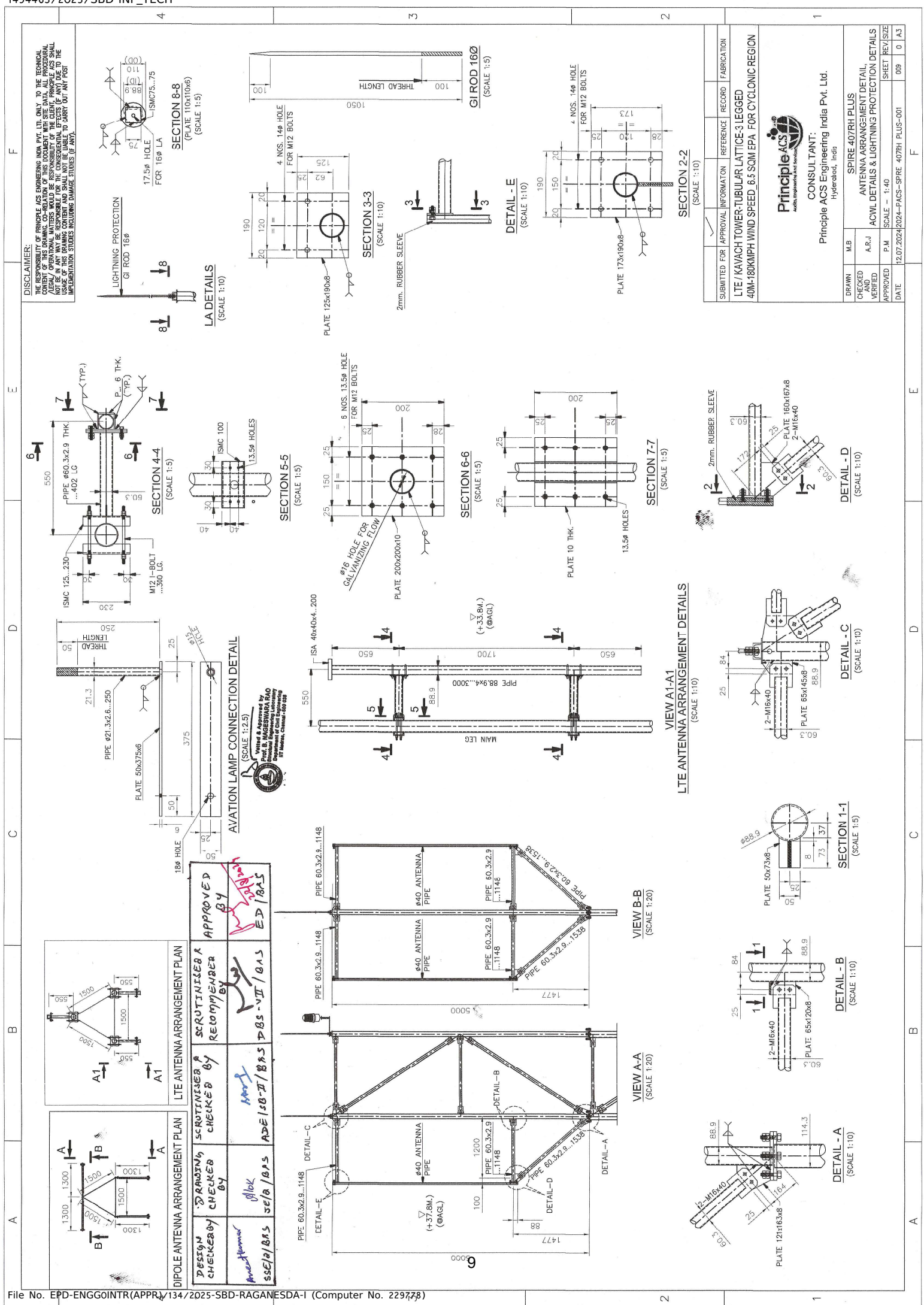
A

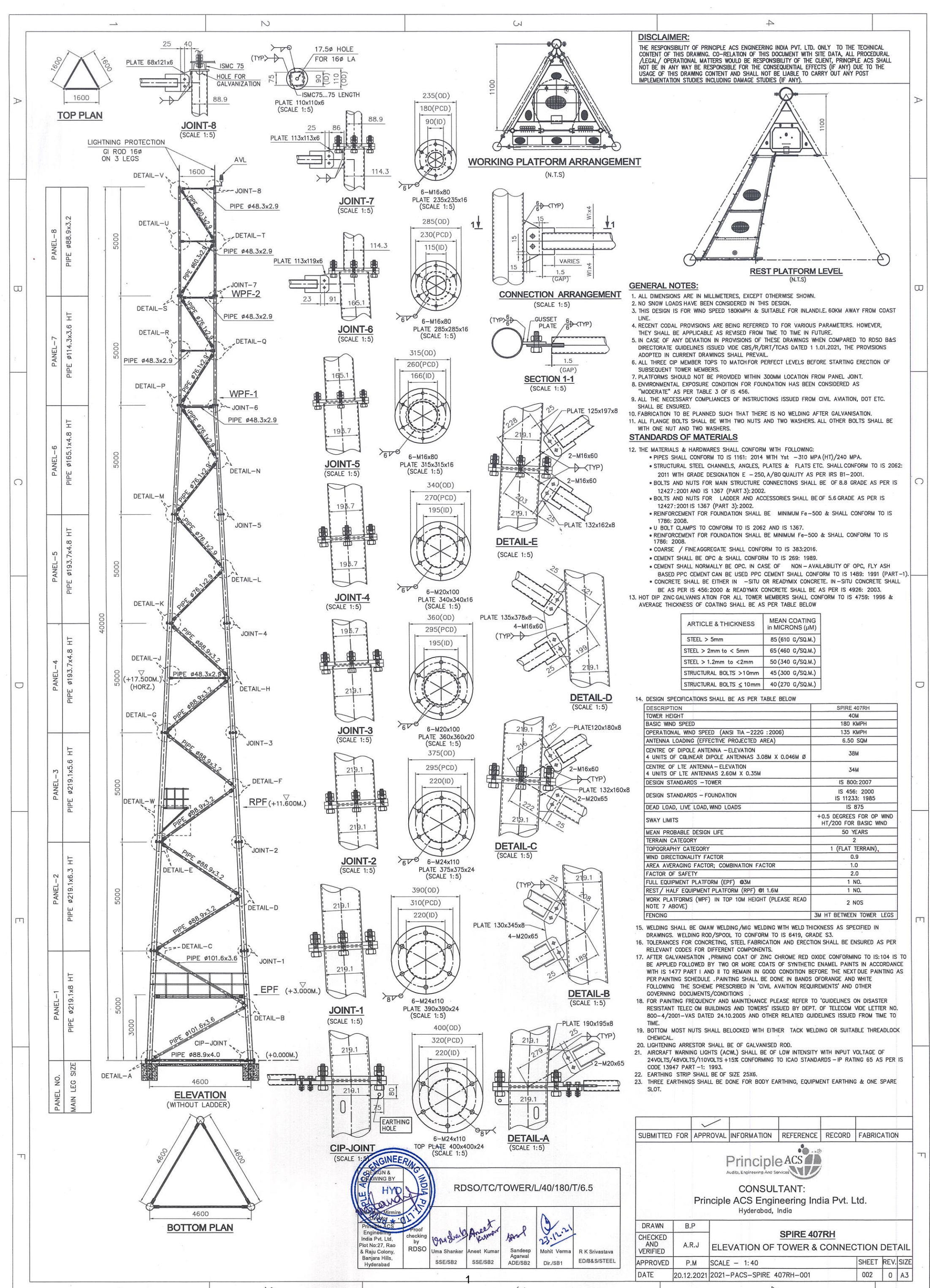
DETAIL OF F4
(SCALE 1:10)

1

7







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GENERAL NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES, EXCEPT OTHERWISE SHOWN.
- NO SNOW LOADS HAVE BEEN CONSIDERED IN THIS DESIGN.
- THIS DESIGN IS FOR WIND SPEED 180KMPH & SUITABLE FOR INLAND I.E. 60KM AWAY FROM COAST LINE.
- RECENT CODAL PROVISIONS ARE BEING REFERRED TO FOR VARIOUS PARAMETERS. HOWEVER, THEY SHALL BE APPLICABLE AS REVISED FROM TIME TO TIME IN FUTURE.
- IN CASE OF ANY DEVIATION IN PROVISIONS OF THESE DRAWINGS WHEN COMPARED TO RDSO B&S DIRECTORATE GUIDELINES ISSUED VIDE CBS/R/DRT/TCAS DATED 11.01.2021, THE PROVISIONS ADOPTED IN CURRENT DRAWINGS SHALL PREVAIL.
- ALL THREE CIP MEMBER TOPS TO MATCH FOR PERFECT LEVELS BEFORE STARTING ERECTION OF SUBSEQUENT TOWER MEMBERS.
- PLATFORMS SHOULD NOT BE PROVIDED WITHIN 300MM LOCATION FROM PANEL JOINT.
- ENVIRONMENTAL EXPOSURE CONDITION FOR FOUNDATION HAS BEEN CONSIDERED AS "MODERATE" AS PER TABLE 3 OF IS 456.
- ALL THE NECESSARY COMPLIANCES OF INSTRUCTIONS ISSUED FROM CIVIL AVIATION, DOT ETC. SHALL BE ENSURED.
- FABRICATION TO BE PLANNED SUCH THAT THERE IS NO WELDING AFTER GALVANISATION.
- ALL FLANGE BOLTS SHALL BE WITH TWO NUTS AND TWO WASHERS. ALL OTHER BOLTS SHALL BE WITH ONE NUT AND TWO WASHERS.

STANDARDS OF MATERIALS

12. THE MATERIALS & HARDWARES SHALL CONFORM WITH FOLLOWING:

- PIPES SHALL CONFORM TO IS 1161: 2014 WITH Yst -310 MPA (HT)/240 MPA.
- STRUCTURAL STEEL CHANNELS, ANGLES, PLATES & FLATS ETC. SHALL CONFORM TO IS 2062: 2011 WITH GRADE DESIGNATION E -250, A/B0 QUALITY AS PER IRS B1-2001.
- BOLTS AND NUTS FOR MAIN STRUCTURE CONNECTIONS SHALL BE OF 8.8 GRADE AS PER IS 12427:2001 AND IS 1367 (PART 3):2002.
- BOLTS AND NUTS FOR LADDER AND ACCESSORIES SHALL BE OF 5.6 GRADE AS PER IS 12427:2001 IS 1367 (PART 3):2002.
- REINFORCEMENT FOR FOUNDATION SHALL BE MINIMUM Fe-500 & SHALL CONFORM TO IS 1786: 2008.
- U BOLT CLAMPS TO CONFORM TO IS 2062 AND IS 1367.
- REINFORCEMENT FOR FOUNDATION SHALL BE MINIMUM Fe-500 & SHALL CONFORM TO IS 1786: 2008.
- COARSE / FINE AGGREGATE SHALL CONFORM TO IS 383:2016.
- CEMENT SHALL BE OPC & SHALL CONFORM TO IS 269: 1989.
- CEMENT SHALL NORMALLY BE OPC. IN CASE OF NON-AVAILABILITY OF OPC, FLY ASH BASED PPC CEMENT CAN BE USED PPC CEMENT SHALL CONFORM TO IS 1489: 1991 (PART-1).
- CONCRETE SHALL BE EITHER IN -SITU OR READY MIX CONCRETE. IN -SITU CONCRETE SHALL BE AS PER IS 456:2000 & READY MIX CONCRETE SHALL BE AS PER IS 4926: 2003.
- HOT DIP ZINC GALVANISATION FOR ALL TOWER MEMBERS SHALL CONFORM TO IS 4759: 1996 & AVERAGE THICKNESS OF COATING SHALL BE AS PER TABLE BELOW

ARTICLE & THICKNESS	MEAN COATING IN MICRONS (µM)
STEEL > 5mm	85 (610 G/SQ.M.)
STEEL > 2mm to < 5mm	65 (460 G/SQ.M.)
STEEL > 1.2mm to < 2mm	50 (340 G/SQ.M.)
STRUCTURAL BOLTS > 10mm	45 (300 G/SQ.M.)
STRUCTURAL BOLTS ≤ 10mm	40 (270 G/SQ.M.)

14. DESIGN SPECIFICATIONS SHALL BE AS PER TABLE BELOW

DESCRIPTION	SPIRE 407RH
TOWER HEIGHT	40M
BASIC WIND SPEED	180 KMPH
OPERATIONAL WIND SPEED (ANSI TIA -222G :2006)	135 KMPH
ANTENNA LOADING (EFFECTIVE PROJECTED AREA)	6.50 SQM
CENTRE OF DIPOLE ANTENNA - ELEVATION	38M
4 UNITS OF C&LINEAR DIPOLE ANTENNAS 3.08M X 0.046M Ø	
CENTRE OF LTE ANTENNA - ELEVATION	34M
4 UNITS OF LTE ANTENNAS 2.60M X 0.35M	
DESIGN STANDARDS - TOWER	IS 800:2007
DESIGN STANDARDS - FOUNDATION	IS 456: 2000 IS 11233: 1985
DEAD LOAD, LIVE LOAD, WIND LOADS	IS 875
SWAY LIMITS	+0.5 DEGREES FOR OP WIND HT/200 FOR BASIC WIND
MEAN PROBABLE DESIGN LIFE	50 YEARS
TERRAIN CATEGORY	2
TOPOGRAPHY CATEGORY	1 (FLAT TERRAIN)
WIND DIRECTIONALITY FACTOR	0.9
AREA AVERAGING FACTOR; COMBINATION FACTOR	1.0
FACTOR OF SAFETY	2.0
FULL EQUIPMENT PLATFORM (EPF) Ø3M	1 NO.
REST / HALF EQUIPMENT PLATFORM (RPF) Ø1.6M	1 NO.
WORK PLATFORMS (WPF) IN TOP 10M HEIGHT (PLEASE READ NOTE 7 ABOVE)	2 NOS
FENCING	3M HT BETWEEN TOWER LEGS

15. WELDING SHALL BE GMAW WELDING/MIG WELDING WITH WELD THICKNESS AS SPECIFIED IN DRAWINGS. WELDING ROD/SPOOL TO CONFORM TO IS 6419, GRADE S3.

16. TOLERANCES FOR CONCRETING, STEEL FABRICATION AND ERECTION SHALL BE ENSURED AS PER RELEVANT CODES FOR DIFFERENT COMPONENTS.

17. AFTER GALVANISATION, PRIMING COAT OF ZINC CHROME RED OXIDE CONFORMING TO IS:104 IS TO BE APPLIED FOLLOWED BY TWO OR MORE COATS OF SYNTHETIC ENAMEL PAINTS IN ACCORDANCE WITH IS 1477 PART I AND II TO REMAIN IN GOOD CONDITION BEFORE THE NEXT DUE PAINTING AS PER PAINTING SCHEDULE. PAINTING SHALL BE DONE IN BANDS OF ORANGE AND WHITE FOLLOWING THE SCHEME PRESCRIBED IN 'CIVIL AVIATION REQUIREMENTS' AND OTHER GOVERNING DOCUMENTS/CONDITIONS.

18. FOR PAINTING FREQUENCY AND MAINTENANCE PLEASE REFER TO 'GUIDELINES ON DISASTER RESISTANT TELECOM BUILDINGS AND TOWERS' ISSUED BY DEPT. OF TELECOM VIDE LETTER NO. 800-4/2001-VAS DATED 24.10.2005 AND OTHER RELATED GUIDELINES ISSUED FROM TIME TO TIME.

19. BOTTOM MOST NUTS SHALL BE LOCKED WITH EITHER TACK WELDING OR SUITABLE THREADLOCK CHEMICAL.

20. LIGHTNING ARRESTOR SHALL BE OF GALVANISED ROD.

21. AIRCRAFT WARNING LIGHTS (ACWL) SHALL BE OF LOW INTENSITY WITH INPUT VOLTAGE OF 24VOLTS/48VOLTS/110VOLTS +15% CONFORMING TO ICAO STANDARDS -IP RATING 65 AS PER IS CODE 13947 PART -1: 1993.

22. EARTHING STRIP SHALL BE OF SIZE 25X6.

23. THREE EARTHINGS SHALL BE DONE FOR BODY EARTHING, EQUIPMENT EARTHING & ONE SPARE SLOT.

SUBMITTED FOR	APPROVAL	INFORMATION	REFERENCE	RECORD	FABRICATION
<div>Principle ACS Audits, Engineering And Services</div> <div>CONSULTANT: Principle ACS Engineering India Pvt. Ltd. Hyderabad, India</div>					
DRAWN	B.P				
CHECKED AND VERIFIED	A.R.J	SPIRE 407RH			
APPROVED	P.M	ELEVATION OF TOWER & CONNECTION DETAIL			
DATE	20.12.2021	SCALE - 1:40	SHEET REV. SIZE		
		2021-PACS-SPIRE 407RH-001	002	0	A3