

**Government of India**  
**Bhabha Atomic Research Centre**  
**Security Electronics & Software Systems Division**

Ref: BARC/SESSD/YG/NIT/2022/28324

Date: 07/02/2022

- 1. Sub: Invitation of quotations for fabrication and supply of antenna masts with tripod and supply of antennas and accessories for DMR Tier II network at BARC, Mumbai as per specifications in Annexures I and II.**

On behalf of President of India, Head, **Security Electronics & Software Systems Division, E&I Group**, Bhabha Atomic Research Centre invites bid in a **sealed envelope through Registered Post/Speed Post of Indian Postal Services only** for the work given below as per Annexures I & II enclosed herewith on or before **03/03/2022 up to 14.30 hrs.**

| Sl. No. | Description of Job   |
|---------|--|
| 1.      | Fabrication and supply of antenna masts with tripod and supply of antennas and accessories for DMR Tier II network at BARC, Mumbai |

The sealed quotation envelope shall contain Technical and Commercial parts of the offer in **two separate sealed envelopes superscripted with Type of bid (differentiated clearly by the terms “TECHNICAL” and “COMMERCIAL” on the respective envelopes), Description of job, Tender Ref. No. and due date** as mentioned above. The technical bids will be opened after the due date of this Notice Inviting Tender (NIT) and commercial bids of technically qualified bidders only will be opened subsequently.

The terms and conditions are given below:

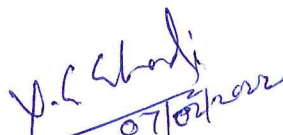
**1. Qualifying Criteria for bidders:**

- 1.1** Firms willing to bid for above mentioned job shall have been vetted by Security Section of BARC.
  - 1.2** The vendor shall provide organizational details including manufacturing facilities, testing and inspection facilities, manpower etc. along with quotation. These details are mandatorily required for vendor evaluation. The organization should have one diploma holder in the relevant field and qualified fitters/technicians on its rolls for assembling.
  - 1.3** The vendor should submit details of past similar works undertaken for BARC or other government organizations in the form of work order reference numbers with details and completion certificates.
  - 1.4** All the supervisors and workers requires to work in BARC, Trombay premises should have valid Police Verification Certificate (PVC) not expiring during the tender period (i.e., from the date of issue of this enquiry till completion of job after getting work order). The list of manpower available with firm shall be submitted along with their details of PVC.
  - 1.5** Workers/laborers given by the vendor should be well experienced in fabrication, installation, servicing and commissioning of similar type jobs.
- 2.** The quotation envelope shall be superscripted with **Description of job, the Tender Ref. No. and due date** as mentioned above.

3. The complete quotation shall reach the following address **on or before 03/03/2022 up to 14:30 Hrs.** by Registered Post/ Speed post:

**(Kind Attn.: Yogesh G Ghadi)**  
**Head, SESSD**  
**BARC, Trombay**  
**Mumbai-400085**

4. **Printed Letter Head:** Quotation should be printed on the letter head of the firm; computer generated quotation is not valid.
5. **Validity of the Offer:** Validity of the offer shall be for 90 days from the date of opening of quotation. Quotation must also indicate the validity of offer.
6. **Delivery Charges:** Delivery charges, if any, must be clearly mentioned in the offer.
7. **Offer of Firm:** Offers of those firms, who do not submit their quotation as per the details given in the technical specification and incomplete quotations in any respect shall not be considered. The offer must include detailed cost breakup including development cost, material cost, conversion cost, testing cost, cost of fabrication, inspection, testing, packing, safe delivery and any other charge.
8. **GST & PAN Numbers:** Quotation shall mention the GST Number and PAN number of the firm.
9. The vendor shall submit detailed techno-commercial offer including salient features, components, raw material details and list of components. The offer must include all technical details for proper technical evaluation. The vendor shall confirm compliance of the technical specification. Any deviation from tender specification shall be clearly indicated in the offer.
10. All the tender rates should be inclusive of all taxes. Detailed Cost breakup including GST should also be provided. Adjustments (i.e. increase or decrease) in the rate of GST are not allowed.
11. The vendor should mention HSN code and applicable GST for each of the items in the quotation clearly.
12. If any of the employee, consultant, or partner of the company is an ex-BARC employee, the same must be stated in the quotation clearly.
13. The Head, SESSD, reserves the right to extend the date of opening the quotations.
14. Head, SESSD, reserves the right to accept/reject any or all quotations without assigning any reason.

  
(Yogesh G Ghadi)  
SA/F, WCSES, SESSD

## ANNEXURE I: General Terms and Conditions

- i. The **specifications and drawing (in Annexure - II)** should be strictly followed by the vendor for this fabrication work.
- ii. Drawings/sketches must not be given to any other party.
- iii. The vendor must execute the job in phased manner as per Sr. No. 2(D) of Annexure-II.
- iv. The vendor shall quote **item-wise rate** (per unit cost and total cost) with cost breakup for the supply as per list Bill of quantity Sr.No 2 of Annexure II.
- v. The vendor should facilitate inspection of raw materials by our engineers for quality checks. Only after inspection and approval by our engineers, the vendor can start the machining and assembly process.
- vi. The fabrication work shall be subjected to inspection by our engineers at intermediate stages of the fabrication work and also for overall testing of the final product with prior notice to the supplier. All the necessary testing facility such as drawings and tooling involved, gauge, instruments etc. should be provided to the engineer during inspection for testing of the items at supplier's premises.
- vii. Inspection and tests shall be carried out by the fabricator as per the requirements detailed in the drawings and specifications. The fabricator shall submit three copies of inspection report to the purchaser for approval. Components found unsatisfactory as to workmanship or material shall be removed by fabricator and replaced by components which are satisfactory and submit the material test certificate to the purchaser for his approval. The finished components shall not be dispatched prior to approval by our engineer.
- viii. All the completed products should be delivered after approval by our engineer on or before **3 months** from date of issue of this WO.
- ix. Security and transportation rules at BARC, Trombay premises shall be strictly followed.
- x. Any delay which is attributable to the contractor is liable for imposition of penalty @0.5% per week (max. up to 10%) on the contractor.
- xi. Requests for delivery date extension from the vendor shall be considered only if they are made before the due date.
- xii. Any Free Issue Material (FIM) and End use certificate shall not be provided.
- xiii. Payment shall be made only on satisfactory completion of work and on production of three copies of invoice, copy of cancelled cheques, option of payment through ECS / RTGS, advance stamped receipt and guarantee/warranty certificate. Advance or Part payment against partial delivery cannot be made.
- xiv. The party should furnish copy of their PAN no. and GSTIN no.
- xv. The invoice should specifically indicate: GSTN, PAN, Location of Supply, Tax component to be separately indicated in the invoice and an undertaking should be submitted by the supplier that the GST has been promptly deposited with the authorities as per attached format.
- xvi. It may be noted that the item shall be used for R&D purpose only. BARC is entitled for Concessional GST rate of IGST @ 5 % or CGST @ 2.5% and SGST @ 2.5 % (refer notification no. 47/2017 dated 14/11/2017 issued by Ministry of Finance). A certificate will be provided to the supplier to the effect that items are for research purpose only for claiming exemption above GST @5%.
- xvii. Income Tax @2% & GST TDS @2% will be deducted from your Bill.
- xviii. Confidentiality clause:
  - a. No party shall disclose any information to third party concerning the matters under this contract generally. In particular, any information identified as "PROPRIETARY"

in nature by the disclosing party shall be kept strictly confidential by the receiving party and shall not be disclosed to any third party without the prior written consent of the original disclosing party.

- b. "RESTRICTED INFORMATION" categories under section 18 of the Atomic Energy Act, 1962 and "OFFICIAL SECRETS" under section 5 of the official Secrets Act, 1923:-  
Any contravention of the above-mentioned provisions by any contractor, sub-contractor, consultant, advisor or the employees of a contractor will invite penal consequences under the aforesaid legislation.
- c. Prohibition against the use of BARC's name without permission for publicity purposes:-  
The contractor or sub-contractor, consultant, advisor or the employees engaged by them, contractor shall not use BARC's name for Publicity purpose through any public media like press, radio, T.V. or Internet without the prior written approval of BARC (Vide circular ref: 2/Misc-9/Lgl/2001/92 dated April 30, 2001).



## ANNEXURE II: Technical Specification

### 1. OVERVIEW OF WORK

BARC has installed and is operating a DMR Tier II network for the wireless communication of security agencies entrusted with the protection of BARC premises and Anushakti Nagar. The work involves fabrication and supply of antenna masts with tripod and supply of antennas and accessories for the

### 2. VENDOR SCOPE OF WORK

The scope of work includes fabrication and supply of antenna masts with tripod and supply of antennas and accessories for DMR Tier II network with safe delivery of following items:

#### Bill of Quantity

| Sl. No. | Description of items  | QTY. |
|---------|---|------|
|         | <b>SUPPLY</b>   |      |
| 01      | 5m Antenna mast including guy ropes, hooks, bolts, nuts etc. with detachable side support bars and detachable type tripod | 10   |
| 02      | 0dBi whip antenna with 5m coaxial cable with BNC Male connector and mounting clamp and brackets                           | 10   |
| 03      | 3dBi Fiberglass Omni directional antenna with N female connector and mounting clamp and brackets                          | 10   |
| 04      | 6dBi Fiberglass Omni directional antenna with N female connector and mounting clamp and brackets                          | 10   |
| 05      | 40m 1/2" Helix cable with N Male Connector at both ends   | 10   |
| 06      | 30m 1/2" Jumper cable with N Male Connector at both ends  | 10   |
| 07      | 10m 1/2" Jumper cable with N Male Connector at both ends  | 10   |
| 08      | RF N-type Male connector  | 100  |
| 09      | RF N-type Female connector  | 100  |
| 10      | RF Cable crimping tool kit  | 02   |

The detailed scope of work for item **Sl. No. 1** in Bill of Quantity is as follows:

- A. Design detailing of 5-mtr Antenna mast and tripod based on preliminary design furnished by BARC.
- B. Preparation of General Arrangement (GA) layouts, sub-assembly level & assembly level drawings and obtaining approval from BARC.
- C. Identification of raw material including bought out components to be used in various sub-assemblies and assemblies of the equipment.
- D. The job should be executed in the following steps:
  - i. Phase 1: Design review and approval: Vendor should submit detailed designs and drawings for purchaser's approval.
  - ii. Phase 2: Fabrication.
  - iii. Phase 3: Pre-dispatch Inspection

- iv. Phase 4: Assembly, Testing & demonstration to user at vendor's site.
- E. The vendor must incorporate minor changes (within 5% of total cost) in the design as required at the time of execution of work at no extra cost.
- F. Supply of GA layouts, as-built assembly, sub-assembly & component level drawings in soft copy along with two sets of hard copies of above drawings, operation/maintenance manuals and parts catalogue.

### 3. BARC SCOPE OF WORK

BARC will arrange the necessary security clearances for entry of the material inside BARC premises.

### 4. GENERAL DESIGN FEATURES

- A. All the parts used in the system should be corrosion-free. For good aesthetics, SS parts used in the system should be of smooth finish. Mild steel, if used for any of the structural components should be plated/painted to prevent corrosion for lifetime.
- B. Design and drawings shall be reviewed by BARC for all components, sub-assemblies and complete assembly. The vendor should start fabrication only after obtaining drawings approval from BARC.
- C. All angle bars and pipes should be detachable and should be joined with nuts and bolts.

### 5. DETAILED TECHNICAL SPECIFICATIONS

| Sl. No.   | Specification                  | Qualitative Requirement          |
|---|--------------------------------|----------------------------------|
| <b>1. 5m Antenna mast including guy ropes, hooks, bolts, nuts etc. with detachable side support bars and detachable type tripod (refer photo and diagram)</b> |                                |                                  |
| 1.  | Pipe 1 length                  | 1m                               |
| 2.  | Pipe 1 diameter                | 76mm                             |
| 3.  | Pipe 2 length                  | 5m (sealed at top)               |
| 4.  | Pipe 2 diameter                | 60mm                             |
| 5.  | No. of Guy ropes               | 3                                |
| 6.  | Guy rope length                | 4500mm                           |
| 7.  | Guy rope diameter              | 4mm                              |
| 8.  | Guy rope material              | Galvanized steel with PVC sleeve |
| 9.  | Tripod Angle Bar 1 (L x W x H) | 2500mm x 4mm x 34mm              |
| 10.   | Tripod Angle Bar 2 (L x W x H) | 670mm x 4mm x 34mm               |
| 11.   | Tripod Angle Bar 3 (L x W x H) | 900mm x 4mm x 34mm               |
| 12.   | Tripod Angle Bar 4 (L x W x H) | 420mm x 4mm x 34mm               |
| 13.   | Support Angle Bar (L x W x H)  | 850mm x 4mm x 34mm               |
| 15.   | Base plate radius              | 73mm                             |
| 16.   | Base plate thickness           | 6mm                              |

|   |  |                           |
|---|--|---------------------------|
| 17.   | Canopy radius                                  | 110mm                     |
| 18.   | Canopy thickness                               | 2mm                       |
| 19.   | Pipes, angle bars, canopy, base plate material | Galvanized iron           |
| 20.   | Triangular cement block length                 | 350mm sides, 50mm corners |
| 21.   | Triangular cement block height                 | 150mm                     |
| 22.   | Hex head bolts                                 | M10 (length 45mm)         |
| 23.   | Max. head load                                 | 10kg                      |
| 24.   | Tolerable wind speed                           | 100kmph                   |
| <b>2. 0 dBi whip antenna with 5m coaxial and BNC Male connector and mounting clamp and brackets</b>         |  |                           |
| 1.  | Frequency                                      | 136-174 MHz (Full Band)   |
| 2.  | Gain   | 0 dBi                     |
| 3.  | Impedance                                      | 50Ω                       |
| 4.  | VSWR   | < 1.5                     |
| 5.  | Polarization                                   | Vertical                  |
| 6.  | Max. power                                     | 50W                       |
| 7.  | Radiation pattern                              | Omni directional          |
| 8.  | Mounting type                                  | L-bracket                 |
| 9.  | Connector                                      | BNC Male                  |
| 10.   | Wind Speed                                     | 200kmph                   |
| 11.   | Length   | 500mm                     |
| <b>3. 3 dBi Fiberglass Omni directional antenna with N Female connector and mounting clamp and brackets</b> |  |                           |
| 1.  | Frequency                                      | 136-174 MHz (Full Band)   |
| 2.  | Make   | Telimart or better        |
| 3.  | Gain   | 3 dBi ± 1                 |
| 4.  | Impedance                                      | 50Ω                       |
| 5.  | VSWR (Max)                                     | 1.5 :1.0                  |
| 6.  | H Plane BW                                     | 360°                      |
| 7.  | E Plane BW                                     | 60° ± 5°                  |
| 8.  | Polarization                                   | Linear, Vertical          |
| 9.  | Max. Power                                     | 100W                      |
| 10.   | Diameter                                       | 45mm                      |
| 11.   | Length   | 1600mm                    |
| 12.   | Radome Material                                | Fiberglass                |
| 13.   | Connector Termination                          | N-Female                  |

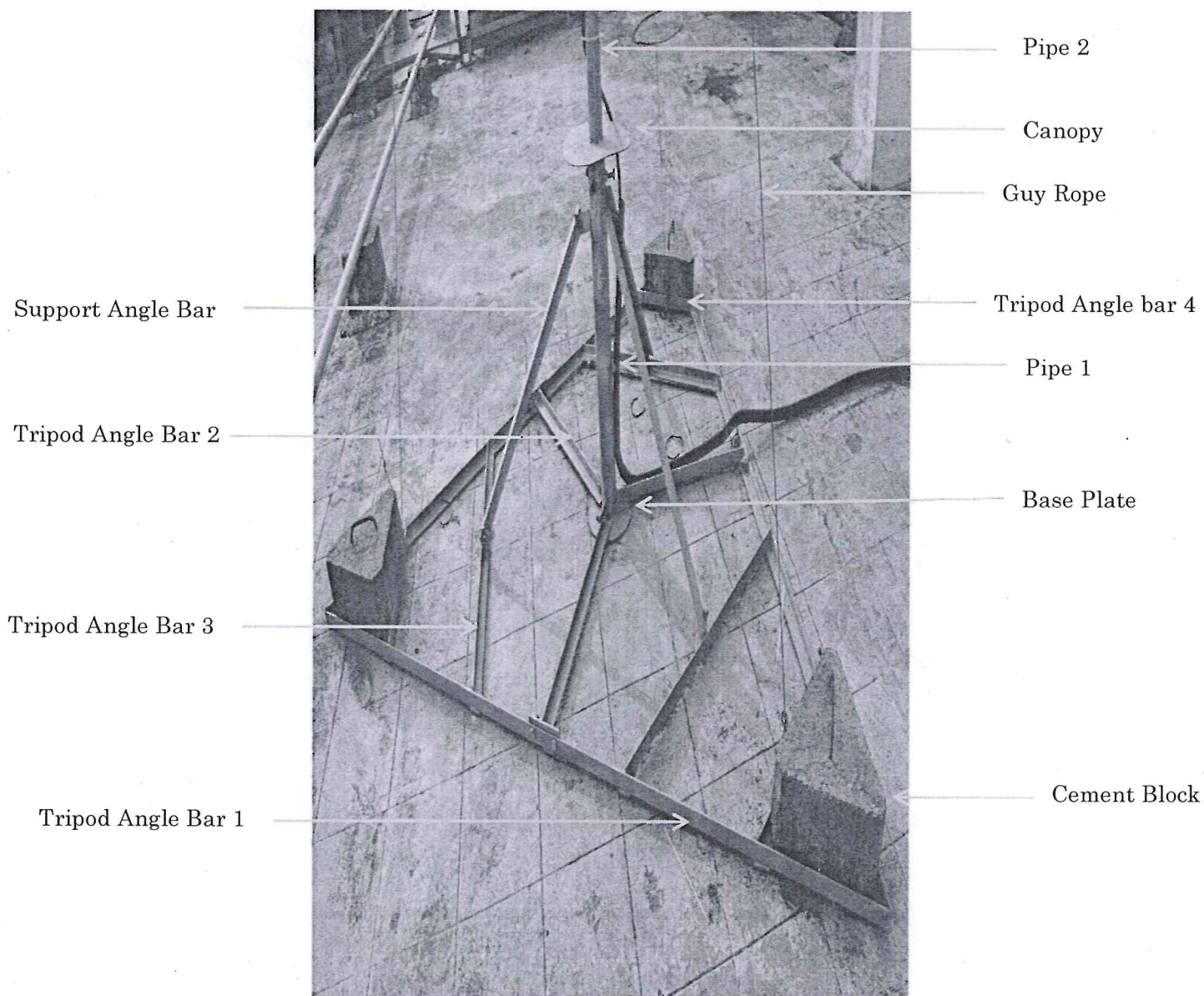


|   |                       |                                       |
|---|-----------------------|---------------------------------------|
| 14.   | Mounting Material     | MS galvanized, powder coated          |
| <b>4. 6 dBi Fiberglass Omni directional antenna with N female connector and mounting clamp and brackets</b> |                       |                                       |
| 1.  | Frequency             | 136-174 MHz (Full Band)               |
| 2.  | Make                  | Telimart or better                    |
| 3.  | Gain                  | 6 dBi $\pm$ 1                         |
| 4.  | Impedance             | 50 $\Omega$                           |
| 5.  | VSWR (Max)            | 1.5 :1.0                              |
| 6.  | H Plane BW            | 360°                                  |
| 7.  | E Plane BW            | 23° $\pm$ 2°                          |
| 8.  | Polarization          | Linear, Vertical                      |
| 9.  | Max. Power            | 100W                                  |
| 10.   | Radome material       | Fiberglass                            |
| 11.   | Mounting Material     | MS galvanized, powder coated          |
| 12.   | Diameter              | 45mm                                  |
| 13.   | Length                | 2500mm                                |
| 14.   | Wind Speed            | 200kmph                               |
| <b>5. 40m 1/2" Helix cable with N Male Connector at both ends</b>   |                       |                                       |
| 1.  | Make                  | Rosenberger or better                 |
| 2.  | Length                | 40m                                   |
| 3.  | Inner conductor       | Copper clad aluminium wire            |
| 4.  | Dielectric            | Foam PE                               |
| 5.  | Outer conductor       | Corrugated copper (annularly)         |
| 6.  | Jacket                | PE, Black, UV resistant, Halogen free |
| 7.  | Impedance             | 50 $\Omega$ $\pm$ 1 $\Omega$          |
| 8.  | Capacitance           | 80pF/m                                |
| 9.  | Bending radius        | 25mm                                  |
| 10.   | Operating temperature | -40°C to +85°C                        |
| 11.   | Connector             | N-Male to N-Male                      |
| <b>6. 30m 1/2" Jumper Cable with N Male Connector at both ends</b>  |                       |                                       |
| 1.  | Make                  | Rosenberger or better                 |
| 2.  | Length                | 30m                                   |
| 3.  | Inner conductor       | Copper clad aluminium wire            |
| 4.  | Dielectric            | Foam PE                               |
| 5.  | Outer conductor       | Corrugated copper (annularly)         |
| 6.  | Jacket                | PE, Black, UV resistant, Halogen free |

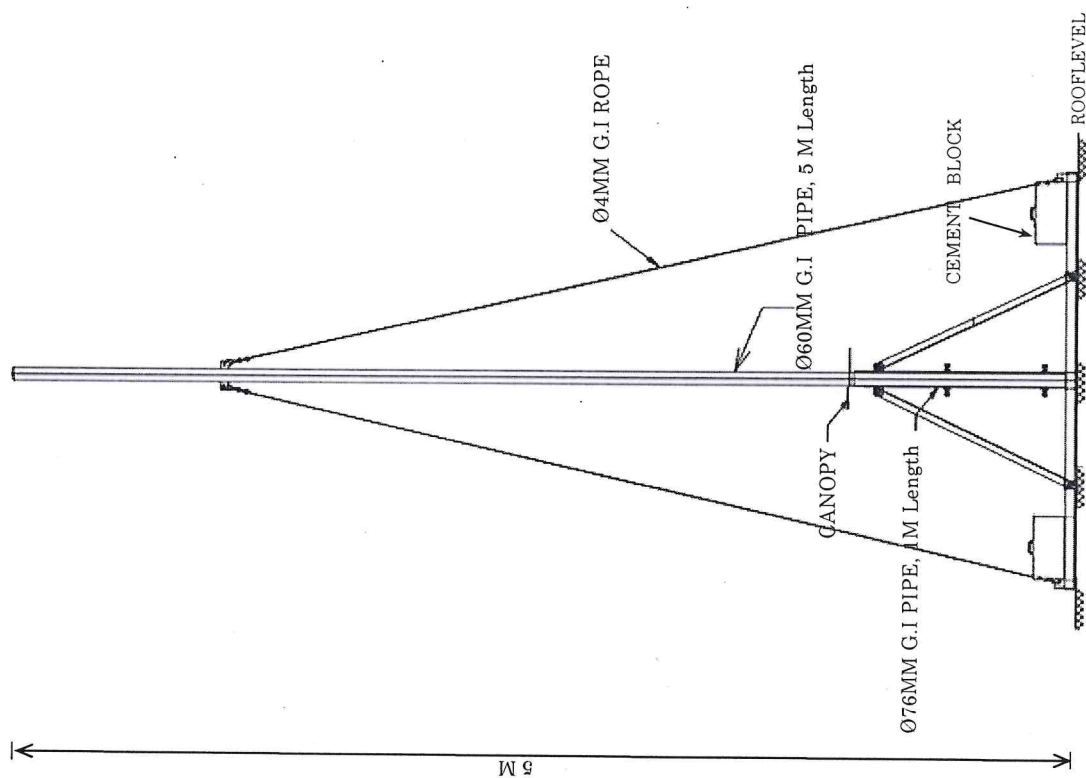


|  |                            |   |
|--|----------------------------|---|
| 7.   | Impedance                  | 50Ω   |
| 8.   | Capacitance                | 80pF/m  |
| 9.   | Bending radius             | 25mm  |
| 10.  | Operating temperature      | -40°C to +85°C                                      |
| 11.  | Connector                  | N-Male to N-Male                                    |
| <b>7. 10m 1/2" Jumper cable with N Male Connector at both ends</b> |                            |   |
| 1.   | Make                       | Rosenberger or better                               |
| 2.   | Length                     | 10m   |
| 3.   | Connector                  | N-Male to N-Male                                    |
| <b>8. RF N-Type Male Connector</b>                                 |                            |   |
| 1.   | Body Finish                | White Bronze  |
| 2.   | Body Material              | Brass   |
| 3.   | Connector Gender           | Male  |
| 4.   | Contact Finish             | Gold  |
| 5.   | Contact Material           | Brass   |
| 6.   | Contact Termination        | Crimp   |
| 7.   | Coupling Mechanism         | Threaded  |
| 8.   | Min. Frequency             | DC  |
| 9.   | Max. Frequency             | 6 GHz   |
| 10.  | Impedance                  | 50Ω   |
| 11.  | Temp (Max Degrees Celsius) | 165   |
| 12.  | Temp (Min Degrees Celsius) | -65   |
| 13.  | Termination Style Cable -  | Crimp   |
| 14.  | Thread Direction           | Standard  |
| 15.  | Size Category              | Standard  |
| 16.  | Compatibility              | It Should be compatible for LMR 400, LMR 600 cable. |
| <b>9. RF N-Type Female Connector</b>                               |                            |   |
| 1.   | Body Finish                | White Bronze  |
| 2.   | Body Material              | Brass   |
| 3.   | Polarity                   | Standard  |
| 4.   | Connector Series           | N   |
| 5.   | Connector Gender           | Female  |
| 6.   | Impedance                  | 50Ω   |
| 7.   | Body Style                 | Straight  |
| 8.   | Attachment Method          | Crimp/Solder  |

|                                       |                |   |
|---------------------------------------|----------------|---|
| 9.                                    | Min. Frequency | DC  |
| 10.                                   | Max. Frequency | 6 GHz   |
| 11.                                   | Compatibility  | It Should be compatible with LMR 400, LMR 600 cable   |
| <b>10. RF Cable crimping tool kit</b> |                |   |
| 1.                                    | Make           | Proskit or better   |
| 2.                                    | Material       | Metal   |
| 3.                                    | Type           | Coax Crimping Kit   |
| 4.                                    | Dies           | 5   |
| 5.                                    | Stripper       | Rotary  |
| 6.                                    | Contents       | Crimping tool, Rotary coaxial cable stripper, Round cable cutter, screw drivers, carry case |

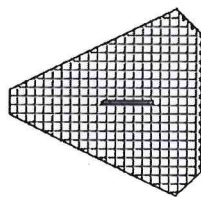


**Fig.1a Photo of 5m Antenna Mast and Tripod**



Photo

Antenna Mast Side View



Cement Block with Iron grip Top View

NOTE:

1. All bars and pipes should be detachable type and should be attachable with nuts and bolts.
2. The base plate should be welded to Pipe 1.
3. The canopy should be welded to Pipe 2.

Fig.1b Drawing of 5m Antenna Mast and Tripod



## **6. BOUGHT OUT ITEMS**

The vendor shall prepare a comprehensive list of all bought out items required for the spares for DMR Tier II network and get approval from BARC before going ahead with their procurement. Components shall be of best quality from reputed manufacturers to have long mean time between failures. The components procured should be brand new having suitable warranty from OEM. The components should be compatible with Kenwood make DMR tier II equipment.

## **7. DOCUMENTATION**

### **A. Design Report & Drawing**

- i. Detailed design report giving the design criteria, features, design calculations considering load & sizing of the components & all relevant design data concerning each sub-assembly/ component shall be furnished. The design shall be reviewed by BARC & if required changes shall be incorporated.
- ii. Two sets of finally approved as built drawings (assembly & part drawings) considering changes accorded during manufacturing & testing shall be submitted to BARC in hard copy and in electronic form.

### **B. Operation & Maintenance (O & M) Manual**

The vendor shall submit two sets of O&M manual in hard copy and in electronic form. The O&M manual shall also contain all the datasheets and user manuals for bought out components which are provided by OEM.

## **8. DELIVERABLES**

- A. Fabrication and supply of items and quantity mentioned in the Bill of Quantity as per the Technical Specifications at Sr. No. 5
- B. Documentation as per Sr. No. 7.

## **9. ACCEPTANCE/REJECTION CRITERIA/PRE-DISPATCH INSPECTION**

- A. The work/job/items under the scope of supply shall be subject to surveillance/ inspection by the indenter or his authorized representative during the progress of the work and/or before final delivery.
- B. Final acceptance shall be subject to meeting the technical specifications as per Sr. No. 5 and after its successful interfacing with the systems.
- C. Failure in execution of any of the above operation or missing functionalities will lead to rejection.

## **10. PACKAGING & TRANSPORTATION**

- A. The items shall be properly packed, suitably crated and protected from damage during transport, transit and storage at site. The packing shall include adequate cushioning, blocking, bracing, anti-skidding, hoisting and tie down provisions.
- B. The vendor shall notify the dispatch of the goods well in advance to BARC giving all pertinent details of this packing. This is necessary to avoid delays/damages during unloading of the packages and storages at site.
- C. Safety of the items being transported shall be the responsibility of the vendor & hence vendor shall make necessary arrangement to deliver the goods safely to BARC. After receipt at BARC, the items will be assembled by vendor and tested to meet the functional requirements.

## **11. DELIVERY SCHEDULE, GUARANTEE & GENERAL INSTRUCTIONS**

### **11.1. DELIVERY PERIOD & DELIVERY SCHEDULE**

All the deliverables items as per Sr. No. 8 shall be delivered to BARC within 3 months from the date of placement of purchase order. The vendor shall submit to the purchaser the detailed time schedule covering various aspects involved in the manufacturing & supply of ordered items such as preparation of drawings, procurement of raw materials & bought out components, fabrication/machining, parts inspection, assembly, testing and safe delivery in the form of Gantt chart or PERT chart.

### **11.2. GUARANTEE**

- A. The vendor shall guarantee that the goods furnished by him shall be in full accordance with the requirements of the tender technical specifications.
- B. The vendor shall provide the warranty that the goods are new & of high quality and that the goods are free from defects in design, materials or workmanship as applicable. The warranty shall cover for a period of 12 months from the date of final acceptance.
- C. If within the expiry of the above stipulated warranty period, the goods or a part thereof are found defective because of workmanship or materials, the vendor shall at his own expense repair or furnish a new part of proper workmanship & material duly approved by BARC. The same shall be installed & tested thoroughly. The warranty period for replaced parts or repair works shall be the same as above.

### **11.3. GENERAL INSTRUCTIONS**

- A. Suitable QA procedures must be followed by the vendor. The fabrication shop should be accessible to BARC representatives for evaluating the QA procedures followed.
- B. All items shall be of best quality and brand new from reputed manufacturers procured from their authorized agents/principals. Used materials/recycled items/repairs items will not be acceptable and will be rejected.
- C. The fabricator shall not sub-contract any or all the work without written consent from the purchaser. The vendor shall be responsible for the part of work that is being sub-contracted.
- D. Payment terms & conditions: 100% after Final acceptance.