PRASAR BHARATI
BROADCASTING CORPORATION OF INDIA
DIRECTORATE GENERAL: ALL INDIA RADIO
(PLANNING & DEVELOPMENT UNIT)
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SPECIFICATION FOR 75M TOWER

Specification for Design, Supply, Erection, Testing and Commissioning of latticed steel self supporting 75M tower including provisions of mountings for installation of VHF FM Antenna.

Introduction:

All India Radio requires FM-cum-Microwave integrated towers for installation of its FM and Microwave dish antenna for various AIR stations.

SECTION-I : General Conditions

SECTION-II : Technical Specification.

SECTION-III. : Schedule of Requirement/ Material (Un priced) for supply at site and design, erection, testing and commissioning of latticed steel self supporting tower of 75 M high FM towers at site shall be submitted by the tenderer in the format enclosed.

Para/ clause wise compliance statement must be enclosed with the tender. Any deviations if any from the Specs shall be clearly indicated.

SECTION-I

1.1. SCOPE:

1.1.1. Design, fabrication, supply and erection of self supporting steel lattice tower and accessories complete with foundation work, earthing devices, pipe for side mounting of 6/8 Bay VHF FM pole type antenna, fixture for mounting of STL/Microwave Dish Antenna, Solid State Aviation Obstruction Lights (with twin circuit arrangement) with cabling, ladders with guard all and free fall prevention system for climbing, Cable Racks for supporting cables and platforms including laying of RF cable. The RF cable will be arranged by indentor. Provision for top mounting of Second Channel FM/ LPTVAntenna,.

1.1.2. Provisions are to be made on the tower as per clause no 2.8 and Annexure-II (Drg. no. TM-15706/1).

1.1.3. The supplier of the tower is required to keep mounting provisions on the tower, for VHF FM Pole Type 6/8 Bay antenna with accessories, microwave dish antenna with accessories and the co-axial feed cables and Yagi Antenna, which will be supplied and installed by other suppliers. The power supply cables will be supplied and installed by the tenderer.

1.1.4. The details of Antennae and accessories with mounting details are enclosed as **Annexure –III, Annexure-IVA & Annexure-IVB.** These details are tentative and likely to be slightly different depending upon their supplier.

1.1.5. Power Supply cable for Solid State Aviation Obstruction Lights (with double cable arrangement), from bottom to the top of the tower will be supplied by the tenderer. The power supply cable for multi point power sockets at various platforms, from power supply source to the topmost platform of tower, will also be supplied by the tenderer.

1.1.6. The RF feeder cable and other cables i.e. cables for AOL, power supply etc between the transmitter building and the tower base shall be routed on a horizontal cable tray supported on G.I. Poles / Angle Iron structure which will be supplied by the tenderer. The cables on the horizontal cable tray shall be provided with G.I. sheet cover of 16 SWG to avoid any damage to RF cable due to any falling objects. Details of Horizontal Cable Tray are enclosed as **Annexure-V**.

1.1.7. The RF cables, AOL cables and utility outlets power supply cable at various platforms shall be taken on tower on the vertical cable rack.

1.2. GENERAL:

General term and conditions of contract for SITC works including all the commercial aspects like ; Packing and Packing List, Insurance and Marine Risk etc., Payment terms, Penalty/Compensation for Delay, Damages and Liabilities, Time Period and Extension for Delay, Foreclosure of Contract due to Abandonment or Reduction in Scope of Work, Cancellation of Contract in Full or Part, Recovery of Security Deposit, Performance Guarantee, Unsatisfactory Workmanship, Damages Incurred During Installation, Indian Electricity Rules, Defects, Recovery of Compensation, Ensuring Payment and Amenities, Compliance with State Labour Laws, Minimum Wages Act Compliance, Indemnifying Government against Patent Rights, Return of Surplus Material, Employment of Technical Staff and Employees, Release of Security Deposit, Safety Code etc. shall be followed by successful tenderer as defined in tender document in totality.

1.2.1. The specifications indicated herein are only to guide the tenderer about the requirements of the user. Detailed design of the tower from all aspects shall be got worked out by the tenderer, keeping in view the effects of local meteorological conditions like wind velocity, seismological & environmental conditions, temperature etc. to ensure the safety of the tower.

1.2.2. The design of the tower shall be based on recognized principles of structural design conforming to standard practices followed in the field. **Full responsibility regarding soundness of design and the execution of work rests with the tenderer.**

1.2.3. *The tender shall be complete and include all minor items of work and accessories which may not have been specifically defined in this specification and schedule but which are useful and essential for the due and perfect assembly and* completion *of the tower. No extra - charges will be paid for providing and installing such items.*

1.2.4. The tender shall be deemed to comply with all the specifications unless specifically mentioned & agreed to.

1.3. The tenderer shall furnish with his tender the following complete documents /information to assess the full merit of the offer:

1.3.1. Outline drawings to scale showing the assembly of the structures. These drawings should show the main dimensions including the sizes of main structural members, mounting centres, methods of attachment to concrete foundations and any special features of design or form.
Total Weight of tower shall be given.

1.3.2. Wind zone and wind velocity taken for designing the tower.

1.3.3. Stress diagrams/ calculations of the complete structures under maximum wind load conditions and with all information necessary for the design of footings.

1.3.4. The design calculations indicating the various formulas used for design, the bearing and sheer stresses used for the design of bolted sections, and the factors of safety adopted for the various structural components and materials. Overall safety factor of the tower under worst atmospheric conditions shall be better than 2 (two)

1.3.5. The detailed Design of foundations for 8.2 MT/Sq.M Soil Bearing Capacity (SBC).

1.3.6. Details of Solid State Aviation Obstruction Lights (with twin circuit arrangement), Antenna Fixtures, P.S. cables, earthing etc.

1.4. The location of the tower at the site vis-à-vis the transmitter building will be marked by indentor on Site Lay Out Plan. Maximum area available, including excavation work, for tower will be 20 x20M.

1.5. The successful tenderer shall make his own arrangements for power supply, water and the storage of materials and their safe custody at installation site.

1.6. The successful tenderer shall make his own arrangements for providing accommodation for his workmen .

1.7. The successful tenderer shall make his own arrangements for procuring the necessary labour, skilled and unskilled. He should conform to all local State laws and regulations concerning labour and their employment.

1.8.1. The successful tenderer shall indemnify and hold harmless the purchaser against claims in respect of injury to any person howsoever arising from the erection of the tower in the course of such erection and throughout the guarantee period.

1.8.2. The successful tenderer shall indemnify and hold harmless the purchaser against all claims in respect of damages to buildings, property, articles, situated nearby not belonging to the purchaser, and public personnel arising from the erection of the tower in the course of such erection and throughout the guarantee period.

1.8.3. The successful tenderer shall make good all damage to the purchaser's buildings, property, equipment, article and departmental personnel arising from the erection of the tower in the course of such erection and throughout the guarantee period.

1.8.4. The successful tenderer shall fully discharge all obligations under the Indian Workmen's Compensation Act in so far as it affects the workmen under his employment.

1.9 The tenderer shall be responsible for the safe erection of the tower and other accessories etc. The tenderer shall take all the necessary safety measures and precautions during the SETC of tower. Tower work shall be got done at site under the supervision of a qualified representative of the firm.

1.10. The successful tenderer shall furnish the following within two month from the date of acceptance of the tender:

1.10.1. General arrangement of tower including solid state aviation obstruction lights, platforms, suitable size and length of pipe for mounting provision of VHF FM antenna along with mounting provision of microwave dish antenna, Yagi antenna etc.

1.10.2. Two sets of complete outline, assembly, foundation and erection drawings. He shall forward all technical information necessary to illustrate that the design fully meets the requirements of this specifications.

1.10.3. A certificate testifying the soundness of design of tower and foundation at his own cost from "Any of Indian Institutes of Technology/ Structural Engineering Research Centre".

After Certification of the design, the successful tenderer should get the detailed working drawings and Drawn Out Details list approved from the indentor.

While sending the detailed working structural drawings of tower including foundation etc. and Details of Design document, list etc. to the indentor for the approval, the following shall be indicated on all the working tower foundation and structural drawing itself;

Directorate AT No. (2) Specification No. (3) Approval Certificate for soundness of tower as per AIR specification along with signature, stamp of competent authority defined as outlined above.

1.10.4 Tenderer shall indicate the weight of the each tower members on the structural drawing it self so as to assess the total weight of the tower as per following table.

Sr.No.	Tower member size Length(mm)xWidth(mm)x Thickness(mm)	Ref. to Structural drawing.	Weight (Kg)	Remarks

After the approval/acceptance of all tower-working drawings from Directorate, the successful tenderer shall send duly approved tower working drawings to Installation Officer, Station Engineer, Zonal Chief Engineer and Directorate indicating all the references. The duly approved tower working drawings (as per para 1.10.2) must be available with all concerned offices before the start of tower work at site.

1.11. **EXPERIENCE AND RESOURCES:**

The tenderer shall submit details of his previous experience in similar type of work undertaken during last 5 years.

1.12. **PATENTS AND COPYRIGHTS:**

The tenderer shall hold the purchaser and his employees safe, harmless and immune from any liability that may arise out of infringements of patents and copyrights associated with the design, fabrication, erection and use of the tower and its accessories.

1.13. **TIME OF COMPLETION:**

The tower erection shall be completed **within nine months** from the date of placing the order.

1.14. INSPECTION:

The successful tenderer shall prepare in consultation with the indentor, the schedule of events with target dates, which shall be adhered to. The successful tenderer shall state in his tender the place of manufacture, testing and inspection of various materials included in the specifications, to enable AIR's authorized representative to carry out inspection and test. The successful tenderer shall provide all the necessary facilities for the purpose. Such of the stores as are to be inspected during manufacture have to be certified by the authorized representative of AIR before the finished materials are packed and forwarded to the destination. Pre-dispatch inspection of tower material and subsequent inspection of erected tower shall be done as per mutually accepted test procedure, which shall be submitted and got approved from the indentor before the supply of tower material. However for guidance purpose, draft Acceptance Test Protocol is enclosed in **"Annexure-I".** *Travelling expenses for AIR's representative(s) will be borne by the indentor.*

1.15. COMPLETION REPORT:

A detailed completion report of tower (after completion of all the works) together with complete set of drawings will be submitted by the successful tenderer to the concerned Installation Officer, Station Engineer, Zonal Chief Engineer and AIR Directorate.

1.16. GUARANTEE:

i) The Tenderer shall guarantee to replace free of charge any material or part thereof that may develop defects *within one year of handing over of the tower*.

ii) The tenderer shall guarantee the stability, safety, durability and satisfactory mechanical behavior of the structure under the conditions of specified loading. *The guarantee shall hold good for a period of one year from the date of handing over of the tower.*

SECTION-II

2. TECHNICAL SPECIFICATIONS:

All the IS Specification referred herein after shall be read with the latest amendment.

2.1. FABRICATION AND DESIGN:

2.1.1. Tower members shall be of structural steel conforming to IS:8500, IS:226, IS:2062 and IS:7215 or latest IS as applicable.

2.1.2. All steel used shall be galvanized, conforming to relevant IS specification i.e. IS:2629 for tower members, IS:1367 for fasteners and IS:1573 for washers.

2.1.3. Assembly of tower members and other structures on tower shall be by means of nuts and bolts alongwith locking nuts / spring washer. *Riveting and welding, if the design demands, shall conform to relevant IS specifications.* **Minimum thickness of the members should be 6 mm.**

2.1.4. The quality of steel used for nuts, bolts and washers etc. should conform to IS No: 6639/72 and mechanical properties as per IS:1367. Dimensionally, it shall conform to IS:1363. All bolts shall have hexagonal heads and nuts. The bolts shall be treated with standard threads to take the full depth of the nut. All nuts shall fit hand tight to the bolts. No appreciable fillet shall exist at the point where shank of the bolt connects to the head. Lock nuts / spring washers shall be provided to all bolts and nuts.

2.1.5. The overall force co-efficient for wind load on tower shall be taken from IS:875/1987 for Self-Supporting Steel Towers. For calculating the solidity ratio, actual obstruction area of tower shall be considered. Separate Wind obstructing areas shall be taken for ladder, cable rack and platforms etc.

2.1.6. The basic dynamic wind pressure at different heights for different zones shall be taken from the Indian Standard Code.

2.1.7. The basic wind velocity for the site is to be taken from the revised BIS Code No.IS: 875/1987.

2.1.8. The permissible stresses in the various structural members of tower shall be adopted from the relevant clauses of IS:800.

2.1.9. Loading effect due to antenna and various accessories as indicated at Para No. 2.8 will be taken into consideration.

2.1.10. Loading effect of seismic forces as per IS:1893 and cyclonic winds and conditions of frost etc. if any, may also be taken into consideration.

2.1.11 Weight of the tower should not be less than 46 MT (Excluding foundation steel).

2.2. FOUNDATIONS:

2.2.1. Tenderer is advised to inspect the tower site and acquaint himself with the local terrain & site conditions, soil conditions, nature of sub soil, water table and its seasonal variations etc. and make such local enquiries, as may be necessary for any data required by him, before quoting his rates. No extra

charges for leveling and retaining walls etc., shall be payable by the indentor in addition to the cost quoted in the tender. Ground has to be properly leveled after erection of tower & cleared of all debris etc. Foundation is to be protected by provision of pitching work on sloping terrain to protect the foundation from erosion.

2.2.2. For the purpose of this bid, the tenderer shall quote the rates (in the commercial bid) on the basis of 8.2 MT/ Sq.M Soil Bearing Capacity(SBC) at 2 m depth.

The tenderer shall also quote for "Extra for reduced Soil Bearing Capacity (SBC) below 8.2 MT /Sq.M for every 0.55 MT/Sq.M decrease."

2.2.3. The successful tenderer shall carry out soil tests through a authorized/reputed firm of experts, to the satisfaction of the indentor. Soil samples should be got tested in a Govt. approved laboratory. When a test boring is conducted, complete test observations will have to be recorded and furnished to the indentor. After taking samples, the bored hole should be closed properly.

2.2.4. The cement, sand and concrete used shall be of best grade and the concrete shall preferably be mixed in a mechanical mixer in the standard ratio 1:2:4. The foundation shall be watered and cured for at least 14 days and the erection of the tower shall be commenced only after the foundations are thoroughly cured.

2.3. VERTICALITY, DEFLECTION & TWIST:

2.3.1. UNDER STILL AIR CONDITIONS:

2.3.1.1. The tower shall be vertical after erection and no straining shall be permitted to achieve this. The errection tolerance of Verticality shall be within 25 mm for every 9100 mm. subject to overall verticality of tower within 50mm along the full height of tower with respect to tower base and stage wise corrective action shall be taken to achieve the above.

2.3.1.2 The angular twist shall not be exceed 0.5 degree from the normal plane of tower face.

2.3.2. UNDER MAXIMUM WIND LOAD CONDITIONS:

The average slope of the axis of the antenna support column shall not depart from the vertical by more than 1 degree under maximum wind load conditions.

2.4. PROTECTION AGAINST LIGHTENING:

The tower shall be provided with a suitably designed complete system of lightening protection in accordance with the provision of IS:2309/1969 including necessary earthing based on the specific resistivity of the soil and sub-soil water level. The lightening protection system shall be got approved from indentor, before execution. Braided copper wire/copper strip is to be provided for Lightening Arrestor from top of the tower to the ground alongwith separate earthing.

2.5. PAINTING:

2.5.1. The tower shall be given two or more coats of paint in addition to two primer coats after erection. The tower shall be painted to have equal alternate bands of international orange and white colours with top and bottom bands painted in orange as per latest Civil Aviation Regulations.

2.5.2. The paints used in painting shall be in accordance with IS:-2074/62, 2932 & 2933/75 or latest IS. Before applying coats of primer, the surface shall be given a coat of Pickling agent so as to avoid the flaking of painting. The tenderer should furnish the details about the pickling agent intended to be applied.

2.6. EARTHING:

All the four tower legs shall be earthed individually, following the standard practice of earthing of such structures in level ground and mountainous regions (Details shall be attached with the tender). *The earth resistance of the tower earthing shall be* less than *1 ohm.*

2.7. FACILITIES ON TOWER:

The following facilities are required to be provided on tower:

2.7.1. PLATFORM:

Provision of platform for access to the antennae and cables at different levels be made as indicated in the **Annexure -II.** 1.5 meter high handrails would be provided at each level with expanded metal net for additional safety. Platform flooring will consist of chequered plate conforming to IS:3502 and shall be designed as to take stationary and moving load of 4 persons plus equipment weighing about 100 Kg. At each platform "Toe-plates"(6”) as a form of protection against accidental dislodging of small tools, are to be provided.

2.7.2. LADDERS:

2.7.2.1. An internal ladder of width not less than 300 mm starting from ground level of the tower and going up to the top with openings at all the platforms shall be provided. The ladder shall be foldable/retractable at the ground level and length of foldable/retractable portion of ladder should not be more than 1.5M. The ladder shall be hooped type with free fall prevention system & Guard All System for safety of the climbing personnel. The face on which the ladder is to be provided shall be intimated by indentor before the commencement of erection of tower.

2.7.2.2. Rungs of the ladder shall be clear of any obstructions to the climber and equally spaced by not more than 250 mm.

2.7.3 SOLID STATE AVIATION OBSTRUCTION LIGHTS & POWER CABLES:

2.7.3.1. Solid State Aviation Obstruction Lights fitting (with twin circuit arrangement) equipped with appropriate colour prismatic globes shall be provided as per latest Civil Aviation Regulations. The globes and their housings shall be strong, weather proof and of approved manufacture (Details shall be attached with the tender). Each globe shall house a solid-state lighting arrangement to yield specified illumination. The tower lighting drawing shall be got approved from the indentor.

2.7.3.2. One no., 3core, 6 Sq. mm copper conductor (Stranded), PVC insulated, PVC sheathed weatherproof armoured Power Supply cable for Multipoint power sockets on each platform shall be supplied, laid and clamped to the cable rack. This cable shall be terminated in SP&N MCB of suitable rating in a suitable weatherproof metal box at the tower base including the earthing etc. Power sockets with switches of suitable rating shall be provided and suitably mounted at each platform in weatherproof boxes.

2.7.3.3. Two no. of PVC Insulated, PVC sheathed weather proof, suitably rated, *Copper conductor*, armoured cable for Solid State AOL(with twin circuit arrangement) shall be provided and laid, fixed with cable clamps on vertical Cable Tray. This cable shall be terminated in SP&N MCB of suitable rating in a suitable weatherproof metal box at the tower base including the earthing etc.

2.7.3.4. Distribution of supply to Solid State Aviation Obstruction Lights (with double cable circuit arrangement) shall be through suitable weatherproof junction boxes with suitable mounting.

2.7.3.5. The successful tenderer shall provide temporary Aviation Obstruction Lights during erection of tower as soon as the tower reaches the height of 25 meters or such heights as prescribed in latest Civil Aviation regulations.

2.7.3.6. A "Sun Switch" is required to be provided for AOL so that these are "ON" automatically if sufficient sunlight is not available around tower. In no case Sun Switch is to be installed inside a room or covered space.

2.7.4. CABLE RUN-WAY AND ANTENNA SUPPORTING FIXTURES:

2.7.4.1. Vertical Cable Rack:

The vertical cable rack for laying cables as indicated in para 2.8.2 starting from the base to the top of the tower shall be provided.

This cable rack shall be routed along the tower face or leg and should be just behind the climbing ladder or be a part of this for easy accessibility. The cable rack shall carry all the RF feeder cables, AOL & Service cables etc. It should have provisions for fixing the cable clamps.

2.7.4.2. Side Mounted FM Antenna Fixtures:

Provision for fixing 100 mm **(inner dia. category class C)** supporting seamless GI pipe of *22 M length* **(As per Annexure - II)** for side mounting VHF FM Pole type Antenna **(As per Annexure - III)** shall be made on three faces of the tower. This supporting pole will be fixed in VHF FM Band -II Aperture on *one of the three faces, to be intimated at the time of erection of tower*. The fixtures of the antenna shall not foul with the cable routing from the power divider to the antenna. The above pipe shall be supplied by the tenderer as part of tower.

2.7.4.3. Top Mounted FM/LPTV Antenna Fixtures:

Provision for fixing 200 mm inner dia class C supporting seamless GI pipe of 12 M length **(As per Annexure - II)** for top mounting VHF FM Pole Type Antenna shall be made on top of tower.

2.7.4.4. Microwave Dish Antenna and Yagi Antenna Fixtures:

Fixtures for mounting Microwave Dish Antennae and Yagi Antennae as shown in the tower profile **(Annexure - II)** are to be provided **(As per Annexure-IVA & IVB).**

2.7.4.5. Horizontal Cable Rack:

The cable run between the tower base & transmitter building shall be through a horizontal cable tray to be provided by the tenderer. The rack will be supported on 75mm G.I. pipes or 60x5 mm G.I. angle

iron structures & the rack will be covered by Semi Circular 16 SWG G.I. sheet cover. The tenderer must quote for the horizontal cable rack on the basis of **per meter rates.** The approximate length of the horizontal cable rack may be taken as 25 Mts. The pricing for horizontal cable rack should include the laying charges of all cables on this tray. Reference drawing is enclosed as **Annexure-V.** Pipes or angle frames should be grouted with RCC in ground as per practice and have a height of 4 Mtrs from the ground.

2.8. LOADING DUE TO FM ANTENNA, YAGI ANTENNA, MICROWAVE DISH & RF CABLES ETC.

2.8.1. The following Net weight and Wind loading figures may be taken into consideration in respect of Antennae, cables etc. Ice loading shall also be taken into design as per site requirement, if required. These are in addition to self loading of tower.

S. No.	Description	Net weight (Kg)	Wind load (Kg)	Remarks
1.	Band II Pole Type VHF FM 6/8 Bay Antenna			
1.1	Side Mounted	600	1000 at 198 Km/hr	Weight & wind loading due to support column not included.
1.2	Top Mounted (FM or LPTV Antenna)	250	400 -do-	-do
2.0	Microwave Dish Antenna-4 nos. (Dia 2.1 M solidity factor 0.25)	50Kg each	To be calculated by tenderer	Provision of 2 Microwave dishes at lower & middle platform.
3.0	Yagi Antenna-2 nos.	30Kg each	-do-	Provision of 2 Yagi Antenna at lower platform.

The above weights do not include weight of the Antenna Supporting Interface on which the antenna will be mounted.

2.8.2. The following cables are to be installed on tower. Wind loading due to these may also be taken into consideration.

2.8.2.1. 3-1/8" RF cable : 2 Nos.
2.8.2.2. 1-5/8" RF cable : 2 Nos.
2.8.2.3. 7/8" Co-axial cable for M/W Dish Antenna : 4 Nos.
2.8.2.4. RF Co-axial cable for Yagi Antenna : 2 Nos.
2.8.2.5. 3 Core, 6 Sq. mm Power Supply cable* : 1 No.
2.8.2.6. Solid State Aviation Obstruction Light cables* : 2 Nos. (with twin circuit arrangement)

(* items are to be supplied by tenderer including lugs, connectors etc.)

2.9. List of Annexure/Drawings:

2.9.1. Draft Acceptance Test Protocol (ATP) - **Annexure -I**
2.9.2. Tower profile - **Annexure –II**(Drg. No. TM-15706/1)
2.9.3. Mounting Arrangement of 6/8 Bay FM Antenna - **Annexure -III**(Drg. No. TM-15709)
2.9.4. Mounting detail of Microwave Dish Antenna (2drgs.) - **Annexure –IVA & IVB**
2.9.5. Details of Horizontal Cable Rack - **Annexure –V**(Drg. No. TM-14453/3)

SECTION-III

SCHEDULE OF REQUIREMENT/MATERIAL (UNPRICED) FOR 75M HIGH LATTICED STEEL SELF SUPPORTING TOWER (FOR EACH TOWER)

I). SUPPLY AT SITE:

(*All the following items shall conform to detailed AIR Specification*)

S.No.	DESCRIPTION	QTY.	UNIT
1.	Design of 75 M tower complete *as per AIR Specification* as required	1 job	Job
2.	Supply of 75M Tower superstructure material including Fabrication, Galvanizing *as per AIR Specification* complete as required. # Qunatity in Metric Ton (MT) to be mentioned by tenderer	#MT	MT
3.0	**Accessories:**		
i)	Supply of Solid State AOL with PVC Insulated, PVC sheathed weather proof, *Copper conductor*, armoured cable for twin circuit arrangement of suitable rating MCB and accessories etc. complete as required.	1 Set Complete	Set
ii).	a) Supply of 3coreX6sq.mm,Copper conductor(Stranded), PVC Insulated, PVC Sheathed , armoured , Weather proof cable with lug etc. complete as required.	100M	M
	b) Supply of 32 Ampere, SP&N, MCB incoming along with weather proof metal boxes with multipoint power sockets and switches at base and each platforms, earthwire etc. complete as required.	1 set complete	set
iii).	Supply of Clamps etc. for fixing / mounting of Microwave Antenna and Yagi Antenna complete as required.	1 Lot	Lot
iv).	Supply of Vertical ladder material with Free Fall Prevention system and Guard All System etc. complete as required.	1 Lot	Lot
v).	Supply of Horizontal Cable Tray material as per specification complete as required.	25M	M
vi).	Supply of Lightening Arrester material/arrangements including earthing material for ground earth (two nos.) with braided copper earth wire / copper strip from tower top to ground with lug etc. complete as required.	1 set complete	set
vii)	Supply of Tower earthing system material for 75 M tower along with copper earthing strips of suitable size s with complete material etc. as required.	1 set complete	set
viii)	Supply of 100 mm **(inner dia. category class C)** supporting seamless GI pipe complete as required	*22 M*	Meter
ix)	Sun Switch complete	1 Set	Set
3.0	Submission of SERC /IIT certified Design documents and working Structural drawings of 75M tower duly signed & stamped by competent authority (For foundation and tower structure) to Directorate for approval	2 Set Complete	Set
4.0	Submission of finally approved working Structural and foundation drawings duly signed & stamped by competent authority for 75M tower to: a). Installation Officer -1 set b) Station -1 set c) Zonal Office -1 set d) AIR Directorate -1 set	4 sets Complete	Set

5.0	Completion Report and submission of final tower drawings after erection at site to: a). Installation Officer -1 set b) Station -1 set c) Zonal Office -1 set d) AIR Directorate -1 set	4 sets	Set
6.0	Pre-dispatch inspection of tower material	1 job	job
	TOTAL OF SUPPLY (A)		

SCHEDULE OF REQUIREMENT/MATERIAL (UNPRICED) FOR 75M HIGH LATTICED STEEL SELF-SUPPORTING TOWER(FOR EACH TOWER)

II). ERECTION, INSPECTION, TESTING AND COMMISSIONING AT SITE:

(*All the following works shall conform to detailed AIR Specification*)

S. No.	Description	Qty.	Unit
1.0	Erection, testing and commissioning of 75 M tower at site as per AIR specification complete as required.	1 Job	Job
2.0	Inspection of Tower at site as per ATP complete as required.	1 Job	Job
3.0	Soil testing with detailed report & document	1 Job	Job
4.0	Design and casting of tower foundation including Supply of complete raw materials, hardware, labour, site clearance etc. as per AIR specification complete as required.	1 Job	Job
5.0	Fixing of clamps etc. for mounting provision of 4 nos. Microwave Antennae and 2 nos. Yagi Antennae complete as required.	1 Job	Job
6.0	Mounting provisions for 3-1/8", 1-5/8" & 7/8" RF cables for feeding VHF FM Antennae,TV antenna,Microwave Dish Antennae and Yagi Antennae complete as required.	1 Job	Job
7.0	Fixing of Solid State Aviation Obstruction lights along with twin circuit arrangement &MCB complete as required.	1 Job	Job
8.0	Painting of tower including Supply of paint material complete as required.	1 Job	Job
9.0	Tower Earthing work complete as required	1 Job	Job
10.0	Tower Lightening Arrester installation work complete as required	1 Job	Job
11.0	Fixing of 100 mm **(inner dia. category class C)** seamless GI pipe of 22 M length with clamps including Supply of material for Mounting provisions for VHF FM Antenna complete as required.	1 Job	Job
12.0	Fixing of Vertical ladder with Free Fall Prevention System, Guard All System Etc. complete as required	1 Job	Job
13.0	Fixing of Vertical Cable Tray with clamps complete as required.	1 Job	Job
14.0	Fixing of Horizontal Cable Tray with clamps complete as required	25M	M
15.0	Laying of RF Cable complete as required	1 Job	Job
16.0	Hoisting of FM Antenna complete as required	1 Job	Job
17.0	Laying and fixing of power supply cable for fixing of weather proof metal boxes with Multipoint Power sockets and switches at base and each platforms, fixing of 32 Ampere, SP&N, MCB including connections, testing etc. complete as required.	1 Job	Job
	TOTAL OF WORKS (B)		
18.0	Additional charges for reduced soil bearing capacity below 8.2 MT /Sq. M **for every 0.55 MT/Sq. M decrease.**	1 Job	Job

ANNEXURE- I

PRASAR BHARATI
BROADCASTING CORPORATION OF INDIA
DIRECTORATE GENERAL: ALL INDIA RADIO
(PLANNING & DEVELOPMENT UNIT)

ACCEPTANCE TEST PROTOCOL FOR 75M FM TOWER

AIR Specification [Specification No.: 10th plan (NE Special Package) /75M FM tower/Oct/2007- D (TD/FM)] for, Design, supply, erection, testing and commissioning of latticed steel self supporting 75M tower including provisions for mounting of VHF FM antenna, Microwave Dish antennae, Yagi antennae and their feeder cables etc may be referred.

I. PRE –DISPATCH TEST/ INSPECTION PROCEDURE:

A. Raw Material:

S.No.	Description	Specification	Procedure of Verification
1	Steel pipes, M.S. Angles, M.S. Plates, M.S. Flats, M.S. Rods, Chequered plates	As per IS amended up to date	Verification of Quality Control (Q.C.) reports of supplier / Manufactures test certificates

B. Manufactured component / sub-assemblies:

S.No.	Description	Specification	Procedure of Verification
1	Manufactured tower members/ Components,Base shoe, Typical Bay proof assembly, Welded Components, Galvanizing,	As per IIT/SERC approval & acceptance of Directorate	Verification of Quality Control (Q.C.) reports and random checks may be made on any chosen items for conformity with Quality Control reports

C. Accessories:

S.No.	Description	Specification	Procedure of Verification
1.	**Cables** a. Power Supply cable b. AOL power supply cable	As per AIR Specification	Verification of Quality Control (Q.C.) reports / Manufactures test certificates
2.	Lightening Arrestors		
3.	Fasteners bolts & nuts		
4.	AOL & accessories		
5.	Copper earthing material		

II. ON SITE TESTS AFTER ERECTION OF TOWER:

S.No.	Description	Specification	Procedure of Verification
1.	Verticality and twist in the tower	Verticality and twist of Tower shall be as per AIR specification	Calculations using the data taken from Theodolite's observations on Tower at site
2.	Workmanship of erection	AS per established practice	Visual check
3.	a).Painting	Colour pattern as per AIR & civil aviations specification amended up to date.	Visual check
	b). No. of coats of paint	Two or more than two	Physical check
	c). No. of coats of primer	Two	Physical check
4.	Working of AOL & Power Supply Points	AS per established practice	Visual and operational check.
5.	Earth Resistance of Tower	AS per established practice	Measurement to be carried out.

III: Test results and inspection report in respect of part-I (A, B, C) shall be submitted by the tenderer after inspection by the authorized inspecting officer as per Directorate's order.