प्रसार भारती
Prasar Bharati
भारत का लोक सेवा प्रसारक
India's Public Service Broadcaster
कार्यालय: अपर महानिदेशक (अभि.) (उत्तरी क्षेत्र)
Office of the Additional Director General (E) (NZ)
आकाशवाणी एवं दूरदर्शन
Akashvani & Doordarshan
आठवां तल, सूचना भवन, सी.जी.ओ. कॉम्प्लेक्स, नई दिल्ली 110003
8th floor, Soochna Bhawan, CGO Complex, New Delhi-110003

सत्यम् शिवम् सुन्दरम्

File No.:5(98)11/NIT-25/AIR-EP **Date: 09.09.2025**

Subject: Design, Supply, Erection, Testing and Commissioning of Latticed Steel-Supporting of 30 Mtr height including dehauling & hauling of RF antenna & RF Cable from 18 Mtr existing guy mast at Akashvani Nathdwara (Rajasthan).

1. The budgetary quotation & drawings of the upcoming bid is enclosed herewith to offer comments, if any by prospective bidders/firms.
2. Bidders/firms are requested to provide information about content in respect of scope along with budgetary quote.
3. Bidders/firms may please submit the above detail on or before due date by e-mail to rajkishoresingh3@prasarbharati.gov.in or at following address.

R.K. SINGH
Assistant Director (Engg.)
Room No. 899
O/o ADG (E)(NZ)
Akashvani & Doordarshan,
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Soochna Bhawan, New Delhi-110003
Mobile No.: 9873364977
e-mail id: rajkishoresingh3@prasarbharati.gov.in

Budgetary Quotation for: Design, Supply, Erection, Testing and Commissioning of Latticed Steel-Supporting of 30 Mtr height including dehauling & hauling of RF antenna & RF Cable from 18 Mtr existing guy mast at Akashvani Nathdwara (Rajasthan).

Due Date to offer Comments: 24 .09.2025

Enclosed:

1. Budgetary Quotation form, Specs & drawing of the upcoming bid is enclosed herewith to offer comments, if any by prospective bidders/firms.

9/9/2025

राजकिशोर सिंह / Rajkishor Singh
सहायक निदेशक (इंजी.) / Assistant Director (Engg.)

Assistant Director (Engg.)
For Additional Director General (E) (NZ)

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आठवां तल, सूचना भवन, सी.जी.ओ. कॉम्प्लेक्स, नई दिल्ली 110003
8th floor, Soochna Bhawan, CGO Complex, New Delhi-110003

5(98)11/NIT-25/AIR-EP **Date: 09 .09.2025**

Budgetary Quotation Form

Subject: Design, Supply, Erection, Testing and Commissioning of Latticed Steel-Supporting of 30 Mtr height including dehaulding & hauling of RF antenna & RF Cable from 18 Mtr existing guy mast at Akashvani Nathdwara (Rajasthan).

Last date of receipt of budgetary quotation in this office: 24.09.2025 upto 12:00Hrs.
Please read carefully the terms and conditions given the enquiry quotation form.

Sr. No.	DESCRIPTION	Make & Model	Unit	Qty	Unit Price	Amount	GST	Total Amount
A)	**SUPPLY**							
1	Design of Latticed Steel Self Supporting (30 M) High FM dipole Antenna complete *as per AIR Specification* as required		Job	1				
2	Supply of 30 M Tower superstructure material including Fabrication, Galvanizing *as per AIR Specification* complete as required. # Quantity in Metric Ton (MT) offered to be mentioned by tenderer		MT	#MT				
3	**Accessories:**							
i)	Supply of Solid State AOL along with Sun Switch with twin circuit arrangement (of PVC Insulated, PVC sheathed weather proof, suitably rated, *Copper conductor,* armoured cable), MCB and accessories etc. complete as required.		Set Complete	1				
ii).	a) Supply of 3core X 6sq.mm, Copper conductor (Stranded), PVC Insulated, PVC Sheathed, armoured, Weather proof cable with lug etc. complete as required.		M	60				
	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, earth wire etc. complete as required.		Set Complete	1				
iii).	Supply of Clamps etc. for fixing / mounting of dipole Antenna complete as required.		Lot	1				
iv).	Supply of Vertical ladder material with Free Fall Prevention system etc. complete as required.		Lot	1				
v).	Supply of Horizontal Cable Tray material as per specification complete as required.(Rate per meter should be quoted)		M	15				
vi).	Supply of Lightening Arrester material/ arrangements including earthing material for ground earth (two nos.) with Copper strip from tower top to ground with lug etc. complete as required.		Set Complete	1				
vii)	Supply of Tower earthing system material for (30 M) High FM Tower along with copper earthing strips of suitable size's with complete material etc. (As per specification)>		Set Complete	6				
viii)	Supply of 50 mm inner dia category Class C seamless GI pipe of *6 M length* with clamps including Supply of material for Mounting provisions for FM Antenna complete as required.		Job	1				
4	Soil testing with detailed report & document		Job	1				
5	Submission of SERC /IIT/ NIT certified Design documents and working Structural drawings of (30 M) High FM Tower for FM Antenna duly signed & stamped by competent authority (For foundation and tower structure) to Zonal Office for approval		Set Complete	2				
6	Submission of finally approved working Structural and foundation drawings duly signed & stamped by competent authority for (30 M) High FM Tower for FM Antenna to: a) Concerned Installation Officer -1 set b) Station -1 set c) Zonal Office -1 set		Set Complete	4				
7	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		Set	3				
8	Pre-dispatch inspection of tower material		Job	1				
	TOTAL OF SUPPLY (A)							

(B)	WORK							
Sr. No.	Description	Make & Model	Unit	Qty	Unit Price	Amount	GST	Total Amount
9	Design and casting of tower foundation including Supply of complete raw materials, hardware, labour, site clearance etc. as per AIR specification complete as required.		Job	1				
10	Erection, testing and commissioning of (30 M) High FM Tower for FM Antenna at site as per AIR specification complete as required.		Job	1				
11	Inspection of Tower at site as per ATP complete as required.		Job	1				
12	Fixing of clamps etc. for mounting provision of Dipole Antenna complete as required.		Job	1				
13	Mounting provisions for 7/8" RF cables for feeding FM Antenna, complete as required.		Job	1				
14	Fixing of Solid-State Aviation Obstruction lights along with twin circuit arrangement & MCB complete as required.		Job	1				
15	Painting of tower including paint material complete as required.		Job	1				
16	Tower Earthing work complete as per AIR specification.		Job	1				
17	Tower Lightening Arrester installation work complete as required		Job	1				
18	Fixing of 50 mm inner dia. seamless category C GI pipe of 6 M length with clamps including Supply of material for Mounting provisions for FM Antenna complete as required.		Job	1				
19	Fixing of Vertical ladder with Free Fall Prevention System, etc. complete as required		Job	1				
20	Fixing of Vertical Cable Tray with clamps complete as required.		Job	1				
21	Fixing of Horizontal Cable Tray with clamps complete as required		M	25				
22	Laying of RF Cable complete as required		Job	1				
23	Hoisting of FM Antenna complete as required		Job	1				
24	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.		Job	1				
25	Dismantling of existing old 18 Mtr guy mast, antenna and RF cable & staking of all the members, nut, bolt, antenna, RF cable etc, at suitable place inside the premises.		Lot	1				
26	Hoisting of FM Antenna & RF cable complete as required.		Job	1				
	TOTAL OF WORKS (B)							
27	Additional charges for reduced soil bearing capacity below 8.2 MT /Sq. m **for every 0.55 MT/Sq. M decreases.**		Job	1				
							Grand Total	

Note:

- **Time of execution as per permission of engineer incharge at Akashvani Nathdwara (Rajasthan).**
- **The bidder must be experienced in same kind of scope & shall submit documentary evidence with offer. The completion certificate is to be attached, issued by any Govt. Agency only.**
- **Execution of scope has to be completed without break in service at Akashvani Nathdwara (Rajasthan).**
- **Before submitting the offer tenderer must visit site and with prior permission of the site in-charge and submit confirmation of site visit. Technical details will be provided by In-charge of Site/I.O.**
- **The firm has to produce a list all such labour along with the address proof which are to be employed office on signing contract. The firm shall issue the identity cards to all such persons to facilitate the entry in at Akashvani Nathdwara (Rajasthan).**
- **Inspection will be carried out preferably in presence of authorized representative of O/o ADG (NZ), AIR & DD, 8th floor, Soochna Bhawan, CGO Complex, New Delhi-110003.**
- **Any damage or misplace in equipment will have to be provided by the firm during execution.**

1) Quantity of Material & Scope may increase or decrease as per actual requirement/constraints at site.

2) Please read carefully the terms and conditions given in this quotation form.

a) GST No: …… b) PAN No……

3) **Delivery at:** Akashvani Nathdwara (Rajasthan).

4) **Consignee:** Installation officer, Akashvani Nathdwara (Rajasthan).

5) **Completion Period:** Execution/Completion of scope within 60days from the date of order.

6) **Validity:** 120days

7) **Payment terms:**

- 97% Payment on completion/execution of scope in good condition at site.
- Balance payment of 03% will be paid after guarantee/warranty period of one year. However payment can be released against FDR/Account Payee Demand Draft/Banker's Cheque of equivalent amount in favour of Chief Engineer (NZ), AIR & DD, New Delhi valid for guarantee period at least.

8) **Performance Security:**

- The firm/supplier/contractor should submit performance security deposit in the form of FDR from a schedule commercial bank valid for one year in favour of Chief Engineer (NZ), AIR & DD, New Delhi.
- The performance security deposit shall be 03% of cost of the order/contract value.
- For release of security deposit/performance security, the firm will submit his claim along with a certificate from the ultimate consignee that equipment supplied/SITC executed against this order has performed satisfactorily during its warranty/guarantee period and department have not suffered any loss/inconvenience on this account.

9) **Declaration:** We declare that all the conditions as given in the quotation form have been read by us.

Name (in capital) _____

(Seal & Signature of the Bidder)

MASTER COPY

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

File No. Tower Design_30M_FM Tower /Specs.-32/5/4/6/2012-D (TD/FM)

SPECIFICATION FOR TOWER DESIGN (30M FM TOWER)

Specification No. Tower Design_30M _FM Tower/February/2012-D (TD/FM)

Specification for Design, approval of design by Institution and preparation of detailed Structural(for fabrication) drawings of lattice steel self supporting 30M tower including provisions for mounting of VHF FM antenna and accessories.

Introduction:

All India Radio requires FM-cum-Microwave integrated towers for installation of VHF FM and Microwave dish antenna. For this very purpose Design document for 30 FM tower is required to be prepared and got approved from competent Institutions/Authority as per Specification.

Essential Requirements of Tender:

1. The Tenderer should submit schedule of requirement without *price in the same format as given as in Section-III* of indenter Specification in the technical bid, failing which the tender shall be considered incomplete and is liable to be rejected.

2. Each statement of this specification has to be complied with & supported by printed technical literature , technical data sheets and technical drawings from the manufacturer of the Tower by the tenderer, to assess the merit of the offer without which tender will be considered incomplete & is liable to be rejected. The tenderer should make a detailed offer.

3. All the technical details, Technical drawings must be submitted and enclosed with the tender by the tenderer failing which the tender is liable to be rejected.

4. The complete Technical specification compliance statement (section wise & clause wise) along with schedule of requirements/materials (unpriced) must be signed & stamped on each page by the Original Designer/Manufacturer of the Tower in the tender document including the clarifications, if any, asked by the Indenter. The Original Designer/Manufacturer of the Tower &

12.03.2012

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tenderers should mention their name in CAPITAL LETTERS, full address with pin code, phone number, fax number, e-mail address and with their full signatures.

5. The complete tender shall be page numbered.

6. The authorization and Guarantee must be given by Original Designer/Manufacturer of the Tower on their letter head pad duly signed & stamped on each page. The authorization and Guarantee other than Original Designer/Manufacturer of the Tower and guarantee other than tenderer in the tender will not be considered, failing which the tender shall be considered incomplete and is liable to be rejected.

7. Any change in the AIR Technical Specification format or language or in parameters or of any other nature including the deletion of technical specification clause, words, lines in the technical compliance statement as mentioned in clause 6 as above by the Original Equipment Manufacturer/ tenderer will not be acceptable to Indenter and the tenderer is liable to be rejected.

8. Tenderers may please note that no clarifications shall be asked by the Indenter regarding Indenter technical specifications, so all the tenderers may submit their tender offers in conformity to AIR specification.

S. Hyder
एस० हैदर
निदेशक (अभि०)

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SECTION-I

Specification for Design, approval of design by Institution/authority and preparation of detailed Structural (for fabrication) drawings of lattice steel self-supporting 30M tower including provisions for mounting of VHF FM antenna and accessories.

1.1 Scope:

1.1.1 DESIGN, Approval of design by Institution/authority and preparation of detailed structural(for fabrication) drawings

Design of self supporting steel lattice tower and accessories complete, design for side mounting of 2 Bay VHF FM Pole type antenna, Micro wave dish antenna, STL antenna with provision for solid state Aviation Obstruction Light with cabling, ladder with guard all and free fall prevention system, cable racks for RF cables (vertical/Horizontal), platform and provision for earthing etc. complete in all respect.

1.1.2 Provision shall be made on tower as per Annexure-I(30M)

1.1.3 The details of Antenna and accessories with mounting details are enclosed as Annexure-II, III (A) & III (B).

1.1.4 The RF feeder cables and other cables i.e. cables for AOL, power supply etc. between the transmitter building and the tower shall be routed on a horizontal cable tray supported on G.I. pipe rolled section such as Angle channel etc. as per details of Horizontal cable tray as per **Annexure-IV**. The Horizontal cable tray shall be provided with G.I. Sheet cover of 16 SWG. The detail drawing for tower will include inter section between vertical and Horizontal cable rack.

1.2 General

1.2.1 The specification indicated here in are to guide the tenderer, about the requirement of purchaser. Tenderer shall be fully responsible considering wind load, seismic load, environmental conditions, temperature etc. to ensure safety of tower for soundness of design, approval by Institution/authority and detailed structural(for fabrication) drawings, design for mounting of antennas and accessories. The design of the tower shall be based on recognized principles of structural design conforming to standard practice and BIS code.

1.2.2 Patent, copy right Intellectual copy right:

The tenderer shall hold purchaser and employee immune and safe from any liability that may arise out of infringement of patents, copy right and intellectual copy right associated with design and detail drawings of tower and its accessories.

1.2.3 The technical specification and basis for design are detailed in section II.

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

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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 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.

1.3.5. The detail design of foundation for 8.2 MT/Sq.M Safe Bearing Capacity.

1.4 After award of contract. (The main works which must be done by the tenderer).

The successful tenderer shall supply within two month from the date of the award of work the following documents to the purchaser for acceptance:-

(i) General arrangement drawing showing tower profile including main dimensions (elevations, panel sizes, width & height), bracing system in plan, hip & elevation, platform with hand rails, arrangement of ladder with guard all and free fall prevention system , cable rack with cable throughout the tower with plan section details, facilities provided on the tower i.e. details of antenna arrangements, detail of aviation light type, lightening arrestors, earthing system, telephone line and service connections and showing all the requirements as per specification. The Loading provision kept in the design of tower and facilities on tower are required to be shown in tabular form.

(ii) Based on the general arrangement design drawing showing all main dimension and size of section of tower with elevation at different levels, panel sizes, bracing system of elevation, hip, plan, platform with hand rails, connection details of tower members, ladder, cable rack throughout the tower with sections, antenna fixtures etc., showing complete detail of tower from design point of view including base detail connection of legs with foundations and FM & MW antenna fixing details. The design drawing shall show all the details specified in this specification.

(iii) Details design, calculation of complete tower, accessories including load calculation (panel wise) for dead, wind, seismic effect, including wind obstruction area, force coefficient, wind pressure, seismic factor etc. The design shall also include loading conditions considering analytical model, computer model and information required as specified in the clause 1.3 of specification and any other technical information deemed necessary to illustrate that tower design meets fully the requirement of this specification, safety along with norms and BIS

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codal provisions.

(iv) Detail design and drawing of foundation based on soil data & tower design loads consisting of bearing, stability check in uplift, overturning, sliding, band etc. Factor of Safety (F.O.S) adopted & as per safety norms and codal provisions.

(v) Tenderer shall submit a detailed report along with dynamic analysis of tower and certificate testifying the soundness and safety of design of tower at his own cost from one of the following institutions.

(a) Indian Institute of Technology.

(b) Indian Institute of Science Bangalore.

(c) Structural Engineering Research Centre.

(d) National Institute of Technology (NIT).

(vi) Detailed drawing of earthing, power cable route, lightening arrestors etc.

(vii) Tenderer shall also submit within two months after submission of soundness certificate from the above institution, three sets of all documents and drawings.

(a) General arrangement drawings with all details and facilities provided on tower.

(b) Design drawing, earthing system & power system & lightening arrestors.

(c) Detailed design calculation of tower and foundation and accessories.

(d) Detailed structural drawing indicating section size, class of Structural Steel used, length of member, sizes of gusset plate, joint details, indicating cutting and bending details, details relevant of fabrication with material and bolt lists including weight etc. complete in all respect.

(e) All the detail drawing of tower accessories & foundation.

(f) Any other drawings for the completeness of the tower design as per specs.

(g) Total weight of tower excluding foundation to be given by tenderer for condition & Type A/Type B/Type C respectively.

1.5 EXPERIENCE AND RESOURCES:

The tenderer shall submit details of his previous experience in similar work. The tenderer shall have proven experience of design, approval of design by Institution/authority of projects for AIR & Doordarshan for Minimum 40 M Tower height in last 5 years.

1.6 The work shall be completed within 6(Six) months from date of placing of order.

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SECTION-II

2. Technical specification.

2.1 DESIGN OF TOWER AND FOUNDATION:

a. Tower loading detail due to antenna & cable etc.

Tower structure and foundation shall be designed for loading due to antenna, RF cables, M/W dishes, power supply cables, vertical cable racks, ladders, platforms etc and loading due to tower body in accordance with BIS design and codes for wind, seismic etc.

i. Loading on tower due to antenna aperture, RF cables and M/W dishes are given below:

Sr.No.	Description	Net Weight (Kg)	Wind Load (Kg)	Remarks
1.	Band II Pole Type VHF FM Antenna			
1.1.	Side Mounted	150	250 at 198 Km/hr without ice	Weight & wind loading due to support column not included.
1.2	Top Mounted (FM or LPTV Antenna)	150	250 -do-	-do-
2.0	Microwave Dish Antenna-4 numbers. (Dia 2.1 M solidity factor 0.25)	50 Kg each	To be calculated by tenderer	Provision of 2 Microwave dishes at middle & top platform.
3.0	Yagi Antenna-2 nos.	30 Kg each	-do-	Provision of 2 Yagi Antenna at platform.

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

ii. The following cables & GI pipe are to be installed on tower. Wind loading due to these may also be taken into consideration.

(a) 1-5/8" RF cable (approx. weight – 1.5 Kg/M) : 4 Nos.

(b) 7/8" Co-axial cable for M/W Dish Antenna : 4 Nos.

(c) RF Co-axial cable for Yagi Antenna : 2 Nos.

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(d) 3 Core, 6 Sq. mm Power Supply Cable : 1 No.

(e) Solid State Aviation Obstruction Light Cables : 2 Nos.
(with twin circuit arrangement)

(f) The weight and wind load of VHF FM antenna supporting interface of 100 mm inner dia supporting seamless GI pipe category 'C" of 8M length is required to be taken into consideration for loading by tenderer with structural mounting hardware accessories as per design

2.2 The wing loading on tower body, platform, ladder, cable rack and cable shall be calculated as per wind loading code IS: 875/Part 3-1987 (with latest amendments). The special care should be taken while calculating the wind load on tower and appurtenances, considering proper probability factor (risk coefficient) terrain category, wind zone (Basic wind zone) as may be applicable based on the tower site location and specified in BIS code.

2.2.1. The tower shall be designed considering probability factor based on mean probable design life of tower structure as 100 years.

2.2.2. The minimum terrain category to be considered for designing the tower shall be 2 and for the tower sites on hill, coastal areas etc. terrain category 1 irrespective of the tower site location.

2.2.3. Topography factor shall be considered for designing the tower on site condition, type of hill and range, cliff and escarpment as per BIS Code IS: 875-1987.

2.3 The tower should be designed due to loading effect of seismic force as per B.I.S., IS: 1893/2002 considering seismic zone as per site.

2.4 The tower shall be designed for dynamic effect of wind and seismic forces as per provisions of IS: 875/Part 3-1987 and IS: 1893/2002 respectively along with static effect.

2.5 The tenderer should spell out clearly in their offer various loads e.g. wind load, seismic force, antenna load etc., design procedures so that same may be scrutinized by the Purchaser.

2.6. The tower shall be designed for basic wind velocity and seismic zone factor as stated below irrespective of site and stated elsewhere. Tower shall be designed for consideration of three basic wind velocity and respective seismic coefficient separately.

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Condition /Type	Wind Zone Basic Wind Velocity	Seismic Zone and factor	Risk factor & Terrain category	Importance factor & soil type
A	Wind Zone 5 & 6, 140Km/hr(39 m/sec)	Seismic Zone III (0.16)	As per table 1 & IS : 875 and terrain Category 2	As per table 6 of IS:1893 and soil type II, Medium soil
B	Wind Zone 4 & 3 170 Km/hr(47m/sec)	Seismic Zone IV(0.24)	-do-	-do-
C	Wind Zone 1 & 2 198 Km/hr(55m/sec)	Seismic Zone V(0.36)	-do-	-do-

2.7 DESIGN CRITERIA OF TOWER.

2.7.1. The tower shall be designed for static & dynamic wind and seismic loads considering antenna loads, RF cables, accessories and tower body loads along with cables, cable rack, platforms ladder etc. Tenderer will specify the loadings, design criteria, philosophy of design, load conditions considered analytical model detail, material used etc. as per good engineering practices and codal requirements.

2.7.2. Tower shall be designed for antenna loads, loads due to tower body and its subsystem for various critical loading conditions and combinations so as to obtain maximum and minimum critical loads in the tower members. Tower shall be analyzed for static and dynamic loads produced by wind load, self weight and seismic forces as other critical load as may be deemed required.

2.7.3. The tower structures and accessories shall be designed as per allowable stress method and as per provisions of IS 800- 2001 working stress for various internal and external forces in members.

2.7.4. Allowable stresses in the tower structure members, accessories and fastener shall be as per IS: 800-2007 working stress and its provisions. No increase in allowable stress shall be allowed for any load combination.

2.7.5. The R.C.C. foundation, tie beams etc. shall be designed and constructed in accordance with IS: 11233-1985 IS: 456:2000 and other applicable codes. The minimum grade of concrete used shall be M-20.

2.7.6. All bracing redundant member of the tower which are horizontal or inclined up to 15 degree from horizontal shall be designed to with stand an ultimate vertical load of 150 Kg considered acting at centre, independent of all other loads. The redundant and connection shall also be designed for 2.5% of minimum axial load of connecting members.

2.7.7. The platform structure and chequered plate flooring shall be designed as to take stationary and moving load of 4 persons plus equipment weighing 100 Kg independent of all other loads. The handrail members shall be designed for 75 Kg load acting horizontally. Height of the hand rail must be 1.5 m on each platform.

2.7.8. Where erection stresses combined with other stresses could produce critical combination in any member, same shall brought within permissible stress limit while designing the tower.

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2.7.9. Members subjected to fluctuations of stresses are liable to suffer from fatigue failure, effect of same shall also be considered while designing the tower members and in accordance with codal provisions.

2.7.10. The minimum thickness and size of tower structural members shall not be less than 6 mm.

2.7.11. All tower members shall be out of structural steel conforming to IS: 2062. Tenderer should clearly indicate the class/classes of steel used in the tower Design for tower members.

2.7.12. Joints shall be designed as to avoid eccentricity as far as possible. The thickness of the gusset plate shall be as per design requirement.

2.7.13. The maximum slenderness ratio L/r for main & secondary members should be as per IS.

2.7.14. <u>Vertically and Maximum deflection of Tower.</u>

The maximum deflection of the axis of tower shall be not more than 1 degree from vertical under maximum wind and other critical loading conditions including dynamic effect.

2.8. <u>Design of foundation.</u>

2.8.1. The R.C.C. foundation, the bean etc. shall be designed considering most critical loads due to tower on foundation as per IS : 456-2000 (working stress method) and applicable codes.

2.8.2. The foundation shall be designed considering safe hearing capacity of soil as 8.2 MT/Sq.M. at the depth of 2 M of Normal soil/wet soil having angle of internal friction 20 degree and unit weight of soil 1.0 MT/cu.m.

2.8.3. The R.C.C. foundation shall be designed with minimum grade M 20 concrete.

2.8.4. The reinforcement shall conform to IS: 1786-1966 for deformed and cold twisted bars and IS: 432-1966 for MS bars and IS: 1139-1966 for hand drawn steel wires.

2.8.5. All properties of concrete and reinforcement regarding strength, under compression, tension, shear punching and bond etc. as well as workmanship will conform to IS: 456-2000.

2.8.6. The detail foundation drawing shall show all details of foundation including bar bending schedule, volumes of concrete etc.

2.9. DETAIL FABRICATION DRAWING:

2.9.1. The detail structure drawing should indicate section, size, length of member, sizes of guests, joint details indicating cutting, drilling and bending details, details relevant of fabrication with material list etc. complete in all respect.

2.9.2. The fasteners used in the drawing shall be listed in the Bolt List.

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2.9.3. The detail drawing shall show all accessories such as ladder, platforms, antenna support/fixture and other relevant details required for fabrication and erection of tower as per good engineering practice and codal requirements.

2.9.4. The detail drawing will also show the galvanizing and paint schedule.

2.9.5. The detail drawing shall show Aviation obstruction light fixing detail and lightening arrestor etc.

2.9.6. The detail of Earthing drawing shall also be supplied by tenderer.

2.10. Fasteners: Bolts, nuts and washers.

2.10.1 The tower members and other structures shall be connected/ assembled by means of nuts and bolts with spring washers or locking nut.

2.10.1. The quality of bolts, nuts, washer etc. should conform to mechanical properties as per IS: 1367/77 and dimension to IS: 6639-1972.

2.10.1. The bolts shall be as per IS and minimum property class 5.6 as specified in IS: 1367 Part III-79 and making nuts property class as specified in IS: 1367 (Part VI)-1980.

2.11 All steel tower members shall be hot dip galvanized after fabrication is completed. The galvanizing of the tower members shall confirm to IS: 2629 and IS: 4759-1996. The thickness of galvanizing shall be indicated in the drawing.

2.12. PAINT & PAINTING:
The tower shall be painted after erection as per latest International Civil Aviation Organization rules in alternate bands of international orange & white colour.

2.12.1 The tower shall be painted with as per given paint schedule.
(a) One coat of each primer.
(b) One coats of zinc chromate primer.
(c) Final two coat of Synthetic enamel.

2.13. FACILITIES TO BE PROVIDED ON TOWER.

2.13.1. Platforms shall be provided for access to the antennas aviations lights and cables at different levels as indicated in drawing, 1.5 m high handrail with expanded metal and toe guard shall be provided around the platform for safety. Platform shall have suitable thickness chequered plate flooring but not less than 6 mm.

2.13.2. An internal ladder of width not less than 300 mm starting from ground level and up to top with opening at all platforms shall be provided. The ladder shall be suitable hooped for safety of the climbing personnel. The location of climbing ladder should be near to the vertical cable rack and it should be located in centre or on one of the faces of tower or at corner.

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

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2.13.3. The vertical cable rack for support of RF feeder cables AOL & power cables starting from the base of the tower up to top. It should have provisions for fixing the cable clamps. It shall have the provisional for intersection between vertical & horizontal cable rack.

2.13.3.1. Horizontal cable rack shall be provided as per Drawing No. TM-14453/3(Annexure-IV) and shall be connected to vertical cable rack with intersection.

2.13.4. Tower shall have provision for fixing solid state Aviation obstruction Light equipped with appropriate colour prismatic globes as per latest Civil Aviation Regulations.

2.13.5. Provision shall be made for fixing 100 mm inner dia support seamless GI pipe category class "C" of 8M length for side mounting VHF FM pole type Band II antenna on faces of tower.

2.13.6. Provision shall be made for fixing 100 mm dia supporting seamless GI pipe category class "C" of 8M length for top mounting VHF FM pole type Antenna/LPTV antenna for second channel in future.

2.13.7. Provision for fixing and fixture for mounting Microwave dish Antenna and Yagi Antenna shall be made as per tower profile drawing.

2.13.8. The tower shall be provided with a suitable designed complete system of lightening protection in accordance with provision of IS: 2309/1969 including necessary earthing based on the specific resistivity of the soil and sub soil water level. The copper strip of size 50 mm x 2mm shall be provided from lightening Arrestor at top to the ground along with separate earthing.

2.13.9. Provision shall be made for all four tower legs to be earthed individually, as per standard practice and drawing shall be prepared for execution. The earth resistance of the tower earthing shall be as per IS.

2.14. **List of Annexure/Drawings:**

2.14.1 Tower Profile - Annexure-I (30M)
2.14.2 Mounting Arrangement of FM Antenna – Annexure II (2 Bay)
2.14.3 Mounting detail of Microwave Dish Antenna –Annexure III(A) & III(B)
2.14.4 Details of Horizontal Cable Rack- Annexure IV (Drg.No.TM-14453/3)

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SECTION-III

SCHEDULE OF REQUIREMENT (UNPRICED) FOR DESIGN OF 30 M HIGH LATTICED STEEL SELF SUPPORTING TOWER (FOR EACH TOWER)

FOR Condition/Type-A {Wind Zone 5 & 6, Wind Speed -140Km/hr(39 m/sec)} **Seismic Zone III**

S.No.	DESCRIPTION	QTY.	UNIT
1.	Design of 30 M tower complete *as per AIR Specification* as required	1 job	Job
2.	Submission of SERC /IIT/NIT certified Design documents and working Structural drawings of 30M tower duly signed & stamped by competent authority (For foundation and tower structure) to Zonal office for acceptance.	2 Set Complete	Set
3.	Submission of SERC /IIT/NIT certified Design documents and working Structural drawings of 30M tower duly signed & stamped by competent authority (For foundation and tower structure) to Zonal office for acceptance.	1 Lot	Lot
4.	Submission of finally approved working Structural drawings duly signed & stamped by competent authority for 30M tower to: a) Concerned Installation Officer -1 set b) Station -1 set c) Zonal Office -1 set d) AIR Directorate -1 set	4 sets Complete	Set
5.	Submission of finally approved working foundation drawings duly signed & stamped by competent authority for 30M tower to: a) Concerned Installation Officer -1 set b) Station -1 set c) Zonal Office -1 set d) AIR Directorate -1 set	4 sets Complete	Set
7.	Any other items required for the completion of design works.	1 lot	lot

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SCHEDULE OF REQUIREMENT (UNPRICED) FOR DESIGN OF 30M HIGH LATTICED STEEL SELF SUPPORTING TOWER (FOR EACH TOWER)

FOR Condition/Type-B {Wind Zone 3 & 4, Wind Speed-170 Km/hr(47m/sec)} **Seismic Zone IV**

S.No.	DESCRIPTION	QTY.	UNIT
1.	Design of 30 M tower complete *as per AIR Specification* as required	1 job	Job
2.	Submission of SERC /IIT/NIT certified Design documents and working Structural drawings of 30M tower duly signed & stamped by competent authority (For foundation and tower structure) to Zonal office for acceptance.	2 Set Complete	Set
3.	Submission of SERC /IIT/NIT certified Design documents and working Structural drawings of 30M tower duly signed & stamped by competent authority (For foundation and tower structure) to Zonal office for acceptance.	1 Lot	Lot
4.	Submission of finally approved working Structural drawings duly signed & stamped by competent authority for 30M tower to: a) Concerned Installation Officer -1 set b) Station -1 set c) Zonal Office -1 set d) AIR Directorate -1 set	4 sets Complete	Set
5.	Submission of finally approved working foundation drawings duly signed & stamped by competent authority for 30M tower to: a) Concerned Installation Officer -1 set b) Station -1 set c) Zonal Office -1 set d) AIR Directorate -1 set	4 sets Complete	Set
7.	Any other items required for the completion of design works.	1 lot	lot

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SCHEDULE OF REQUIREMENT (UNPRICED) FOR DESIGN OF 30M HIGH LATTICED STEEL SELF SUPPORTING TOWER (FOR EACH TOWER)

FOR Condition/Type-C {Wind Zone 1 & 2, Wind Speed-198 Km/hr(55m/sec)} **Seismic Zone V**

S.No.	DESCRIPTION	QTY.	UNIT
1.	Design of 30 M tower complete *as per AIR Specification* as required	1 job	Job
2.	Submission of SERC /IIT/NIT certified Design documents and working Structural drawings of 30M tower duly signed & stamped by competent authority (For foundation and tower structure) to Zonal office for acceptance.	2 Set Complete	Set
3.	Submission of SERC /IIT/NIT certified Design documents and working Structural drawings of 30M tower duly signed & stamped by competent authority (For foundation and tower structure) to Zonal office for acceptance.	1 Lot	Lot
4.	Submission of finally approved working Structural drawings duly signed & stamped by competent authority for 30M tower to: a) Concerned Installation Officer -1 set b) Station -1 set c) Zonal Office -1 set d) AIR Directorate -1 set	4 sets Complete	Set
5.	Submission of finally approved working foundation drawings duly signed & stamped by competent authority for 30M tower to: a) Concerned Installation Officer -1 set b) Station -1 set c) Zonal Office -1 set d) AIR Directorate -1 set	4 sets Complete	Set
7.	Any other items required for the completion of design works.	1 lot	lot

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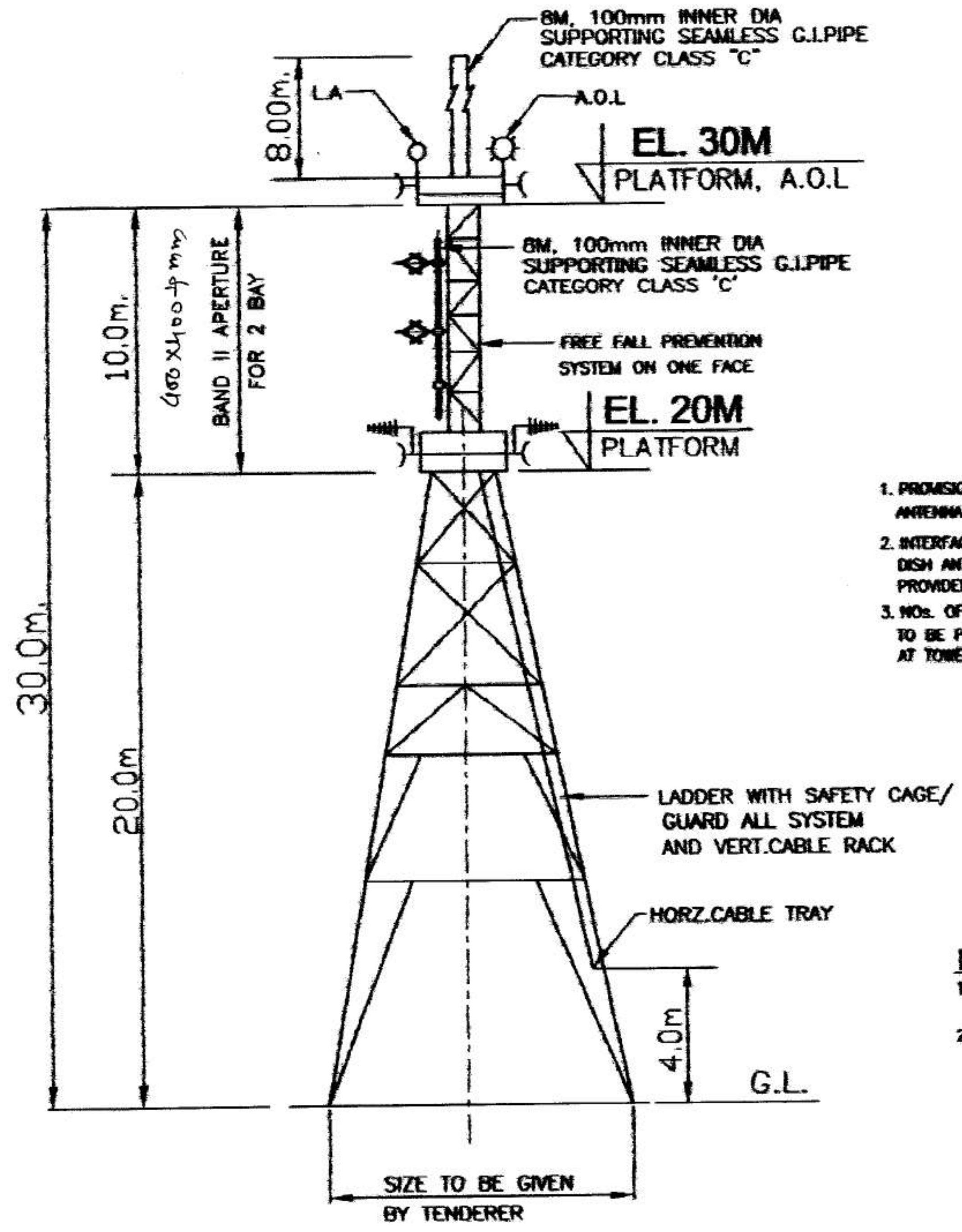
30m. HIGH F.M. TOWER

ANNEXURE-I

SCALE:— N.T.S.

(FOR REFERENCE ONLY)



1. PROVISION OF 2Nos. OF M/W DISH ANTENNA AND 2Nos.YAGI ANTENNAS
2. INTERFACE FOR MOUNTING OF MW DISH ANTENNA FIXTURE TO BE PROVIDED ON SUPER STRUCTURE
3. NOs. OF FIXTURES FOR ABOVE TO BE PROVIDED AND INSTALLED AT TOWER PLATFORM

NOTES

1. ALL DIMENSIONS AND LEVELS ARE IN METERS
2. DIRECTION OF TOWER FACE FOR MOUNTING F.M. ANTENNA WILL BE GIVEN LATER ON.

FEB. 2012

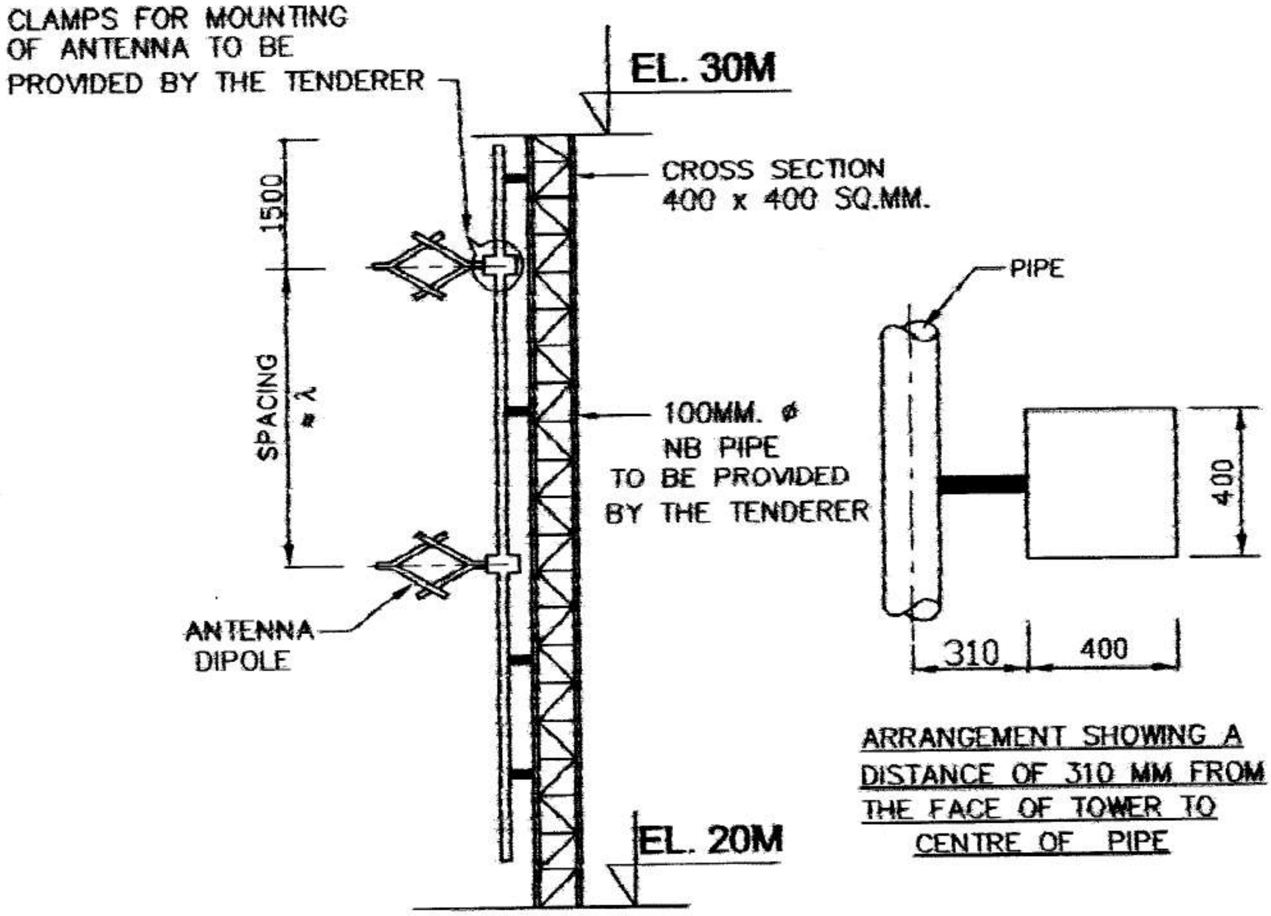
DRN: —	A.E.	D.E.

ALL INDIA RADIO

P & D UNIT

DRG. No. TM - 16001

ANNEXURE-1



ARRANGEMENT OF 2 BAY FM ANTENNA
ON 50M.TOWER FOR NE SPECIAL PACKAGE
(DRG. FOR REFERENCE ONLY)

SCALE:– N.T.S.

CHAUHAN DRN BY:–	A.E.	D.E.	**ALL INDIA RADIO** **P & D UNIT**

Illustration for mounting on Tower Leg

ANNEXURE – III (A)

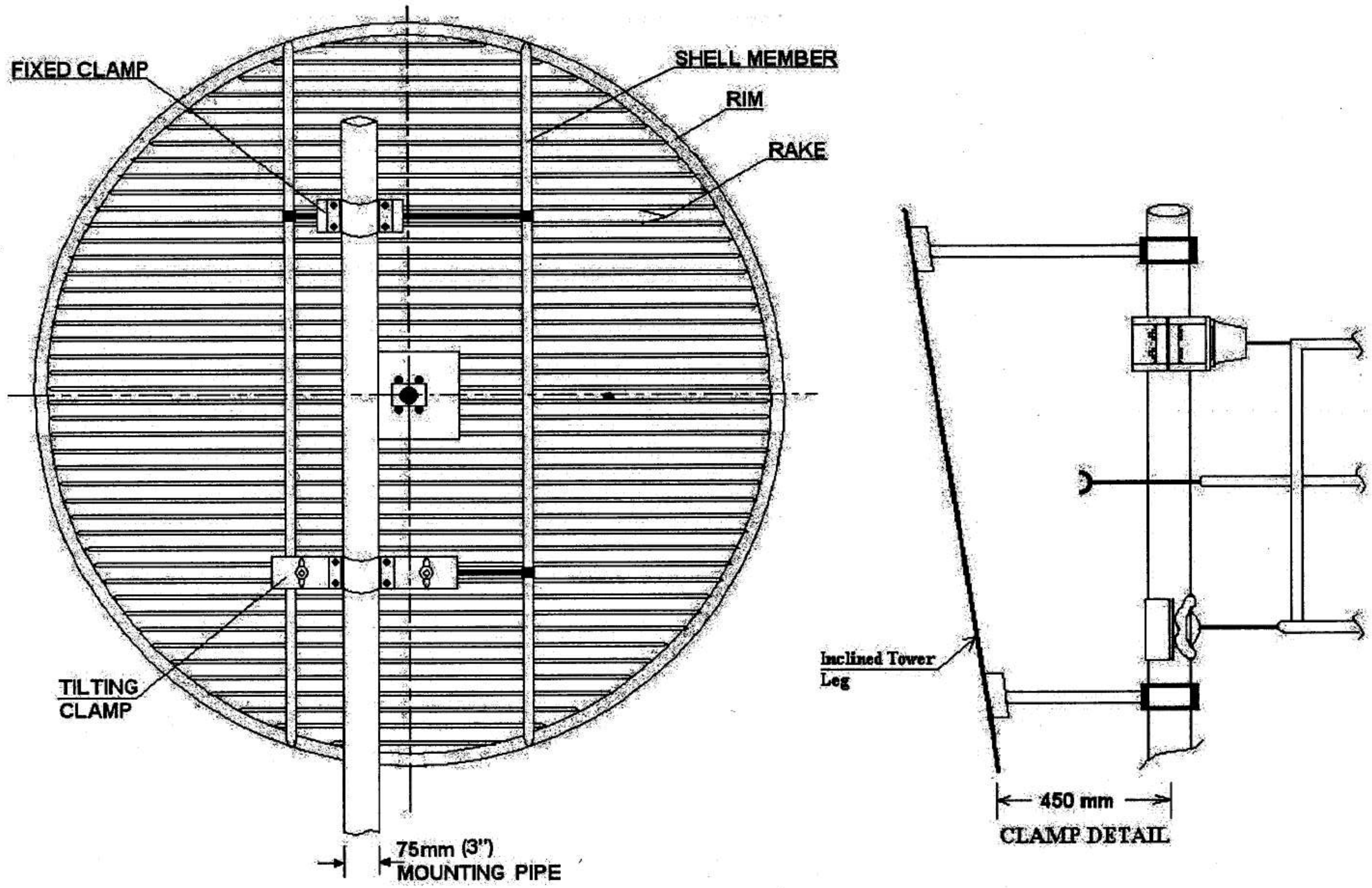
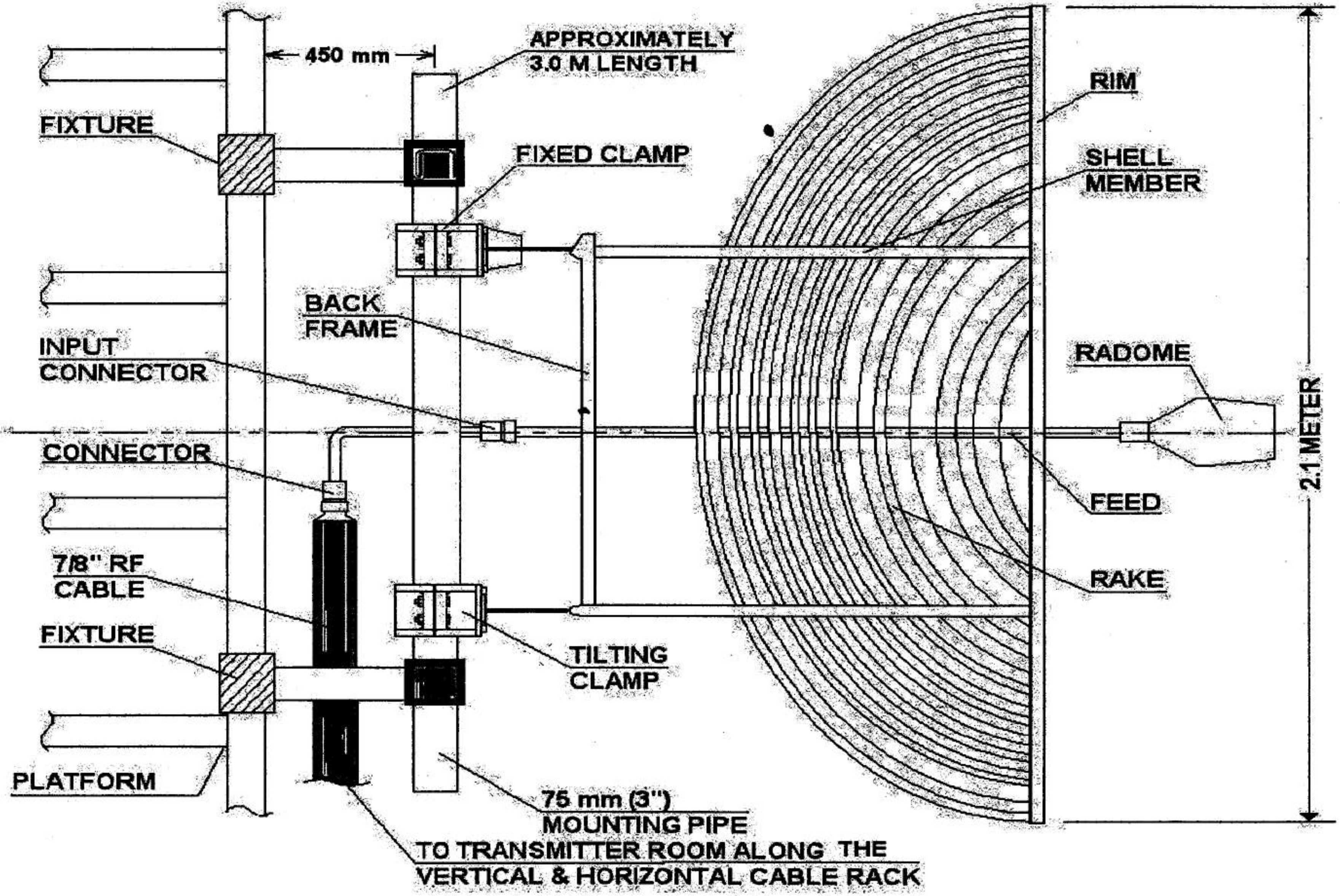


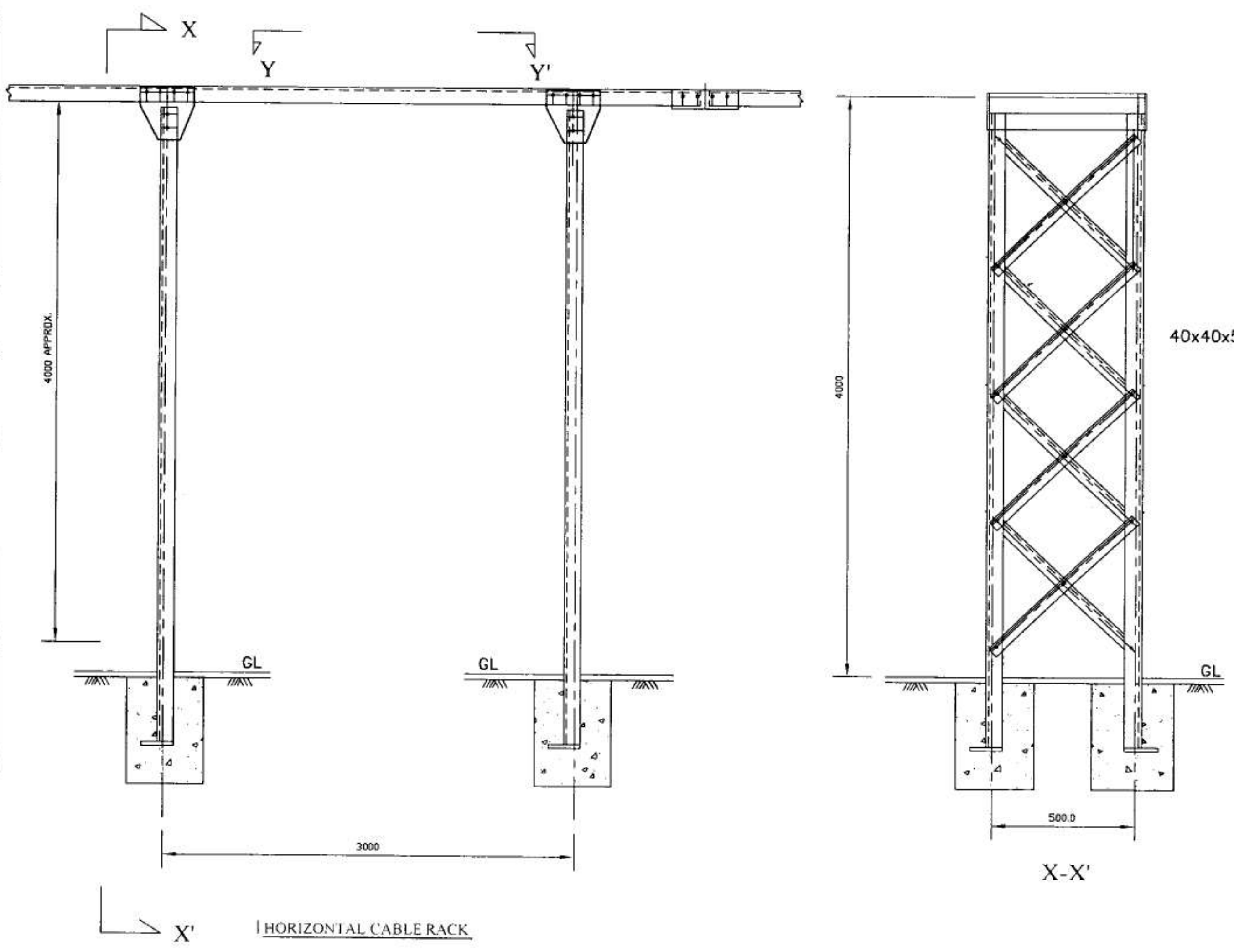
Illustration for mounting on Platform

ANNEXURE – III (B)

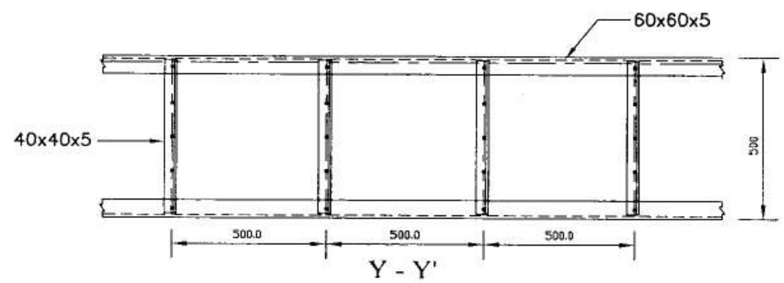


EXACT DIMENSION WILL BE INTIMATED AT THE TIME OF AWARD OF WORK

S NO	DATE	BRIEF RECORD	INIT
1	4.10.99	DISTANCE BETWEEN TWO LEGS OF HORZ. CABLE RACK CHANGED & WIDTH OF RACK IN SECTION X-X' & Y-Y' CHANGED & MEMBER SIZE GIVEN IN mm.	Sd/
2	29.10.07	SIZE OF ANGLE IRON OF HORIZONTAL TRAY CHANGED TO 60x60x3 mm. & SHAPE OF G.I. SHEET COVER CHANGED TO SEMI-CIRCULAR	
3	12.02.09	SIZE OF ANGLE IRON OF HORIZONTAL TRAY CHANGED TO 60x60x5 mm.	Sd/-

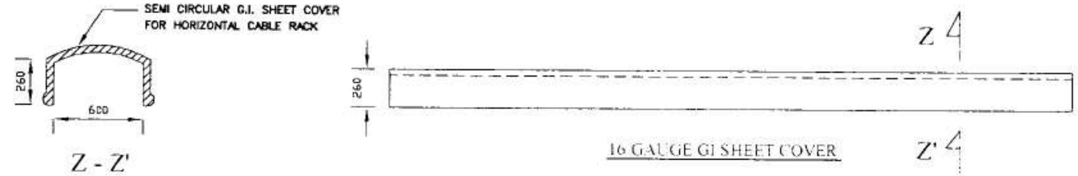


HORIZONTAL CABLE RACK



NOTES:--

1. THIS DRG. IS FOR REFERENCE ONLY.
2. THE HEIGHT OF HORIZONTAL RACK WILL BE ABOUT 4.0 M.
3. MAXIMUM SPACING BETWEEN VERTICAL SUPPORTS BE 4.0 M.
4. 16 GUAGE G.I. SHEET COVER SHOULD BE PROVIDED ON HORIZONTAL CABLE RACK TO PROTECT CABLES.
5. ALL DIMENSION ARE IN MILLIMETRES.



16 GAUGE GI SHEET COVER

	DATE	NAME
DRN	4 8 99	A.S.BADGUJAR
TRD	24 10 07	KALONIA
CHD		
COMP		
C.D.		
SCALE:- N.T.S		
Sd/ A.D.E		Sd/ D.D.E

GENERAL

DETAILS OF HORIZONTAL CABLE RACK

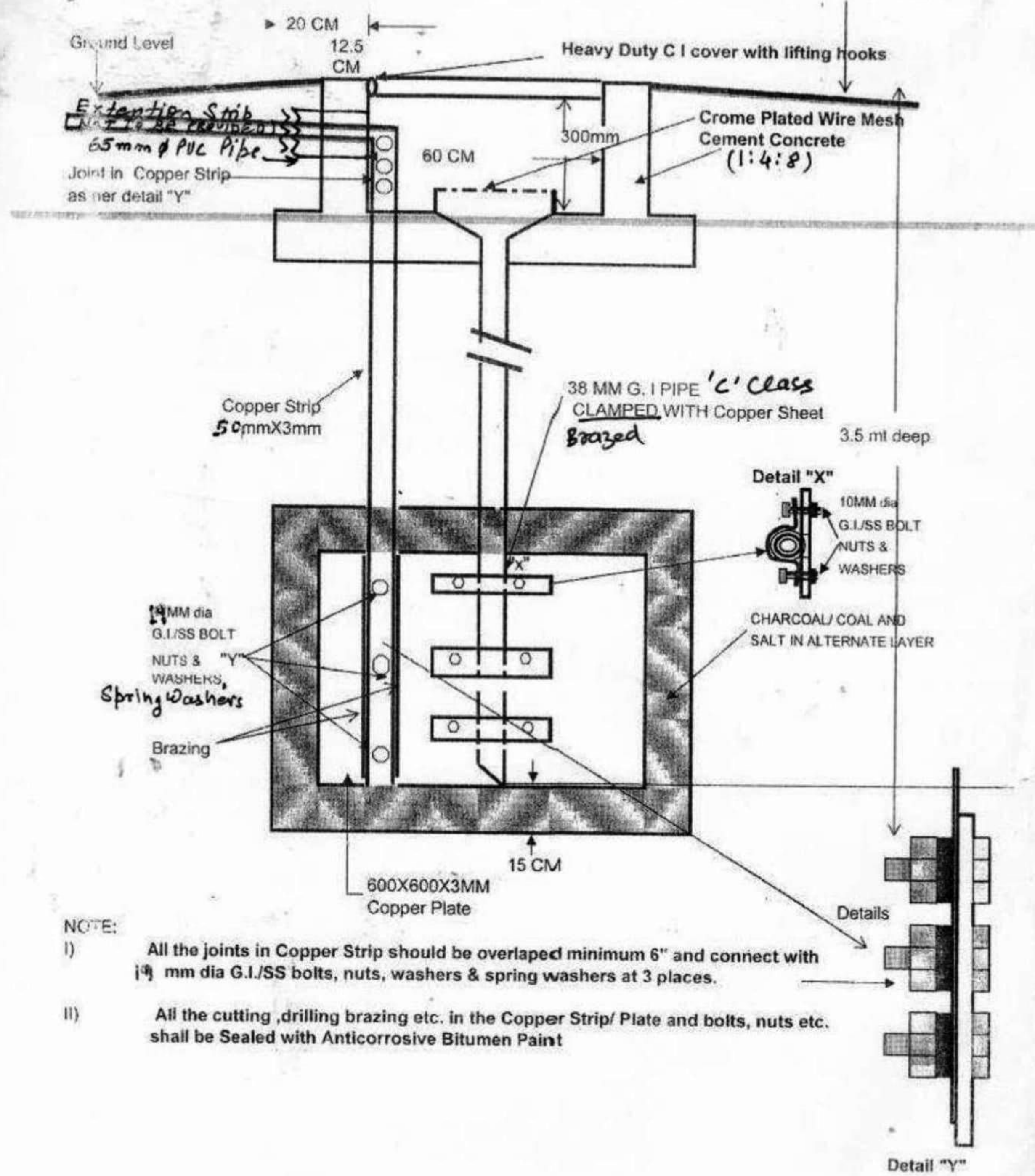
ALL INDIA RAD
P&D UNIT
NEW DELHI,INDI

APPROVED:-

NO. TM-14453/3

NO. TM-14453/3

TYPICAL COPPER PLATE EARTHING.



NOTE:

I) All the joints in Copper Strip should be overlaped minimum 6" and connect with mm dia G.I./SS bolts, nuts, washers & spring washers at 3 places.

II) All the cutting ,drilling brazing etc. in the Copper Strip/ Plate and bolts, nuts etc. shall be Sealed with Anticorrosive Bitumen Paint

Drawing No. 15175/2 (General)