



राष्ट्रीय भौतिक प्रयोगशाला

(वैज्ञानिक एवं औद्योगिक अनुसंधान परिषद्)

NATIONAL PHYSICAL LABORATORY

(Council of Scientific & Industrial Research)

डॉ० के. एस. कृष्णन मार्ग, नई दिल्ली-110012

Dr. K.S. Krishnan Marg, New Delhi-110012

Dated 16.12.2012



Form:

The Director,
National Physical Laboratory

SPEED POST

To,

Sub: Installation of Antenna near RASD Hutment at NPL Campus.

Sir,

Reference this office enquiry letter of even number dated 12.11.2013 (Copy enclosed) inviting short term item rate tenders for the subject work, I am directed to inform that Competent Authority, NPL has been pleased to extend the dates for sale / submission and opening of tenders as detailed below:

Name of Work	Tender Cost	Estimated Cost (Rs.)	Earnest Money (Rs.)	Completion of time
Installation of antenna near RASD hutment at NPL Campus.	500/-	2,34,410/-	4,688/-	1 Month

- * Sale of Tenders :- 1.1.2014
- * Submission of tenders :- 3.1.2014 upto 2.30 P.M.
- * Opening of tenders :- 3.1.2014 at 3.00 P.M

Other terms & conditions of enquiry letter dated 12.11.2013 remains unchanged.

Encls : as above

Yours faithfully,
Sd/-
(H.N. Meena)
Section Officer

Copy for information to:-

1. Civil & Elect Engg Section, NPL - along with a set of tender document for information and necessary action.
2. Notice Boards, NPL.
3. The Joint Secretary, (Admin), CSIR Hqrs.
4. The Director, NISCAIR, New Delhi
5. The Director, NISTADS, New Delhi
6. The Director, IGIB, New Delhi.
7. The Director, CRRI New Delhi.
8. The Director (EC), ESD, CSIR Complex, Pusa, New Delhi

हनिमायाण मीना
16.12.13
(H.N. Meena)
SO (W)

Fax / फॅक्स : 91-11-45609310
Director Office : 45609201 / 45609301

ई-मेल : root@nplindia.org
E-mail : root@nplindia.org

To:

No. 4/1523/2013-CW&M

Dated: 12.11.2013

From:

The Director,
National Physical Laboratory

To:

Sir,

Short term Item rate tenders are invited by the undersigned on behalf of Director, NPL for the work detailed below.

Sl. No.	Name of Work	Tender Cost (Rs.) (Non-refundable)	Estimated Cost (Rs.)	Earnest Money (Rs.)	Completion time
1.	Installation of antenna near RASD hutment at NPL Campus.	500/-	2,34,410/-	4,688/-	1 Month

1. General Condition of Contract can be seen in CW&M Section, Room No. 214, 2nd floor, Main Building NPL.
2. The tenderer are required to produce proof of registration, credentials of having executed two or one similar works of 60% or 80% or above respectively of the estimated cost during last 5 years along with copies of latest Sales Tax Clearance Certificate, and PAN No. while making request for the purchase of tender document .
3. The tender document for the work can be purchased on all working days between 1000 Hrs. to 1600 Hrs from 18.11.2013 to 27.11.2013 (**Extended upto 1.1.2014**) from the Office of Section Officer (Works), Room No. 214, 2nd Floor, Main Building NPL, New Delhi.
4. Interested parties can also download complete tender document for the work from our website www.nplindia.org. The tenderer while submitting the downloaded tender document shall ensure submission of all requisite document as mentioned in para 2 above along with separate pay orders towards non-refundable tender cost and EMD in favour of Director, NPL **in a separate cover indicating** " Pay Orders for Tender cost, EMD and credentials". Such tenders shall be opened only after the EMD, tender cost and credentials of the tenderer are found in order and satisfaction of the Tender Opening Committee.
5. The last date for submission of dully filled tender documents is 3.1.2014 up to 1430 Hrs. The tenders received will be opened on the same day at 1500 Hrs in the presence of tenderers or their authorized representatives, who may like to be present.
6. The rates quoted shall be valid for 90 days. The rates should be written both in figures as well as in words failing which the tender is liable to be rejected. REBATE OFFERED, IF ANY SHOULD BE ON COVERING LETTER OF THE TENDERER.

Contd...P/2

7. The date of issue of pay order/banker's cheque in respect of tender cost and EMD should be after the date of issue of enquiry letter. Cheques will not be accepted.
8. Tender with any condition including conditional rebate, shall be rejected. However, tenders with unconditional rebate will be accepted.
9. Earnest money is liable to be forfeited if the contractor selected for award of work fails to submit (i) acceptance, (ii) performance security @ 5 % of award value, (iii) non judicial stamp paper, (iv) sign formal agreement; or (v) fails to start the work within ten days from the date of issue of award letter.
10. Director, NPL reserves the right to accept, in part or in full, any or all the tenders received or to reject all the tenders received without assigning any reasons thereof.

Yours faithfully,
Sd/-
Section Officer

Copy for information to:-

1. Civil Engg Section, NPL - along with a set of tender document for information and necessary action.
2. Notice Boards, NPL
3. The Joint Secretary, (Admin), CSIR Hqrs.
4. The Director, NISCAIR, New Delhi
5. The Director, NISTADS, New Delhi
6. The Director, IGIB, New Delhi.
7. The Director, CRRI New Delhi.
8. The Director (EC), ESD, CSIR Complex, Pusa, New Delhi

Section Officer (W)



NATIONAL PHYSICAL LABORATORY
DR. K.S. KRISHNAN MARG,
NEW DELHI - 110 012.

Name of work:- Installation of antenna near RASD hutment at NPL Campus.

CONTENTS

Sl. NO.	DESCRIPTION	NO. OF PAGES
1	Contents	1
2	Notice Inviting Tenders	2-4
3	Schedule of quantities & summary	5-22
4	Special Conditions, Additional Conditions and latest General Conditions of contract with amendments: can be seen in the Office Section Officer (Works), Room No.214.	

NOTE Tenderer should confirm that they have received all the above papers. All the documents issued are to be returned duly signed by the tenderer while submitting his offer.

TENDER ISSUED TO:

M/s. / Sh.

TENDER FEE: vide P.O. No.

Dated _____ for Rs. 500/-

Earnest Money Deposit:

Pay order No. _____ dated _____

For Rs. _____

Issued by _____

**SIGNATURE OF THE OFFICER
ISSUING Tenderer**



NATIONAL PHYSICAL LABORATORY
DR. K.S. KRISHNAN MARG,
NEW DELHI - 110 012

1. Sealed item rate tenders are hereby invited for the work "Installation of antenna near RASD hutment at NPL Campus" from the contractors of appropriate class of CPWD, Railways, MES, Post & Telegraph Dept., State PWD'S, Central, State Govt./Semi Govt./PSU's or from those who have worked for CSIR or its Laboratories/Institutes and successfully carried out preferably two or one similar works amounting to 60% or 80% or above respectively of the estimated cost during last five years. The tenderers are required to produce proof of fulfilling these conditions along with copy of latest Sales Tax Clearance Certificate, PAN No., **and EARNEST MONEY DEPOSIT PAY ORDER** while making request for issue of tender document.
2. Estimated cost is **Rs. 2,34,410/-** (Rs. Two Lakh Thirty Four Thousand Four Hundred and Ten only) based on DSR 2012 and **Market Rates**.
3. Time for carrying out the work will be **01 Month** and the date of commencement shall be reckoned from the tenth day of issue of award letter.
4. Complete contract documents to be complied with by the tenderer whose tender may be accepted can be seen at the office of Section Officer (Works), NPL, Dr. K.S. Krishnan Marg, New Delhi - 110 012 on any working day.
5. Tenders should be on the specified form (non-transferable) which may be obtained from the Office of Section Officer (Works), Room No. 214, NPL Main Bldg. **from 1000 Hrs. to 1600 Hrs. between 18.11.2013 to 27.11.2013 (Extended upto 1.1.2014)** on payment of **Rs. 500/-** (Rupees five hundred only) in the shape of Demand Draft/Pay order of a schedule Bank drawn in favour of Director, NPL (Non-refundable).
6. Tenders should be submitted in wax sealed cover subscribed with the name of the work, date of opening written on the envelope. Tenders will be received **upto 1430 Hrs on 3.1.2014** and will be **opened on the same day at 1530 Hrs** in the office of Section Officer (Works), CW&M Section Room No. 214. NPL, Dr. K. S. Krishnan Marg, New Delhi - 110 012. Tender should be dropped in the tender box before the closing date and time indicated above. In case these are sent by Post these should be sent Regd. Post / Speed Post addressed to Section Officer, CW&M Section Room No. 214, NPL Tenderers are to ensure that they post the tender well in advance so as to reach before the closing time and date indicated.
7. The Earnest Money amounting to **Rs. 4,688 /-** (Rs. Four Thousand Six Hundred and Eighty Eight only) in the shape of pay order issued by a schedule Bank and drawn in favour of Director, NPL should accompany the request letter.
8. The Employer does not bind himself to accept the lowest or any tender and reserves to himself the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rates quoted.
9. Canvassing in connection with the tenders is prohibited and the tenders submitted by the contractor who resort to canvassing are liable for rejection.

10. The tenderer shall not be permitted to tender for work in the concerned unit of CSIR in which a relative is posted in the grade between Controller of Administration and Junior Engineer (both inclusive). He shall also intimate the names of persons who are working with him in any capacity or subsequently employed by him and who are relatives as mentioned above.

NOTE: A person shall be deemed to be a relative of another if, and only if, (a) they are members of a Hindu undivided family; or (b) they are husband & wife, or (c) the one is related to the other in the following manner: Father, Mother (including step mother), son (including step son), Son's son's son. Son's son's wife, son's daughter, son's daughter's son's wife, daughter's daughter, daughter's daughter's husband, Brother (including step brother), Brother's wife, Sister (including step sister), Sister's husband.

11. Tender submitted shall remain valid for 90 days from the date of opening for the purpose of acceptance and award of work, validity beyond 90 days from the date of opening shall be by mutual consent.

12. The tenderer shall quote rates both in figures and words failing which, tender is liable to be rejected. On check if there are differences between the rates quoted by the tenderer in words and in figures or in the amount worked out by him, the following procedure shall be followed:

i) When there is a difference between the rates in figures and in words, the rates which correspond to the amounts worked out by the tenderer shall be taken as correct.

ii) When the amount of an item is not worked out by the tenderer or it does not correspond with the rate written either in figures or in words, the rate quoted by the tenderer in words shall be taken as correct.

iii) When the rate quoted by the tenderer in figures and in words tallies but the amount is not worked out correctly the rate quoted by the tenderer shall be taken as correct and not the amount.

13. The tenderer should see drawings and in case of doubt obtain required particulars, which may in any way influence his tender from the Engineer as no claim whatsoever will be entertained for any alleged ignorance thereof.

14. Before tendering, the tenderer shall inspect the site to fully acquaint himself about the condition in regard to accessibility of site, nature and extent of ground, working condition of site and locality including stacking of materials, installations of tools and plants (T&P) etc., conditions affecting accommodations and movement of labour etc. required for the satisfactory execution of the work contract. No claim whatsoever on such account shall be entertained by the Employer in any circumstances.

15. Earnest money will be forfeited if the contractor fails to commence the work as per letter of award.

16. Except writing rates and amount, the tenderer should not write any conditions or make any changes, additions, alterations and modifications in the printed form of tenders. Tenderers who are desirous to offer rebate the same should be brought out separately in the covering letter and submitted along with the tender.

17. Some of the provisions of General Conditions of contract are given below. Interpretation however shall be as given in the General Conditions of contract.

- a) DEFECT LIABILITY PERIOD: **Twelve months** from the date of completion as certified by the Employer.
- b) MINIMUM VALUE OF WORK FOR THE INTERMEDIATE CERTIFICATE: **Rs. 2,34,410/-**
- c) SECURITY DEPOSIT; A sum @ 10% of the gross amount of the bill shall be deducted from each running bill of the contractor till the sum along with the sum already deposited as earnest money will amount to security deposit of 5% of the tendered value of the work. In addition, the contractor shall be required to deposit an amount equal to 5% of the tendered value of the contract as Performance Security within the period prescribed for commencement of work in the letter of award issued to him.
- d) COMPENSATION: Contractor shall pay as compensation an amount equal to one percent or such smaller amount as the Employer (whose decision in writing shall be final) may decide on the cost of the whole work as shown in the agreement for every week that the work remains uncompleted or unfinished or due quantity of work remains incomplete after the proper dates. Compensation to be paid shall not exceed ten percent of the estimated cost of the work as shown in the agreement.
18. Clauses No. 28 of conditions of contract i.e., "ESCALATION" will not be applicable in this contract.
19. The materials would be brought to site in one/two lots and would be used at site only after approval of Engineer-in-Charge.
20. Store to issue: NIL
(Contractor has to arrange Cement & Steel of the following brands:
(i) JK/Vikram/Shree/Birla Uttam and approved brands:
(ii) Steel-TMT/RANA/Rathi/Kamdhenu-TOR Steel or approved brand.
21. All tenderers should submit the proof of their registration with Sales Tax Department while tendering for works in N.C.T. of Delhi as per Works contract Act, 1999. Deduction of Sale Tax at the rate of 2% of payment will be made from their running / final bill on all works within N.C.T. of Delhi. It may be noted by the tenderers that the site of work is in restricted area and there will be curb on traffic movement in specified hours. This fact should be taken into account and no extra payment /claim in this regard shall be admissible.
22. If any tenderer withdraws his tender before expiry of the validity period, or before the issue of letter of acceptance, whichever is earlier, or makes any modification in the terms and conditions of the tender which are not acceptable to the department, then the Employer shall, without prejudice to any other right remedy, be at liberty to forfeit 50% of the earnest money absolutely. This provision would naturally apply only to the lowest tenderer once the earnest money of all the tenderers except that of the lowest is refunded .
23. In case of forfeiture of earnest money as prescribed above the tenderer shall not be allowed to participate in the retendering process of the work.
24. Tenders with any condition, including conditional rebates, shall be rejected. However, tenders with unconditional rebate will be acceptable.

**Signature of the Contractor
with date**



NATIONAL PHYSICAL LABORATORY

Installation of antenna near RASD hutment at NPL Campus.

Brought forward from Page No. 1 Rs.

Brought forward from Page No. 2 Rs.

Brought forward from Page No. 3 Rs.

.

TOTAL Rs.

=====

(In words Rupees _____)

SIGNATURE OF THE CONTRACTOR

**NATIONAL PHYSICAL LABORATORY
DR. K.S. KRISHNAN MARG,
NEW DELHI – 110 012
APPENDIX**

Installation of antenna near RASD hutment at NPL Campus.

PARTICULARS OF MATERIAL			RATES AT WHICH THE MATERIAL WILL BE CHARGED TO THE CONTRACTOR		PLACE OF DELIVERY
	APPROX. QNTY	UNIT			
CEMENT	56	BAGS	CEMENT & Steel WILL BE ARRANGED BY THE CONTRACTOR		BY OWN ARRANGEMENT
STEEL	NIL	P.M.T.	RS. (FIGURE)	RS. IN WORDS	Central Store on availability otherwise to be arranges by the contractor at his own cost.



NATIONAL PHYSICAL LABORATORY
DR. K.S KRISHNAN MARG
NEW DELHI - 110012

Name of Work :- Installation of antenna near RASD hutment at NPL campus.
SCHEDULE OF WORK

S. No	Description of items	Qty	Unit	Rate in figure	Rate in words	Amount
1	Earth work in excavation by mechanical means (Hydraulic excavator)/ manual means over areas (exceeding 30cm in depth, 1.5m in width as well as 10 sqm on plan) including disposal of excavated earth, lead upto 50m and lift upto 1.5m, disposed earth to be levelled and neatly dressed All kinds of soil	13.00	cum			
2	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift upto 1.5 m	8.00	cum			
3	Clearing grass and removal of the rubbish upto a distance of 50 m outside the periphery of the area cleared.	3600.00	100 sqm			
4	Providing and laying in position cement concrete of specified grade excluding the cost of centring and shuttering - All work upto plinth level.					
(a)	1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)	1.20	cum			
(b)	1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size)	2.20	cum			
5	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of centring, shuttering, finishing and reinforcement - All work upto plinth level : 1:1½:3 (1 cement : 1½ coarse sand : 3 graded stone aggregate 20 mm nominal size)	5.30	cum			

KS
KS

S. No	Description of Items	Qty	Unit	Rate in Figure	Rate in words	Amount
6	Centering and shuttering including strutting, propping etc and removal of form for Foundations, footings, bases of columns, etc for mass concrete	20.00	sqm			
7	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level. Thermo-Mechanically Treated bars	530.00	kg			
8	Providing and fixing double scaffolding system (cup lock type) on the exterior side up to seven story height made with 40mm dia. M.S. tube 1.5 m centre to centre horizontal & vertical tubes joining with cup & lock system with M.S. tubes, M.S. tube challes, M.S. clamps and M.S. staircase system in the scaffolding for working platform etc. and maintaining it in a serviceable condition for the required duration as approved and removing it there after. The scaffolding system shall be stiffened with bracings, runners, connection with the building etc wherever required for inspection of work at required locations with essential safety features for the workmen etc. complete as per directions and approval of Engineer-in-charge. The elevational area of the scaffolding shall be measured for payment purpose. The payment will be made once irrespective of duration of scaffolding.	90.00	sqm			
9	Dismantling steel work in built up sections in angles, tees, flats and channels including all gusset plates, bolts, nuts, cutting rivets, welding etc including dismembering and stacking within 50metres lead	265.00	kg			
10	Erection of Transmit Tower with stay guys upto 30mts height. (as per drawings & attached specifications)	1.00	one job			
11	Erection of Transmit Antenna system upto 30mts height. (as per drawings & attached specifications)	1.00	one job			
12	Erection of 4 Receiver Antennas. (as per drawings)	1.00	one job			

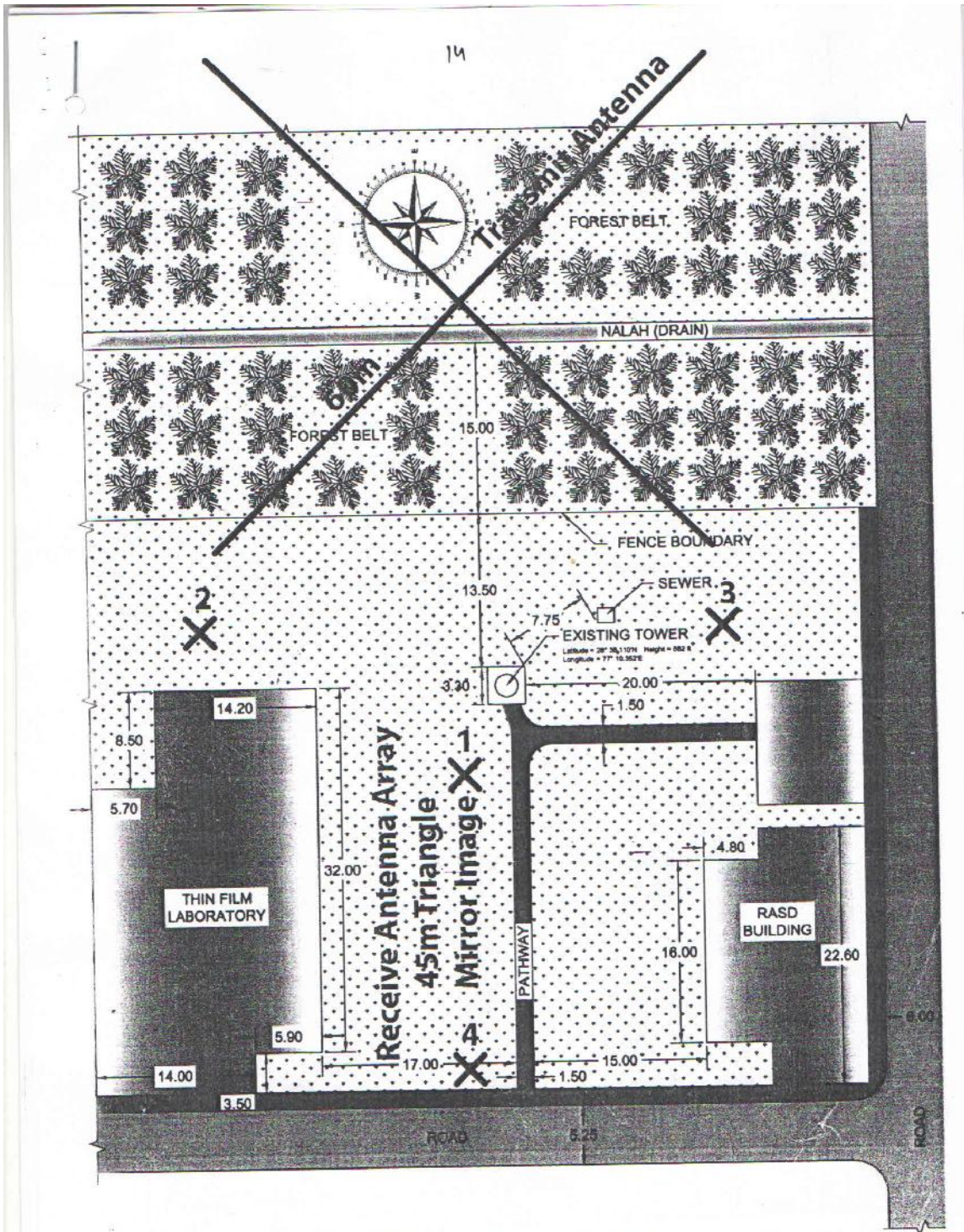
AKK

S. No	Description of Items	Qty	Unit	Rate in figure	Rate in words	Amount
13	Labour charges for Laying of 50mm to 125mm HDPE pipe along with thermo welding joints 750mm below ground level for 6 COAX Cable from transmit tower and four receiver to junction point near Digisonde Room and Cable from junction point to Digisonde Room and protection with sand filling 500mm wide and 150mm depth laying bricks on top	240.00	Rmt			
Total						

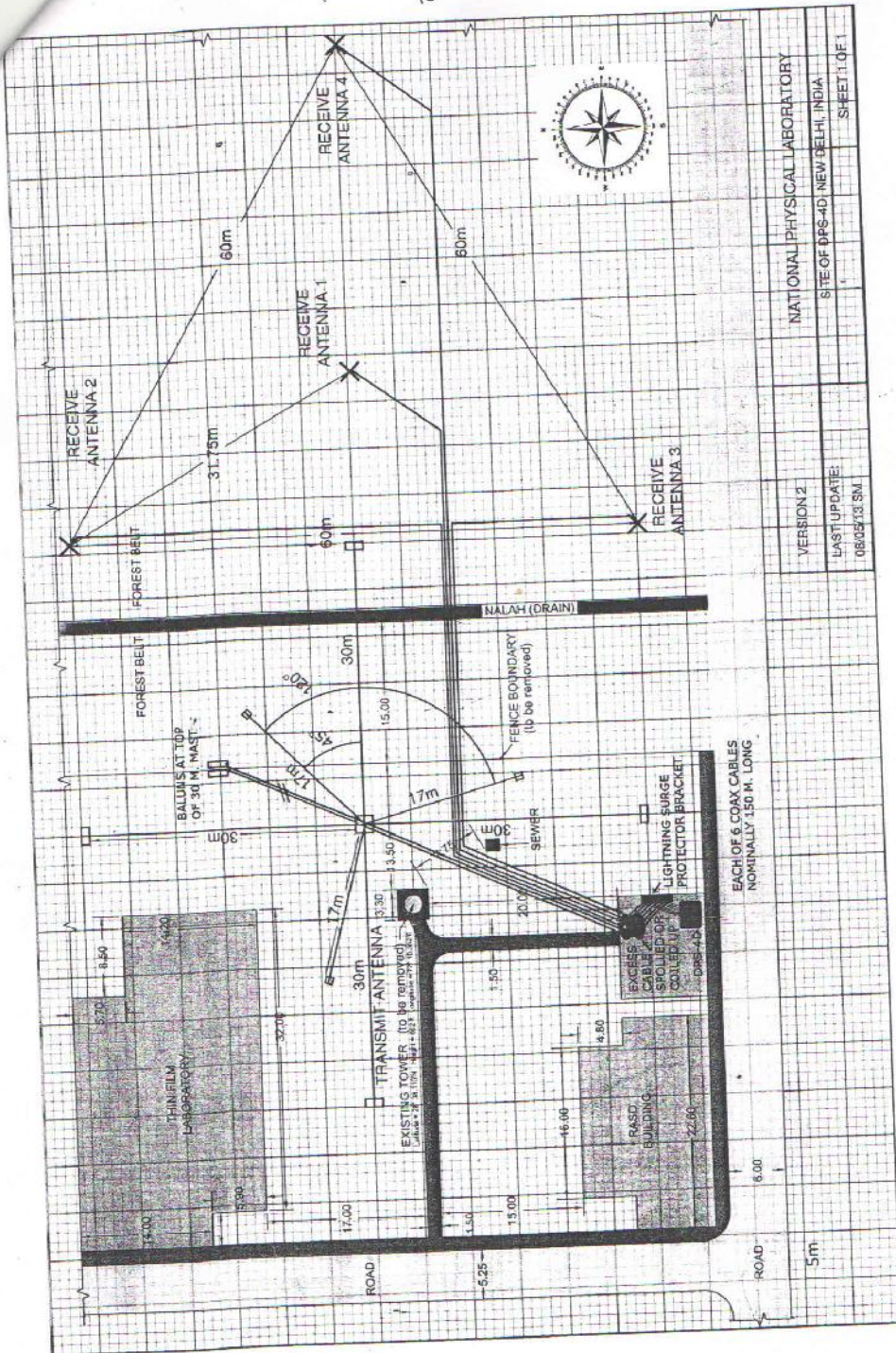
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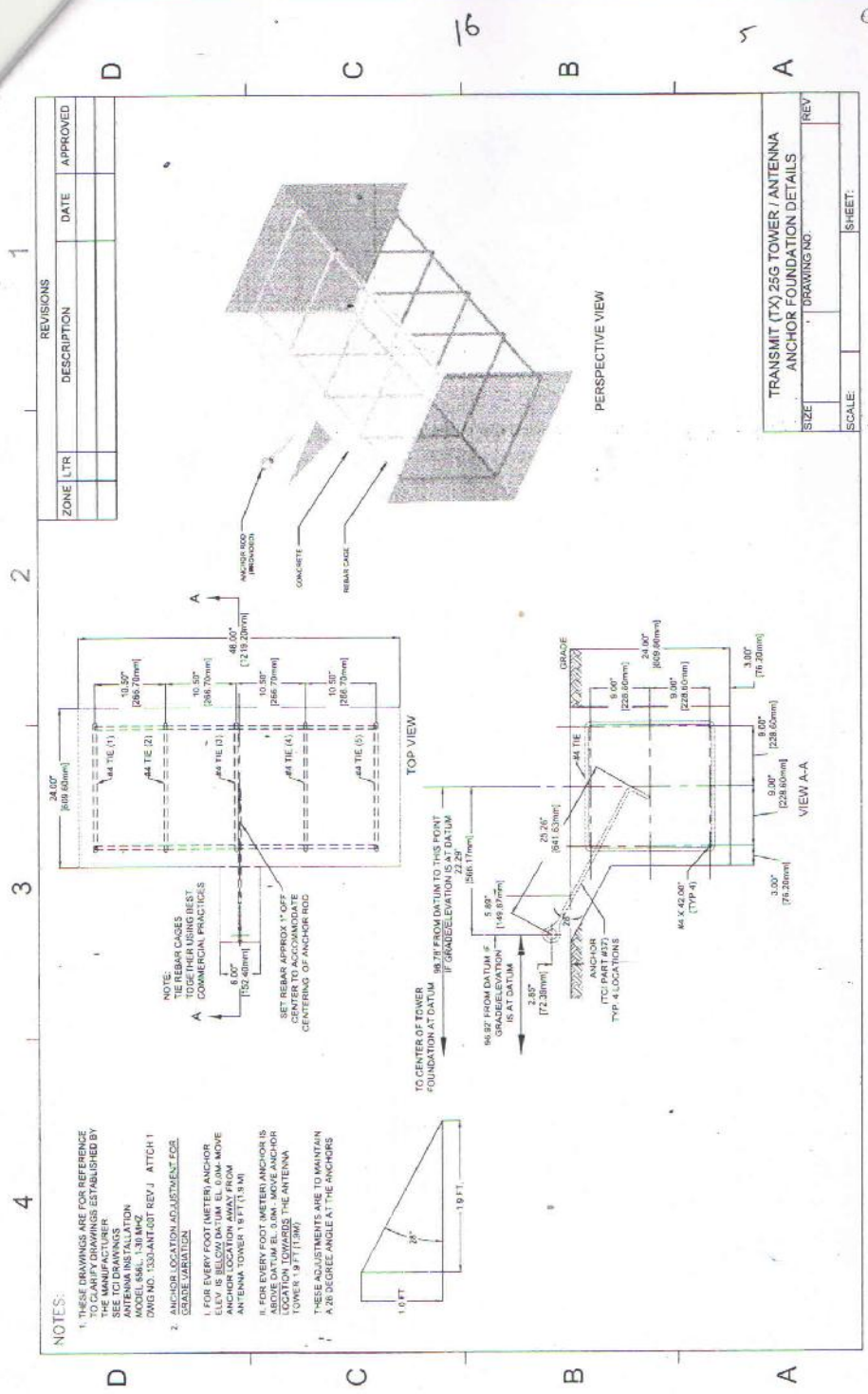
Signature of contractor
with date



SITE OF DIGITAL IONOSONDE



NATIONAL PHYSICAL LABORATORY	
VERSION 2	SITE OF DPS-4D, NEW DELHI, INDIA
LAST UPDATE/1	SHEET 1 OF 1
10/05/13 SM	

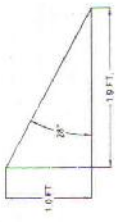


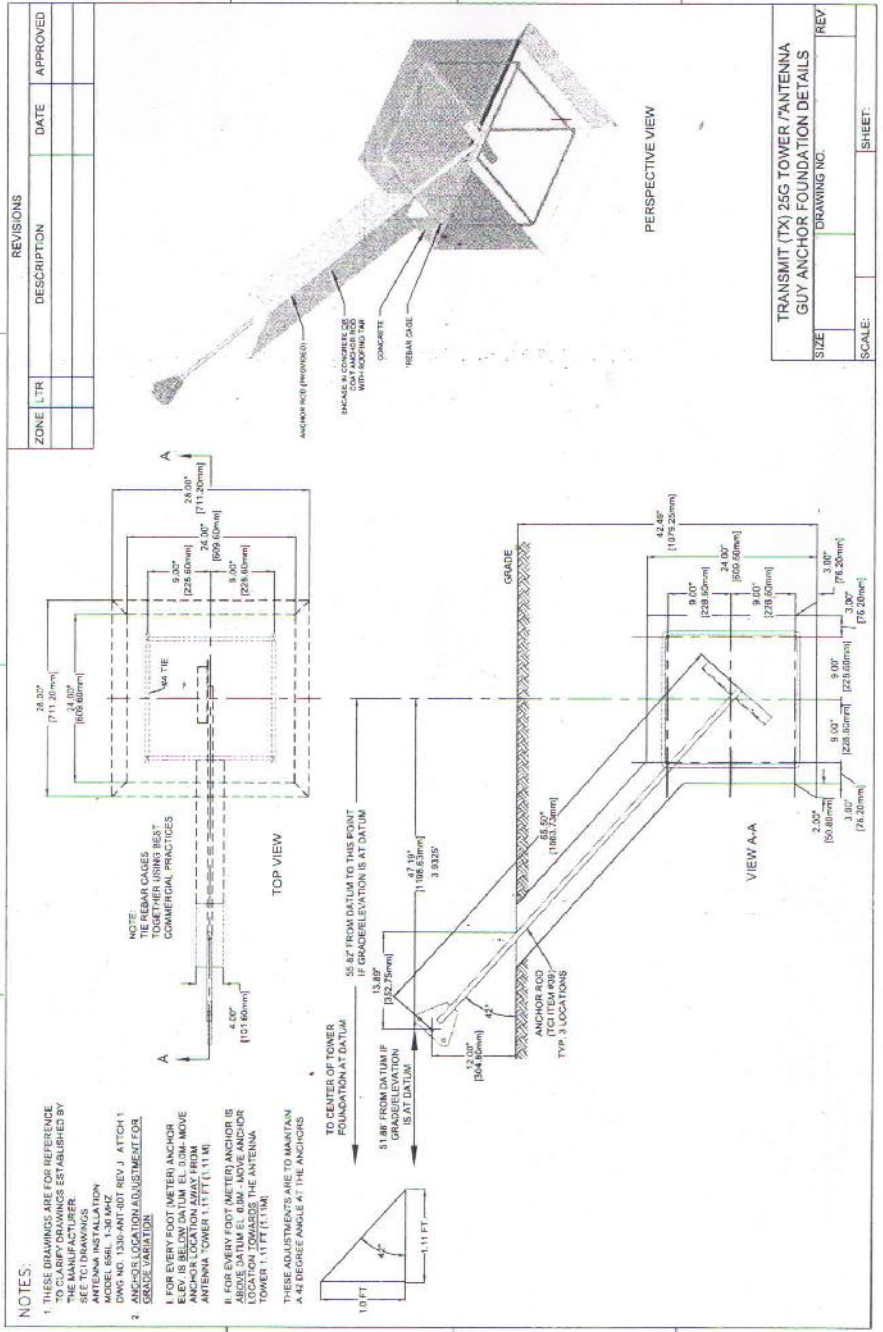
ZONE	LTR	DESCRIPTION	DATE	APPROVED

1 2 3 4

NOTES:

1. THESE DRAWINGS ARE FOR REFERENCE ONLY. ALL DIMENSIONS ESTABLISHED BY THE MANUFACTURER. SEE TCI DRAWINGS. ANTENNA INSTALLATION SHALL BE IN ACCORDANCE WITH THE TOWER MANUFACTURER'S DRAWING NO. 1331 ANT 407 REV J ATTCH 1. ANCHOR LOCATION ADJUSTMENT FOR GRADE VARIATION.
1. FOR EVERY FOOT (METER) ANCHOR ELEV. IS BELOW DATUM, ELEV. MOVE ANCHOR TOWARDS THE ANCHOR TOWER 1.9 FT (1.3M).
2. FOR EVERY FOOT (METER) ANCHOR IS ABOVE DATUM, ANCHOR LOCATION TOWARDS THE ANCHOR TOWER 1.9 FT (1.3M).
3. THESE ADJUSTMENTS ARE TO MAINTAIN A 26 DEGREE ANGLE AT THE ANCHORS.

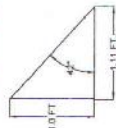




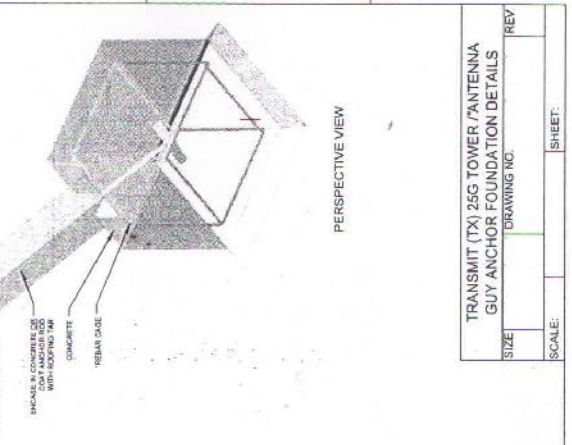
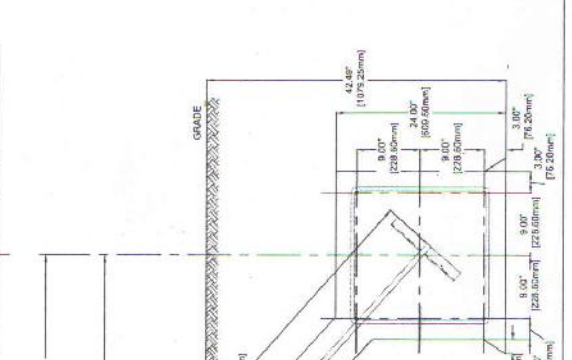
ZONE	LTR	REVISIONS	DESCRIPTION	DATE	APPROVED

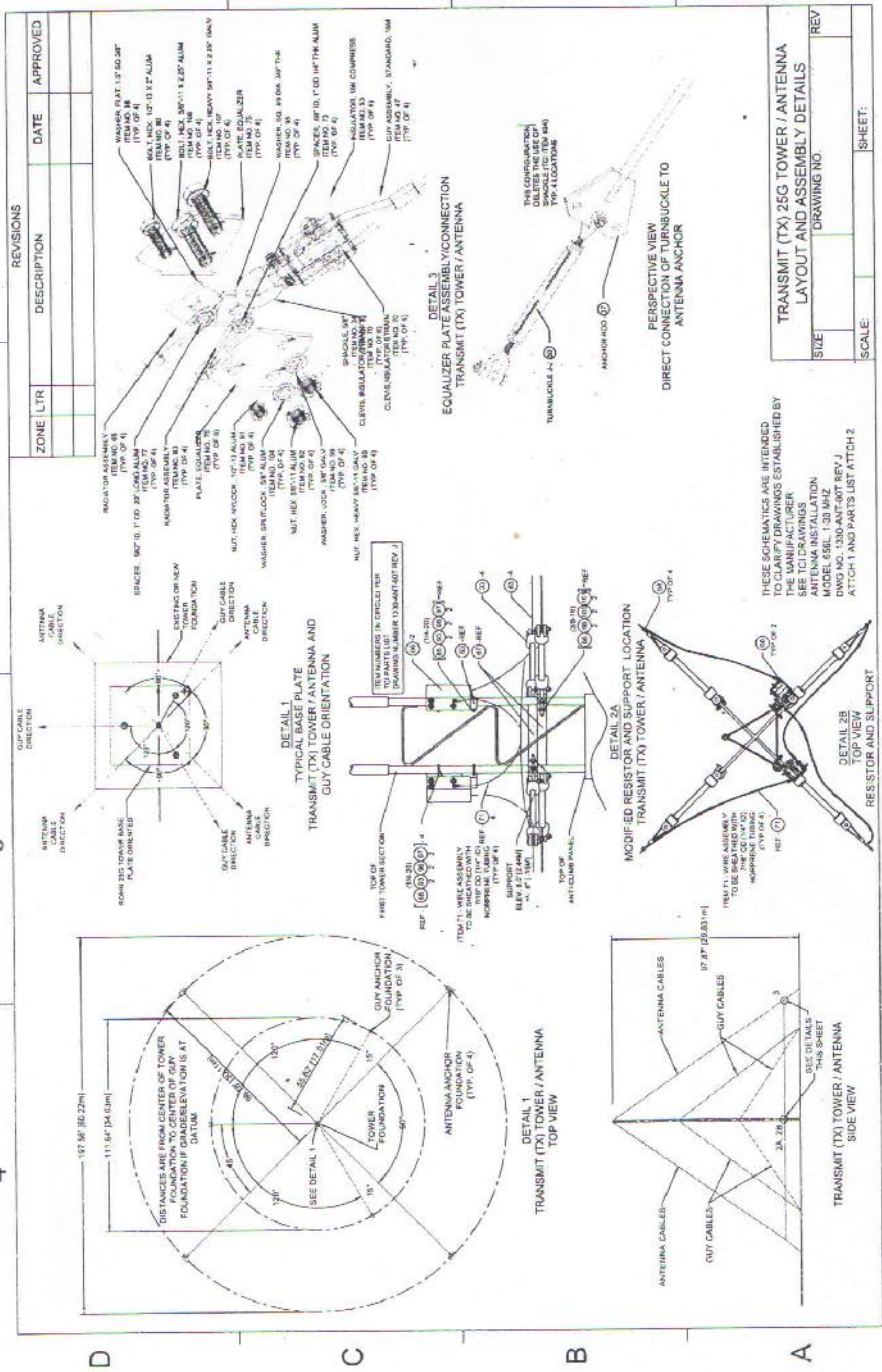
TRANSMIT (TX) 25G TOWER / ANTENNA GUY ANCHOR FOUNDATION DETAILS	
SIZE	DRAWING NO.
SCALE:	SHEET:

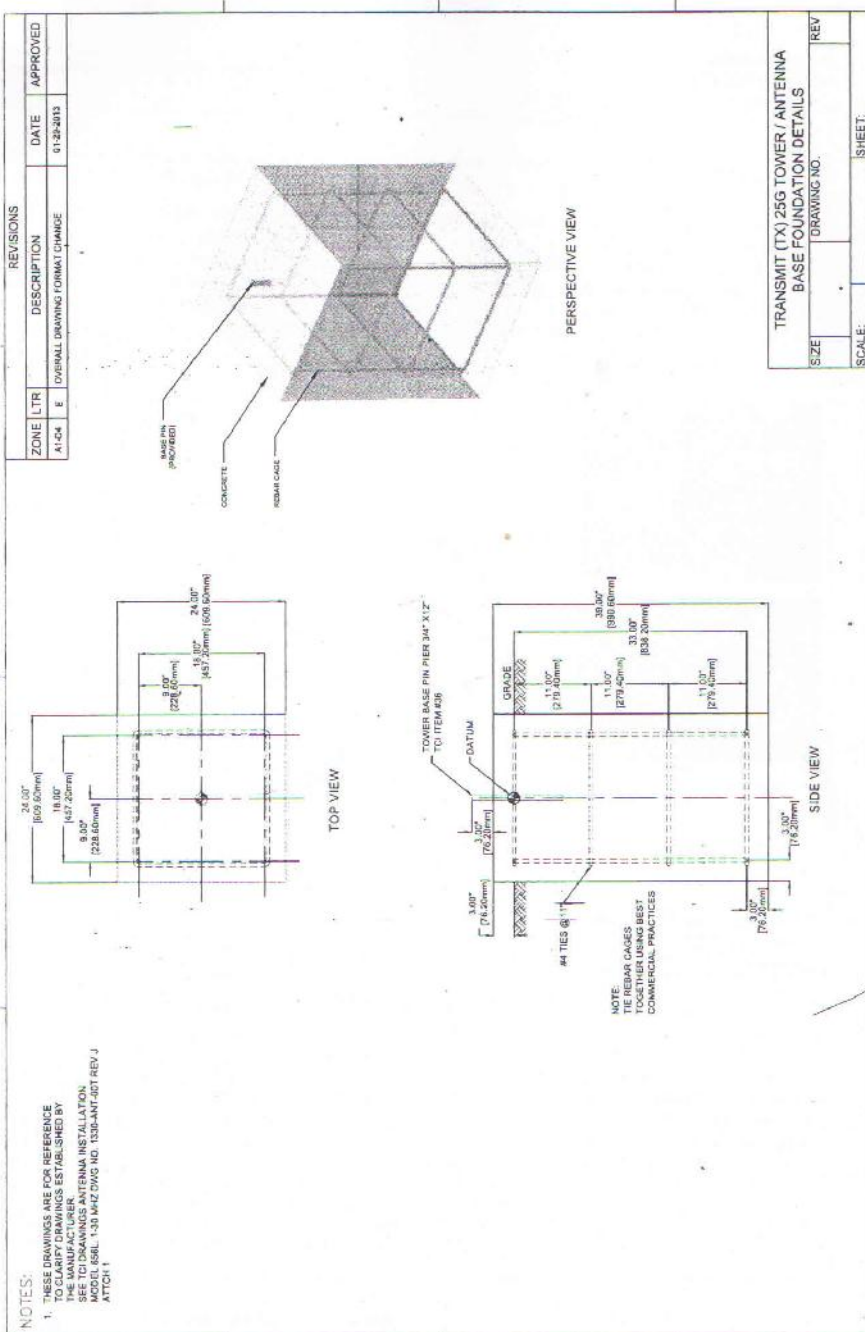
- NOTES:**
1. THESE DRAWINGS ARE FOR REFERENCE TO CLARIFY DRAWINGS ESTABLISHED BY THE MANUFACTURER. THE MANUFACTURER'S ANTENNA INSTALLATION MODEL 656L 130 MHZ.
 2. ANCHOR LOCATION ADJUSTMENT FOR SERVICE LABORER.
 3. FOR EVERY FOOT (METER) ANCHOR ELEV. IS BELOW DATUM EL. DIM. MOVE ANCHOR TOWARD THE TOWER 1.11 FT (1.11 M).
 4. FOR EVERY FOOT (METER) ANCHOR IS ABOVE DATUM EL. DIM. MOVE ANCHOR TOWARD THE TOWER 1.11 FT (1.11 M).
- THESE ADJUSTMENTS ARE TO MAINTAIN A 42 DEGREE ANGLE AT THE ANCHORS



TO CENTER OF TOWER FOUNDATION AT DATUM
 55.87' FROM DATUM TO THIS POINT IF GRADE ELEVATION IS AT DATUM
 51.88' FROM DATUM IF GRADE ELEVATION IS AT DATUM
 47.19' FROM DATUM IF GRADE ELEVATION IS AT DATUM
 3.925'







ed identically on each receive antenna station. Orientation of the Antenna #3 / Antenna #2 side of the triangle should be preferably Geographic North (see Figure 2-2).

2:29. Each receive antenna station comprises four crossed-loop active elements. Physical details of the antenna station including its concrete footing are provided in Figure 2-1 showing a small concrete pad for each antenna leg. There certainly are alternative ways of installing the antennas depending on local weather and soil conditions. However the antenna legs are installed, the antennas should be restrained from being blown around by wind or being inadvertently moved from position. The Polarization Switch (pre-amp) mounted under the lower cross of the loops should be high enough to be out of any vegetation or snow.

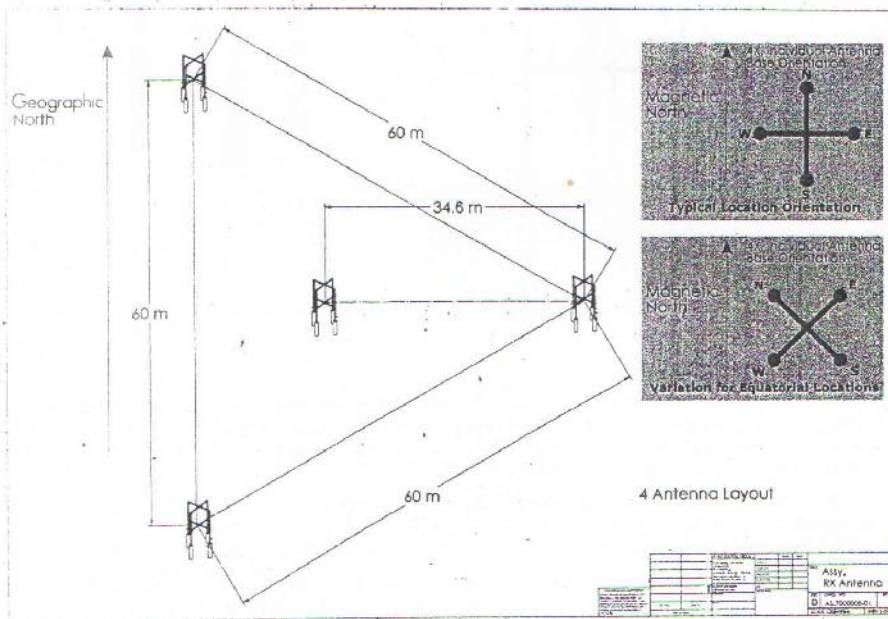


Figure 2-2: Standard Receive Antenna Array

Antenna Cable Connections -

2:30. Connect each transmit, receive, and GPS antenna directly to the Surge Protectors then to the back of the Sounder using the supplied 7.6 m RG-58 cable, with a MALE "N" type connectors. The four receive antennas cable lengths must be matched to within 6 inches or 20 cm of each other. The maximum receive antenna cable length for RG-213 is 300 m, and depending on the local RF noise environment, shorter lengths may be suggested. For distances greater than 300 m use of a Heliax type cable is suggested.

2:31. Connect the two transmit antenna cables to the Surge Protectors then to the XMT1 and XMT2 outputs on the sounder's rear I/O panel using the supplied 7.6 m RG-58 cable.

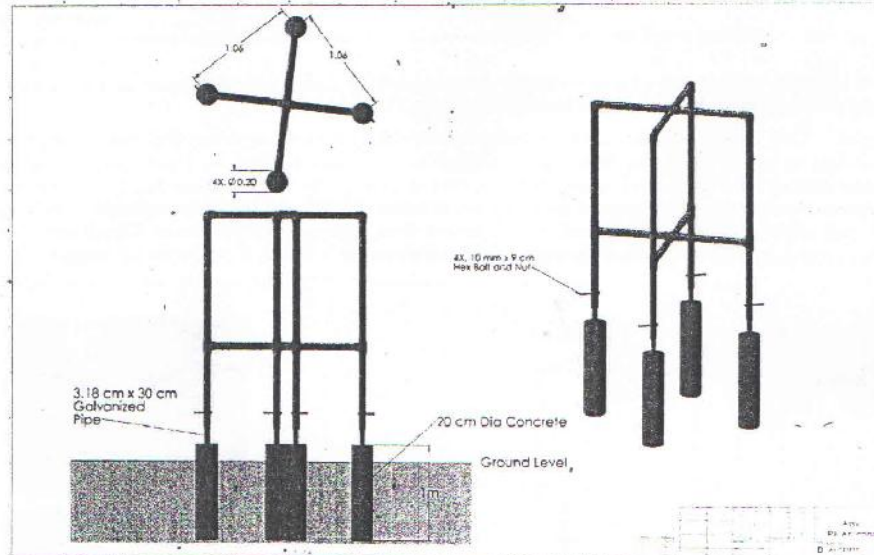


Figure 2-1: Receive Antenna Typical Dimensions

Receive Antenna Array Layout

2:24. The sounder installation uses a receive antenna array consisting of four antenna stations, three of which form an equilateral triangle, the fourth station is located at its centroid. Figure 2-2 details array layout measurements and antenna orientation. The location of each crossed-loop antenna station in each antenna field shall be in accordance with the installation drawings.

2:25. Deviations from the standard antenna array configuration shown in Figure 2-2 are acceptable if the available space for the antenna field does not accommodate the standard configuration. Deviations shall be properly reflected in the station personalization files (see Paragraph 2:49, *et seq.*).

2:26. The orientation of the individual antennas is not critical as long as all four receive antennas are parallel to each other within 1 degree. i.e., if one antenna has its legs NW, NE, SE, and SW, then the other antennas must have their legs positioned exactly the same. Most commonly one loop is positioned magnetic North - South, and the other loop is positioned magnetic East - West.

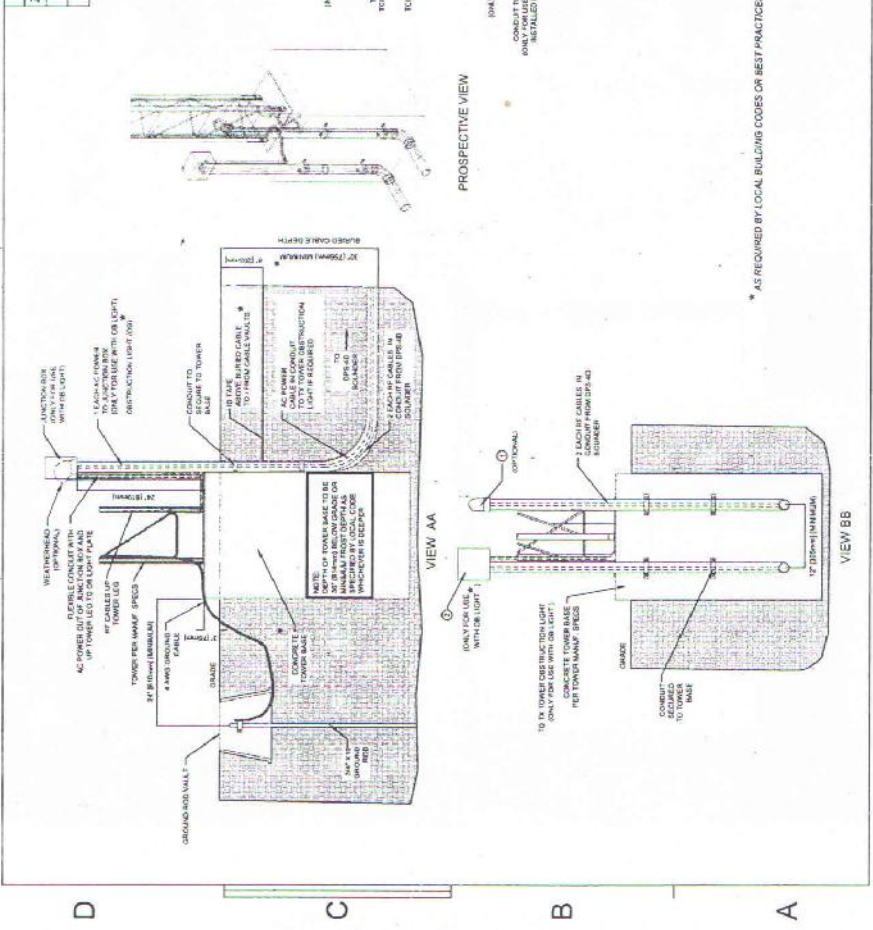
2:27. Orienting the antenna array with respect to the Geographic North simplifies configuration of the analysis software. If orientation is done with respect to the ground level compass North, the configuration files need to store deviation of the antenna array axis from the Geographic North at the time of installation to account for movement of the magnetic North Pole with time.

2:28. The vertical plane polarization and East-West (i.e., orientation of North-south loop planes) of all four turnstile antennas must be within $\pm 1^\circ$ of the datum line. All antenna preamplifier-boxes must be orient-

ZONE	LTR	DESCRIPTION	DATE	APPROVED

1 2 3 4

D C B A



TYPICAL TRANSMIT (TX) TOWER BASE DETAILS			
SIZE		DRAWING NO.	REV
SCALE: NONE		SHEET:	

Site Preparation and Antenna Installation for NPL

- A. Remove fence labeled "FENCE BOUNDARY" in drawing "Site of DPS-4D, New Delhi, India".
- B. Remove tower labeled "EXISTING TOWER" in drawing "Site of DPS-4D, New Delhi, India".
- C. Install TCI 656L Transmit Antenna in accordance with TCI 656L manual.
 1. Specifications for the concrete work for the tower and guy bases are in the following 5 drawings (attached to a previous email).
 - a. TX ANTENNA-TOWER ANCHOR FOUNDATION.pdf ✓
 - b. TX ANTENNA-TOWER GUY ANCHOR FOUNDATION.pdf ✓
 - c. TX ANTENNA-TOWER LAYOUT AND ASSEMBLY.pdf
 - d. TX TOWER BASE.pdf
 - e. TYPICAL TRANSMIT TOWER BASE.pdf
 2. Positioning of the transmit antenna is shown in drawing "Site of DPS-4D, New Delhi, India".
 3. Variations in the positioning shown to facilitate placement of the concrete bases on equal height terrain, minimizing the clearing of existing large trees, etc. are allowed providing 16 meters separation between any part of the Transmit antenna and any of the four Receive antennas is maintained.
 4. The base of the Transmit antenna tower may be no further than 116 meters from the DPS-4D Digisonde instrument after allowances for the routing of the cables is made. Note that the six 156.25 meters long antenna cables (two will be used for the Transmit antenna) supplied by LDI are matched electrically with a resolution of +/- 5 cm and must not be shortened.
 5. The two Delta antennas (hung on one tower) which are part of the TCI 656L antenna must be at right angles (90 degrees) to each other +/- 2 degrees. If possible, the antennas should be oriented as shown in the drawing "Site of DPS-4D, New Delhi, India" with arms of the antennas being magnetic NE, SE, SW, and NW +/- 2 degrees.
 6. Vegetation and trees must be cleared for a distance of 1 meter around all parts of the transmit antenna. Additional clearing will facilitate the construction work but is not necessary from an operational standpoint. Trees cannot be allowed to overhang any part of the Transmit antenna.

7. An obstruction light must be installed at the top of the Transmit antenna tower if required by India's aviation authorities.
8. Construction permits must be obtained for erecting the Transmit Antenna tower if required by local authorities.

D. Four Receive antennas are to be installed in accordance with section 2 of the Lowell Digisonde International Digisonde 4D manual.

1. Suggested positioning of the Receive antennas is shown in drawing "Site of DPS-4D, New Delhi, India".
2. Variations in the positioning shown to facilitate placement of the concrete bases on equal height terrain, minimizing the clearing of existing trees, etc. are allowed providing:
 - a. 16 meters separation between any part of the Transmit antenna and any of the Receive antennas is maintained.
 - b. 10 meters separation between any Receive antennas and buildings or any metallic structure such as fences or reinforced concrete walls, etc. is maintained.
 - c. The distance between the three outer antennas must be the same ± 0.5 meters. The distance shown in drawing "Site of DPS-4D, New Delhi, India" is 55 meters but this could be changed to anything between 50 and 60 meters providing the specifications here (i. through v.) are met.
 - d. The distance between the center antenna and the three outer antennas must also be the same ± 0.5 meters. This distance will be 31.75 meters if the distance between the outer antennas is 55 meters.
 - e. The line connecting Receive antennas 2 and 3 should be within 5 degrees of magnetic North South.
 - f. The furthest of the four Receive antennas may be no further than 146 meters from the DPS-4D Digisonde instrument after allowances for the routing of the cables is made. Note that the six 156.25 meters long antenna cables (four will be used for the Receive antennas) supplied by LDI are matched electrically with a resolution of ± 5 cm and must not be shortened.
3. The four Receive antennas must be the same height ± 10 cm above the ground. Although it is simplest if all four antennas are at the same height (altitude), it is not necessary nor desirable to have the legs or concrete bases at different heights above the ground. LDI will adjust cable lengths as required to compensate for different heights electrically.
4. The four individual arms of each Receive antenna must point:

- a. Magnetic North (0 degrees), East (90 degrees), South (180 degrees), and West (270 degrees).
 - b. Alternatively, magnetic NE (45 degrees), SE (135 degrees), SW (225 degrees), and NW (315 degrees) is also acceptable.
 - c. The main consideration is that the arms of all four receive antennas be parallel to each other, i.e. the arms of all four antennas point in the same four directions +/- 2 degrees.
5. Vegetation and trees must be cleared for a distance of at least 1 meter around the Receive antennas. Trees cannot be allowed to overhang any of the Receive antennas.
6. Figures 2-1 and 2-2 in section 2 of the Lowell Digisonde International Digisonde 4D manual have additional detail regarding concrete bases for the Receive antennas. It is acceptable to mount the antennas on concrete "pilings" under each leg as shown in the drawings. In an area where vegetation grows rapidly it would be preferable to mount the antennas on concrete platforms 2 or 2.5 meters in diameter. The platforms would then have short lengths of galvanized iron pipe sticking up at the distances specified in Figure 2-1.
- E. Cabling to the antennas must be protected from damage by vehicles, animals, solar UV, etc.
- 1. Shallow ducts are the preferred protection for the cables. The cables must not be sitting in water continuously.
 - 2. If convenient, excess cable should be coiled or spooled (on the supplied spools) inside a building protected from the weather. If the excess cable is outside in an underground cable vault, it must be assured that the cable vault is dry.
 - 3. No additional cables, such as cables for lights or security cameras, should be in the same ducts as the Receive antenna cables.
- F. The Lightning protection bracket on which are mounted the Surge Protectors is the central point for grounds.
- 1. As short as possible (3 or 4 meters) ground should be made from the Lightning protection bracket to a 2 meter driven ground rod or possibly a nearby underground metallic water pipe by #8 (3 mm.) wire.
 - 2. The Digisonde chassis should be connected to this central point by #8 (3 mm) wire.
 - 3. The protective ground of the AC mains should be connected to this central point.
 - 4. The neutral of the AC mains should be connected to this central point if consistent with local wiring regulations.
 - 5. No grounds are necessary nor desired at the four Receive antennas.
 - 6. The Transmit tower should be grounded in accordance with the TCI instructions contained

within the TCI 656L manual.

G. Climate control (air conditioning) must be provided for the Digisonde DPS-4D. A typical "office" environment is suitable. Specifically, the temperature should be maintained at no greater than 28 degrees C.

