प्रसारभारती / PRASAR BHARATI
(भारतकालोकसेवाप्रसारक/ INDIA'S PUBLIC SERVICE BROADCASTER)
अपरमहानिदेशककाकार्यालय(अभि.) (द.क्षे..) / O/o. ADDL. DIRECTOR GENERAL (E)(SZ)
आकाशवाणीएवंदूरदर्शन / AKASHVANI& DOORDARSHAN
स्वामीशिवानंदासालै, चेन्नई/ SWAMY SIVANANDA SALAI, CHENNAI – 600 005.
e-mail:adgszpurchase@prasarbharati.gov.in

No. J-11011/81/2026-PURCHASE-ADG(E)-(SZ) **Date: 27/10/2026**

Clarification to Bidder's queries - I

Sub: Dismantling, Transportation, Design and Construction of Foundation, Erection of 45 m High Self-Supporting Lattice Steel Tower at Akashvani Mahabubnagar as per specification -reg

Ref: Tender No. J-11011/81/2026-PURCHASE-ADG(E)-(SZ) dt 04.09.2026

The reply to the query raised by the firms is as below.

Query:

With reference to the above mentioned tender,it is observed that the foundation design forces/load reactions for the proposed 45 m high self-supporting lattice steel tower have not been specified in the tender documents or technical specifications. In this regard, you are kindly requested to provide the tower foundation forces including the maximum compression, uplift, shear forces and moments at the tower base as applicable to enable us to design the foundation in accordance with the prescribed technical requirements and relevant design standards.

Reply : The member geometry details of the superstructure are available in the GA and detail of the tower drawing which is included in the bid document. The bill of material given in the drawing includes the member dimensions, quantity and their weight. Firms may use these details along with antenna and RF cable load details given in the bid document to determine the foundation forces. Firms may also refer to the soil test report given in the bid document for geotechnical details. Firms may also refer to the 45 m SStower foundation drawing attached for reference purpose only. Tenderers are required to submit tower foundation design drawing approved by the NIT/IIT/SERC testifying the soundness and safety of design foundation etc. Bidders are advised to visit the site to acquaint themselves with terrain and site conditions.

The due date for the submission of the bid is extended to 09/11/2026

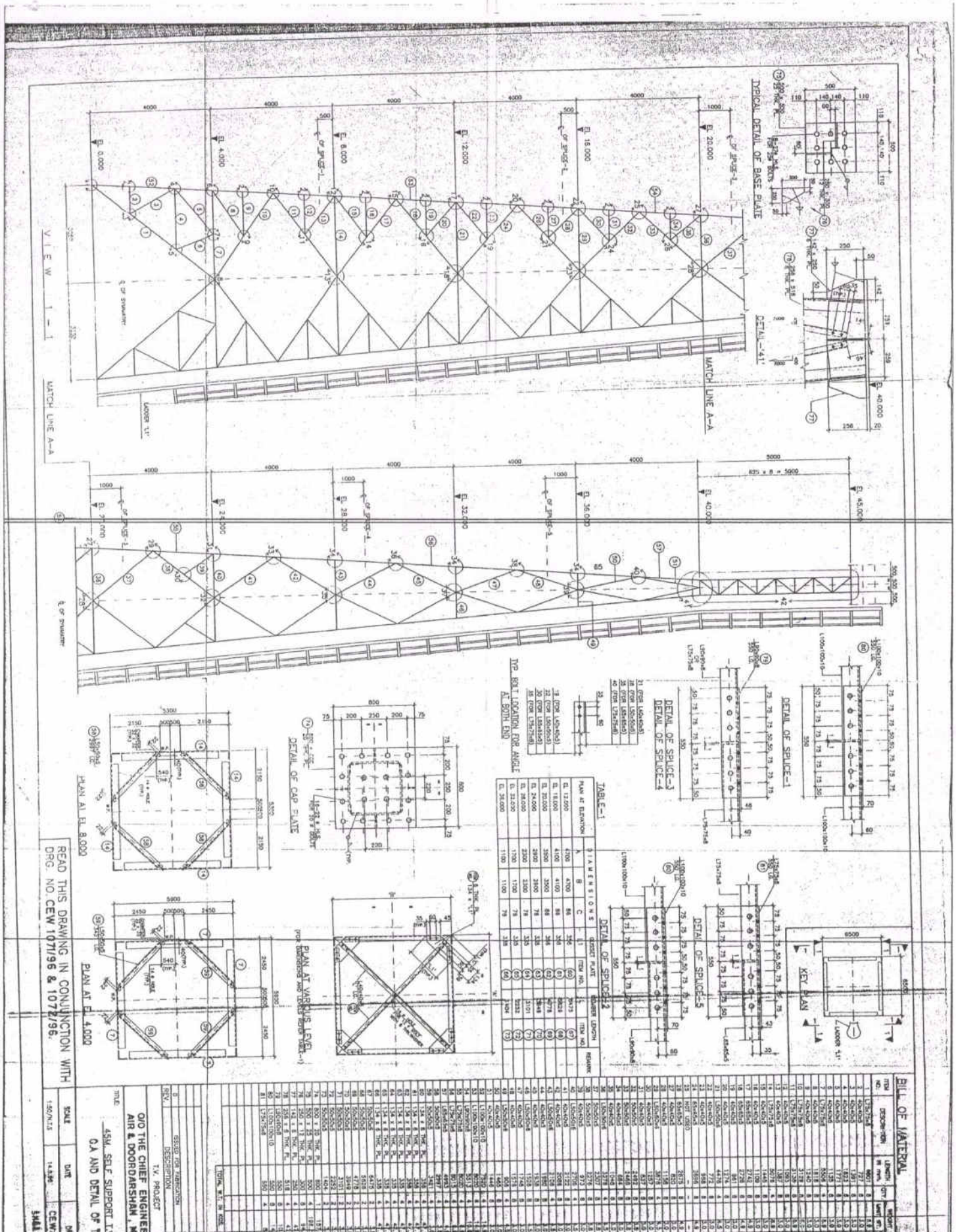
27/10/26

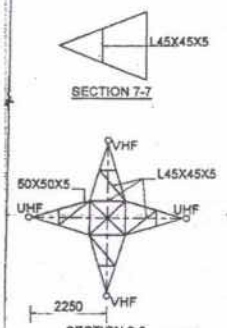
V. Dinesh kumar
Deputy Director(E)
For ADG(BO) (SZ)

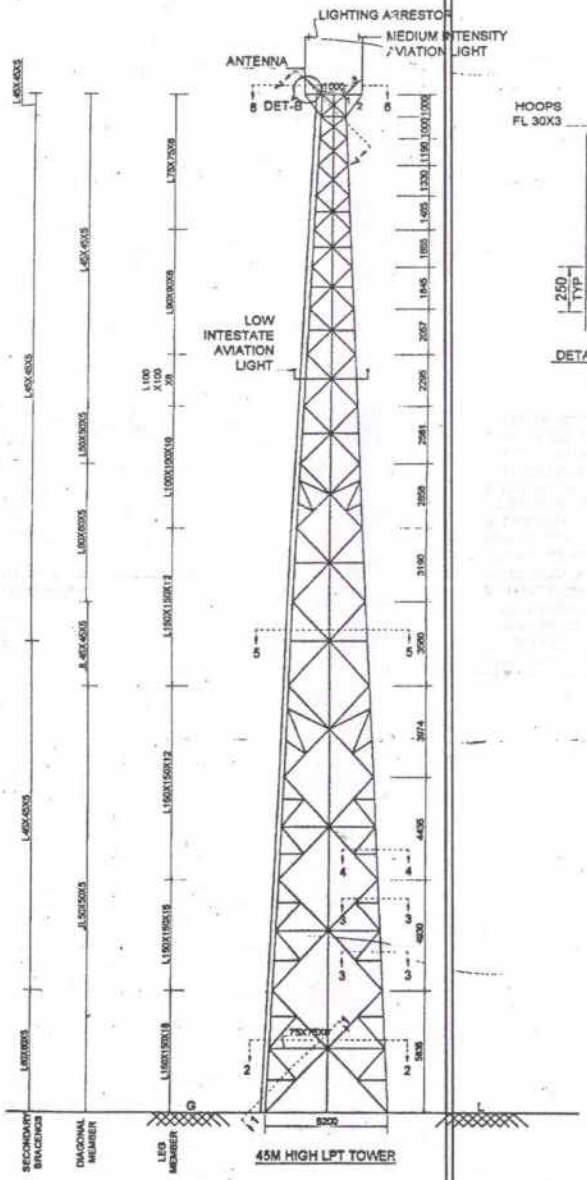
Encl. Tower Drawing, Foundation drawing and Soil test report

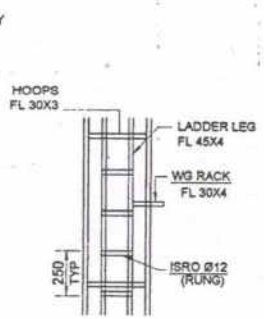
45mtr Tower Drawing.

(1)

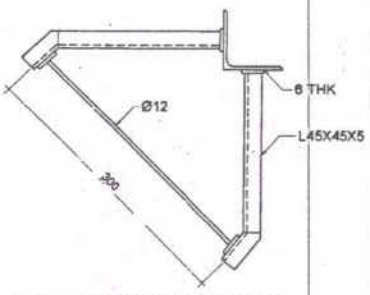








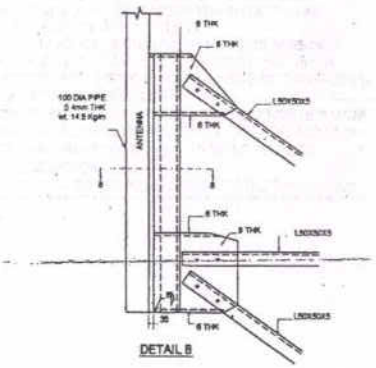
DETAIL OF LADDER



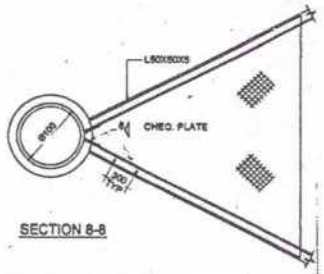
DETAIL LADER CONNECTION WITH LEG



PLAN OF LADDER



DETAIL B



SECTION 8-8

NOTES:
1. ALL DIMENSIONS ARE IN MM.
2. ALL CONNECTIONS SHOULD BE DEVELOPED WITH 50 % OF THE CAPACITY OF THE MEMBER EXCEPT SPLICES WHICH WILL BE 100% CAPACITY .
3. ALL BOLTS/NUTS SHALL BE 16 DIA PROPERTY CL. 5.6 /5.0 CONFORMING TO DIMENSIONS AS PER IS: 6639.
4. ALL WELDS SHOULD BE 5 mm UNTIL NOTED OTHER WISE AND ALL CONTACT SURFACES SHOULD BE WELDED.
5. ALL BOLTS SHOULD HAVE ONE SPRING WASHER CONFORMING IS :3036 OR IS:4072 .
6. ALL TOWER MEMBER SHALL BE OF STRUCTURAL STEEL CONFORMING TO IS:2062.Gr A STEEL 5th AND ABOVE SHALL BE PROCURED EXCLUSIVELY FROM MAIN PRODUCER i.e SAIL, TISCO, RINL (VSP). PRIOR PERMISSION SHOULD BE OBTAINED FROM DOORDARSHAN FOR USE OF STEEL FROM OTHER SOURCES THAN SPECIFIED .
7. ALL STEEL MEMBERS SHALL BE HOT-DIP GALVANIZED CONFORMING TO IS: 2629 -1985, FASTENERS AS PER IS:1367 PART XIII AND WASHERS AS PER IS:1573-1986.
8. ALL MEMBERS SHALL BE PAINTED AFTER ERECTION AS PER PAINT SCHEDULES GIVEN BELOW:-
(I) ONE COAT OF LEAD OXIDE CONFORMING TO IS:5666-1970
(II) ONE COAT OF ZINC OXIDE PRIMER CONFORMING : IS:104.
(III) TWO COATS OF SYNTHETIC ENAMEL PAINTS INTERNATIONAL ORANGE & WHITE COLORS IS:2932
9. THE TOWER SHALL BE PAINTED TO HAVE ALTERNATE BANDS OF INTERNATIONAL ORANGE AND WHITE COLORS WITH TOP AND BOTTOM HAND PAINTED IN ORANGE AS PER CIVIL AVIATION REGULATIONS
10. FOR FOUNDATION DETAIL REF FOUNDATION DRAWING 006
11. USE OF THIS DESIGN DRAWING IS FOR THE TOWER SITES HAVING MAX BASIC WIND SPEED OF 47m/SEC (169.2km/h), RISK COEFFICIENT K1=1.07 TERRAIN CATEGORY 2 STRUCTURE CLASS B TOPOGRAPHY FACTOR K3=1.0 OF IS: 875 (III)-1987. FOR OTHER CLASS DESIGN REVIEW IS REQUIRED.

Deptt. of Civil Engg., I.I.T. Roorkee

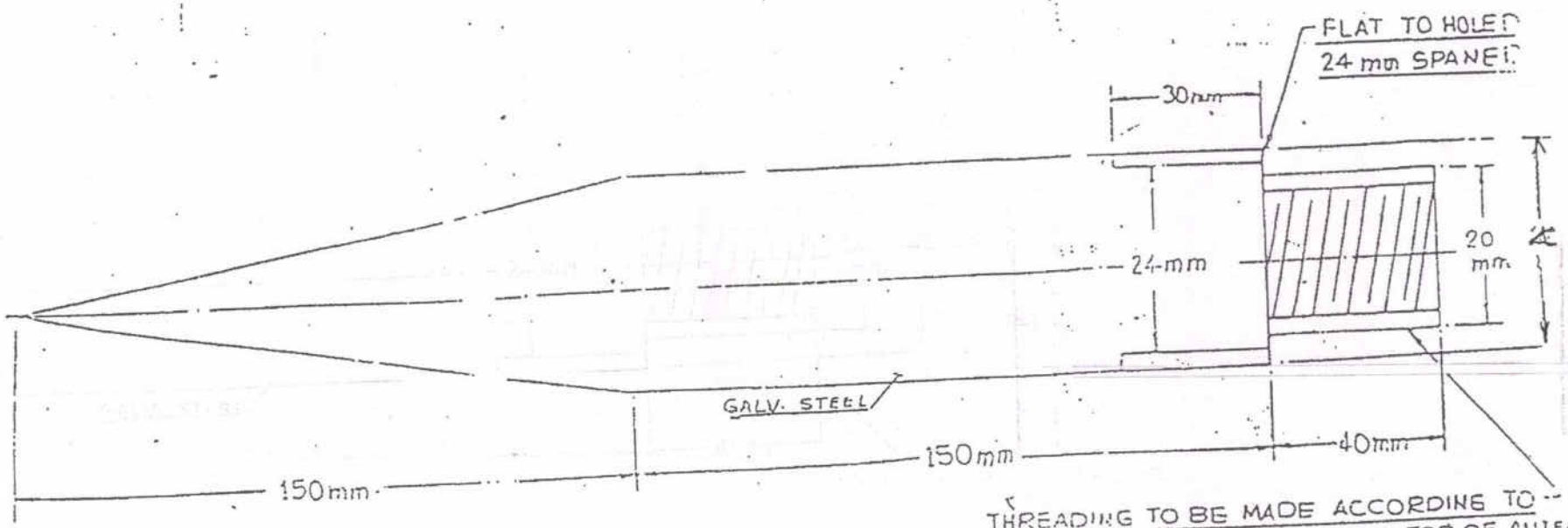
Client .
PRASAR BHARTI (BCI)
Office of Chief Engineer (NZ)
New Delhi

Subject .
45 M LPT DOORDARSHAN TOWER FOR WIND ZONE IV (NON HILLY)

Job .
GENERAL ARRANGEMENT DRAWING

Designed & Checked by
Akhil Upadhayay Krishan Kumar

SCALE:-1:25,1:10,1:20.
Ref. Drg.TVT/45m/IITR/GAD
DATE: 21.05.05 REV: 0

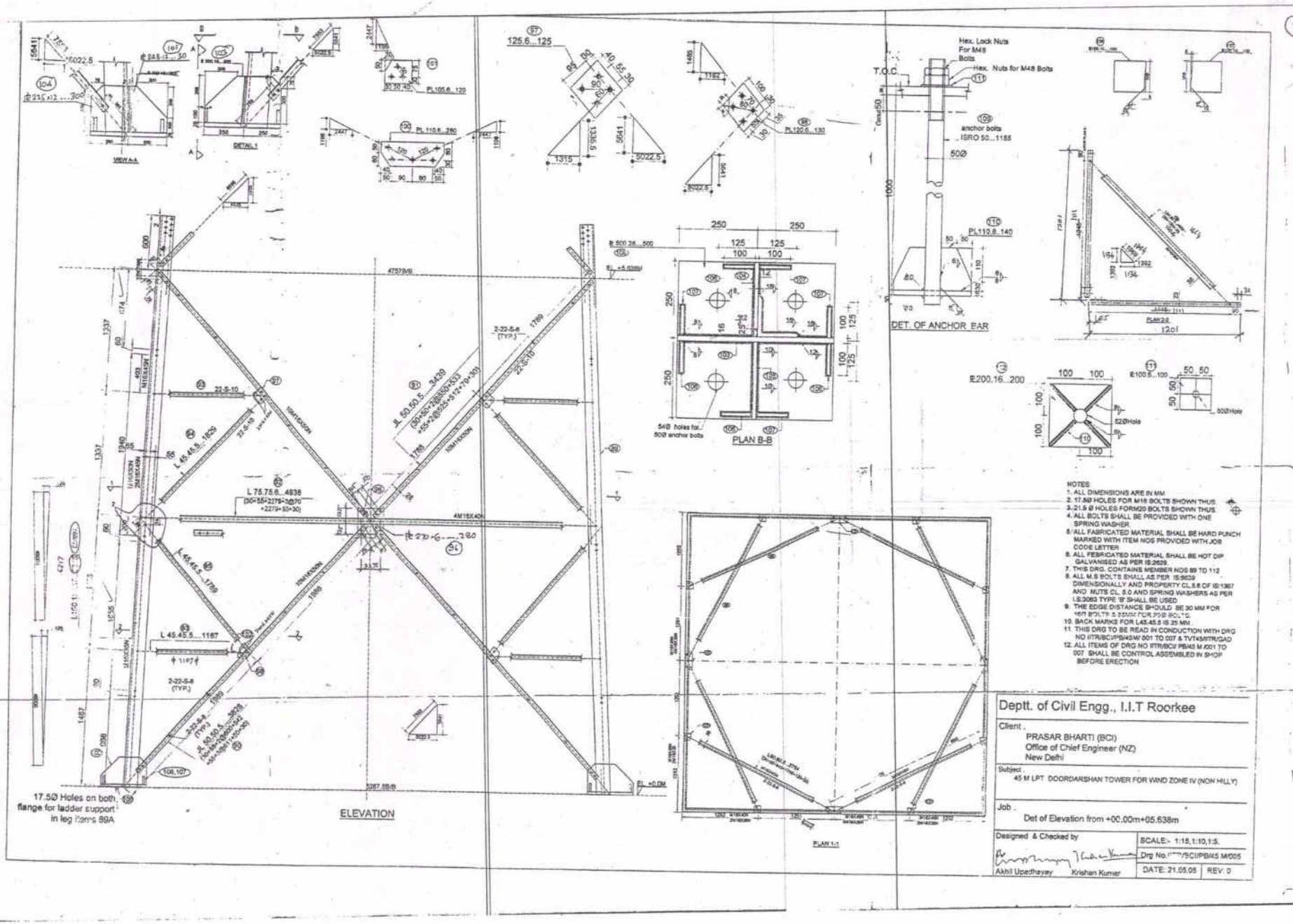


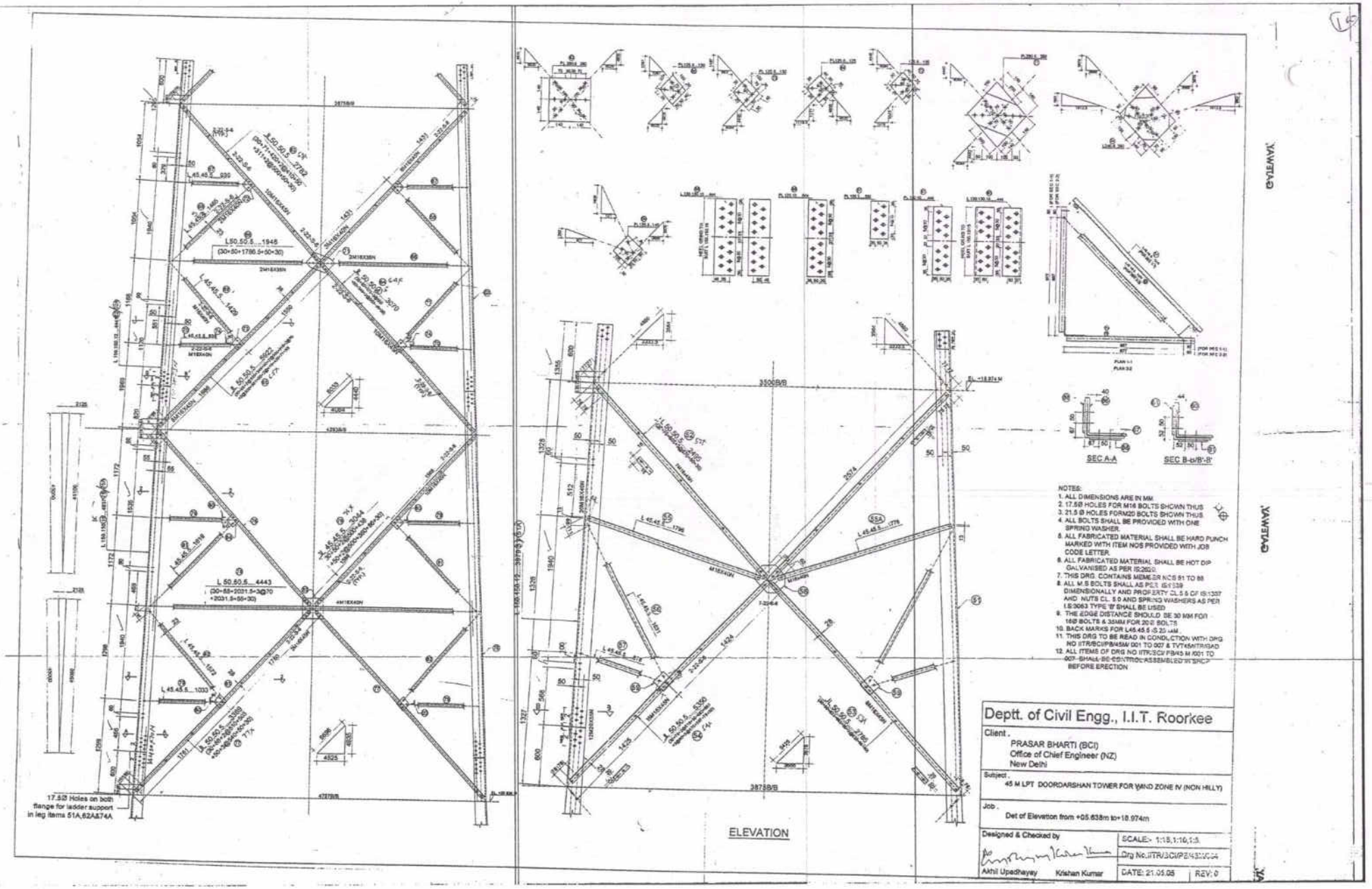
THREADING TO BE MADE ACCORDING TO THE THREADED HOLE ON THE TOP OF ANTEN
THIS SHOULD BE DONE AT SITE ONLY.

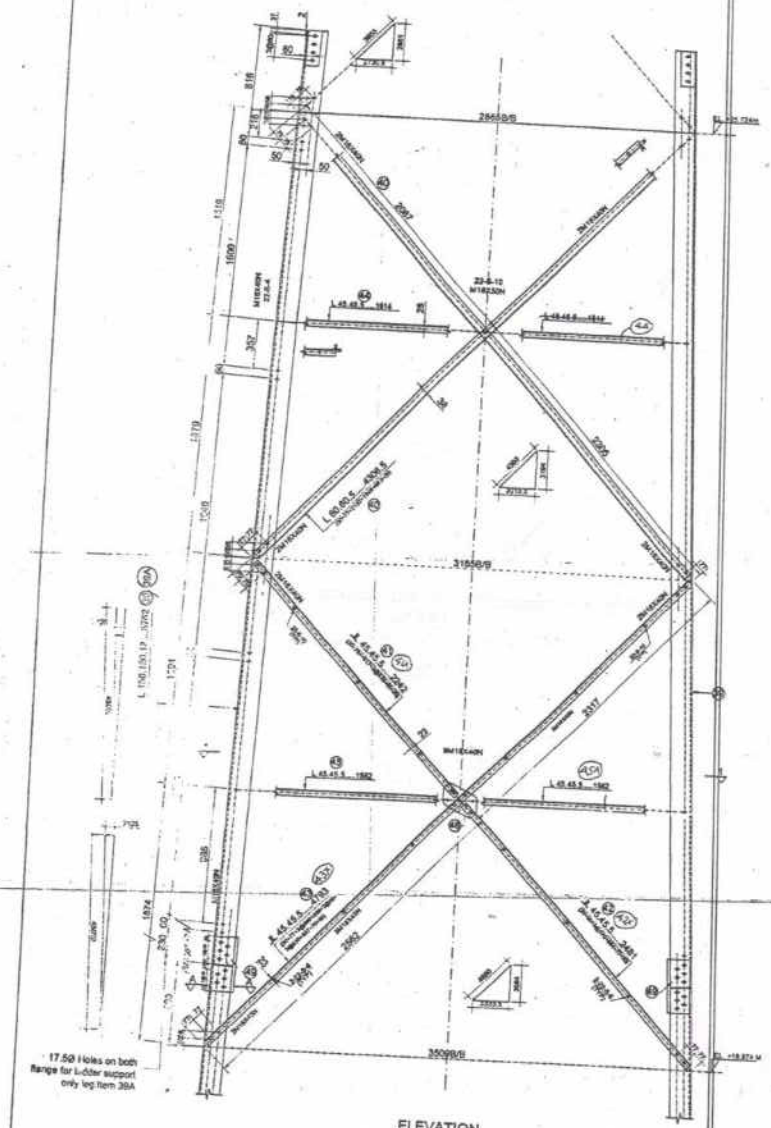
LIGTENING ARRESTOR
FOR
45MLPT TOWER

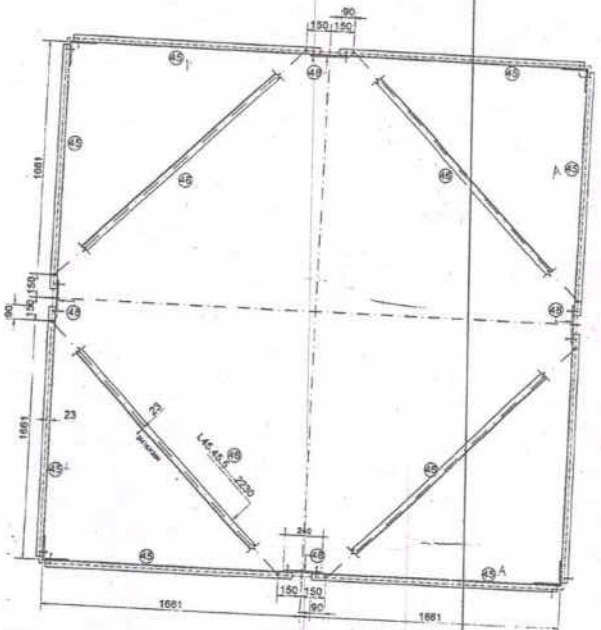
SK-2

104

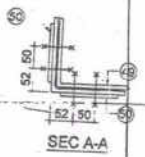

ELEVATION
PLAN B-B
PLAN 1-1
DET. OF ANCHOR EAR
DETAIL 1
VIEW A-A
T.O.C.
Hex. Lock Nuts For M48 Bolts
Hex. Nuts for M48 Bolts
anchor bolts ISRO 50...1155
50Ø
PL110.8 140
PL120.6 130
PL105.6 120
PL 110.6 280
125.6...125
54Ø holes for 50Ø anchor bolts
17.5Ø Holes on both flange for ladder support in leg items 89A
L 45.45.5...1629
L 45.45.5...1167
L 75.75.6...4838
L 50.50.5...3439
L 50.50.5...3628
2-22-S-8 (TYP.)
22-S-10
4M16X40H
10M16X50H
NOTES
1. ALL DIMENSIONS ARE IN MM
2. 17.5Ø HOLES FOR M16 BOLTS SHOWN THUS
3. 21.5 Ø HOLES FORM20 BOLTS SHOWN THUS
4. ALL BOLTS SHALL BE PROVIDED WITH ONE SPRING WASHER
5. ALL FABRICATED MATERIAL SHALL BE HARD PUNCH MARKED WITH ITEM NOS PROVIDED WITH JOB CODE LETTER
6. ALL FEBRICATED MATERIAL SHALL BE HOT DIP GALVANISED AS PER IS:2629.
7. THIS DRG. CONTAINS MEMBER NOS 89 TO 112
8. ALL M.S BOLTS SHALL AS PER IS:9639 DIMENSIONALLY AND PROPERTY CL.5.6 OF IS:1367 AND NUTS CL. 5.0 AND SPRING WASHERS AS PER I.S:3063 TYPE 'B' SHALL BE USED
9. THE EDGE DISTANCE SHOULD BE 30 MM FOR 16Ø BOLTS & 35MM FOR 20Ø BOLTS.
10. BACK MARKS FOR L45.45.5 IS 25 MM.
11. THIS DRG TO BE READ IN CONDUCTION WITH DRG NO ITR/SC/PB/45/M/ 001 TO 007 & TV745/ITR/GAD
12. ALL ITEMS OF DRG NO ITR/SC/ PB/45 M /001 TO 007 SHALL BE CONTROL ASSEMBLED IN SHOP BEFORE ERECTION
Deptt. of Civil Engg., I.I.T Roorkee
Client .
PRASAR BHARTI (BCI)
Office of Chief Engineer (NZ)
New Delhi
Subject .
45 M LPT DOORDARSHAN TOWER FOR WIND ZONE IV (NON HILLY)
Job .
Det of Elevation from +00.00m+05.638m
Designed & Checked by
Akhil Upedhyay
Krishan Kumar
SCALE:- 1:15,1:10,1:5.
Drg No.:ITR/SC/PB/45 M/005
DATE: 21.05.05
REV: 0

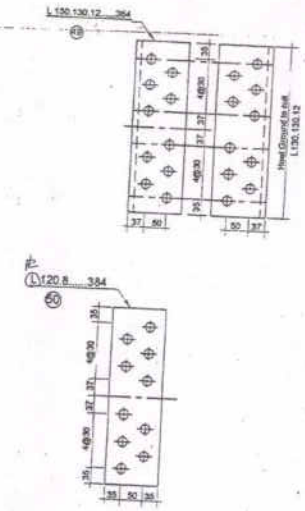

17.5Ø Holes on both flange for ladder support in leg items 51A,62A&74A
ELEVATION
SEC A-A
SEC B-B'/B'-B
NOTES:
1. ALL DIMENSIONS ARE IN MM.
2. 17.5Ø HOLES FOR M16 BOLTS SHOWN THUS
3. 21.5 Ø HOLES FORM20 BOLTS SHOWN THUS
4. ALL BOLTS SHALL BE PROVIDED WITH ONE SPRING WASHER.
5. ALL FABRICATED MATERIAL SHALL BE HARD PUNCH MARKED WITH ITEM NOS PROVIDED WITH JOB CODE LETTER.
6. ALL FABRICATED MATERIAL SHALL BE HOT DIP GALVANISED AS PER IS:2629.
7. THIS DRG. CONTAINS MEMBER NOS 51 TO 88
8. ALL M.S BOLTS SHALL AS PER IS:1239 DIMENSIONALLY AND PROPERTY CL.5.6 OF IS:1367 AND NUTS CL. 5.0 AND SPRING WASHERS AS PER I.S:3063 TYPE 'B' SHALL BE USED
9. THE EDGE DISTANCE SHOULD BE 30 MM FOR 16Ø BOLTS & 35MM FOR 20Ø BOLTS
10. BACK MARKS FOR L45.45.5 @ 20 c/c.
11. THIS DRG TO BE READ IN CONJUCTION WITH DRG NO IITR/SC/PB/45M/ 001 TO 007 & TVT45NTRIGAD
12. ALL ITEMS OF DRG NO IITR/SC/ FB/45 M /001 TO 007 SHALL BE CONTINUOUSLY ASSEMBLED IN SHOP BEFORE ERECTION
Deptt. of Civil Engg., I.I.T. Roorkee
Client . PRASAR BHARTI (BCI) Office of Chief Engineer (NZ) New Delhi
Subject . 45 M LPT DOORDARSHAN TOWER FOR WIND ZONE IV (NON HILLY)
Job . Det of Elevation from +05.638m to+18.974m
Designed & Checked by
Akhil Upadhyay Krishan Kumar
SCALE:- 1:15,1:10,1:5.
Drg No.:IITR/SC/PB/45M/004
DATE: 21.05.08
REV: 0





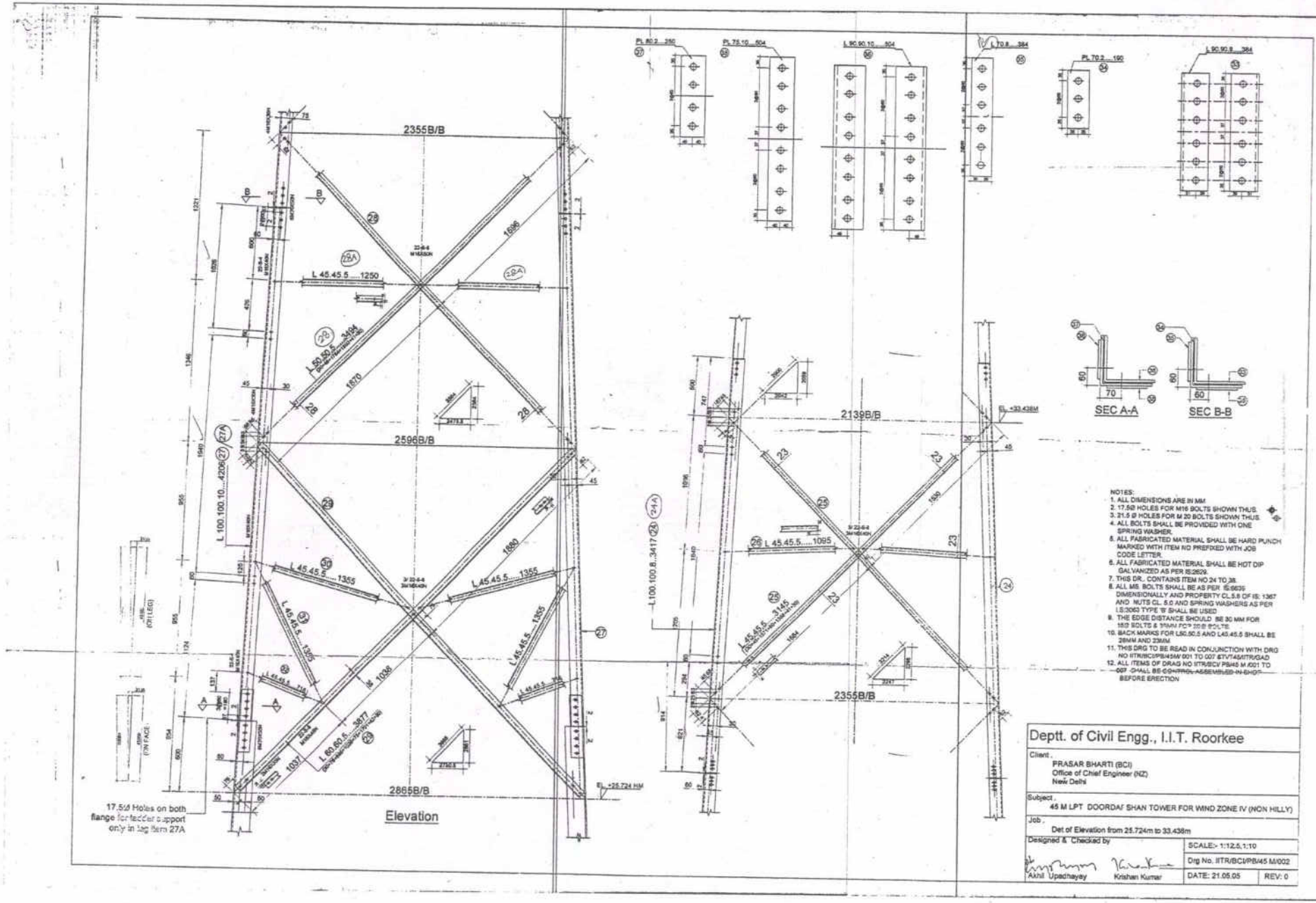






NOTES:
1. ALL DIMENSIONS ARE IN MM
2. 17.5Ø HOLES FOR M16 BOLTS SHOWN THUS.
3. 21.5 Ø HOLES FORM20 BOLTS SHOWN THUS.
4. ALL BOLTS SHALL BE PROVIDED WITH ONE SPRING WASHER.
5. ALL FABRICATED MATERIAL SHALL BE HARD PUNCH MARKED WITH ITEM NOS PROVIDED WITH JOB CODE LETTER.
6. ALL FABRICATED MATERIAL SHALL BE HOT DIP GALVANISED AS PER IS:2629.
7. THIS DRG. CONTAINS MEMBER NOS 39 TO 50
8. ALL M.S BOLTS SHALL AS PER IS:6639 DIMENSIONALLY AND PROPERTY CL.5.6 OF IS:1367 AND NUTS CL. 5.0 AND SPRING WASHERS AS PER I.S:3063 TYPE 'B' SHALL BE USED
9. THE EDGE DISTANCE SHOULD BE 30 MM FOR 16Ø BOLTS & 35MM FOR 21Ø BOLTS.
10. BACK MARKS FOR L45.45.5 IS 25 MM.
11. THIS DRG TO BE READ IN CONJUCTION WITH DRG NO IITR/BC/PS/45M/ 001 TO 007 & TVT45/IITR/GAD 007 SHALL BE CONTROL ASSEMBLED IN SHOP BEFORE ERECTION
12. ALL ITEMS OF DRG NO IITR/BC/V PS/45 M /001 TO
13. ITEM NO 47 DOSE NOT EXIST

Deptt. of Civil Engg., I.I.T Roorkee		
Client. PRASAR BHARTI (BCI) Office of Chief Engineer (NZ) New Delhi		
Subject. 45 M LPT DOORDARSHAN TOWER FOR WIND ZONE IV (NON HILLY)		
Job. Det of Elevation from +18.974m to+25.724m		
Design ed & Checked by	SCALE:- 1:15,1:10,	
Akhil Upadhayay Krishan Kumar	Drg No. IITR/BC/PS/45 M/003	
	DATE: 21.05.05	REV: 0



NOTES:
1. ALL DIMENSIONS ARE IN MM
2. 17.5ø HOLES FOR M16 BOLTS SHOWN THUS.
3. 21.5 ø HOLES FOR M 20 BOLTS SHOWN THUS.
4. ALL BOLTS SHALL BE PROVIDED WITH ONE SPRING WASHER.
5. ALL FABRICATED MATERIAL SHALL BE HARD PUNCH MARKED WITH ITEM NO PREFIXED WITH JOB CODE LETTER.
6. ALL FABRICATED MATERIAL SHALL BE HOT DIP GALVANIZED AS PER IS:2629.
7. THIS DR., CONTAINS ITEM NO 24 TO 38.
8. ALL MS. BOLTS SHALL BE AS PER IS:6639 DIMENSIONALLY AND PROPERTY CL.5.6 OF IS: 1367 AND NUTS CL. 5.0 AND SPRING WASHERS AS PER I.S:3063 TYPE 'B' SHALL BE USED
9. THE EDGE DISTANCE SHOULD BE 30 MM FOR 16ø BOLTS & 35MM FOR 20ø BOLTS.
10. BACK MARKS FOR L50.50.5 AND L45.45.5 SHALL BE 28MM AND 23MM
11. THIS DRG TO BE READ IN CONJUNCTION WITH DRG NO IITR/BCI/PB/45M/001 TO 007 &TVT/45/IITR/GAD
12. ALL ITEMS OF DRAG NO IITR/BCI/ PB/45 M /001 TO 007 SHALL BE CONTROL ASSEMBLED IN SHOP BEFORE ERECTION

Deptt. of Civil Engg., I.I.T. Roorkee

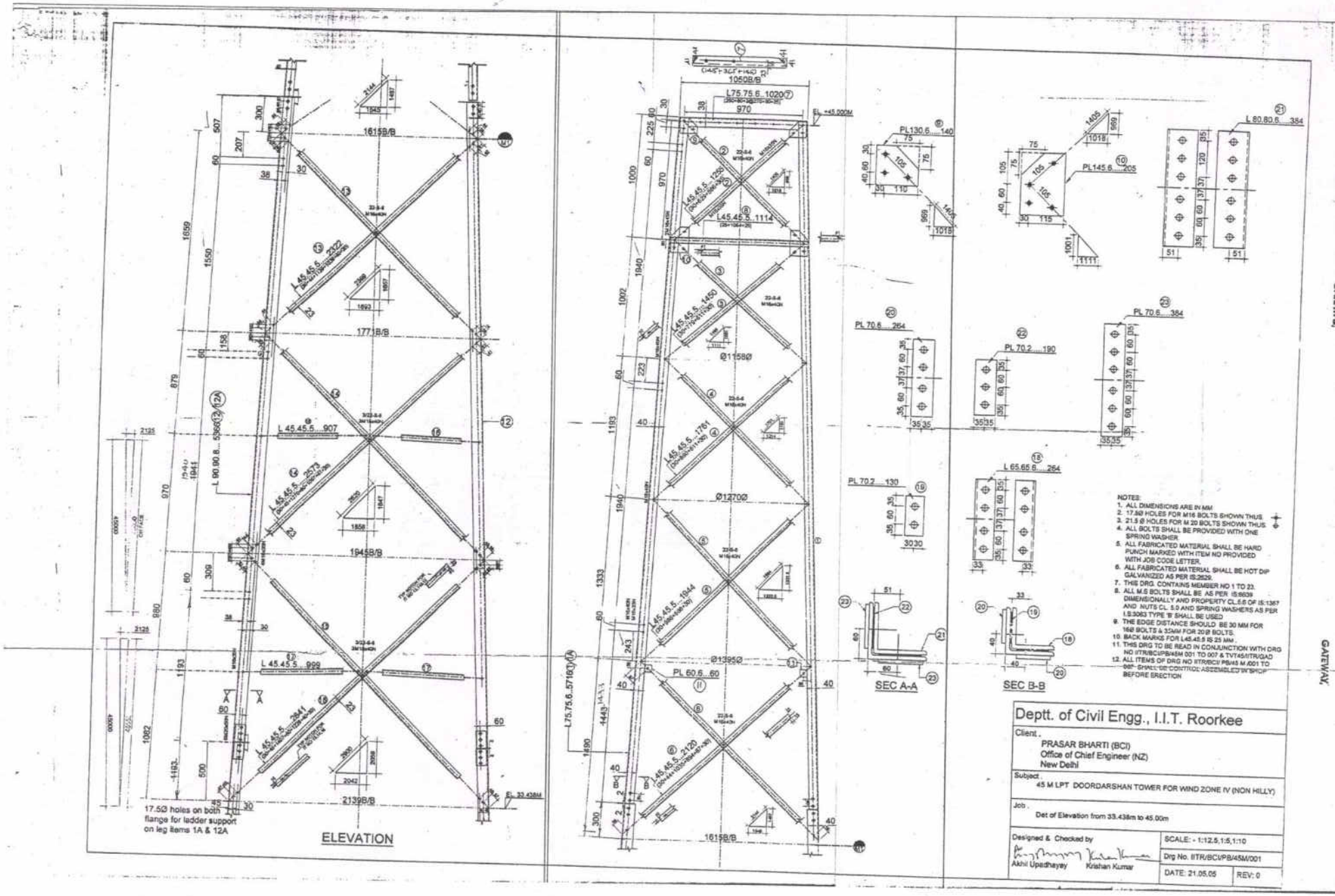
Client .
PRASAR BHARTI (BCI)
Office of Chief Engineer (NZ)
New Delhi

Subject .
45 M LPT DOORDARSHAN TOWER FOR WIND ZONE IV (NON HILLY)

Job .
Det of Elevation from 25.724m to 33.438m

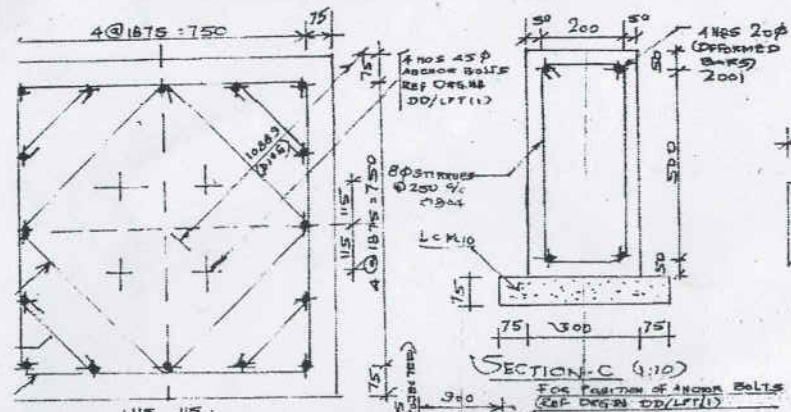
Designed & Checked by
Akhil Upadhayay | Krishan Kumar

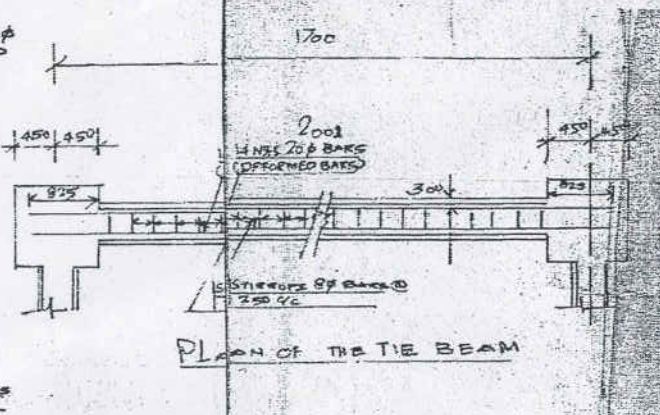
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Drg No. IITR/BCI/PB/45 M/002
DATE: 21.05.05 | REV: 0

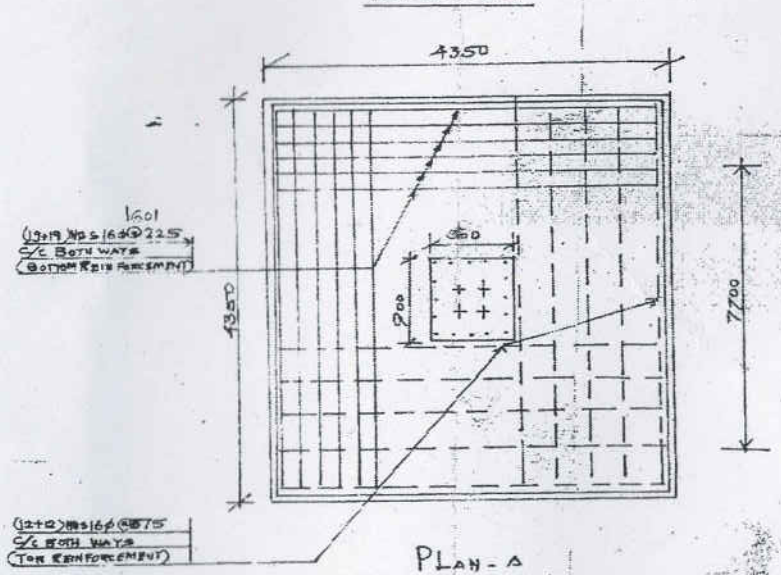

ELEVATION
SEC A-A
SEC B-B
17.5Ø holes on both flange for ladder support on leg items 1A & 12A
NOTES:
1. ALL DIMENSIONS ARE IN MM.
2. 17.5Ø HOLES FOR M16 BOLTS SHOWN THUS
3. 21.5 Ø HOLES FOR M 20 BOLTS SHOWN THUS.
4. ALL BOLTS SHALL BE PROVIDED WITH ONE SPRING WASHER.
5. ALL FABRICATED MATERIAL SHALL BE HARD PUNCH MARKED WITH ITEM NO PROVIDED WITH JOB CODE LETTER.
6. ALL FABRICATED MATERIAL SHALL BE HOT DIP GALVANIZED AS PER IS:2629.
7. THIS DRG. CONTAINS MEMBER NO 1 TO 23.
8. ALL M.S BOLTS SHALL BE AS PER IS:6639 DIMENSIONALLY AND PROPERTY CL.6.6 OF IS:1367 AND NUTS CL. 5.0 AND SPRING WASHERS AS PER I.S:3063 TYPE 'B' SHALL BE USED.
9. THE EDGE DISTANCE SHOULD BE 30 MM FOR 16Ø BOLTS & 33MM FOR 20Ø BOLTS.
10. BACK MARKS FOR L45.45.5 IS 25 MM.
11. THIS DRG TO BE READ IN CONJUNCTION WITH DRG NO IITR/BCI/PB/45M 001 TO 007 & TVT45/ITR/GAD 007.
12. ALL ITEMS OF DRG NO IITR/BCI/ PB/45 M /001 TO 007 SHALL BE CONTROL ASSEMBLED IN SHOP BEFORE ERECTION
Deptt. of Civil Engg., I.I.T. Roorkee
Client .
PRASAR BHARTI (BCI)
Office of Chief Engineer (NZ)
New Delhi
Subject .
45 M LPT DOORDARSHAN TOWER FOR WIND ZONE IV (NON HILLY)
Job .
Det of Elevation from 33.438m to 45.00m
Designed & Checked by
Akhil Upadhayay
Krishan Kumar
SCALE: - 1:12.5,1:5,1:10
Drg No. IITR/BCI/PB/45M/001
DATE: 21.05.05
REV: 0
GATEWAY

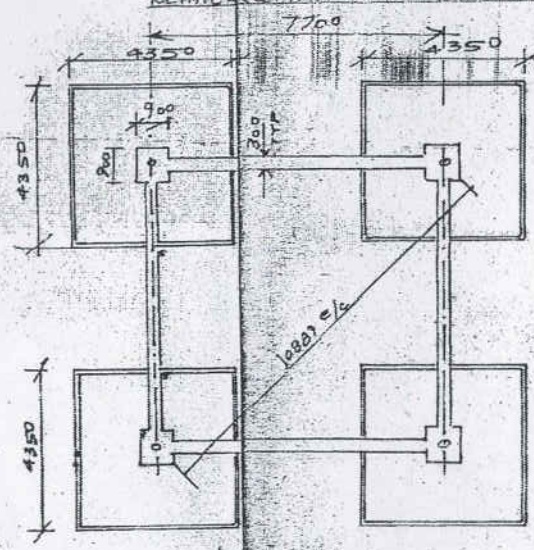
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2156110/2026/AIR Proj.Zonal Office(SZ)









Notes

1. All dimensions are in mm Unless
2. Suitable chairs are to be provided to hold top reinforcement in slab during concreting as directed by the Engineer
3. Where exact length of bars are not available splices shall be done by lapping as per IS:456.
4. Foundation Concrete shall be of M15 throughout
5. Lean Concrete shall be of M15 Gr conforming to IS:
6. Bending of bars shall be according to IS:2502
7. A Clear Cover of 50mm shall be provided for rein
8. If necessary, Suitable Shoring shall be provi Prevent falling off of earth during excavation
9. Form Work for Concrete & Concrete work manship Conform to IS:456.
10. Net allowable bearing capacity at 2.5 m d
11. For other details refer dwg. Nos TVT-5882, TVT 5883 & TVT 5884
12. Foundation is to be modified for lower bearing capacity of soil.

FOUNDATION QUANTITIES PER TOWE

Sl.No	Description	Quantity
1.	Concrete M-10	6.6 m³
2.	Concrete M-15 (in foundation)	39.2 m³
3.	Concrete M-15 (in tie beam)	4.9 m³
4	Grout (1:2) 50mm thk.	3.24 m²
5	Reinforcement (IS:1786 Fe 415)	3.353

DETAILS OF FOUNDATION OF 45M TOWER FOR LPT PROJECTS.

Scale 1:10; 1:40; 1:100

Traced from: TVT-5881.

% Chief Engineer (SZ)
All India Radio & Doordarshan.
Dwg. No. CE(SZ)T/928/195
Traced:
Checked

GEO-TECHNICAL INVESTIGATIONS FOR THE PROPOSED CONSTRUCTION OF FOUNDATION FOR 100FT HIGH AT ALL INDIA RADIO, HIGH POWER TRANSMITTERS IN MAHABUBNAGAR, IN MAHABUBNAGAR DISTRICT IN TELANGANA STATE

June 21st, 2024



Report for

Client :
M/S PRASAR BHARTI (INDIA'S PUBLIC SERVICE BROADCASTER),
OFFICE OF ADDITIONAL DIRECTOR GENERAL (E) (SZ),

AKASHWANI & DOODRDARSHAN,

CHENNAI, 600005
Contractors:

M/s STUP INFRA PVT LTD,

GHAZIABAD, UTTARPRADESH 201002

KAMBHAMPATI CONSULTANTS
(NABL Accredited)
PLOT NO 9, BANK COLONY, GAYATRI NAGAR, SAHEB NAGAR, HYDERABAD
Ph : 9885716987, 7569026753 Email : kambhampaticonsultants@gmail.com

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FOR THE PROPOSED CONSTRUCTION OF 100M TOWER

CLIENT : **M/S PRASAR BHARTI (INDIA'S PUBLIC SERVICE BROADCASTER),**
OFFICE OF ADDITIONAL DIRECTOR GENERAL (E) (SZ),
AKASHWANI & DOODRDARSHAN,
SWAMI SIVANANDA SALAI,
CHENNAI- 600005

CONTRACTORS : **M/S STUP INFRA PVT LTD,**
F-109, PLOT NO: A-12,
ADITYA CORPORATE HUB, RDC,
RAJNAGAR, GHAZIABAD, UTTARPRADESH, 201002

21.06.2024

KAMBHAMPATI CONSULTANTS HYD.

MAHABOOBNAGAR

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CERTIFICATE OF ACCREDITATION

KAMBHAMPATI CONSULTANTS

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

PLOT NO 9,GAYATRI NAGAR, BANK COLONYVANASTHASLIPURAM, HYDERABAD, RANGA REDDY, TELANGANA, INDIA

in the field of

TESTING

Certificate Number: TC-6105

Issue Date: 10/08/2023 **Valid Until:** 09/08/2025

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : KAMBHAMPATI CONSULTANTS

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

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FOR THE PROPOSED CONSTRUCTION OF FOUNDATION FOR 100FT HIGH AT ALL INDIA RADIO, HIGH POWER TRANSMITTERS IN MAHABUBNAGAR, IN MAHABUBNAGAR DISTRICT IN TELANGANA STATE

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Appendix List of IS Codes Tables & Figures

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GEO-TECHNICAL INVESTIGATIONS FOR THE PROPOSED CONSTRUCTION OF FOUNDATION FOR 100FT HIGH AT ALL INDIA RADIO, HIGH POWER TRANSMITTERS IN MAHABUBNAGAR, IN MAHABUBNAGAR DISTRICT IN TELANGANA STATE

1.0 AUTHORITY

1.1 M/s Prasar Bharati (India's Public Service Broadcaster), Office of Additional Director General (E) (SZ), Akashwani & Doordarshan, Swami Sivananda Salai, Chennai-600005 are proposing for Design, Supply, Erection, Testing and Commissioning (DSETC) of Self Supporting Latticed Steel 100M Tower including provisions for mountings and installation of VHF FM Antenna etc, for FM Station Situated at All India Radio, High Power Transmitters, Mahabubnagar in Mahabubnagar District in Telangana State.

1.2 M/s Stup Infra Pvt Ltd, F-109, Plot No. A-12, Aditya Corporate HUB, RDC, Rajnagar, Ghaziabad, Uttarpradesh 201002 are the Contractors

1.3 A soil investigation programme has been conducted as per the Telephonic Conversations held with Mr. Naushad Alam on date 12th June 2024.

2.0 PROJECT DETAILS

2.1 The Site

2.1.1 The site for the Proposed structure is located at Mahabubnagar which is about 103 km from Hyderabad.

2.2 Structure

2.2.1 As per the clients information a Self Supporting Lattice Steel 100 M High Tower is proposed to be constructed.

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2.3 Weather Conditions

2.3.1 The weather was Clear and Dry during field investigations, which were carried out on 18th June 2024.

2.4 Seismic Zone

2.4.1 The proposed project site is situated near Hyderabad, which falls under Seismic Zone II as per IS 1893 (Part I) - 2002.

3.0 OBJECT OF INVESTIGATIONS

3.1 For designing the foundation system of the proposed structures, the following data are required:

a) Type of foundation system.

b) Depth below the ground level at which the foundation system is to be laid.

c) Allowable bearing pressure on the foundation at different depths.

3.2 To determine above factors, the following information would be required:

a) The sub soil profile indicating thickness of the various soil strata, to a depth down to the influence zone below the foundations.

b) Engineering properties of the soil strata at various levels.

c) Physical characteristics of the soil strata.

d) Variation of the strength of the strata with depth.

3.3 For evaluating the above parameters, field investigations and laboratory tests on the soil samples collected during the field investigations have been carried out.

3.4 The results from these investigations have been analysed to provide the recommendations for the design of foundations.

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3.5 These recommendations are valid for the investigated locations only.

4.0 SCOPE OF INVESTIGATIONS

4.1 In order to achieve the above objectives, the scope of investigations given by the client includes the following:

a) Drilling Two bore holes of 100 mm dia down to a depth of 10m into Soils/Refusal strata as per IS 1892.

b) Collection of Disturbed and Undisturbed soil samples in the borehole.

c) Conducting standard penetration tests at regular intervals in the borehole.

d) Conducting relevant laboratory tests on soil samples recovered.

e) Preparation and submission of a technical report containing the details of the tests carried out, their analysis and recommendations regarding the foundation system to be adopted.

5.0 FIELD INVESTIGATIONS

5.1 Preliminary Details

2.4.1 Field investigations were carried out on 18th June 2024.

5.2 Boreholes

5.2.1 The Boreholes were drilled at the specified locations shown by the client

5.2.2 The termination depths of the boreholes are given in the following table.

Borehole No.	Termination Depth from Existing GL (m)
1	10.0
2	10.0

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5.2.3 No water table is encountered in all the boreholes.

5.2.4 The following operations were undertaken in the boreholes.

i. Conducting standard penetration tests.

ii. Collecting undisturbed samples.

5.2.5 Disturbed soil samples recovered from the split spoon sampler were packed in polythene bags and retained for identification purposes.

5.2.6 Undisturbed soil samples were recovered by thin walled shell-by tubes conforming to IS 2132. These tubes had an area ratio of less than 10%.

5.2.7 The diameter of soil samples were 50 mm and its length was 45 cm. However in the refusal strata samples of smaller lengths were collected as further penetration was not practical.

5.2.8 The ends of sample tubes were sealed by wax to prevent loss/ ingress of moisture.

5.2.9 Standard Penetration Tests were conducted as per IS 2131 - 1981.

6.0 LABORATORY INVESTIGATIONS

6.1 The soil and rock samples brought to the laboratory were tested to evaluate the following properties

a) Type of soil and its gradation

b) Specific gravity

c) Consistency limits

d) Natural density

e) Natural water content

f) Swelling properties

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g) Shear strength properties

6.2 In order to determine the above properties the following tests have been conducted.

a) Sieve analysis on the coarse grained soil fraction

b) Hydrometer analysis on the fine grained soil fraction

c) Specific gravity

d) Atterberg limits

e) Natural Density and Water Content tests

f) Triaxial Shear tests

7.0 RESULTS OF INVESTIGATIONS

7.1. The results of field investigations and laboratory tests conducted on the soil/ rock samples collected from the bore have been presented in the form of soil profile tables.

7.2 The soil profile tables (Table No 1) as well as the compiled profile (Figure 2) gives the details of the strata including their classification and strength properties as ascertained from the tests conducted.

7.3 The soil profile tables indicate the following:

a) Standard Penetration Test Values (observed N- values) at various depths

b) In-situ bulk density and Water content

c) Direct Shear test results

d) Atterberg limits

e) Grain size Analysis

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8.0 ANALYSIS OF RESULTS

8.1 Subsoil Profile

8.1.1 The compiled subsoil profile as determined from the results of the field and laboratory investigations has been presented in Figure 2.

8.1.2 An analysis of the data provided in soil profile tables indicates stratification with the presence of the following strata:

i. Stratum I : Clayey Silty Sand with Gravels

ii. Stratum II : Soft Disintegrated Rock

iii. Stratum III : Hard Granite Rock

Bore Hole No	(Depth in m : from - to)		
	Stratum I	Stratum II	Stratum III
BH 1	0.0 – 1.0	-	1.0 – 10.0
BH 2	0.0 – 1.0	6.5 – 7.0	1.0 – 6.5, 7.0 – 10.0

9.0 DESIGN CRITERIA

9.1 Type of Foundations

9.1.1 As per the clients information a Self Supporting Lattice Steel 100 M High Tower is proposed to be constructed.

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9.1.2 The type of foundation depends upon the founding strata, loading intensity at the foundation level and configuration at loading points.

9.1.3 For the above conditions, Open foundations are recommended for the proposed structures.

9.2 Depth of Foundation

9.2.1 The following criteria have been taken into consideration to arrive at the minimum depth of foundation.

a) Top loose zone

b) Adequate depth of soil above founding level, to ensure mobilization of full safe bearing capacity

c) Adequate depth of soil strata below founding level of requisite strength to mobilize the safe bearing capacity and at the same time restrict the total and differential settlements within the allowable limits.

9.2.2 The actual depth of foundation shall be decided by the design engineer.

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10 RECOMMENDATIONS

a) Type of Foundations : RAFT

b) Type of Footing : Combined

c) Allowable bearing pressure: Allowable bearing pressure as given in the following table may be adopted

Foundation		Strata	Location	Allowable Settlement (mm)	Allowable Bearing Pressure (tons/m²)
Depth	Width				
1.50 M	5.00 m	Hard Granite Rock	BH 1, 2	Nil	36.0
1.50 M	5.50 m	Hard Granite Rock	BH 1,2	Nil	37.5
1.50 M	6.00 m	Hard Granite Rock	BH 1,2	Nil	38.0
1.50 M	6.50 m	Hard Granite Rock	BH 1,2	Nil	39.0
1.50 M	7.00 m	Hard Granite Rock	BH 1,2	Nil	39.5
2.00 M	5.00 m	Hard Granite Rock	BH 1, 2	Nil	40.0
2.00 M	5.50 m	Hard Granite Rock	BH 1,2	Nil	41.0
2.00 M	6.00 m	Hard Granite Rock	BH 1,2	Nil	42.5
2.00 M	6.50 m	Hard Granite Rock	BH 1,2	Nil	44.0
2.00 M	7.00 m	Hard Granite Rock	BH 1,2	Nil	45.0

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11.0 PRECAUTIONS

11.1 Entire report should be studied before implementing the recommendations.

11.2 Loose pockets of weathered / fissured & fractured rock if encountered shall be removed and backfilled with concrete. A leveling course of concrete shall be laid and construction of foundations can be taken up subsequently.

12.0 LIMITATIONS

12.1 The soil investigations have been carried out at locations in the site chosen by the clients so as to represent the entire site. The recommendations provided in this report are hence valid only for these test locations. However, if there is any change in sub soil conditions and properties at places between or beyond chosen test locations, KAMBHAMPATI CONSULTANTS may be contacted for further advice.

12.2 With passage of time, the recommendations may vary due to manmade and natural environmental changes.

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13.0 REFERENCES

13.1 A list of IS codes referred for providing the recommendations and that which might be required to implement the same has been given in Appendix 3.

for KAMBHAMPATI CONSULTANTS

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M.Tech (IIT Madras), M.I.S.T.E
Chief Consultant

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TABLE-1

SUMMARY OF SOIL PROPERTIES

Property /Bore Hole No.	Soil	Depth (m)	Specific Gravity	Water Content (%)	Natural Density (g/cc)	Grain Size Distribution (%)			Atterberg Limits (%)			Shear Parameters	
						Gravel > 4.75mm	Sand 4.75 – 0.075mm	Silt + Clay < 0.075mm	Liquid Limit	Plastic Limit	Plasticity Index	Cohesion kg/sq cm	Φ degrees
BH 1	SC	1.0	2.62	1.3	1.63	15	33	52	30.5	22.5	8	0.32	28
BH 1	HDR	2.0	2.82	1.9	1.97	-	-	-	-	NP	NP	0	35
BH 1	HDR	3.5	2.83	2.7	2.00	-	-	-	-	NP	NP	0	35
BH 1	HDR	5.0	2.85	3.6	2.02	-	-	-	-	NP	NP	0	36
BH 1	HDR	6.5	2.86	4.3	2.05	-	-	-	-	NP	NP	0	36
BH 1	HDR	8.0	2.87	5.7	2.07	-	-	-	-	NP	NP	0	36
BH 1	HDR	9.5	2.88	6.4	2.09	-	-	-	-	NP	NP	0	36

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TABLE-1A

SUMMARY OF SOIL PROPERTIES

Property /Bore Hole No.	Soil	Depth (m)	Specific Gravity	Water Content (%)	Natural Density (g/cc)	Grain Size Distribution (%)			Atterberg Limits (%)			Shear Parameters	
						Gravel > 4.75mm	Sand 4.75 – 0.075mm	Silt + Clay < 0.075mm	Liquid Limit	Plastic Limit	Plasticity Index	Cohesion kg/sq cm	Φ degrees
BH 2	CL	1.0	2.61	1.3	1.61	8	32	60	33.5	23.5	10	0.35	27
BH 2	HDR	2.0	2.82	1.8	1.99	-	-	-	-	NP	NP	0	35
BH 2	HDR	3.5	2.85	2.8	2.01	-	-	-	-	NP	NP	0	35
BH 2	HDR	5.0	2.86	3.7	2.03	-	-	-	-	NP	NP	0	35
BH 2	SDR	6.5	2.87	4.6	2.00	-	-	-	-	NP	NP	0	34
BH 2	HDR	8.0	2.88	5.3	2.07	-	-	-	-	NP	NP	0	36
BH 2	HDR	9.5	2.89	6.4	2.09	-	-	-	-	NP	NP	0	36

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APPENDIX – 1

CALCULATIONS FOR ALLOWABLE BEARING PRESSURE

Shear Failure Criterion (Ref. IS: 6403)

Soil Properties as in the Borehole 1 & 2

Depth of foundations	D	=	150 cm
Width of foundation	B	=	600 cm
Length of foundation	L	=	600 cm
Angle of shearing resistance	φ	=	35°
Cohesion	C	=	0.0 kg/cm^2
Natural density	γ	=	1.97 g/cm^3
Submerged density	γ_b	=	0.97 g/cm^3

Bearing Capacity Factors $N_c = 46.12$ $N_q = 33.30$ $N_\gamma = 48.03$, $N_\phi = 3.69$

Shape Factors $S_c = 1.30$, $S_q = 1.20$, $S_\gamma = 0.80$

Depth factors $d_c = 1.10$, $d_q = 1.05$, $d_\gamma = 1.05$

Inclination factors $i_c = i_q = i_\gamma = 1.0$

Water table factor $W' = 0.5$

Safe bearing capacity (under submerged conditions)

$$q_s = 1/3\ [2/3C\ N_c\ s_c d_c i_c + \gamma_b\ D_f\ (N_q - 1) S_q d_q i_q + 0.5\ \gamma_b\ B\ N\gamma\ S\gamma\ d\gamma\ i\gamma\ W']$$

$$q_s = 3.92\ kg/cm^2 = 39.2\ t/m^2$$

Settlement Criterion

Bearing Pressure for 25 mm settlement

Where		N	=	N - value	=	60
W'	=	water table correction factor			=	0.5
R_d	=	depth factor = [1+0.33D/B]$\leq$ 1.33			=	1.08
D	=	depth of foundation			=	1.50 m
B	=	Width of Foundation			=	6.00 m

Substituting the values in the above equation we get:

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$q_n = 12.2\ (N)\ [(B + 0.3)/B]^2\ W'\ R_d$

$q_n = 435.8\ kN/m^2 = 43.6\ t/m^2$

Allowable Bearing Pressure

The lower value of the allowable bearing pressure shall be adopted. Therefore, adopt an allowable bearing pressure of:

q_a = 3.9 kg/cm² i.e. 39.0 tons/m²

Note: q_a is a NET VALUE, Weight of backfill etc. need not be added to the loading except in case of filling above original Ground Level.

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APPENDIX – 2

CALCULATIONS FOR ALLOWABLE BEARING PRESSURE

Shear Failure Criterion (Ref. IS: 6403)

Soil Properties as in the Borehole 1 & 2

Depth of foundations	D	=	200 cm
Width of foundation	B	=	600 cm
Length of foundation	L	=	600 cm
Angle of shearing resistance	φ	=	35°
Cohesion	C	=	0.0 kg/cm^2
Natural density	γ	=	1.97 g/cm^3
Submerged density	γ_b	=	0.97 g/cm^3

Bearing Capacity Factors $N_c = 42.15$ $N_q = 30.36$ $N_\gamma = 44.57$, $N_\phi = 3.69$

Shape Factors $S_c = 1.30$, $S_q = 1.20$, $S_\gamma = 0.80$

Depth factors $d_c = 1.13$, $d_q = 1.06$, $d_\gamma = 1.06$

Inclination factors $i_c = i_q = i_\gamma = 1.0$

Water table factor $W' = 0.5$

Safe bearing capacity (under submerged conditions)

$$q_s = 1/3\ [2/3C\ N_c\ s_c d_c i_c + \gamma_b\ D_f\ (N_q - 1) S_q d_q i_q + 0.5\ \gamma_b\ B\ N\gamma\ S\gamma\ d\gamma\ i\gamma\ W']$$

$$q_s = 4.26 \text{ kg/cm}^2 = 42.6 \text{ t/m}^2$$

Settlement Criterion

Bearing Pressure for 25 mm settlement

Where		N	=	N - value	=	62
W'	=	water table correction factor			=	0.5
R_d	=	depth factor = [1+0.33D/B]$\leq$ 1.33			=	1.11
D	=	depth of foundation			=	2.00 m
B	=	Width of Foundation			=	6.00 m

Substituting the values in the above equation we get:

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$q_n = 12.2\ (N)\ [(B + 0.3)/B]^2\ W'\ R_d$

$q_n = 462.8\ kN/m^2 = 46.3\ t/m^2$

Allowable Bearing Pressure

The lower value of the allowable bearing pressure shall be adopted. Therefore, adopt an allowable bearing pressure of:

q_a = 4.25 kg/cm² i.e. 42.5 tons/m²

Note: q_a is a NET VALUE, Weight of backfill etc. need not be added to the loading except in case of filling above original Ground Level.

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APPENDIX – 3

CALCULATIONS FOR ALLOWABLE BEARING PRESSURE

Shear Failure Criterion (Ref. IS: 6403)

Soil Properties as in the Borehole 1&2

Depth of foundations	D	=	200 cm
Width of foundation	B	=	700 cm
Length of foundation	L	=	700 cm
Angle of shearing resistance	φ	=	35°
Cohesion	C	=	0.0 kg/cm^2
Natural density	γ	=	1.97 g/cm^3
Submerged density	γ_b	=	0.97 g/cm^3

Bearing Capacity Factors $N_c = 42.15$ $N_q = 30.36$ $N_\gamma = 44.57$, $N_\phi = 3.69$

Shape Factors $S_c = 1.30$, $S_q = 1.20$, $S_\gamma = 0.80$

Depth factors $d_c = 1.11$, $d_q = 1.05$, $d_\gamma = 1.05$

Inclination factors $i_c = i_q = i_\gamma = 1.0$

Water table factor $W' = 0.5$

Safe bearing capacity (under submerged conditions)

$$q_s = 1/3\ [2/3C\ N_c\ s_c d_c i_c + \gamma_b\ D_f\ (N_q - 1) S_q d_q i_q + 0.5\ \gamma_b\ B\ N\gamma\ S\gamma\ d\gamma\ i\gamma\ W']$$

$$q_s = 4.53 \text{ kg/cm}^2 = 45.3 \text{ t/m}^2$$

Settlement Criterion

Bearing Pressure for 25 mm settlement

Where		N	=	N - value	=	68
W'	=	water table correction factor			=	0.5
R_d	=	depth factor = [1+0.33D/B]≤ 1.33			=	1.09
D	=	depth of foundation			=	2.00 m
B	=	Width of Foundation			=	7.00 m

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Substituting the values in the above equation we get:

$q_n = 12.2\ (N)\ [(B + 0.3)/B]^2\ W'\ R_d$

$q_n = 491.7\ kN/m^2 = 49.2\ t/m^2$

Allowable Bearing Pressure

The lower value of the allowable bearing pressure shall be adopted. Therefore, adopt an allowable bearing pressure of:

q_a = 4.5 kg/cm² i.e. 45.0 tons/m²

Note: q_a is a NET VALUE, Weight of backfill etc. need not be added to the loading except in case of filling above original Ground Level.

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APPENDIX - 4

LIST OF IS CODES

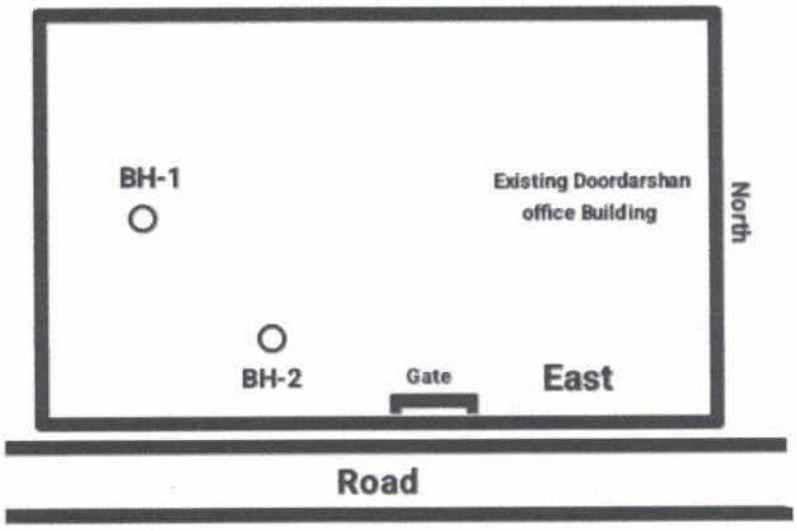
LABORATORY TESTS

1.	IS 2720 (Part 1) - 1983	:	Preparation of soil samples
2.	IS 2720 (Part 2) - 1973	:	Determination of water content
3.	IS 2720 (Part 4) - 1985	:	Grain Size Analysis
4.	IS 2720 (Part 5) - 1985	:	Atterberg Limits
5.	IS 2720 (Part 11) - 1973	:	Determination of shear Strength parameters using triaxial shear apparatus.

FIELD INVESTIGATIONS

1.	IS 1498 :	1970	:	Classification and Identification of soils for general engineering purposes.
2.	IS 1892 :	1979	:	Code of practice for sub surface investigations for foundations.
3.	IS 2131 :	1981	:	Method of standard penetration test for soils.
4.	IS 2132 :	1986	:	Code of practice for thin walled tube sampling of soil.

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LEGEND :

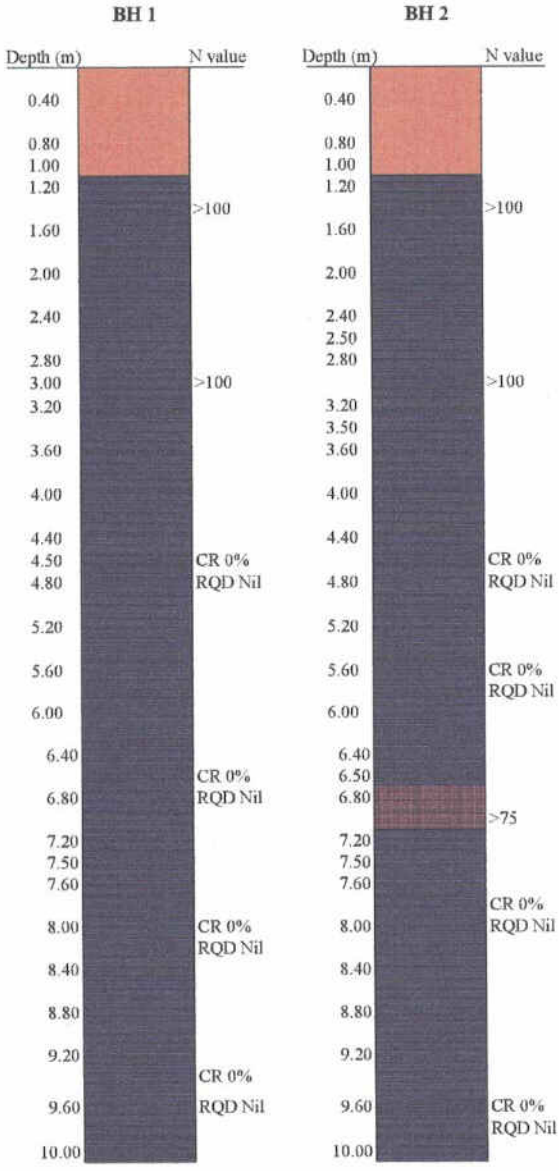
BH ○ : Boreholes

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FIGURE 2

COMBINED SOIL PROFILE



LEGEND

	Clayey Silty Sand with Gravels
	Soft Disintegrated Rock
	Hard Granite Rock
>100	Observed N Value Seventy Blows for 2cm Penetration

FIGURE-3

FIELD BORE LOG CHART AND DATA SHEET - PROFORMA SHEET NO. (1)

BORE HOLE LOCATION: BH 1

Depth below G.L. (m)	Strata thickness (m)	Visual Description of strata by field person	Symbolic rep.	Nature of sampling	Depth of sample below G.L.	SPT Details					Core Recovery Data	% Core recovery	RQD Value (m)	RQD, %	Rate of drill / 30cm/min	Colour of drilling water	Remarks
						Depth (m)	No.of Blows 0 - 15 cm	No.of Blows 15 - 30 cm	No.of Blows 30 - 45 cm	Corrected N Value	Total length of cores (m)						
0.00	1.00	Clayey Silty Sand with Gravels/ Pebbles	! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !	DS	1.0	1.0									12	Red	
1.00	2.00	Hard Granite Rock	% % % % % % % % % % % % % % % %	SPT	1.5	1.5	70/4cm	-	-	Refusal		0%		Nil	63	White/ Grey	
3.00	2.00	Hard Granite Rock	% % % % % % % % % % % % % % % %	SPT	3.0	3.0	72/2cm	-	-	Refusal		0%		Nil	Avg 64	White/ Grey	
5.00	2.00	Hard Granite Rock	% % % % % % % % % % % % % % % %	DS	5.0	5.0						0%		Nil	66	White/ Grey	
7.00	1.50	Hard Granite Rock	% % % % % % % % % % % % % % % %	DS	7.0	7.0						0%		Nil	67	White/ Grey	
8.5	1.50	Hard Granite Rock	% % % % % % % % % % % % % % % %	DS	9.0	9.0						0%		Nil	68	White/ Grey	
10.00																	

FIGURE-3

FIELD BORE LOG CHART AND DATA SHEET - PROFORMA SHEET NO. (2)

BORE HOLE LOCATION: BH 2

Depth below G.L. (m)	Strata thickness (m)	Visual Description of strata by field person	Symbolic rep.	Nature of sampling	Depth of sample below G.L.	SPT Details					Core Recovery Data		% Core recovery	RQD Value (m)	RQD, %	Rate of drill / 30cm/min	Colour of drilling water	Remarks
						Depth (m)	No.of Blows 0 - 15 cm	No.of Blows 15 - 30 cm	No.of Blows 30 - 45 cm	Corrected N Value	Total length of cores (m)							
0.00	1.00	Clayey Silty Sand with Gravels	! ! ! ! ! ! ! ! ! ! ! !	DS	1.0	1.0										12	Brown	
1.00	2.00	Hard Granite Rock	% % % % % % % % %	SPT	1.5	1.5	72/3cm	-	-	Refusal			0%		Nil	64	White/ Grey	
3.00	2.00	Hard Granite Rock	% % % % % % % % %	SPT	3.0	3.0	75/1cm	-	-	Refusal			0%		Nil	Avg 65	White/ Grey	
5.00	1.50	Hard Granite Rock	% % % % % % % % %	DS	5.0	5.0							0%		Nil	66	White/ Grey	
6.50	0.50	Soft Disintegrated Rock	X X X X X X X X X	SPT	7.0	7.0	65/6cm	-	-	Refusal			0%		Nil	67	White/ Grey	
7.0	1.50	Hard Granite Rock	% % % % % % % % %	DS	8.0	8.0							0%		Nil	68	White/ Grey	
8.50	1.50	Hard Granite Rock	% % % % % % % % %	DS	9.0	9.0							0%		Nil	Avg 69	White/ Grey	
10.00																		



Fig : Drilling of Borehole 1 in progress



Fig : Drilling of Borehole 2 in progress

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