REPORT ON
GEOTECHNICAL INVESTIGATION WORK AT
NTPC RAMAGUNDAM TPS STAGE- I & II
(3X200MW + 3X500MW) FGD PACKAGE

1. INTRODUCTION

M/s. NTPC has proposed the construction of NTPC Ramagundam TPS Stage –I & II (3 x 200 MW + 3x500MW) FGD package and the job was awarded to **M/s. Bharat Heavy Electricals Limited**. For designing of Foundation Structures coming under this project, it was necessary to conduct a Detailed Geotechnical Investigation Work and **M/s Bharat Heavy Electricals Limited**, in turn awarded the job to **M/s. C. E. Testing Company Pvt. Ltd., Kolkata.**

The scope of the work comprises of sinking 78 nos. Boreholes, 1 no. Trial Pits (TP), 2 nos. Plate Load Tests (PLT), 3 nos. Cyclic Plate Load Tests (CPLT), 6 nos. Dynamic Cone Penetration Tests (DCPT), 5 nos. Cross Hole Tests (CST) and 10 nos. Electrical Resistivity Tests (ERT).

The boreholes of 150 mm diameter were advanced by Shell and Auger method in soil. In rock, rotary core drilling of “NX” size was adopted. The scope also included conducting Standard Penetration Tests, collecting disturbed samples at regular intervals for identification and logging purposes, collecting undisturbed tube samples at suitable intervals or at change of strata whichever is earlier and testing these in the laboratory.

Based on the above, this report presents the Bore Logs, Soil Profile, laboratory and field Test Results. On the basis of field tests and laboratory test results and their analysis thereof, the most suitable type of foundation is suggested.

The subsoil is characterised by a layer of filled up soil at top followed by loose to medium dense, clayey silty sand. Below these, very dense, silty sand / sandy silt layer was found. After that weathered rock layer is struck and that continues upto the terminating depth of all the boreholes. However, stiff and very stiff to hard, silty clay layers have also been observed at few borehole locations.

Considering the nature of the subsoil as revealed from field tests, most suitable type of foundation is recommended. However, this is discussed in details later.

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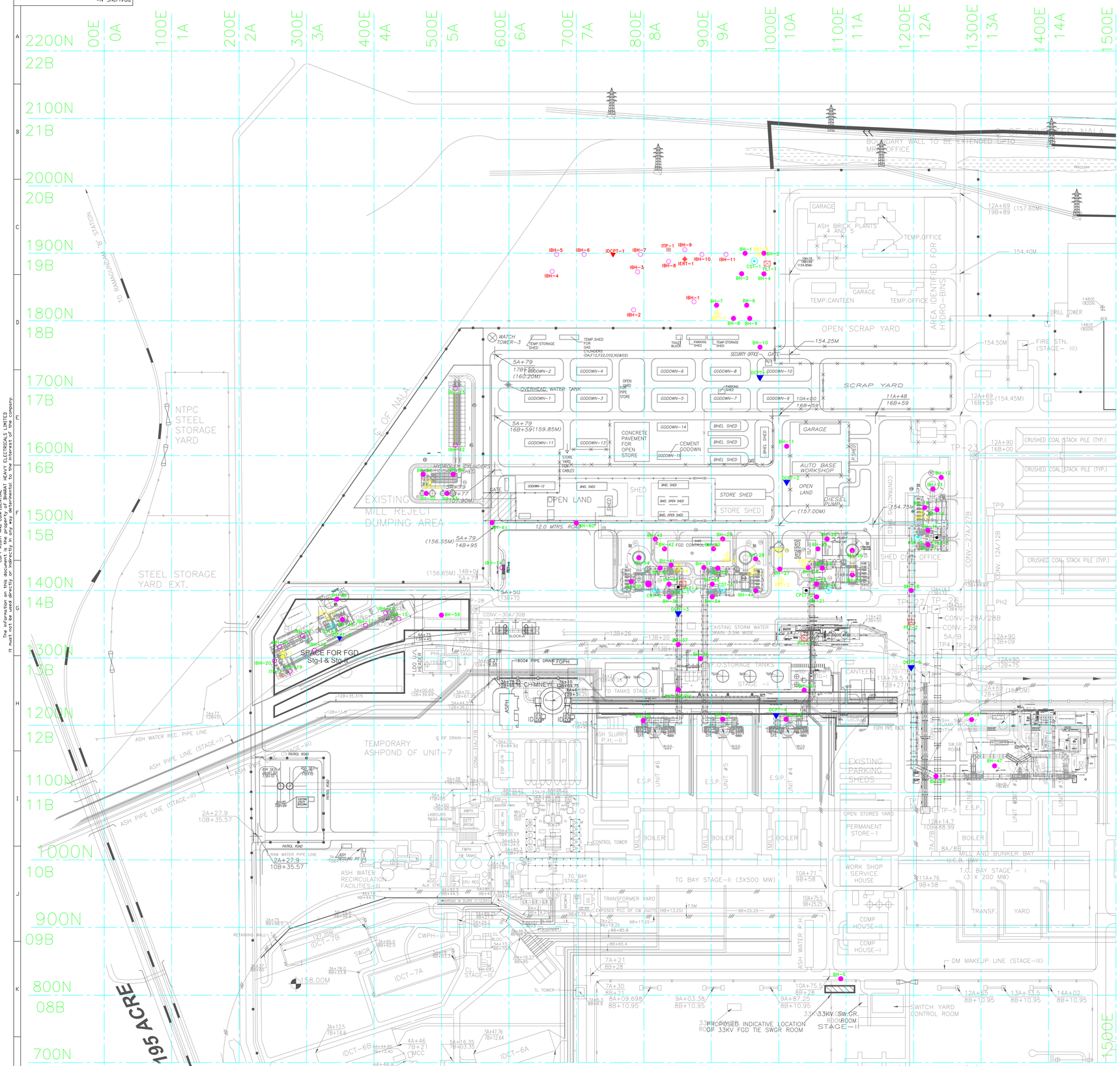
DRAWING No. PE-DG-467-602-C001

CUSTOMER'S DRAWING No.

FIRST ANGLE PROJECTION — ALL DIMENSIONS ARE IN MM



BORE HOLE (BH/IBH)				DEPTH (M)
MARKING	CO-ORDINATES			
BH-1	9.50	A	19.00 B	20
BH-2	9.78	A	19.00 B	20
BH-3	9.45	A	18.70 B	20
BH-4	9.78	A	18.70 B	20
BH-5	10.92	A	8.24 B	15
BH-6	9.53	A	18.23 B	13
BH-7	9.08	A	18.23 B	15
BH-8	9.33	A	18.03 B	15
BH-9	DELETED DUE TO CHANGE IN LAYOUT			
BH-10	9.72	A	17.61 B	15
BH-11	10.12	A	16.14 B	15
BH-12	12.41	A	15.68 B	16
BH-13	12.29	A	15.51 B	16.5
BH-14	12.35	A	15.20 B	17
BH-15	12.17	A	15.23 B	17.5
BH-16	12.21	A	14.89 B	20
BH-17	12.21	A	14.68 B	20
BH-18	11.96	A	14.00 B	15
BH-19	12.86	A	12.09 B	15
BH-20	10.38	A	12.52 B	15
BH-21	10.56	A	13.91 B	20
BH-22	10.56	A	14.10 B	19.5
BH-23	10.65	A	14.33 B	20
BH-24	10.44	A	14.34 B	20
BH-25	10.58	A	14.62 B	25
BH-26	10.72	A	14.76 B	18
BH-27	10.02	A	14.32 B	20
BH-28	9.66	A	14.47 B	20
BH-29	9.17	A	14.76 B	25
BH-30	9.03	A	14.62 B	19.5
BH-31	8.89	A	14.34 B	20
BH-32	9.10	A	14.34 B	20
BH-33	9.01	A	14.10 B	18.5
BH-34	9.01	A	13.91 B	20
BH-35	8.84	A	12.99 B	15
BH-36	7.99	A	12.07 B	15
BH-37	8.51	A	13.20 B	15
BH-38	8.37	A	13.91 B	20
BH-39	8.37	A	14.10 B	20
BH-40	8.24	A	14.33 B	20
BH-41	8.40	A	14.38 B	20
BH-42	8.31	A	14.62 B	20
BH-43	8.17	A	14.76 B	18.5
BH-44	9.66	A	14.00 B	24
BH-45	9.17	A	12.09 B	20
BH-46	10.11	A	12.09 B	12
BH-47	13.2	A	11.40 B	20
BH-48	3.45	A	13.87 B	20
BH-49	3.53	A	13.57 B	20
BH-50	5.17	A	15.72 B	15
BH-51	4.73	A	15.72 B	15
BH-52	4.77	A	15.44 B	15
BH-53	5.08	A	15.44 B	15
BH-54	7.93	A	14.49 B	17
BH-55	7.81	A	14.13 B	16
BH-56	11.09	A	14.59 B	19.5
BH-57	11.09	A	14.23 B	19.5
BH-58	12.33	A	11.25 B	15
BH-59	5.00	A	13.64 B	15
BH-60	7.00	A	15.00 B	14.75
BH-61	5.75	A	15.00 B	15
IBH-1	DELETED DUE TO CHANGE IN LAYOUT			
IBH-2				
IBH-3				
IBH-4				
IBH-5	6.71	A	18.98 B	6
IBH-6	7.12	A	18.98 B	5
IBH-7	DELETED DUE TO CHANGE IN LAYOUT			
IBH-8	8.37	A	18.87 B	25
IBH-9	8.61	A	19.05 B	25
IBH-10	8.86	A	18.98 B	25
IBH-11	9.22	A	18.98 B	25
IBH-12	5.20	A	16.16 B	17
IBH-13	5.20	A	16.99 B	20
IBH-14	5.90	A	14.34 B	17
IBH-15	4.37	A	13.58 B	20
IBH-16	4.17	A	13.67 B	25
IBH-17	3.88	A	13.48 B	18
IBH-18	3.12	A	13.11 B	20
IBH-19	2.76	A	12.80 B	14.5
IBH-20	2.52	A	12.96 B	17.5
IBH-21	2.60	A	13.17 B	15
IBH-22	2.94	A	13.33 B	20
PLT-04/BH	8.51	A	12.53 B	15

PLATE LOAD TEST (PLT)				
MARKING	CO-ORDINATES			DEPTH (M)
PLT-1	DELETED DUE TO CHANGE IN LAYOUT			
PLT-2	11.96	A	13.53 B	3
PLT-3	CANCELLED DUE TO OBSTRUCTION			
PLT-4	8.58	A	14.10 B	3

NOTES:–

1. ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE.
2. BORE HOLE SHALL BE DRILLED UPTO THE DEPTH INDICATED AGAINST EACH BORE HOLE OR 5M CONTINUOUS IN ROCK WITH RQD >25% WHICH–EVER IS EARLIER.
3. BACKFILLING OF BORE HOLES AND PITS SHALL BE AS PER SPECIFICATION AND AS DIRECTED BY THE ENGINEER–IN–CHARGE.
4. STARTING DEPTH OF STANDARD PENETRATION TEST (SPT) SHALL BE 1M BELOW GROUND LEVEL AND THE TEST SHALL BE CONDUCTED AT EVERY 1M INTERVAL ALTERNATE TO COLLECTION OF UNDISTURBED SAMPLE (UDS) UPTO 10M DEPTH BELOW GROUND LEVEL AND AT EVERY 1.5M INTERVAL ALTERNATE TO COLLECTION OF UDS BEYOND 10M DEPTH.
5. STARTING DEPTH OF COLLECTION OF UDS SHALL BE 2M BELOW GROUND LEVEL AND UDS SHALL BE COLLECTED AT 1M INTERVAL ALTERNATE TO CONDUCTING SPT UPTO 10M DEPTH BELOW GROUND LEVEL AND AT EVERY 1.5M INTERVAL ALTERNATE TO CONDUCTING SPT BEYOND 10M DEPTH.
6. PUMP IN TYPE FIELD PERMEABILITY TEST SHALL BE CARRIED OUT IN BH–1, BH–16, BH–28, BH–38 & IBH–6 AT 1M, 3M, 5M, 8M & 12M BELOW LEVEL.
7. ELECTRICAL RESISTIVITY TEST SHALL BE CARRIED OUT BY WENNER'S METHOD.
8. GROUND WATER SAMPLE SHALL BE COLLECTED FROM BH–15, BH–23, BH–43, IBH–2 & IBH–9.
9. CROSS HOLE SHEAR WAVE TEST SHALL BE CARRIED OUT AT 2M, 4M, 6M, 8M, 10M, DEPTH BELOW GROUND LEVEL.
10. GEOTECHNICAL INVESTIGATION SHALL BE CARRIED OUT AS PER SPECIFICATION.
11. DO NOT SCALE THIS DRAWING.

GEOTECHNICAL INVESTIGATION LEGEND:–

1. BOREHOLE (BH/IBH) . . . . . ●
2. DYNAMIC CONE PENETRATION TEST (DCPT/IDCPT) . . . . ▼
3. ELECTRICAL RESISTIVITY TEST (ERT/IERT). . . . . ✳
4. PLATE LOAD TEST (PLT) . . . . . ☒
5. CROSSHOLE SHEAR TEST (CST). . . . . ⊙
6. TRIAL PIT (TP/ITP). . . . . ▨
7. CYCLIC PLATE LOAD TEST (CPLT). . . . . ◘

REFERENCE DRAWINGS:–

1. DRG.NO. 0–FW–000–01375,TITLED"PLANT LAYOUT OF FGD SYSTEM".

ELECTRICAL RESISTIVITY TEST (ERT/IERT)			
MARKING	COORDINATES		
ERT–1	9.62 A	14.33 B	
ERT–2	10.03 A	14.16 B	
ERT–3	10.03 A	14.53 B	
ERT–4	8.52 A	14.37 B	
ERT–5	10.38 A	14.37 B	
ERT–6	12.12 A	15.15 B	
ERT–7	DELETED DUE TO CHANGE IN LAYOUT		
ERT–8			
ERT–9	9.24 A	14.52 B	
ERT–10	3.33 A	13.59 B	
ERT–11	4.82 A	15.61 B	
IERT–1	DELETED DUE TO CHANGE IN LAYOUT		
IERT–2	2.65 A	13.00 B	

DYNAMIC CONE PENETRATION TEST (DCPT/IDCPT)		
MARKING	CO–ORDINATES	
DCPT–1	9.72 A	17.16 B
DCPT–2	10.12 A	15.61 B
DCPT–3	8.51 A	13.66 B
DCPT–4	9.96 A	12.15 B
DCPT–5	11.96 A	12.86 B
IDCPT–1	DELETED DUE TO CHANGE IN LAYOUT	
IDCPT–2	3.49 A	13.30 B

CROSSHOLE SHEAR TEST (CST)		
MARKING	CO–ORDINATES	
CST–1	DELETED DUE TO CHANGE IN LAYOUT	
CST–2	8.17 A	14.00 B
CST–3	9.16 A	14.00 B
CST–4	10.74 A	14.00 B
CST–5	12.06 A	14.79 B
CST–6	13.47 A	3.38 B

CYCLIC PLATE LOAD TEST (CPLT)			
MARKING	CO–ORDINATES		DEPTH (M)
CPLT–1	8.51 A	14.05 B	2
CPLT–2	10.41 A	14.00 B	3
CPLT–3	12.34 A	14.78 B	2

TRIAL PIT (ITP)				DEPTH (M)
MARKING	CO–ORDINATES			
ITP–1	DELETED DUE TO CHANGE IN LAYOUT			
ITP–2	2.63	A	12.74 B	1.5

BHEL–PROJECT ENGINEERING MANAGEMENT(CIVIL)

THIS DRAWING MARKED( )IS RELEASED FOR

☐ COMMENTS/APPROVAL
☐ PLANNING/INFORMATION
☑ CONSTRUCTION

STAMP ALL PREVIOUS REVISION AS SUPERSEDED

	ISSUED BY
NAME	MP
SIGNATURE	–sd–
DATE	28.02.2020

REV	DATE	ALTD	CHD	APPD
03	28.02.20	YK	W/AKV	TMSR

REVISED DUE TO CHANGE IN PLOT PLAN & MARKED THUS. △3

REV	DATE	ALTD	CHD	APPD
02	22.02.20	YK	W/AKV	TMSR

REVISED DUE TO CHANGE IN PLOT PLAN & MARKED THUS. △2

REV	DATE	ALTD	CHD	APPD
01	18.12.19	KAMLJEET	–sd–	TMSR

NTPC COMMENTS INCORPORATED VIDE TRANSMITTAL NO. CC:3100:109:5143 DTD. 17.12.19 AND MARKED THUS. △1

NTPC DRG. NO. 3130–109–PVC–B–007

CONSULTANT

NTPC Limited
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ENGINEERING DIVISION

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REV	DATE	ALTD	CHD	APPD
01	18.12.19	KAMLJEET	W/AKV	TMSR

PROJECT
RAMAGUNDAM SUPER THERMAL POWER PROJECT
(3X200MW+3X500MW)

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA

DEPT CODE		NAME	SIGN	DATE
C	DRN	KAMALJEET	–sd–	09.12.2019
	DESN	VV	–sd–	09.12.2019
	CHD	AKV	–sd–	09.12.2019
	APPD	TMSR	–sd–	09.12.2019

TITLE
GEOTECHNICAL INVESTIGATION LAYOUT FOR FGD AREA

MPL	C	MSE	I	MAX	E	DEPT.	SCALE	DRAWING No.
						SIGN		PE–DG–467–602–C001
						DATE		SHEET 01 OF 01 REV 03

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