


TSGENCO MANUGURU NATURAL DRAFT COOLING TOWER ENQUIRY
TECHNICAL ADDENDUM -1

TECHNICAL SPECIFICATION NO.: PE-TS-411-165-N001 (REV.0)


1) Cl. no.1 of Section C3, Specific Technical requirements (Civil):
GEO-TECHNICAL INVESTIGATION & FOUNDATION SYSTEM:

Pl. find enclosed the Geotechnical investigation and the foundation system for the cooling tower as Annexure-1.

2) Section C 1, Specific technical requirements (Mechanical): The subsequent/running pages of this section consists of “Section D” written inadvertently at the top header. The same shall be considered as Section “C” instead of Section “D”.

	4x270 MW MANUGURU TPS– SPECIFIC TECHNICAL REQUIREMENTS	SPECIFICATION NO.	
		VOLUME – II B	
		SECTION - C	SUB-SECTION -
		REV.0	DATE13.02.2015
		SHEET 1 OF 5	

3.00.00	GEO-TECHNICAL INVESTIGATION & FOUNDATION SYSTEM
3.01.01	BHEL is carrying out detailed geo-technical investigation in the proposed cooling tower site. The sub-strata details encountered at bore holes BH-79, 80, 81, 123, 82, 83, 84, 85, 99, 106, 107, 108, 109, 110, 111, & 122 are enclosed as Annexure-1. The geotechnical data attached shall be solely for the purpose of guidance to the bidder. BHEL/owner does not take any responsibility about the accuracy and applicability of the geo-technical data furnished herewith. The onus of correct assessment/interpretation and understanding of the existing sub-strata conditions is on the bidder. Any variation in the data between the one furnished and to that found during execution of the work at site shall not constitute a valid reason in affecting the terms & conditions of this bid and the bidder shall note that nothing extra will be payable on this account. The bidder shall fully satisfy himself about the nature of sub-strata expected to be encountered including the type of foundation, ground water table and construction methodology to be adopted etc. prior to the submission of the bid.
3.01.02	Detailed geo-technical Investigation report shall be made available to the successful bidder during contract engineering stage. If the bidder desires to carry out additional geo-technical investigation he/she may do so with prior information/permission of BHEL/owner at no extra cost to BHEL/owner. No extension in time schedule shall be permitted on this account. The bidder shall obtain approval on the agency for conducting geo-technical investigation work, field and laboratory testing schedule proposed by the bidder etc from BHEL/owner before undertaking the geo-technical investigation work. However, the net safe bearing capacity (SBC) of shallow foundation to be adopted for the design of foundations during detailed engineering shall be limited to the values mentioned elsewhere in the specification and any value of net SBC higher than the one indicated shall not be accepted. However, bidder shall note that the net safe bearing capacity and foundation depth/ safe load carrying capacity of pile to be adopted for design during detailed engineering stage shall be got approved by BHEL/owner.
3.02.00	Foundation System
3.02.01	General Requirements a. All equipments/structures shall be supported on suitable open foundation along with any special requirements/remedial measures/treatment called for subsoil/foundations as approved by BHEL/owner.

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**4x270 MW MANUGURU TPS– SPECIFIC
TECHNICAL REQUIREMENTS**

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value of net SBC higher than the one indicated shall not be accepted. However, bidder shall note that the net safe bearing capacity and depth of foundation to be adopted for design during detailed engineering stage shall be got approved by BHEL/owner.

Table-1

a) Net Safe Bearing Capacity for cooling Tower 3&4

Unit	Type of Foundation	Founding Level (m)	Net Safe Bearing capacity (T/sq.m)	Finished Ground Level (FGL) (m)	Remarks
1	Isolated/Raft	(+)69.000	15	R.L (+)71.000 M	Minimum founding level shall be RL(+)69.000 M
2	Isolated/Raft	(+)68.000	20		
3	Isolated/Raft	(+)67.000	25		
4	Isolated/Raft	(+)66.000	30		
5	Isolated/Raft	(+)65.000	40		



**4x270 MW MANUGURU TPS– SPECIFIC
TECHNICAL REQUIREMENTS**

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b) Net Safe Bearing Capacity for cooling tower 1&2

Unit	Type of Foundation	Founding Level (m)	Net Safe Bearing capacity (T/sq.m)	Finished Ground Level (FGL) (m)	Remarks
1	Isolated/Raft	(+)67.000	15	R.L (+)69.000	Minimum founding level shall be RL(+)67.000 M
2	Isolated/Raft	(+)66.000	20		
3	Isolated/Raft	(+)65.000	30		
4	Isolated/Raft	(+)64.000	35		
5	Isolated/Raft	(+)63.000	40		

- iv. It shall be ensured that all foundations of a particular structure/building/equipment shall rest on one bearing stratum.
- v. The permissible settlement as mentioned under para “permissible settlement of foundations” or permissible settlement from functional requirement whichever is more stringent shall be adopted for the design.
- vi. The permissible total settlement and differential settlement of foundation resting on soil mass shall be governed by IS: 1904 and from functional requirements whichever is more



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stringent. Unless otherwise mentioned, the total settlement of cooling tower foundation resting on soil shall be restricted to 25mm.

- vii. Analysis and proportioning of footings to minimize differential settlements shall be carried out for all major foundations and the same shall be submitted for BHEL/owner's approval.
- viii. In case any soft soil/loose stratum is met with at the founding level or below during execution, the same shall be completely removed and filled back with PCC 1(cement):3(sand):6(stone aggregates) up to desired foundation level.
- ix. Expansive soil shall not be used for filling/back filling around foundation.
- x. No foundation shall be resting on expansive soil.

Annexure –I



NAGADI CONSULTANTS PRIVATE LIMITED
DELHI - BANGALORE - CHENNAI - SECUNDERABAD

RECORD OF BORING

Doc. No. : FD/G/09/01
Job No. : 1658
B.H. No. : 79
Term. Depth : 80.00m

Project : 4x270 MW T.S. GENCO, Manugur, T.P.S.
Started Time : 28/01/15 8.15 AM. Completed : 23/01/15 5.00 P.M.
B.H. Co-ordinates : 1992770N, 471932E Size of B.H. : 100mm. Water Table :
Equipment : Calix
Nearest Location : Cooling Tower Area (1)

Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
0.50 - 1.00 B.S. SPT	0.50 1.00	3.0 3.0	3.0 3.0	N = 11
1.00 - 1.50 B.S.	1.50	3.0	3.0	
1.50 - 2.00 Y/B/Pink clay with gravels	2.00	3.0	3.0	
2.00 - 2.50 do	2.50	3.0	3.0	
2.50 - 3.00 do	3.00	3.0	3.0	
3.00 - 3.50 M/Y + yellow silty clay with gravels	3.50	3.0	3.0	
3.50 - 4.00 Reddish brown weathered rock	4.00	3.0	3.0	
4.00 - 4.50 Reddish brown w. rock (shell)	4.50	3.0	3.0	
4.50 - 5.00 do	5.00	3.0	3.0	
5.00 - 5.50 do	5.50	3.0	3.0	
5.50 - 6.00 do	6.00	3.0	3.0	
6.00 - 6.50 do	6.50	3.0	3.0	
6.50 - 7.00 do	7.00	3.0	3.0	
7.00 - 8.50 CR-0.50M	8.50	3.0	3.0	
8.50 - 10.00 CR-0.50M	10.00	3.0	3.0	
10.00 - 11.50 CR-0.50M	11.50	3.0	3.0	
11.50 - 13.00 Pinkish brown sand stone with shell	13.00	3.0	3.0	
13.00 - 14.00 B.S.	14.00	3.0	3.0	
14.00 - 14.50 SPT	14.50	3.0	3.0	
14.50 - 17.50 SPT	17.50	3.0	3.0	
17.50 - 20.00 SPT	20.00	3.0	3.0	
20.00 - 22.50 CR-0.50M	22.50	3.0	3.0	
22.50 - 27.00 CR-0.50M	27.00	3.0	3.0	
27.00 - 30.00 CR-0.50M	30.00	3.0	3.0	
30.00 - 32.50 CR-0.50M	32.50	3.0	3.0	
32.50 - 35.00 CR-0.50M	35.00	3.0	3.0	
35.00 - 37.50 CR-0.50M	37.50	3.0	3.0	
37.50 - 40.00 CR-0.50M	40.00	3.0	3.0	
40.00 - 42.50 CR-0.50M	42.50	3.0	3.0	
42.50 - 45.00 CR-0.50M	45.00	3.0	3.0	
45.00 - 47.50 CR-0.50M	47.50	3.0	3.0	
47.50 - 50.00 CR-0.50M	50.00	3.0	3.0	
50.00 - 52.50 CR-0.50M	52.50	3.0	3.0	
52.50 - 55.00 CR-0.50M	55.00	3.0	3.0	
55.00 - 57.50 CR-0.50M	57.50	3.0	3.0	
57.50 - 60.00 CR-0.50M	60.00	3.0	3.0	

Client : DS. Disturbed ; UDS, Undisturbed
J.S. Ravi
Nagadi Consultants
Site-in-Charge

Interval	Depth (ft)	Soil Type	Notes	Penetration Test	Penetration Value (psi)	Penetration Value (kg/cm²)	Penetration Value (N/mm²)
0-9.0	9.0	SPT	G/Reddish weathered rock (Silty)				
9.0-10.0	10.0	DS					
10.0-10.5	10.5	UDS					
10.5-12.0	12.0	DS					
12.0-14.0	14.0	SPT	Grayish/Reddish weathered rock				
14.0-15.20	15.20	CR					
15.20-16.70	16.70	CR					
16.70-18.10	18.10	CR	Grayish/y & Reddish weathered rock				
18.10-19.0	19.0	CR					
19.0-20.0	20.0	DS					
20.0-21.0	21.0	SPT	Reddish weathered rock				
21.0-22.0	22.0	DS					
22.0-23.0	23.0	DS					
23.0-24.0	24.0	SPT					
24.0-24.50	24.50	DS					
24.50-26.00	26.00	UDS					
26.00-27.50	27.50	DS					
27.50-29.0	29.0	SPT	Grayish/Reddish weathered rock				
29.0-30.0	30.0	DS	Reddish weathered rock				
30.0-31.0	31.0	SPT	Grayish/Reddish weathered rock				

$N = 95 / 10.1$

$N = 100 / 11.4$

$N = 105 / 11.4$

$N = 88 / 10.1$

$N = 86 / 12.7$

$N = 90 / 12.7$

$N = 75 / 10.1$

$\frac{3''}{60}, \frac{3''}{35}$

$\frac{3''}{40}, \frac{1 1/2''}{60}$

$\frac{3''}{80}, \frac{1 1/2''}{25}$

$\frac{3''}{26}, \frac{1''}{52}$

$\frac{3''}{32}, \frac{2''}{54}$

$\frac{3''}{30}, \frac{2''}{60}$

$\frac{3''}{5}, \frac{3''}{40}, \frac{3''}{45}, \frac{1''}{30}$

RECORD OF BORING

Doc. No. : FD/G/09/01	Job No. : 1658	B.H. No. : 81	Term. Depth : 20.0
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Project 4X270 MW T.S. GENCO, Mangunyah, T.P.S.
Started 23/01/15 Time 9:30 AM Completed 25/01/15 Time 1:00 P.M.
B.H. Co-ordinates 1992770N, 471897E Size of B.H. 100mm. Water Table
Equipment Well-90(Y) Nearest Location : Cooling Towers Area (A)

Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
B. Brownish silty clay	0.50	B.S.	$3 \frac{2}{3}, 3 \frac{2}{3}, 3 \frac{2}{3}$	36
do	1.00	SPT	$1 \frac{3}{4}, 2 \frac{1}{2}, 2 \frac{1}{2}, 3 \frac{2}{3}$	26
do	1.50	B.S.		
do	2.00	U.D.S.		
do	2.50	B.S.		
do	3.00	SPT	$5 \frac{1}{4}, 1 \frac{1}{2}, 1 \frac{1}{2}, 2 \frac{1}{2}, 3 \frac{2}{3}$	82
do	3.50	B.S.		
do	4.00	U.D.S.		
do	4.50	B.S.		
do	5.00	SPT	$2 \frac{2}{3}, 3 \frac{2}{3}, 3 \frac{2}{3}, 3 \frac{2}{3}$	106/3.7
do	6.00	B.S.		
do	6.50	U.D.S.		
do	7.00	B.S.		
do	8.00	SPT	$3 \frac{2}{3}, 3 \frac{2}{3}, 3 \frac{2}{3}, 1 \frac{1}{2}$	$N = 127 \frac{1}{2}$
do	9.00	B.S.		
do	9.50	U.D.S.		
do	10.00	B.S.		
do	11.00	SPT	$3 \frac{2}{3}, 1 \frac{1}{2}, 2 \frac{1}{2}, 5 \frac{1}{2}$	89/17.2
do	12.00	B.S.		
do	13.00	B.S.		
do	14.00	SPT	$3 \frac{2}{3}, 2 \frac{1}{2}, 1 \frac{1}{2}, 3 \frac{2}{3}, 4 \frac{1}{2}$	93/21.25
do	15.00	B.S.		
do	16.00	B.S.		
do	17.00	SPT	$3 \frac{2}{3}, 1 \frac{1}{2}, 2 \frac{1}{2}, 4 \frac{1}{2}$	65/11.4

Client
B. Q. 15/01/13
*DS. Disturbed ; UDS, Undisturbed
Site-in-Charge
Nagadi Consultancy

J. S. Davis
Nagadi Consulting
Site-in-Charge

93/21.05

41/68

$$N = 127 \frac{1}{2}$$

106/37

82

36

Cooling Tower Area - 2

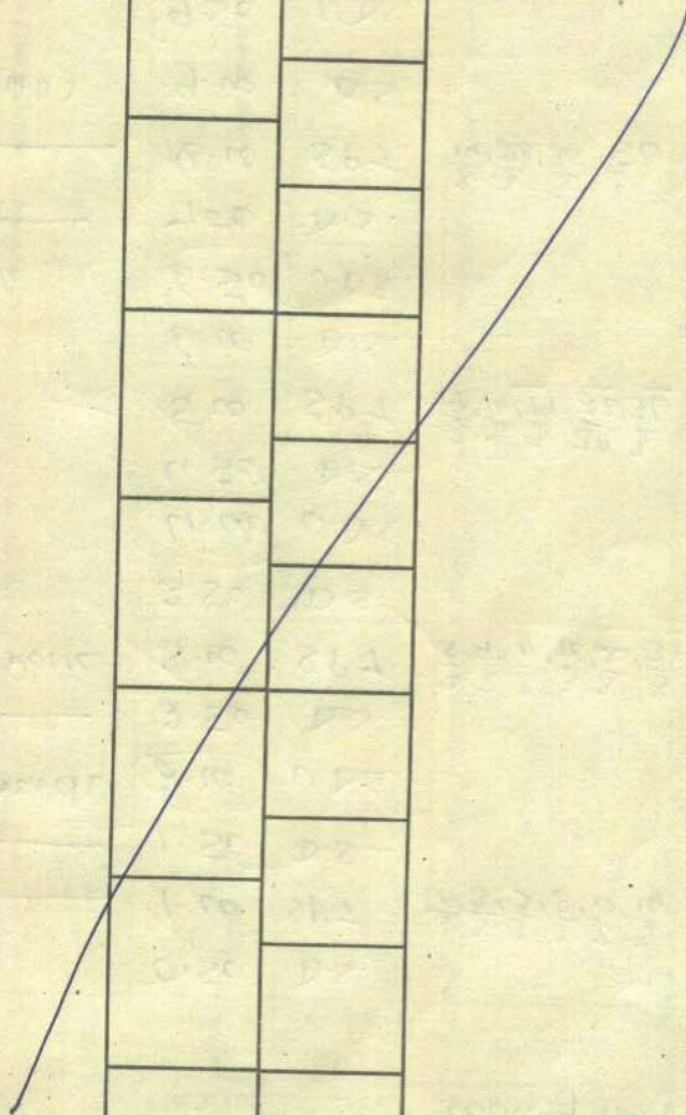
Reddish w. Rock (shell)

do
Greyish + Reddish w. Rock (shell)

18.0 D.S.

19.0 D.S.


20.0 SPT

 $\frac{34}{30.50}$ 2" $N = 80/12.7$ 

* D.S. Disturbed ; UDS, Undisturbed

Client

B. @usad
25/01/15J. S. Rana
Nagadi Consultants
Site-In-Charge

		NAGADI CONSULTANTS PRIVATE LIMITED DELHI - BANGALORE - CHENNAI - SECUNDERABAD	
Job No. : 1656 B.H. No. : 82		RECORD OF BORING	
Doc. No. : FD/G/09/01 Term. Depth : 15.0 m			

Project Ux270 MW T.S. GENCO, Mangalore, TDS	
Started 24/01/15	Time 4.20 P.M.
Completed 28/01/15	
Time 5.30 P.M.	
B.H. Co-ordinates 1992965 N, 471938 E	
Size of B.H. 100mm.	
Water Table	
Nearest Location : Cooling Tower Area (2)	

Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
B. Brownish clay with silt & gravels	0.50	B.S.		
Reddish, brownish silty clay with gravels	1.00	SPT	8 3/3, 3 3/3, 1 2/3, 4 4/5, 2 3/3	19
Brownish silty clay	1.50	B.S.		
Brownish silty clay with gravels	2.00	U.D.S.		
Brownish silty sandy clay	2.50	B.S.		
grayish, brownish silty sandy clay	3.00	SPT	3 3/3, 3 3/3, 4 4/4, 2 3/3, 10 7/13	34
Brownish silty clay with sand	3.50	B.S.		
yellowish Brown w. Rock	4.00	U.D.S.		
Brownish w. Rock	4.50	B.S.		
5.00	SPT	3 3/3, 3 3/3, 11 10/13, 14 15/17		Sample stopped 57
Reddish w. Rock (shell)	6.00	B.S.		
do	6.50	U.D.S.		
do	7.50	B.S.		
grayish Reddish w. Rock (shell)	8.00	SPT	3 3/3, 3 3/3, 8 16/17, 19 22/32	84
Reddish w. Rock (shell)	9.00	B.S.		
do	9.50	U.D.S.		
Brownish weathered Rock	10.50	B.S.		
Reddish weathered Rock (shell)	11.00	SPT	2 2/3, 3 3/3, 8 16/17, 19 22/32	84
12.00	B.S.			
Reddish weathered Rock (shell)	12.50	SPT	3 3/3, 1 1/55	86/100
do	13.50	B.S.		
do	14.50	B.S.		
15.00	SPT	3 3/3, 1 1/55		Sample stopped 88/11.4m

Reddish w. Rock (Slate)

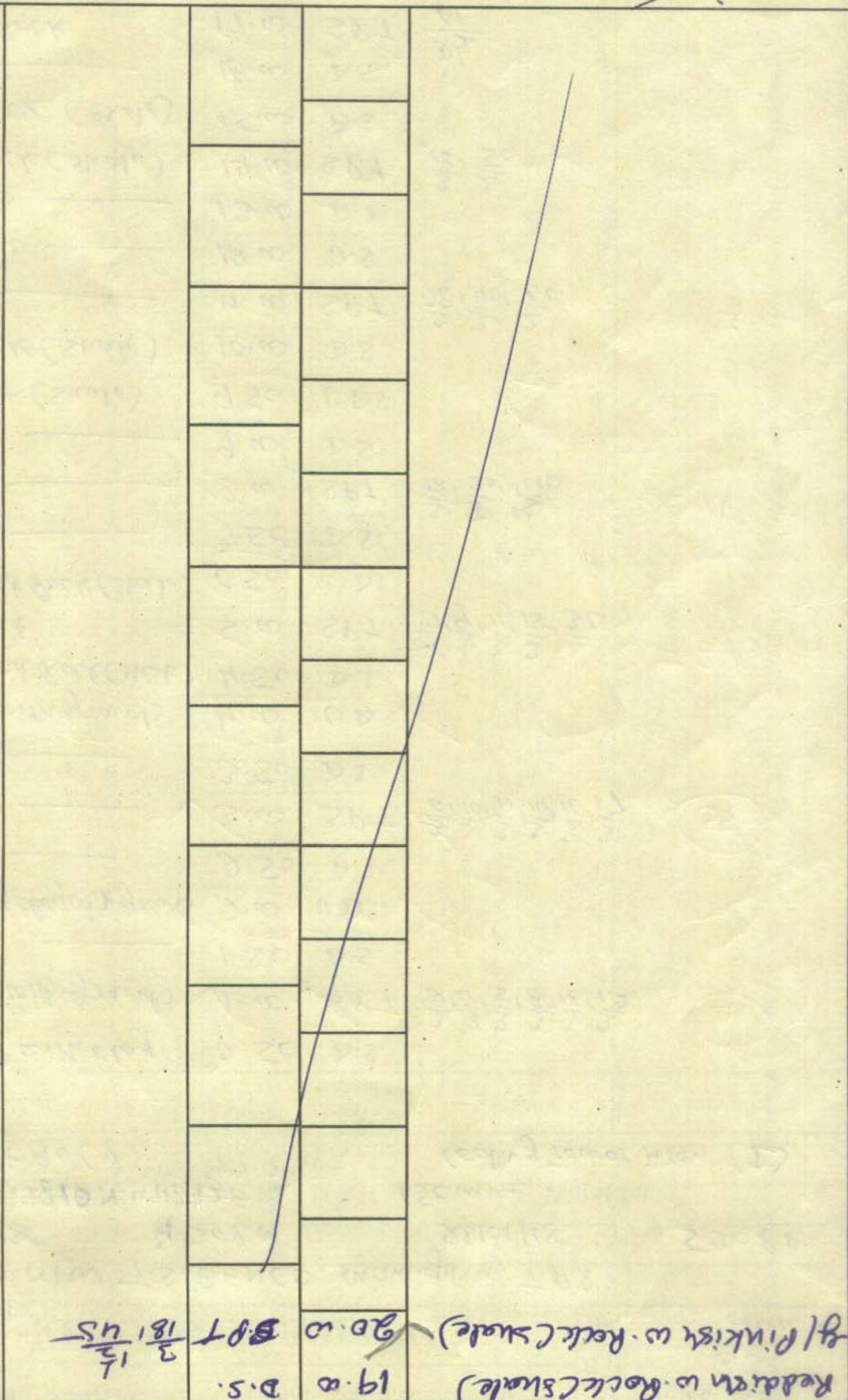
g/Pinkish w. Rock (Slate)

20.0

B.P.T

 $3\frac{1}{2}$
18.45

D.S.



* DS. Disturbed ; UDS, Undisturbed

Client

28/01/15

T.S. Rana

Nagadi Consultant
Site-in-Charge

5.4

CR-0140M

J. S. Rana
Nagadi Consultants
Site-in-Charge

Project UX 270 MW T.S GENCO, Mangunur TPS.
 Started 31/02/15 Time 10.00 A.M Completed 14/01/15 Time 11.00 A.M
 B.H. Co-ordinates 192810N/471793E Size of B.H. 150 mm Water Table not found
 Equipment Well-35 (S) Nearest Location : coding Tower - 2

Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
Brownish clay	0.50	D.S.		
Brownish silty clay	1.00	005	$\frac{5}{6}, \frac{9}{13}$	n=22
do	1.50	D.S.		
Sandy silty clay with gravels	2.00	SPT	$\frac{6}{6}, \frac{16}{23}$	n=39
do	2.50	D.S.		
do	3.00	U.D.S.	$\frac{6}{6}, \frac{14}{15}$	n=29
do	3.50	D.S.		
Yellowish & Brownish sandy soil	3.60	SPT	$\frac{36}{36}$	
coloured, yellowish & Brownish sandy soil	4.50	D.S.		
coloured, greyish & Reddish weathered Rock	5.00	SPT	$\frac{6}{6}, \frac{24}{28}$	n=52
greyish & whitish boulders	5.50	D.S.		52
coloured & Reddish w. Rock	6.00	D.S.		
do	6.50	SPT	$\frac{6}{6}, \frac{34}{50}$	N > 100
Reddish sandy soil	7.00	D.S.		100/24
whitish & Reddish Brown sandy soil	8.00	U.D.S.	$\frac{6}{44}, \frac{50}{52}$	N > 100
Reddish silty sandy soil	9.00	D.S.		
Reddish silty sandy soil with gravels	9.50	SPT	$\frac{6}{13}, \frac{32}{52}$	N > 100
Reddish sandy soil	10.00	D.S.		
greyish sandy soil with gravels	11.00	U.D.S.	$\frac{4}{53}, \frac{51}{51}$	N > 100
do	12.00	D.S.		
Brownish silty sandy clay with gravels	12.50	SPT	$\frac{4}{12}, \frac{55}{47}$	N > 100
do	13.50	D.S.		
Brownish	14.00	U.D.S.	$\frac{4}{50}, \frac{52}{52}$	N > 100
Brownish silty sandy soil	15.00	D.S.		

RECORD OF BORING

Doc. No. : FD/G/09/01
Job No. : 1658
B.H. No. : 85
Term. Depth : 20.00

Project 4x870, MW T.S. GENCO, Mangalore, TDS


Started 26/01/15 Time 10.00 A.M Completed 29/01/15 Time 6.15 P.M
B.H. Co-ordinates 1992878N, 47176E Size of B.H. 100mm Water Table _____

Equipment	Catix	Nearest Location:	Cooling Towers Area (2)
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Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
D. Brownish silt with clay	0.50	B.S.	3, 3, 3, 3, 3, 3	
do	1.00	SPT	1, 1, 1, 1, 4, 8, 11	24
do	1.50	B.S.		
do	2.00	U.D.S.		
do	2.50	B.S.		
do	3.00	SPT	3, 3, 3, 3, 3, 3, 3, 3	53
do	3.50	B.S.		
Brownish silty sandy clay	4.00	U.D.S.		
do	4.50	B.S.		
B/Brownish silty clay with gravels	5.00	SPT	3, 3, 3, 3, 3, 3, 3, 3, 4, 4, 5, 6, 6, 8	25
do	6.50	U.D.S.		
do	7.50	B.S.	3, 3, 3, 3, 3, 3, 3, 3, 11, 21, 23, 24, 30	114/34
do	8.00	SPT		80/200
do	9.00	B.S.		
do	10.00	SPT	3, 3, 3, 20, 25, 1, 35	93/2200
do	11.00	B.S.		
do	12.00	B.S.	3, 3, 3, 2, 2, 45	
do	13.00	SPT		
do	14.00	B.S.		
Reddish soft Rock (shell)	16.00			CR-0.33M
do	17.50			CR-0.31M
do	19.00			CR-0.39M
do	20.00			CR-0.48M

Project	4x270 MW T.S. GENCO, Mangunrejo, TPS
Started	23/10/15
	Time 6.30 AM.
	Completed 24/10/15
	Time 6.15 P.M.
B.H. Co-ordinates	1993633 N, 471792 E
	Size of B.H. 100mm.
	Water Table
Equipment	Well 35/3
	Nearest Location : Cooking Tanks area (3)

[illegible]


		NAGADI CONSULTANTS PRIVATE LIMITED DELHI - BANGALORE - CHENNAI - SECUNDERABAD	
Doc. No. : FD/G/09/01	Job No. : 1658	B.H. No. : 106	Term. Depth : 20.40

Project 4x20 MW T.S. GENCO, Mangun TPS	
Started 21/01/15	Time 8.00 A.M.
Completed 22/01/15	
Time 5.30 P.M.	
B.H. Co-ordinates 1993865 N, 471822 E Size of B.H. 10 mm. Water Table	
Equipment Volt 35 (S)	
Nearest Location : Cooling Tower Area (3)	

Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
Brownish silt with clay	0.50	B.S.		
Yellowish brown silty clay with gravel	1.00	SPT		
do	1.50	B.S.		
R/V / greyish silty clay	2.00	U.D.S.		
B / yellowish silty sandy clay with gravel	2.50	B.S.		
B / yellowish sandy clay with gravel & boulders	3.00	SPT		
B / V / pinkish sandy soil	3.50	B.S.		
Greyish Reddish weathered Rock	4.00	U.D.S.		
Greyish yellowish Brown w. Rock	4.50	B.S.		
Greyish Reddish weathered Rock	5.00	SPT		
Brownish Red weathered Rock	6.00	B.S.		
Reddish weathered Rock	6.50	U.D.S.		
Y / G / Reddish	7.50	B.S.		
Greyish + Reddish w. Rock	8.00	SPT		
do	9.00	B.S.		
do	9.50	U.D.S.		
Reddish weathered Rock	10.50	B.S.		
do	11.00	SPT		
Reddish soft Rock (Swell)	12.50			
do	14.50			
do	15.50			
do	17.00			
do	18.50			
do	20.00			

Client 12/01/15	* DS. Disturbed : UDS, Undisturbed
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T.S. Power
 Nagadi Consultants
 Site-in-Charge

		NAGADI CONSULTANTS PRIVATE LIMITED DELHI - BANGALORE - CHENNAI - SECUNDERABAD	
Doc. No. : FD/G/09/01	Job No. : 1658	B.H. No. : 107	
Term. Depth : 30.0			

Project Hx 270 T.S. GENCO Mangalore TPS
 Started 15/01/15 Time 1.00 P.M. Completed 20/01/15 Time 3.15 P.M.
 B.H. Co-ordinates 1993548N, 471810 Size of B.H. 100mm. Water Table
 Equipment UD-35 (S) Nearest Location : Cooling Tower Area (3)

Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
B. Brownish clay with silty gravels	0.50	D.S.		
do	1.00	SPT	$\frac{64}{10}, \frac{61}{15}$	
do	1.50	D.S.		
Yellowish grey silty clay with gravels	2.00	UDS		
do	2.50	D.S.		
As silty clay with gravels	3.00	SPT	$\frac{54}{18}, \frac{61}{28}$	
do	3.50	D.S.		
do	4.00	UDS		
Reddish weathered Rock (Swell)	5.00	SPT	$\frac{61}{61}, \frac{31}{38}$	
do	5.50	D.S.		
do	6.00	UDS		
do	6.50	D.S.		
do	7.50	SPT	$\frac{44}{75}$	
do	8.50	D.S.		
do	9.00	UDS		
do	10.00	D.S.		
do	16.50	SPT	$\frac{64}{11}, \frac{55}{60}$	
do	11.50	D.S.		
do	18.00	UDS		
do	13.00	D.S.		
do	13.50	SPT	$\frac{64}{11}, \frac{60}{42}$	
do	14.50	D.S.		
do	15.50	D.S.		
do	16.50	SPT	$\frac{50}{14}$	

Client J. S. Ganga
 Site-in-Charge Nagadi Consultants
 * DS. Disturbed : UDS, Undisturbed

25
 46
 129
 37.5
 75/100
 115/17.50
 102/17.50
 50/2.50

CR-0.33M

D.S.

17.50

Reddish w. Rock (shell)

D.S.

18.50

do

do

do

Reddish soft Rock (shell)

20.50

greyish + reddish soft Rock

22.50

SPT

112"
55

No sample

CR-0.60M

27.50

CR-1.02M

29.00

CR-1.12M

30.00


CR-0.60M


*DS. Disturbed : UDS, Undisturbed

J.S. Rana
Nagadi Consultants
Site-in-Charge

Client

22/01/15

	NAGADI CONSULTANTS PRIVATE LIMITED	
	DELHI - BANGALORE - CHENNAI - SECUNDERABAD	
RECORD OF BORING	Job No. : 1658 B.H. No. : 108 Term. Depth : 80.00	Doc. No. : FD/G/09/07

		NAGADI CONSULTANTS PRIVATE LIMITED DELHI - BANGALORE - CHENNAI - SECUNDERABAD	
Doc. No. : FD/G/09/01 Job No. : 1658 B.H. No. : 109		RECORD OF BORING	
Term. Depth : 20.00			

Project Hx270 MW T.S. GENCO, Mangur, TPS
 Started 21/01/15 Time 9.00 A.M. Completed 23/01/15 Time 3.50 P.M.
 B.H. Co-ordinates 1993530N, 471950E Size of B.H. 100mm. Water Table _____
 Equipment Volt 90CR Nearest Location : Cooling Tower Area (4)

Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
B. brownish silt with clay	0.50	B.S.		
do	1.00	SPT	6, 6, 6, 12	
do	1.50	B.S.		
do	2.00	U.D.S.		
do	2.50	B.S.		
do	3.00	SPT	4, 7, 6, 12	
do	3.50	B.S.		
do	4.00	U.D.S.		
do	4.50	B.S.		
do	5.00	SPT	6, 6, 6, 30, 35	
do	5.50	B.S.		
do	6.00	U.D.S.		
do	6.50	B.S.		
do	7.00	SPT	3, 3, 3, 12, 17, 36, 30	
do	7.50	B.S.		
do	8.00	SPT		
do	9.00	B.S.		
do	9.50	U.D.S.		
do	10.50	B.S.		
do	11.00	SPT	2, 3, 2, 4, 8, 50	
do	12.00	B.S.		
do	12.50			
do	14.00			
do	15.00			
do	16.00	B.S.		
do	17.00	SPT	2	

Client _____
 * DS. Disturbed : UDS, Undisturbed _____
 J.S. Datta
 Nagadi Consultants
 Site-in-Charge

Reddish weathered Belt (Swell)

18.0

D.S.

19.0

D.S.

20.0

D.S.


15
55

55/3.17

* DS. Disturbed ; UDS, Undisturbed

Client

B. Quaid
23/01/10J. S. Rana.
Hagadi Consultants
Site-in-Charge

		NAGADI CONSULTANTS PRIVATE LIMITED DELHI - BANGALORE - CHENNAI - SECUNDERABAD	
Doc. No. : FD/G/09/01 Job No. : 1658 B.H. No. : 110		RECORD OF BORING	
Term. Depth : 30.0		Term. Depth : 30.0	

Project 4x270 MW T.S. GENCO, TPS Managur, TPS	
Started 15/01/15 Time 11.00 A.M. Completed 20/01/15 Time 4.00 P.M.	B.H. Co-ordinates 1993568 N, 471946 E Size of B.H. 100mm. Water Table
Equipment Volt 90 (R) Nearest Location : Ceiling Towers Area (47)	

Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
B. Brownish clay with silt	0.50	D.S.	6.0 6.1 6.1	20
do	1.00	SPT	5.9 6.1	
do	1.50	D.S.		
Y & brownish clay with gravel	2.00	U.D.S.		
do	2.50	D.S.		
do	3.00	SPT	8.1 8.1 8.1	33
do	3.50	D.S.		
Reddish silty clay with gravel	4.00	U.D.S.		
do	4.50	D.S.		
do	5.00	SPT	8.1 8.1 8.1	32
do	5.50	D.S.		
Reddish silty clay with gravel	6.00	U.D.S.		
Reddish weathered Rock (shell)	6.50	D.S.		
do	7.00	SPT	5.0 5.1	
do	7.50	D.S.		
do	8.00	U.D.S.		
do	8.50	D.S.		
Reddish w. Rock (shell)	9.00	SPT	4.9 5.1	
do	10.50	U.D.S.		
do	11.00	D.S.		
do	12.00	SPT	4.9 5.1	
do	13.00	D.S.		
do	14.00	U.D.S.		
do	14.50	D.S.		

Client 20/01/15 * DS. Disturbed : UDS, Undisturbed	J.S. Managur Managur Site-in-Charge
-------------------------------------------------------	---------------------------------------------------

4" 60

69/10

SPT

16.00 D.S.

17.00 D.S.

18.00 SPT

19.00 D.S.

20.00 D.S.

21.00 SPT

22.00 D.S.

23.00 D.S.

24.00 SPT

25.00 D.S.

26.00 D.S.

27.00 SPT

28.00 D.S.

29.00 D.S.

30.00

34" 75

31" 70

31" 70

4" 60

CR-O-31M

75/8.89

70/7.5

70/7.5

Reddish w. Rock (shell)

greyish & Reddish w. Rock (shell)

do

do

do

do

greyish & Reddish w. Rock (shell)

Reddish w. Rock

do

greyish & Reddish w. Rock (shell)

Reddish w. Rock (shell)

do

greyish & Reddish w. Rock (shell)

Reddish w. Rock (shell)

do

* DS. Disturbed ; UDS, Undisturbed

I.S. Davis
Magadi Consultants

Site-in-Charge

Client

09/20/01/15



Project UX 270 MW T.S. GENCO, Manugay TPS

Started 25/01/15 Time 10.30 A.M. Completed 27/01/15 Time 4.00 P.M.
B.H. Co-ordinates ~~1995568N, 472000E~~ 1995568N, 472000E Size of B.H. 150mm Water Table

Equipment 101T 90(R) Nearest Location : Cooling Tower area (4)

Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
B. Brownish silty clay	0.50	D.S.		
do	1.00	SPT	$6 \frac{5}{6}$	
do	1.50	D.S.		
Brownish silty clay with gravels	2.00	UDS		
Brownish silty sandy clay with gravels	2.50	B.S.		
Y/G / Brown with weathered Rock	3.00	SPT	$6 \frac{5}{6}$	
Y/G / Reddish weathered Rock	3.50	B.S.		
do	4.00	UDS		
do	4.50	D.S.		
Grayish & Reddish weathered Rock	5.00	SPT	$6 \frac{5}{6}$	
do	6.00	D.S.		
do	6.50	UDS		
Reddish w. Rock (Shale)	7.50	B.S.		
Y / Reddish w. Rock (Shale)	8.00	SPT	$3 \frac{3}{4}$	
Reddish w. Rock (Shale)	9.00	B.S.		
Y / Reddish w. Rock (Shale)	9.50	UDS		
Reddish w. Rock (Shale)	10.50	B.S.		
Y / Reddish w. Rock (Shale)	11.00	SPT	$3 \frac{3}{4}$	
Reddish w. Rock (Shale)	12.00	B.S.		
do	13.00	B.S.		
do	14.00	SPT	$3 \frac{3}{4}$	
do	15.00	B.S.		
do	16.00	B.S.		
do	17.00	SPT	$3 \frac{3}{4}$	

* DS. Disturbed ; UDS, Undisturbed

Client

J.S. Rana
Nagadi Consultant
Site-in-Charge

80/100

96/190

84/11.4

96/180

106

(35)

(23)

Reddish w. Rock (Shale)

do

do

18.00 D.S.

19.00 D.S.

20.00 SOT

$\frac{3}{35} \frac{1}{55}$

90110

*DS. Disturbed ; UDS, Undisturbed

Client


27/01/15

J.S. Rana

Moyni Consultants
Site-in-Charge

Project HX 070 MW T.S. GENCO, Mangunay, TDS
 Started 23/01/15 Time 8.30 A.M. Completed 24/01/15 Time 6.00 P.M.
 B.H. Co-ordinates 1994 1993503N, 471978E Size of B.H. 100mm Water Table _____
 Equipment Walt 90 (R) Nearest Location : Cooling Tower area (A)

Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
B. brown with silty clay	0.50			
do	1.00	B.P.T	6" 6' 6' 12'	
do	1.50	D.S.		
yellowish grey silty clay with gravel	2.00	UDS		
do	2.50	B.S.	6' 6' 6' 12'	
Reddish grey	3.00	SPT	6' 6' 6' 12'	
do	3.50	B.S.		
Reddish weathered Rock	4.00	UDS		
do	4.50	B.S.		
do	5.00	SPT	3' 3' 3' 1' 25' 26' 30' 30'	
do	5.50	B.S.		
greyish Reddish w. Rock (shell)	6.00	UDS		
do	6.50	B.S.		
do	7.00	SPT	3' 3' 3' 1' 25' 26' 30' 30'	
do	7.50	B.S.		
do	8.00	SPT	3' 3' 3' 1' 25' 26' 30' 30'	
do	8.50	B.S.		
do	9.00	D.S.		
do	9.50	B.S.		
do	10.00	D.S.		
Reddish weathered Rock (shell)	11.00	SPT	3' 3' 3' 1' 25' 26' 30' 30'	
do	12.00	B.S.		
do	13.00	D.S.		
do	14.00	SPT	3' 3' 3' 1' 25' 26' 30' 30'	
do	15.00	SPT	3' 3' 3' 1' 25' 26' 30' 30'	

		NAGADI CONSULTANTS PRIVATE LIMITED DELHI - BANGALORE - CHENNAI - SECUNDERABAD	
Doc. No. : FD/G/09/01 Job No. : 1658 B.H. No. : 123		RECORD OF BORING	
Term. Depth : 10.0 m			

Project 4x270 MW T.S. GENCO, Manguru, TPS	
Started 24/11/15 Time 8.30 A.M. Completed 24/11/15 Time 6.00 P.M.	B.H. Co-ordinates 1992750N, 471957E Size of B.H. 100mm. Water Table
Equipment <u>Calix</u> Nearest Location : <u>Cooling Towers Area (1)</u>	

Soil Description	Depth (m)	SPT / Sample Q	N - Value	Remarks
do	0.50	B.S.		
do	1.00	SPT $\frac{3}{3} \frac{3}{3} \frac{3}{3}$		
do	1.50	B.S.		
yellowish brown silty clay with gravels	2.00	U.D.S.		
do	2.50	B.S.		
do	3.00	SPT $\frac{8}{9} \frac{3}{15} \frac{3}{19} \frac{3}{35} \frac{3}{35}$		
do	3.50	B.S.		
do	4.00	U.D.S.		
B/Y & greyish shell with gravels	5.00	B.S.P.T. $\frac{3}{3} \frac{3}{12} \frac{3}{16} \frac{1}{28}$		
do	6.50	U.D.S.		
B/G / Pinkish shell with gravels	8.00	SPT $\frac{3}{3} \frac{3}{14} \frac{3}{35} \frac{1}{40}$		
do	9.50	U.D.S.		
Brownish, Pinkish shell	10.00	SPT $\frac{3}{3} \frac{3}{11} \frac{3}{22} \frac{1}{24}$		