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CHIEF EXECUTIVE



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PROJECT

Proposed Construction of PMSSY Health project,
Government Rajaji Hospital
Madurai.

Architect

Srikar and Associates (P) Ltd

2, 1st Cross, 1st Main, RMV 2nd Stage

1st Block, Ashwathnagar

Bangalore 560 094

Ph : 080-23514620

Project Consultant

HLL Health Care Ltd.,

Chennai.

TITLE

GEOTECHNICAL INVESTIGATION REPORT

A handwritten signature in blue ink, reading 'Sanna Ratnavel', with the text 'Chief Executive Sceba Consultancy Services' printed below it.

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PROJECT

**Proposed Construction of PMSSY Health project,
Government Rajaji Hospital,
Madurai.**

Introduction

Geo technical investigation was undertaken to assess the safe bearing capacity and type of soil profile at the above-mentioned site using SPT as per BIS 6403.

Objectives

1. To estimate the Safe Bearing Pressure @ 1.5m interval in view of settlement Criteria using SPT Values.

Methodology- Site Investigation

1. Drilling of bore holes with calyx drill unto 10.0 depth below existing ground level at the locations marked by the local dept. staffs.
2. Conducting Standard Penetration Test (SPT) at 1.5m intervals in all bore holes as per IS: 2131-1981, 1892-1979, and 1904-1986.
3. Collection of Soil Samples analysis and identify type of soils etc., complete.
4. Collection of soil samples at all depth to estimate Density etc. complete.



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Methodology &

Soil Analysis

1. The Soil test is to assess the N values based on SPT and (SPT) Systems & Procedure.

2. Soil Bearing Capacity Parameters are based on N cor. values only.

3.Safe Bearing Capacity Arrived based on Shear and Settlement criteria using N values.

4. The critical value of SBC for one-meter has been reported in the tables.

Calculation of Ultimate Bearing Capacity

1) Shear Criteria:

a) $Q_{uc} = C N_c$ (for 'C' value)

**b) $Q_{uf} = \gamma D (N_q - 1) + 0.5 B \gamma N_\gamma R_{w1}$ -
(f or 'Φ' value)**

C = Cohesion of Soils KN/m²

γ = Unit Weight KN/m³

D = Depth of Footing in m.

N_q, N_c, N_γ = Bearing Capacity Parameters

R_{w1}, R_{w2} = water table corrections

F.O.S = 3 to 5 for Non Cohesive Soils and 3to 6 for cohesive soils.

2) Settlement Criteria:

a) $\sigma = Q/Z^2 (3/2\lambda(1+(r/z)^2)^{5/2}$

b) As Per BIS 8009- (1)-1976- Fig-9 –settlement for SPT corrections

c) And As Per BIS 8009- (1)- Fig –12 Fox correction

N Corrected SPT Value, B= Width of Footing in meters.

d) Allowable Bearing Pressure Criteria:

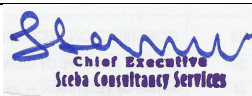
$$q_a = N_c / 0.08 (B + 0.3/B)^2 (1 + 0.33D/B)$$

For $(1 + 0.33D/B)$ max value = 1.33

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GENERAL

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01	SCOPE A. SAFE BEARING CAPACITY PARAMETERS B. INDEX PROPERTIES C. OTHER ENGINEERING PROPERTIES/SPECIFY REASONS FOR DISTRESS (OR) FAILURES	YES YES YES
02	TYPE OF BUILDING PROPOSED	Hospital Building
03	ANY OTHERS STRUCTURES SPECIFY	Multistoried R.C.C.Framed Structures
04	TYPE OF TEST CONDUCTED	SPT as per BIS- 2131-1981
05	NO. OF BORE HOLES	Nine Holes-as per IS 1892
06	TYPE OF DRILLING	Helical Auger/Calyx drill with Nx 100 diamond bit
07	DRILLING STOPPED DUE TO	Reached Target Depth & Hard strata
08	WATER TABLE ENCOUNTERED	No
09	REASON FOR WATER TABLE	Nil
10	DETAILS OF WATER RESOURCES AT SITE	Bore water
11	WATER TEST RESULTS	Not in the Scope
12	POTABLE WATER AVAILABLE AT SITE	Water to be tested
13	WATER TREATMENT SUGGESTIONS IF ANY	As per water test results
14	CLIMATE MAX-MIN TEMPERATURE	23° C- 42° C
15	MEAN ANNUAL RAINFALL IN MM	(750MM to 1200MM)


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16	Seismic Zone Classification	Zone II as per IS 1893
17	TYPE OF GROUND	Plain Ground
18.	LEVEL DIFFERENCE BETWEEN EXISTING ROAD AND SITE LEVEL	As per site condition
19	FIELD INVESTIGATION CARRIED OUT ON	22nd March to 10 th April 2012
20	ANY RECENT RAIN FALL DURING INVESTIGATION	NO
21	LAB TEST CONDUCTED FOR INDEX PROPERTIES	YES
22	PECULIAR PHENOMENON PARTICULARS	Swelling Soils
23	CONSTRUCTION RECORDS OF EXISTING BUILDING	NA
24	CRACKS AND TYPE OF DISTRESS PARTICULARS EXISTING	NA
25	NATURE OF VEGETATION IN AND AROUND SITE SIGNIFICANCE	Neem Trees, Palm trees
26	TRIAL PIT SIGNIFICANCE	Stable
27	LAND SLIDES AND SLOPE STABILITY SIGNIFICANCE	Not in the scope
28	BEHAVIOR OF EXISTING STRUCTURE IN SITE/ADJOINING SITE PARTICULARS	Good and severe Corrosion observed near by Overhead water Tank
29	GEO-TECHNICAL REPORT OF ADJOINING SITE PARTICULARS	N.A.
30	ANY OTHER SPECIAL INFORMATION	Hard Strata is varying from location to Location within the site. Hence uniform footing level need to be maintained as per site condition

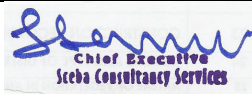


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RESULTS AND COMMENTS.

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1.	TYPE OF SITE CONDITION	Plain ground with bushes and few country trees
2.	COLOUR OF SOIL @ SURFACE	Brown in Color
3.	TYPE OF FILLING ANY	Made up Soils observed in few locations
4.	SURFACE WATER STAGNATION, IF ANY	Nil
5.	SOIL COMPOSITION CHANGES AS THE DEPTH CHANGES	Yes.
6.	BORE HOLE DETAILS UNIFORM/NON-UNIFORM	Uniform
7.	TYPE OF SOIL AND ITS SIGNIFICANCE	Expansive Clay Soils at the top & Weathered SAND STONE at the bottom.(Refer tables.)
8.	TYPE OF BOULDERS AND ITS SIGNIFICANCE	Nil
9.	ASSESSED REACTIVE ZONE DUE TO MOISTURE CONTENT	As per tables
10	PROBABLE NON-REACTIVE ZONE DUE TO MOISTURE CONTENT	As per Tables
11	COMMENTS ON SOIL WATER INTERACTION	Not stable unto 3.0m depth
12	SIGNIFICANCE OF SOIL WATER INTERACTION	Swelling & Shrinking
13	PRESENCE OF CLAY AND ITS SIGNIFICANCE	Expansive Clay with traces of Lime coarse particles
14	PRESENCE OF COARSE PARTICULARS AND ITS SIGNIFICANCE	Lime Gravel and Coarse sand Observed
15	DETAILS OF INDEX PROPERTIES OF SOILS	Enclosed in tables
16	DETAILS OF SAFE BEARING CAPACITY PARAMETERS AT DIFFERENT DEPTH.	Sand stones are considered as dense Sand. (RQD=Nil %)



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Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.		
17	SAFE BEARING CAPACITY SUGGESTED @ WHAT DEPTH FROM EXISTING GROUND LEVEL. (This Bearing Capacity is calculated from critical value chart for 40mm Settlement criteria.)	SBC = 38 t/m ² between 3.2m and 4.0m depth for 40 mm settlement (Critical value)
18	TYPE OF FOUNDATION Suggested	Raft, Mat & Isolated
19	TYPE OF PILE FOUNDATION	Undreamed Piles for light loaded structures like compound wall etc.
20	MINIMUM LENGTH OF PILE FOUNDATION	As per structural Engineer
21	MINIMUM DIA OF PILE FOUNDATION	As per structural Engineer
22	DESIGN AND ANALYSIS DETAILS OF UNDER REAMED PILE FOUNDATION Codes provisions	As per IS 2911 series.
23	TYPE OF CRACKS EXPECTED DUE TO	Swelling & Shrinking
24	SOIL STABILIZATION REQUIRES	At Surface Level for floor beddings
25	TYPE OF SOIL STABILIZATION	As per Structural Engineer
26	DETAILS OF TEST RESULTS ENCLOSED	Index & Engineering Properties & (RQD=Nil)
27	ANY OTHER SPECIAL TEST SUGGESTED	NA
28	PRECAUTION REQUIRED DURING EXCAVATION OF SOILS	Usual Safety methods
29	REINFORCEMENTS AND CONCRETE MIX DESIGN FOR PROPOSED FOUNDATION OF SPECIAL STRUCTURE	As per structural consultant


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Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.

Borehole NO. 1 Index Properties (Calyx Drill)

Sl No .	Depth m	'N' Value Cor.	Grain size Distribution						Relative Density	Liquid Limit %	Plastic Limit %	Plasticity Index %	Shrinkage Limit %	Degree Of Free Swelling %
			Gravel %	Sand* % Coarse, Medium, Fine			Silt %	Clay %						
				C	M	F								
1.	0.0 1.0m	NA	---	--	8	--	--	90	--	76.0	45.0	31.0	6.4	100
2.	1.5m	15 @ 1.5m	---	66	22	--	--	8	Mediu m	Nil	Nil	Nil	Nil	Nil
3.	3.0m	45 @ 3.0m	12	70 Lime stone	15	--	--	--	Very Dense	Nil	Nil	Nil	Nil	Nil
4.	3.0 To 4.50m	>50 @ 4.5m	--	72	18	--	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
5.	4.5 To 6.0m	>50 @ 6.0m	--	24	65	10	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
6.	6.0 to 7.5m	<u>Refusal</u>	--	--	78	16 Mica	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
7.	7.5 to 9.0m	<u>Refusal</u>		6	82	10	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
8.	9.0 to 10.5m	<u>Refusal</u>		14	76	8	--	--	Very dense	Nil	Nil	Nil	Nil	Nil

Table 1


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Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.

BH-1 Geo Tech Design Values (Calyx Drill)

Sl No	Depth m	'N' Value Cor.	Type of Soil	Density Kn/m ³ (Mean)	Bearing Capacity Parameters			'Φ'	'C' Value (mean) KN/M ²	SBC KN/Sqm	
					Nc	Nr	Nq			Shear	Settlement 40mm
1.	0.0 1.0m	NA	Clay soil Traces of Sand	NA	NA	NA	NA	NA	NA	NA	Reactive Zone
2.	1.5m	15 @ 1.5m	Sand y soils Traces of Clay	16.5	36.53	24.36	32.65	32°	Nil	NA	172.5
3.	3.0m	45 @ 3.0m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
4.	3.0 To 4.50m	>50 @ 4.5m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
5.	4.5 To 6.0m	>50 @ 6.0m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
6.	6.0 to 7.5m	Refusal	Sand stone	>32	63.63	51.84	84.85	38°	Nil	—	>500
7.	7.5 to 9.0m	Refusal	Sand stone	>32	63.63	51.84	84.85	38°	Nil	>500	>500
8.	9.0 to 10.5m	Refusal	Sand Stone	>32	63.63	51.84	84.85	38°	Nil	>500	>500

Table 1-A

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Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.

Borehole NO. 2 Index Properties (Calyx Drill)

Sl No .	Depth m	'N' Value Cor.	Grain size Distribution						Relative Density	Liquid Limit %	Plastic Limit %	Plasticity Index %	Shrinkage Limit %	Degree Of Free Swelling %
			Gravel %	Sand %			Silt %	Clay %						
				Coarse	Medium	Fine								
				C	M	F								
1.	0.0 1.0m	NA	--	8 Lime stones	--	--	--	92	NA	83.0	46.0	37.0	5.8	100
2.	1.5m	8 @ 1.5m	---	--	12	--	--	88	Soft	86.5	47.0	39.5	5.6	110
3.	3.0m	>50 @ 3.0m	3 Lime stone	22	75	--	--	---	Very dense	Nil	Nil	Nil	Nil	Nil
4.	3.0 To 4.50m	Refusal @ 4.5m	--	20	72	8	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
5.	4.5 To 6.0m	Refusal @ 6.0m	--	22	78	--	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
6.	6.0 to 7.5m	<u>Refusal</u>	--	16	82	---	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
7.	7.5 to 9.0m	<u>Refusal</u>		75	22	3	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
8.	9.0 to 10.5m	<u>Refusal</u>		75	22	3	--	--	Very dense	Nil	Nil	Nil	Nil	Nil

Table 2


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Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.

BH-2 Geo Tech Design Values (Calyx Drill)

Sl No	Depth m	'N' Value Cor.	Type of Soil	Density Kn/m ³ (Mean)	Bearing Capacity Parameters			'Φ'	'C' Value (mean) KN/M ²	SBC KN/Sqm	
					Nc	Nr	Nq			Shear	Settlement 40mm
1.	0.0 1.0m	NA	Clay soils traces of Lime Particles Whitish Gray in color	NA	NA	NA	NA	NA	NA	NA	Reactive Zone
2.	1.5m	8 @ 1.5m	Clay soils traces of Lime Particles Whitish Brown In Color	12.0	5.67	NA	NA	NA	55	NA	Reactive Zone
3.	3.0m	>50 @ 3.0m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
4.	3.0 To 4.50m	Refusal @ 4.5m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
5.	4.5 To 6.0m	Refusal @ 6.0m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
6.	6.0 to 7.5m	Refusal	Sand stone	>32	63.63	51.84	84.85	38°	Nil	—	>500
7.	7.5 to 9.0m	Refusal	Sand stone	>32	63.63	51.84	84.85	38°	Nil	>500	>500
8.	9.0 to 10.5m	Refusal	Sand Stone	>32	63.63	51.84	84.85	38°	Nil	>500	>500

Table 2-A

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Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.

Borehole NO. 3 Index Properties (Calyx Drill)

Sl No .	Depth m	'N' Value Cor.	Grain size Distribution						Relative Density	Liquid Limit %	Plastic Limit %	Plasticity Index %	Shrinkage Limit %	Degree Of Free Swelling %
			Gravel %	Sand %			Silt %	Clay %						
				Coarse, Medium, Fine										
				C	M	F								
1.	0.0 To 1.0m	NA	--	--	--	--	--	98	---	78.0	44.0	34.0	6.5	100
2.	1.5m	11 @ 1.5m	---	--	--	16	--	84	Soft	78.0	44.0	34.0	6.5	100
3.	3.0m	>50 @ 3.0m	--	20	80	--	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
4.	3.0 To 4.50m	50 @ 4.5m	--	86	14	--	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
5.	4.5 To 6.0m	Refusal @ 6.0m	--	24	76	--	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
6.	6.0 to 7.5m	<u>Refusal</u>	--	--	22	75	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
7.	7.5 to 9.0m	<u>Refusal</u>	--	--	22	75	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
8.	9.0 to 10.5m	<u>Refusal</u>	--	78	20	--	--	--	Very dense	Nil	Nil	Nil	Nil	Nil

Table 3


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Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.

BH-3 Geo Tech Design Values (Calyx Drill)

Sl No	Depth m	'N' Value Cor.	Type of Soil	Density Kn/m ³ (Mean)	Bearing Capacity Parameters			'Φ'	'C' Value (mean) KN/M ²	SBC KN/Sqm	
					Nc	Nr	Nq			Shear	Settlement 40mm
1.	0.0 To 1.0m	NA	Clay soil	NA	NA	NA	NA	NA	NA	NA	Reactive Zone
2.	1.5m	11 @ 1.5m	Clay soil Traces of Fine Sand	16.5	NA	NA	NA	NA	70	NA	Reactive Zone
3.	3.0m	>50 @ 3.0m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500 @ 3.0m
4.	3.0 To 4.50m	50 @ 4.5m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
5.	4.5 To 6.0m	Refusal @ 6.0m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
6.	6.0 to 7.5m	Refusal	Sand stone	>32	63.63	51.84	84.85	38°	Nil	—	>500
7.	7.5 to 9.0m	Refusal	Sand stone	>32	63.63	51.84	84.85	38°	Nil	>500	>500
8.	9.0 to 10.5m	Refusal	Sand Stone	>32	63.63	51.84	84.85	38°	Nil	>500	>500

Table 3-A

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Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.
Borehole NO. 4 Index Properties (Calyx Drill)

Sl No .	Depth m	'N' Value Cor.	Grain size Distribution						Relative Density	Liquid Limit %	Plastic Limit %	Plasticity Index %	Shrinkage Limit %	Degree Of Free Swelling %
			Gravel %	Sand %			Silt %	Clay %						
				Coarse	Medium	Fine								
				C	M	F								
1.	0.0 to 1.0 m	NA	--	12 Lime stones	--	--	--	88	NA	78.0	44.0	34.0	6.5	100
2.	1.5m	13 @ 1.5m	---	10 Lime Stone	--	--	--	90	Soft	78.0	44.0	34.0	6.5	100
3.	3.0m	>50 @ 3.0m	--	--		76	20 Mica	--	Very dense	Nil	Nil	Nil	Nil	Nil
4.	3.0 To 4.50m	Refusal @ 4.5m	--	--	82	14	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
5.	4.5 To 6.0m	Refusal @ 6.0m	--	17	83	--	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
6.	6.0 to 7.5m	<u>Refusal</u>	--	--	26	72	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
7.	7.5 to 9.0m	<u>Refusal</u>	--	--	22	75	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
8.	9.0 to 10.5m	<u>Refusal</u>	--	--	22	75	--	--	Very dense	Nil	Nil	Nil	Nil	Nil

Table 4


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Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.

BH-4 Geo Tech Design Values (Calyx Drill)

Sl No	Depth m	'N' Value Cor.	Type of Soil	Density Kn/m ³ (Mean)	Bearing Capacity Parameters			'Φ'	'C' Value (mean) KN/M ²	SBC KN/Sqm	
					Nc	Nr	Nq			Shear	Settlement 40mm
1.	0.0 to 1.0 m	NA	Clay soils with Lime Particles Black in color	NA	NA	NA	NA	NA	NA	NA	Reactive Zone
2.	1.5m	13 @ 1.5m	Clay soils with Lime Particles Black in Color	15.0	5.67	NA	NA	NA	85	NA	Reactive Zone
3.	3.0m	>50 @ 3.0m	Sand stone With Mica particles	>32	63.63	51.84	84.85	38°	Nil	NA	>500
4.	3.0 To 4.50m	Refusal @ 4.5m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
5.	4.5 To 6.0m	Refusal @ 6.0m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
6.	6.0 to 7.5m	Refusal	Sand stone	>32	63.63	51.84	84.85	38°	Nil	—	>500
7.	7.5 to 9.0m	Refusal	Sand stone	>32	63.63	51.84	84.85	38°	Nil	>500	>500
8.	9.0 to 10.5m	Refusal	Sand Stone	>32	63.63	51.84	84.85	38°	Nil	>500	>500

Table 4-A


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Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai

Borehole NO. 5 Index Properties (Calyx Drill)

Sl No .	Depth m	'N' Value Cor.	Grain size Distribution						Relative Density	Liquid Limit %	Plastic Limit %	Plasticity Index %	Shrinkage Limit %	Degree Of Free Swelling %
			Gravel %	Sand %			Silt %	Clay %						
				Coarse	Medium	Fine								
				C	M	F								
1.	0.0 to 1.0m	NA	--	4 Lime Stone	--	--	--	96	NA	88.5	45.0	43.5	5.8	110
2.	1.5m	10 @ 1.5m	---	4 Lime Stone	--	--	--	96	Soft	88.5	45.0	43.5	5.8	110
3.	3.0m	>50 @ 3.0m	--	18	68	12	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
4.	3.0 To 4.50m	Refusal @ 4.5m	--	--	92	8	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
5.	4.5 To 6.0m	Refusal @ 6.0m	6	--	93	--	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
6.	6.0 to 7.5m	<u>Refusal</u>	--	--	12	86	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
7.	7.5 to 9.0m	<u>Refusal</u>	--	--	12	86	--	--	Very dense	Nil	Nil	Nil	Nil	Nil
8.	9.0 to 10.5m	<u>Refusal</u>	--	--	12	86	--	--	Very dense	Nil	Nil	Nil	Nil	Nil

Table 5


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Sl No	Depth m	'N' Value Cor.	Type of Soil	Density Kn/m ³ (Mean)	Bearing Capacity Parameters			'Φ'	'C' Value (mean) KN/M ²	SBC KN/Sqm	
					Nc	Nr	Nq			Shear	Settlement 40mm
1.	0.0 to 1.0m	NA	Clay soils with Lime Particles Black in color	NA	NA	NA	NA	NA	NA	NA	Reactive Zone
2.	1.5m	10 @ 1.5m	Clay soils with Lime Particles Black in Color	14.0	5.67	NA	NA	NA	70	NA	Reactive Zone
3.	3.0m	>50 @ 3.0m	Sand stone With Mica particles	>32	63.63	51.84	84.85	38°	Nil	NA	>500
4.	3.0 To 4.50m	Refusal @ 4.5m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
5.	4.5 To 6.0m	Refusal @ 6.0m	Sand stone	>32	63.63	51.84	84.85	38°	Nil	NA	>500
6.	6.0 to 7.5m	Refusal	Sand stone	>32	63.63	51.84	84.85	38°	Nil	—	>500
7.	7.5 to 9.0m	Refusal	Sand stone	>32	63.63	51.84	84.85	38°	Nil	>500	>500
8.	9.0 to 10.5m	Refusal	Sand Stone	>32	63.63	51.84	84.85	38°	Nil	>500	>500

Table 5-A

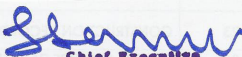
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Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.

Borehole NO. 6 Index Properties (Auger Drill)

SI No	Depth m	'N' Value Cor.	Grain size Distribution						Relative	Liquid Limit %	Plastic Limit %	Plasticity Index %	Shrinkage Limit %	Degree Of Free Swelling %
			Gravel %	Sand %			Silt %	Clay %						
				Coarse, Medium, Fine										
				C	M	F								
1.	0.0 to 1.2m	NA	--	--	68	26	6	--	NA	Nil	Nil	Nil	Nil	Nil
2.	1.2 To 1.8m	16 @ 1.5m	--	12 Lime	--	--	--	84	Medium	82.72	45.72	37.0	6.2	100
3.	1.8 To 2.10m	20 @ 2.1m	--	8 Lime	--	--	--	90	Medium	82.72	45.72	37.0	6.2	100
4.	2.1 To 2.40m	22 @ 2.4m	--	--	6	--	--	88	Medium	82.72	45.72	37.0	6.2	100
5.	2.40 To 3.0m	42 @ 3.0m	--	8 Lime	6	--	--	82	Hard	82.72	45.72	37.0	6.2	100
6.	3.0 To 4.50m	Hard strata	Hard strata	Hard strata	--	--	--	--	--	--	--	--	--	--
7.	4.5 to 6.0m													
8.	6.0 to 7.5m	Hard strata	Hard strata	Hard strata	--	--	--	--	--	--	--	--	--	--
9.0	7.5 to 9.0m	Hard strata	Hard strata	Hard strata	--	--	--	--	--	--	--	--	--	--
10.	9.0 to 10.5m	Hard strata	Hard strata	Hard strata	--	--	--	--	--	--	--	--	--	--

Table 6


 Chief Executive
 Sceba Consultancy Services

Sl No	Depth m	'N' Value Cor.	Type of Soil	Density KN/m ³ (Mean)	Bearing Capacity Parameters			'Φ'	'C' Value (mean) KN/M ²	SBC KN/Sqm	
					Nc	Nr	Nq			Shear	Settlement 40mm
1.	0.0 to 1.2m	NA	Fine to Medium Sand Brown in Color	NA	5.67	NA	NA	NA	NA	NA	Reactive Zone
2.	1.2 To 1.8m	16 @ 1.5m	Clay soil Traces of Lime Stones Whitish Brown in color	17.5	5.67	NA	NA	NA	105	NA	Reactive Zone
3.	1.8 To 2.10m	20 @ 2.1m	Clay soil Traces of Lime Stones Whitish Brown in color	20	5.67	NA	NA	NA	135	NA	Reactive Zone
4.	2.1 To 2.40m	22 @ 2.4m	Clay soil Traces of Lime Stones Whitish Brown in color	>20	5.67	NA	NA	NA	140	NA	Reactive Zone
5.	2.40 To 3.0m	42 @ 3.0m	Clay soil Traces of Lime Coarse particles Whitish Brown in color	>30	5.67	NA	NA	NA	160	NA	483 @ 3.0m
6.	3.0 To 4.50m	Hard strata	Hard strata	>30	51.96	39.48	60.20	38°	Nil	>500	>500
7.	4.5 to 6.0m	Hard strata	Hard strata	>32	51.96	39.48	60.20	38°	Nil	>500	>500
8.	6.0 to 7.5m	Hard strata	Hard strata	>32	51.96	39.48	60.20	38°	Nil	>500	>500
9.0	7.5 to 9.0m	Hard strata	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
10.	9.0 to 10.5m	Hard strata	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500

Table 6-A

 Chief Executive
 Sceba Consultancy Services

Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.

Borehole NO. 7 Index Properties (Auger Drill)

Sl No	Depth m	'N' Value Cor.	Grain size Distribution						Relative Density	Liquid Limit %	Plastic Limit %	Plasticity Index %	Shrinkage Limit %	Degree Of Free Swelling %
			Gravel %	Sand %			Silt %	Clay %						
				Coarse	Medium	Fine								
				C	M	F								
1.	0.0 to 1.2m	NA		6	--	--	--	94 With organic matter	NA	76.50	44.30	32.20	6.8	100
2.	1.2 To 1.8m	20 @ 1.5m	25	2	8	--	--	62	Medium	48.50	21.00	27.50	11.75	50
3.	1.8 To 2.10m	NA	2	16	54	12	8	22	NA	48.50	21.00	27.50	11.75	50
4.	2.1 To 2.40m	24 @ 2.4m	--	68 Lime Particles		8	--	22	Medium	48.50	21.00	27.50	11.75	50
5.	2.40 To 3.0m	28 @ 3.0m	--	18	80	--	--	--	Medium	--	--	--	--	--
6.	3.0 To 4.50m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--
7.	4.5 to 6.0m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--
8.	6.0 to 7.5m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--
9.0	7.5 to 9.0m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--
10.0	9.0 to 10.5m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--

Table 7


Chief Executive
Sceba Consultancy Services

Sl No .	Depth m	'N' Value Cor.	Type of Soil	Density KN/m ³ (Mean)	Bearing Capacity Parameters			'Φ'	'C' Value (mean) KN/M ²	SBC KN/Sqm	
					Nc	Nr	Nq			Shear	Settlement 40mm
1.	0.0 to 1.2m	NA	Clay soil traces of Gravel black in color	NA	5.67	NA	NA	NA	NA	NA	Reactive Zone
2.	1.2 To 1.8m	20 @ 1.5m	Gravel Clay reddish Brown in Color	20	5.67	NA	NA	NA	135	NA	Reactive Zone
3.	1.8 To 2.10m	20	Clayey Sand Reddish Brown in Color	20	5.67	NA	NA	NA	135	NA	Reactive Zone
4.	2.1 To 2.40m	24 @ 2.4m	Clayey Lime gravels	>20	5.67	NA	NA	NA	162	NA	Reactive Zone
5.	2.40 To 3.0m	28 @ 3.0m	Medium Lime Particles with Clay whitish brown in color	>25	46.12	33.30	48.03	35°	Nil	NA	322 @ 3.0m
6.	3.0 To 4.50m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
7.	4.5 to 6.0m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
8.	6.0 to 7.5m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
9.0	7.5 to 9.0m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
10.	9.0 to 10.5m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500

Table 7-A

 Chief Executive
 Sceba Consultancy Services

Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai .

Borehole NO. 8 Index Properties(Auger Drill)

Sl No .	Depth m	'N' Value Cor.	Grain size Distribution						Relative Density	Liquid Limit %	Plastic Limit %	Plasticity Index %	Shrinkage Limit %	Degree Of Free Swelling %
			Gravel %	Sand % Coarse, Medium, Fine			Silt %	Clay %						
				C	M	F								
1.	0.0 to 0.90 m	NA		2	--	18	--	78	NA	78.0	44.8	33.2	6.8	100
2.	0.90 To 1.8m	12 @ 1.5m	6	--	--	12	--	80	Mediu m	45.0	23.0	22.0	12.60	50
3.	1.8 To 2.40m	NA	16 Lime Stone	8	--	--	--	74	--	72.5	41.7	30.8	7.2	80
4.	2.4 To 2.65m	NA	62 Lime Stone (L.S)	--	22	--	--	12	--	--	--	--	--	--
5.	2.65 To 3.0m	>50 @ 3.0m	--	22	52	--	24	--	Hard					
6.	3.0 To 4.50m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--
7.	4.5 to 6.0m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--
8.	6.0 to 7.5m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--
9.0	7.5 to 9.0m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--
10.	9.0 to 10.5m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--

Table 8


Chief Executive
Sceba Consultancy Services

Sl No.	Depth m	'N' Value Cor.	Type of Soil	Density KN/m ³ (Mean)	Bearing Capacity Parameters			'Φ'	'C' Value (mean) KN/M ²	SBC KN/Sqm	
					Nc	Nr	Nq			Shear	Settlement 40mm
1.	0.0 to 0.90 m	NA	Sand Clay Brown in color	NA	5.67	NA	NA	NA	NA	NA	Reactive Zone
2.	0.90 To 1.8m	12 @ 1.5m	Sand Clayey Brown in Color	15	5.67	NA	NA	NA	75	NA	Reactive Zone
3.	1.8 To 2.40m	12	Lime Gravel Clay whitish brown in color	15	5.67	NA	NA	NA	75	NA	Reactive Zone
4.	2.4 To 2.65m	12	Lime gravel with traces of Clay soil whitish Brown in color	15	5.67	NA	NA	NA	75	NA	Reactive Zone
5.	2.65 To 3.0m	>50 @ 3.0m	Medium Lime Particles with Clay fissures whitish brown in color	>32	51.96	39.48	60.20	38°	Nil	NA	>500 @ 3.0m
6.	3.0 To 4.50m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
7.	4.5 to 6.0m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
8.	6.0 to 7.5m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
9.0	7.5 to 9.0m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
10.	9.0 to 10.5m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500

Table 8-A

 Chief Executive
 Sceba Consultancy Services

Proposed Construction of PMSSY Health project, Government Rajaji Hospital, Madurai.

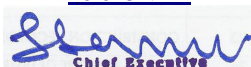
Borehole NO. 9 Index Properties (Auger Drill)

Sl No .	Depth m	'N' Value Cor.	Grain size Distribution						Relative Density	Liquid Limit %	Plastic Limit %	Plasticity Index %	Shrinkage Limit %	Degree Of Free Swelling %
			Gravel %	Sand % Coarse, Medium, Fine			Silt %	Clay %						
				C	M	F								
1.	0.0 to 0.90 m	NA	--	12 Lime stones	--	--	--	88	NA	76.4	44.0	32.0	7.2	100
2.	0.90 To 1.8m	18 @ 1.5m	---	--	--	--	--	100	Medium	76.4	44.0	32.0	7.2	100
3.	1.8 To 2.10m	NA	4	53 Lime Stone	--	--	--	40	--	38.0	20.0	18.0	14.0	50
4.	2.1 To 2.40m	26 @ 2.4	4	6 Lime Stone	--	--	--	90	Medium	74.0	40.5	33.5	10.8	80
5.	2.40 To 3.0m	30 @ 3.0m		54.0	6	--	--	Clay Fissures	Hard	--	--	--	--	--
6.	3.0 To 4.50m	>50 @ 4.5m	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--
7.	6.0 to 7.5m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--
8.	7.5 to 9.0m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--
9.0	9.0 to 10.5m	Hard strata (H.S)	Hard strata (H.S)	Hard strata (H.S)	---		--	--	--	--	--	--	--	--

Table 9


Chief Executive
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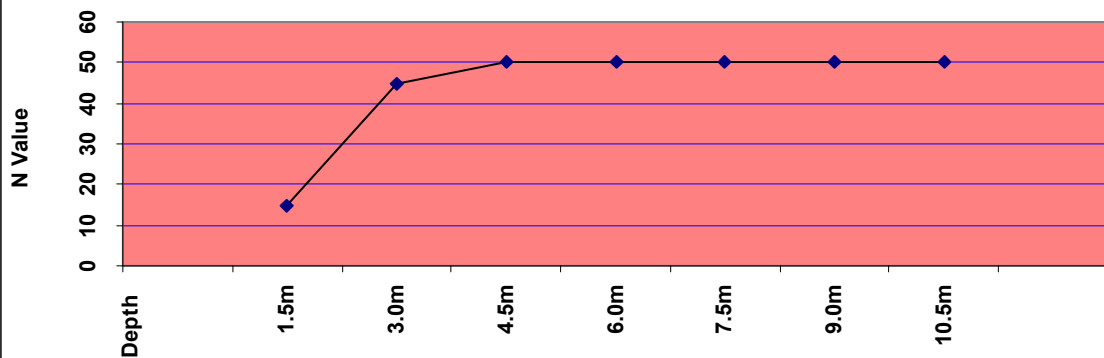
Sl No	Depth m	'N' Value Cor.	Type of Soil	Density KN/m ³ (Mean)	Bearing Capacity Parameters			'Φ'	'C' Value (mean) KN/M ²	SBC KN/Sqm	
					Nc	Nr	Nq			Shear	Settlement 40mm
1.	0.0 to 0.90 m	NA	Clay soil with coarse lime stones	NA	5.67	NA	NA	NA	NA	NA	Reactive Zone
2.	0.90 To 1.8m	18 @ 1.5m	Clay soils	19.0	5.67	NA	NA	NA	175	NA	Reactive Zone
3.	1.8 To 2.10m	18	Clayey Coarse sand	19.0	5.67	NA	NA	NA	175	NA	Reactive Zone
4.	2.1 To 2.40m	26 @ 2.4	Clay soil traces of Lime stones	>20	5.67	NA	NA	NA	170	NA	Reactive Zone
5.	2.40 To 3.0m	30 @ 3.0m	Coarse Lime particles with Clay fissures	>25	51.96	39.48	60.20	36°	Nil	NA	368 @ 3.0m
6.	3.0 To 4.50m	>50 @ 4.5m	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
7.	6.0 to 7.5m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
8.	7.5 to 9.0m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
9.0	9.0 to 10.5m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500
10.	9.0 to 10.5m	Hard strata (H.S)	Hard strata	>32	63.63	51.84	84.85	38°	Nil	>500	>500

Table 9-A

 Chief Executive
 Sceba Consultancy Services

**Proposed Construction of PMSSY Health project, Government Rajaji Hospital,
Madurai**

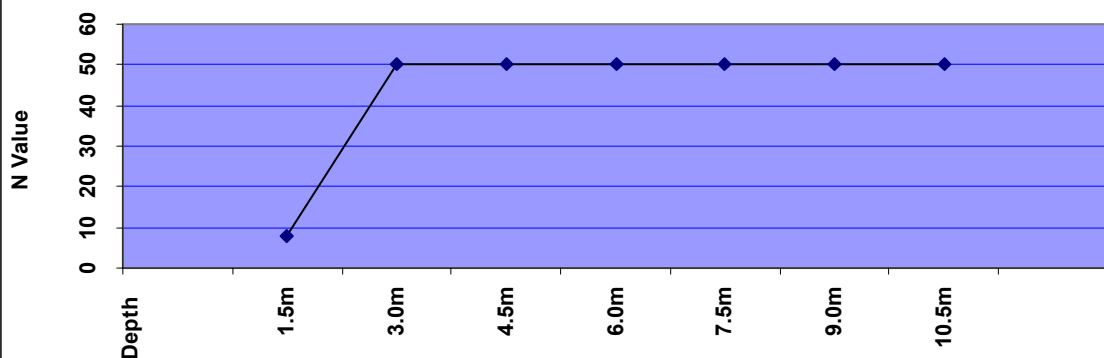
Bh1

Geo Tech Design 'N'- Value vs Depth



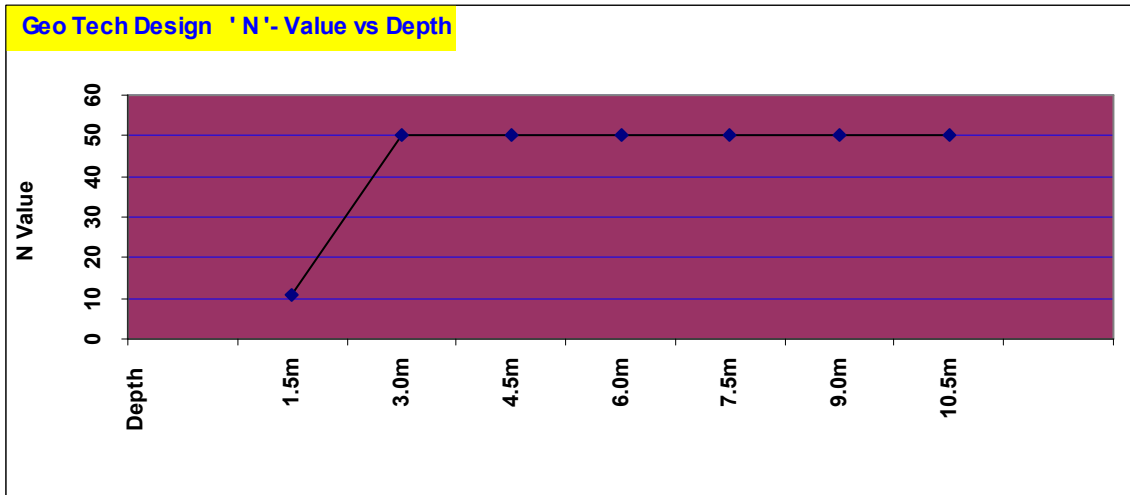
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Geo Tech Design 'N'- Value vs Depth

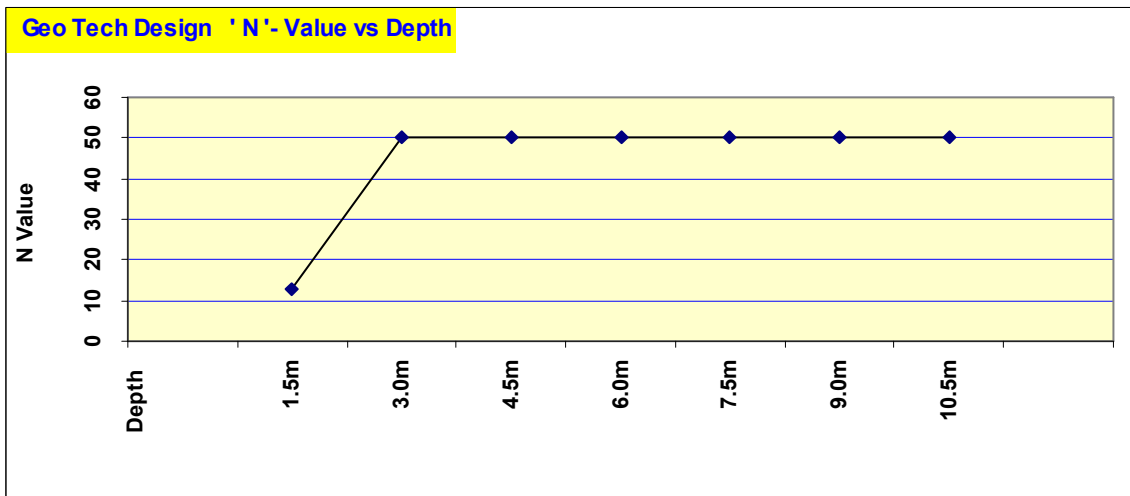



Chief Executive
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Proposed Construction of PMSSY Health project, Government Rajaji Hospital,
Madurai
Bh 3

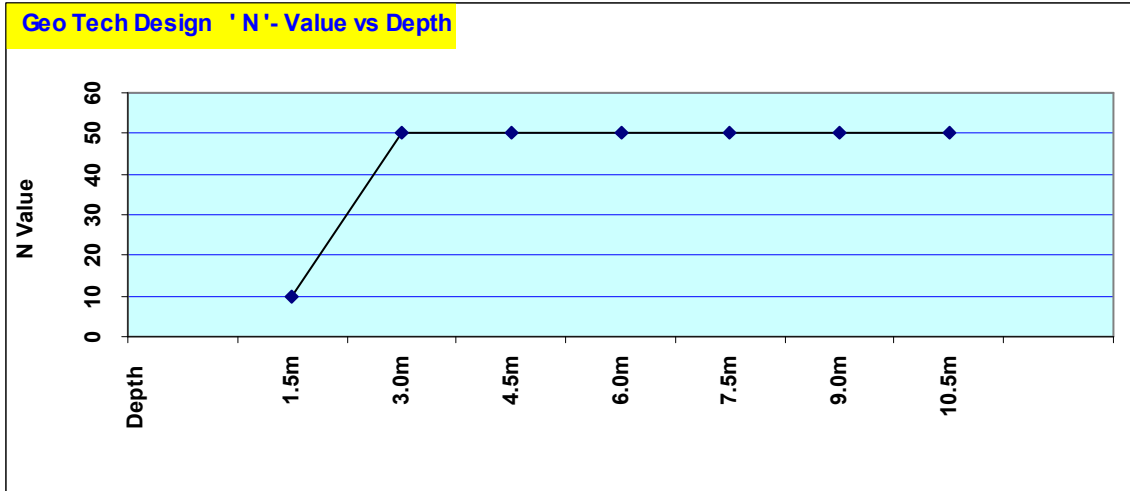


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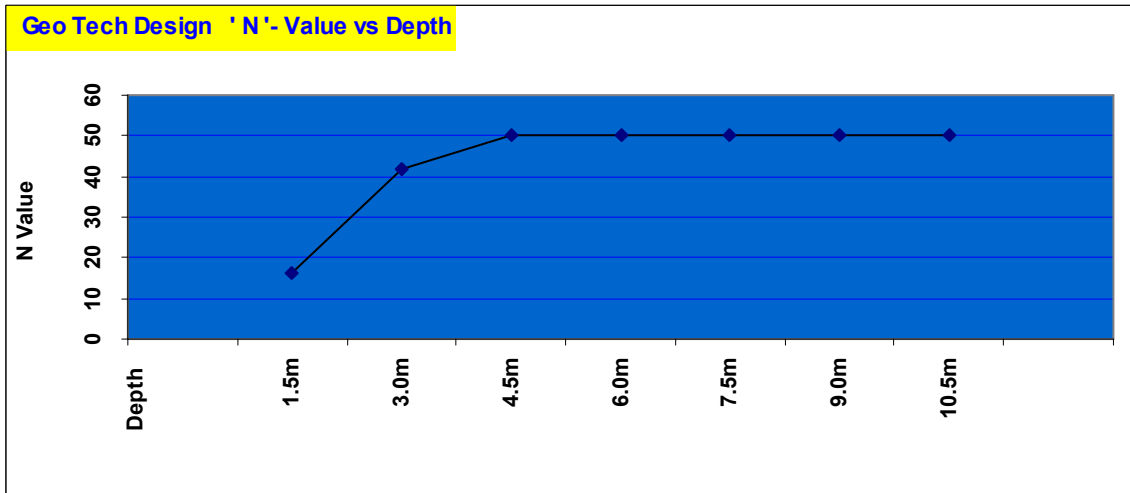



Chief Executive
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Proposed Construction of PMSSY Health project, Government Rajaji Hospital,
Madurai
Bh 5

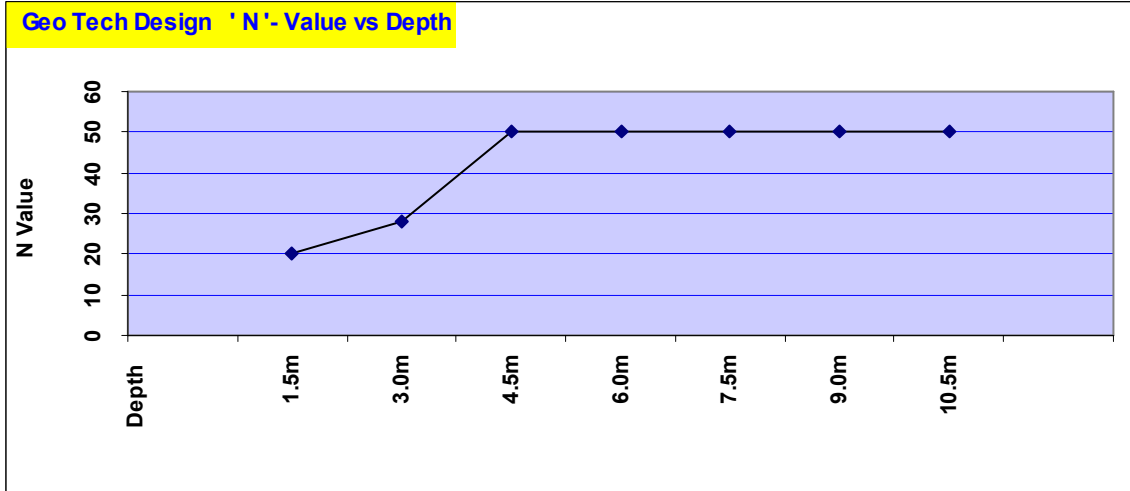


Bh 6

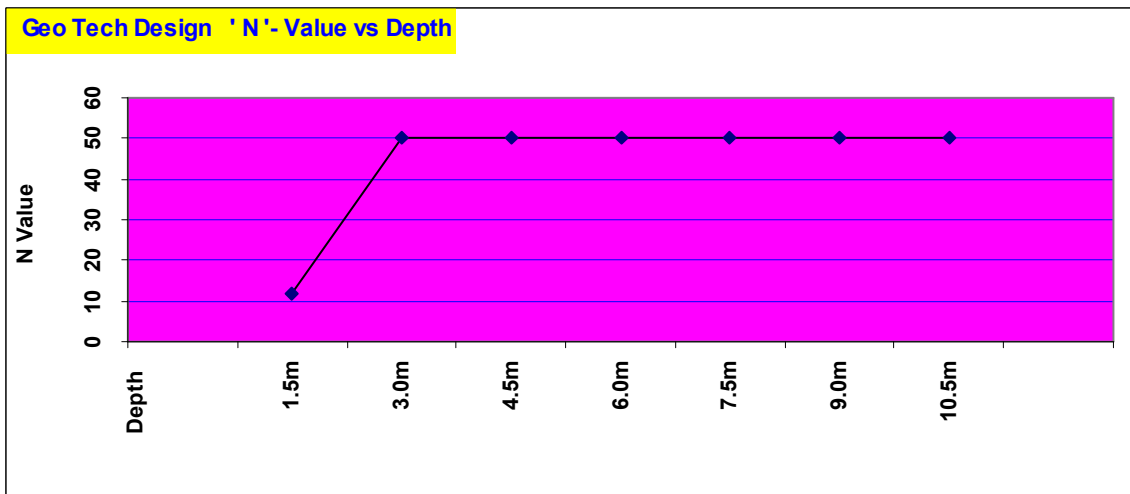




Chief Executive
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Proposed Construction of PMSSY Health project, Government Rajaji Hospital,
Madurai
Bh.7



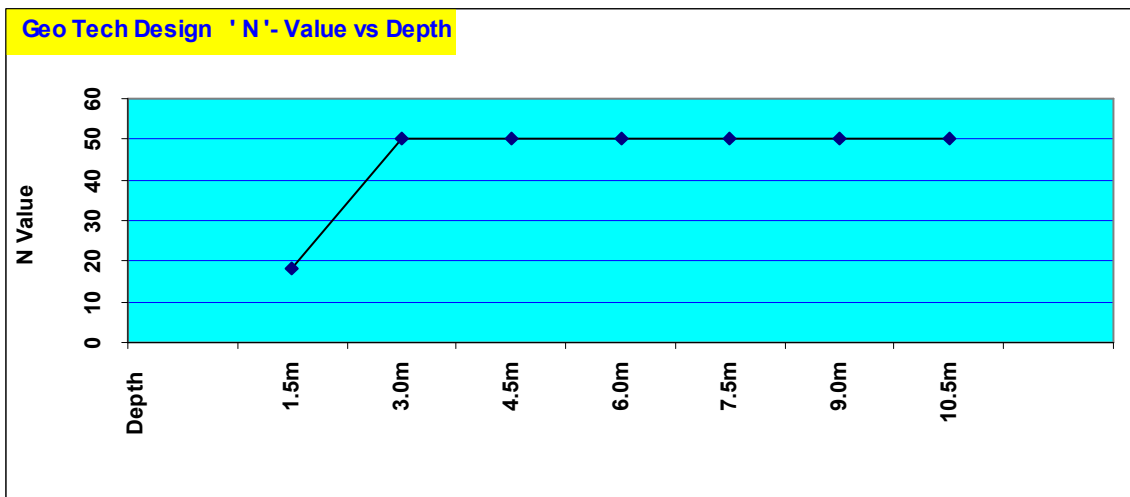
Bh.8





Chief Executive
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Proposed Construction of PMSSY Health project, Government Rajaji Hospital,
Madurai

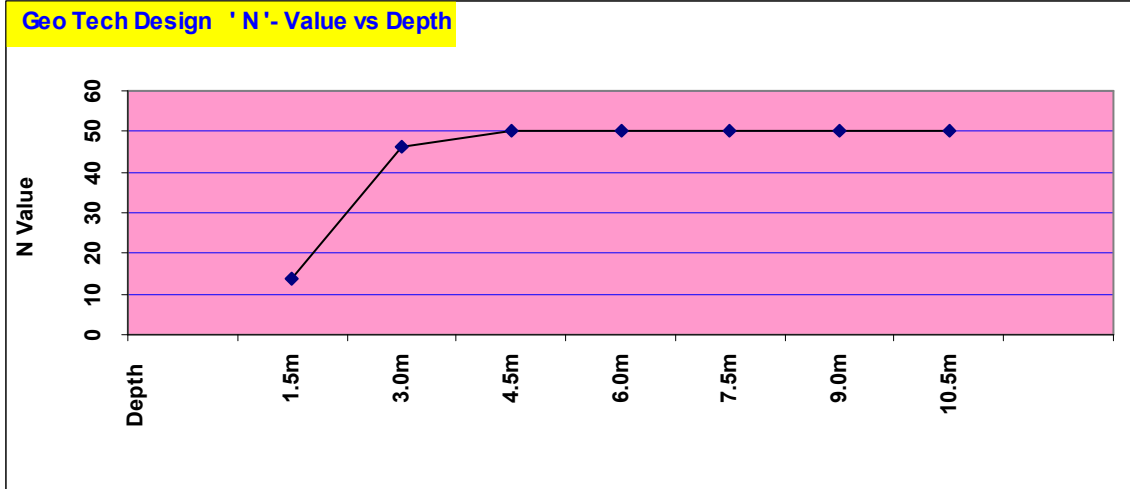
Bh 9



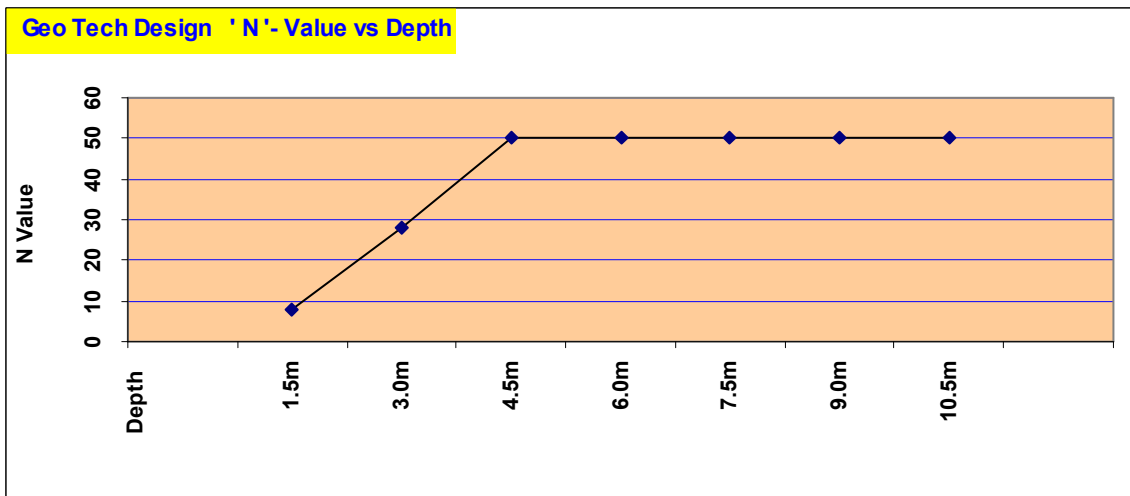

Chief Executive
Sceba Consultancy Services

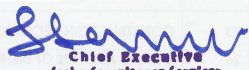
**Proposed Construction of PMSSY Health project, Government Rajaji Hospital,
Madurai**

Mean Values



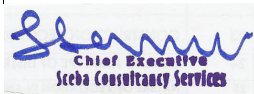
**Critical
Values**




Chief Executive
Sceba Consultancy Services

FINAL BILL**S.Ratnavel****ACPPR5657K****Proprietor****Sceba Consultancy Services,****Penthouse, Bougainvillea,****106, P.T.Rajan Road, Madurai.14****0452-2522455, 2522555.****Project: Proposed Construction of PMSSY Health project, Madurai.****Architect: Srikar & Associates (P) Ltd., Bangalore.**

Sno.	Description	Unit	Qty.	Rate Rs.	Amount Rs.	Remarks
1.	a)Soil Investigation using Calyx drill using Nx100 diamond Pit and conducting SPT @ 1.5m interval unto Hard Strata as per the report .	Per hole	5 nos.	20000.00	1,00,000.00	As per quotation
	b)Soil Investigation using Manual helical auger using 15 cm helical auger and conducting LCPT dynamic test at 1.5m interval unto Hard Strata as per the report .	Per hole	4 nos.	8500.00	34000.00	As per quotation
II	Additional Depth	Per hole	Nil	Nil	Nil	
III	Geotechnical Lab, and Calculations etc complete.	Per hole	L.S	L.S	Included	
IV	Geotechnical Analysis and Calculations etc complete.	Per hole	L.S	L.S	Included	
	a) Calyx drill Equipment Mobilization and handling etc.				9000.00	As per quotation
	b) Auger Drill and LCPT accessories mobilization etc.				6000.00	As per quotation
	Total (One lac .and Forty Nine Thousand only)				149000.00	
	Advance Received (As per NEFT-Message)				75000.00	
	Bank details; Name of Account Holder: S.Rathinavelu Name of Bank: Syndicate Bank. Sellur Branch, Madurai. IFSC:SYNB- 0006206 A/CNo.6206-220-0015960					
	Final Balance(Seventy Four Thousand Only)				74000.00	



Chief Executive
Sceba Consultancy Services

*Sanna. Ratnavel***Madurai.****Date: 11/04/2012**