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SHRI BALAJI GEOTECH

Soil Investigations, Rock Core Drilling, Grouting works, Foundation & Structural Design
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SHRI BALAJI
GEOTECH

SBGT/CIV/2022-2023/59

SOIL INVESTIGATION REPORT

Name of Work: CONDUCTING SOIL EXPLORATION FOR PROPOSED CONSTRUCTION OF R.C.C TERRACED ROOF 30 DWELLINGS RESIDENTIAL BUILDING AT OLD T.S.NO: 6/1 PT,NEW WARD - E , BLOCK-21, T.S.NO: 2/3 , ERODE MUNICIPAL CORPORATION, ERODE TALUK & DISTRICT.

CLIENT:

Mr. SENTHILKUMAR,
S/O SIVAJI KRISHNAN
Mr.P.ASHOK, S/O K.PERIYASAMY

SHRI BALAJI GEOTECH ★ SALEM

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1 Introduction

Geotechnical Investigation for the **"CONDUCTING SOIL EXPLORATION FOR PROPOSED CONSTRUCTION OF R.C.C TERRACED ROOF 30 DWELLINGS RESIDENTIAL BUILDING AT OLD T.S.NO: 6/1 PT,NEW WARD - E , BLOCK-21, T.S.NO: 2/3 , ERODE MUNICIPAL CORPORATION, ERODE TALUK & DISTRICT".** was carried out by SHRI BALAJI GEOTECH, SALEM.

2 Scope of Work

- Two bore holes is drilled through mechanically operated rotary drilling machine.
- Proposed construction of Residential Building up to hard strata for preliminary identification of type and extent of soil layers.
- The Safe Bearing Capacity of layers at different depth is based on Standard Penetration test values which are conducted in the bore holes at regular intervals.
- Submitting geotechnical investigation report for the above project based on field and laboratory test results and recommendation of suitable foundation systems based on as per IS-1892 and IS -2720.

3 Field work

Field investigations were carried out through mechanically operated rotary drilling machine

3.1 Drilling through soil medium

3.1.1 ROTARY BORING

Rotary drilling technique was adapted using Rotary drilling machine in the proposed project. In this method, boring is effected by the cutting action of a rotating bit that is kept in firm contact with the bottom of the hole. The bit is attached to the lower end of a hollow drill rod that is rotated by a suitable chuck. Drilling mud (usually Bentonite) is continuously forced down the hollow drill rods. The mud returning upwards though the annular space between the drill rods and the side of the hold bring the cutting to the surface.

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3.1.2. STANDARD PENETRATION TEST

It is now most commonly used in site test. The test measures the penetration resistance of the split spoon sampler, when it is driven into the soil, at the bottom of a borehole in a standard manner. The N-value, which is the number of blow required to achieve 300mm penetration of the soil, indicates the relative density of sand or gravel, the consistency of other soil such as silts or clays and the strength of weak rocks. The test is described in IS 2131 - 1981. The split spoon sampler is attached to stiff drill rod and lowered to the bottom of the bore hold. A standard blow consists of dropping a mass of 63.5kg free fall through 750 mm on to an anvil at the top of the rods and ensuing that this amount of dynamic energy is transferred to the sampler as much as possible.

The number of blows required to achieve each 150mm penetration is recorded for a fall penetration of 450mm. The initial 150mm penetration is referred to as seating drive and the blows required for this penetration are not considered as this zone is in disturbed soil. The next 300mm of penetration is referred to as the test drive and the number of blows required to achieve this fully is termed the penetration resistance or N-value. The SPT results are given in the annexure

4. SAMPLING:

The disturbed samples were collected through SPT sampler and undisturbed samples were collected through brass tube, properly waxed on both sides then sent to laboratory for analysis.

4. 1 LABORATORY TESTS

Following laboratory tests are conducted as per IS codes.

a. Sieve analysis- IS 2720 Part 4
b. Specific gravity –IS 2720-Part 3/Sec 1
c. Unconfined compressive strength-IS 2720-Part 10
d. Direct Shear test-IS 2720 Part 13 & Part 39 Sec 1
e. Natural Moisture Content-IS 2720 Part 2
f. Soil classification as per IS 1498-1970

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5. Subsoil Conditions

The soil conditions at this site found through Standard Penetration Test samples N Values are obtained. The Two boreholes are terminated at a maximum depth of 5.00 m from Natural Ground level which are shown in bore logs.

6. Engineering Appraisal

Based on Laboratory results on the samples collected from investigation locations, the shear strength parameters such as C (Cohesive Strength) and Φ (angle of internal friction) can be correlated with SPT values.

7. Design Methodology

The Safe Bearing Capacity of the soil can be calculated on Shear failure Criteria and Settlement Criteria and any foundation system has to satisfy the above said criteria. The former one depends on shear strength and the bearing capacity equation suggested by IS 6403 as follows.

Net ultimate Bearing Capacity is given by

$$C\ Nc\ Sc\ dc\ ic + \gamma\ D\ (Nq - 1)\ Sq\ dq\ iq + 0.5\ \gamma\ B\ N\gamma\ S\gamma\ d\gamma\ i\gamma\ W'$$

The Safe Bearing Capacity is the maximum gross intensity of loading that the soil can carry safely without failing in shear which is obtained by the Net ultimate Bearing Capacity divided by factor of safety (2.5 to 3.0)

The later one follows Settlement Criteria, that the intensity of the loading will cause within the permissible settlement is termed as allowable bearing pressure given by

Safe bearing capacity (SBC) = $1.4\ (N-3)\ \{(B+0.3)/2B\}^2$ X RW X S+P Where,

N = Corrected N value N2

B = Width of Foundation = constant 1

RW = Water Correction, If water table at

founding level is 0.5 and 1.0 for not occur.

FD = Depth of Factor = constant 1

P = Over Burden Pressure

S = Permissible settlement

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8. Safe Bearing Capacity

The recommended safe bearing capacity at various depth based on SPT results are tabulated in the annexure.

9. Depth of Foundation

Minimum depth of foundations is governed by the following factors:

- Avoid Top loose zone.
- Adequate depth of soil above founding level, to ensure mobilization of full safe bearing Capacity.
- Adequate depth of soil strata below founding level of requisite strength to mobilize the safe bearing capacity and at the same time restricts the total and differential settlements within the allowable limits.

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10. FOUNDATION RECOMMENDATIONS:

The site for **CONDUCTING SOIL EXPLORATION FOR PROPOSED CONSTRUCTION OF R.C.C TERRACED ROOF 30 DWELLINGS RESIDENTIAL BUILDING AT OLD T.S.NO: 6/1 PT,NEW WARD - E , BLOCK-21, T.S.NO: 2/3 , ERODE MUNICIPAL CORPORATION, ERODE TALUK & DISTRICT.** The borehole investigation was conducted and SBC was determined.

1. The safe bearing capacity of soil for site at successive depth mentioned in soil test results. The recommendation depth of foundation in 3.00m from natural ground level. The SBC of soil is varying from one location to another location.

2. The recommended SBC of soil is 30.00 ton/sq.m for this site which is covered around 8000 sq.ft from the location of borehole investigation done.

3. Open foundation may be recommend for this site as per field investigation, Designer may change type of foundation as structural condition.

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FIELD BORE LOG REPORT

Name of Work	CONDUCTING SOIL EXPLORATION FOR PROPOSED CONSTRUCTION OF R.C.C TERRACED ROOF 30 DWELLINGS RESIDENTIAL BUILDING AT OLD T.S.NO: 6/1 PT,NEW WARD - E , BLOCK-21, T.S.NO: 2/3 , ERODE MUNICIPAL CORPORATION, ERODE TALUK & DISTRICT						SHRI BALAJI GEOTECH
Name of Contractor	SHRI BALAJI GEOTECH ,SALEM						
Name of Client	Mr. SENTHILKUMAR, S/O SIVAJI KRISHNAN Mr.P.ASHOK, S/O K.PERIYASAMY						
Type of Bore:	Rotary Circular Drilling				CH :-		-
Period:	06/07/2022-07/07/2022				RL:-		-
Bore No : 1	LAT: 11.341		LONG: 77.7172		Water Table in Metre :		NOT MET
LOCATION	NORTH EAST				Weather Condition:		SUNNY

Graphic Log	Depth in Metre	Soil Description	Thickness of each soil Layers in metre	Depth in metre	Standard Penetration Test (SPT) Data IS : 2131 - 1981				Soil Collection		Rock Samples IS : 11315 (Part. 11) -1985		Graphical Representation of Penetration Resistance (SPT in No. of Blows / 30 cm Penetration) Depth Vs Blows	Remarks
					0.0 - 15.0 Cms	15.0 - 30.0 Cms	30.0 - 45.0 Cms	SPT Value in No.of Blows/Cms	UDS/DS	IS CLASSIFICATION	Percentage of Rock Core Recovery	Percentage of Rock Quality Designation (RQD)		
		POORLY GRADED GRAVELS	3.00	1.00	9	14	18	32	DS	GP	-	-		ABBREVIATIONS : GL -Ground Level , DS -Disturbed Soil ,UDS - Undisturbed Soil ,RB -Rebound , WS -Washing Sample
				2.00	12	17	22	39	DS		-	-		
	3.00			3.00	15	20	24	44	DS		-	-		
		SOFT DISITEGRATED ROCK	2.00	4.00	50/8	RB	-	>50	DS	SDR	-	-		
	5.00			5.00	RB	-	-	>50	DS		-	-		

Bore Terminated at 5.00m from NGL

Note :
1. The bore has been closed as per the field officers instruction.
2. Number of Disturbed Samples (DS)... 5
3. Number of Undisturbed Soil Samples (UDS) ... -
4. Number of Soft Rock Core Bits ... -
5. Number of Hard Rock Core Bits ... -
6. Soft / Hard Rock Core Dia (Ø) ... -

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FIELD BORE LOG REPORT

Name of Work	CONDUCTING SOIL EXPLORATION FOR PROPOSED CONSTRUCTION OF R.C.C TERRACED ROOF 30 DWELLINGS RESIDENTIAL BUILDING AT OLD T.S.NO: 6/1 PT,NEW WARD - E , BLOCK-21, T.S.NO: 2/3 , ERODE MUNICIPAL CORPORATION, ERODE TALUK & DISTRICT						SHRI BALAJI GEOTECH
Name of Contractor	SHRI BALAJI GEOTECH ,SALEM						
Name of Client	Mr. SENTHILKUMAR, S/O SIVAJI KRISHNAN Mr.P.ASHOK, S/O K.PERIYASAMY						
Type of Bore:	Rotary Circular Drilling				CH :-		-
Period:	7/7/2022				RL:-		-
Bore No :	2	LAT:	11.341	LONG: 77.7172	Water Table in Metre :		NOT MET
LOCATION	NORTH EAST				Weather Condition:		SUNNY

Graphic Log	Depth in Metre	Soil Description	Thickness of each soil Layers in metre	Depth in metre	Standard Penetration Test (SPT) Data IS : 2131 - 1981				Soil Collection		Rock Samples IS : 11315 (Part. 11) -1985		Graphical Representation of Penetration Resistance (SPT in No. of Blows / 30 cm Penetration Depth Vs Blows	Remarks
					0.0 - 15.0 Cms	15.0 - 30.0 Cms	30.0 - 45.0 Cms	SPT Value in No.of Blows/Cms	UDS/DS	IS CLASSIFICATION	Percentage of Rock Core Recovery	Percentage of Rock Quality Designation (RQD)		
		SILTY SAND	2.00	1.00	12	16	20	36	DS	SM	-	-		ABBREVIATIONS : GL -Ground Level . DS -Disturbed Soil .UDS - Undisturbed Soil .RB -Rebound .WS -Washing Sample
	2.00			2.00	16	20	24	44	DS		-	-		
		SOFT DISITEGRATED ROCK	3.00	3.00	19	23	26	49	DS	SDR	-	-		
				4.00	50/10	RB	-	>50	DS		-	-		
	5.00			5.00	RB	-	-	>50	DS		-	-		

Bore Terminated at 5.00m from NGL

Note :	1.The bore has been closed as per the field officers instruction.			4. Number of Soft Rock Core Bits	
	2. Number of Disturbed Samples (DS)...	5		5. Number of Hard Rock Core Bits	-
	3. Number of Undisturbed Soil Samples (UDS)	-		6. Soft / Hard Rock Core Dia (Ø)	-

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SOIL TEST RESULTS

Name of work: CONDUCTING SOIL EXPLORATION FOR PROPOSED CONSTRUCTION OF R.C.C TERRACED ROOF 30 DWELLINGS RESIDENTIAL BUILDING AT OLD T.S.NO: 6/1 PT,NEW WARD - E , BLOCK-21, T.S.NO: 2/3 , ERODE MUNICIPAL CORPORATION, ERODE TALUK & DISTRICT

SHRI BALAJI GEOTECH, SALEM					BORE NUMBER - 1			LOCATION:						GROUND WATER LEVEL:NIL	WORK COMMENCED ON 06.07.2022		WORK COMPLETED ON 07.07.2022			
					INDEX TEST			SIEVE ANALYSIS % RETAINED IS SIEVE ANALYSIS							SHEAR TEST		STANDARD PENETRATION TEST			
SOIL PROFILE AND DEPTH IN METRES	DEPTH OF SAMPLING	IS SOIL CLASSIFICATION	NATURAL WET DENSITY	NATURAL MOISTURE CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX	GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	SILT	CLAY	SPECIFIC GRAVITY	COHESION C Ton / M^2	ANGLE OF INTERNAL FRICTION ^{0}	DEPTH OF TESTING M	OBSERVED N VALUE	CORRECTED N VALUE	SAFE BEARING CAPACITY T/m^2
			15.4	13.6	NP	NP	NP	1	16	74	9	-	-	2.65	-	27.5	1.00	32	35.34	24.60
		GP	16.3	10.5	NP	NP	NP	2	11	74	13	-	-	2.66	-	29.8	2.00	39	40.03	28.76
	3.00		-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.00	44	41.42	30.50
																	4.00	>50	50.00	37.58
		SDR															5.00	>50	50.00	38.28
	5.00																			

GP-POORLY GRADED GRAVELS, SDR-SOFT DINITEGRATED ROCK, SBC based on SPT N value. NP – Non plastic.

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SOIL TEST RESULTS

SBGT/CIV/2022-2023/59

Name of work: CONDUCTING SOIL EXPLORATION FOR PROPOSED CONSTRUCTION OF R.C.C TERRACED ROOF 30 DWELLINGS RESIDENTIAL BUILDING AT OLD T.S.NO: 6/1 PT,NEW WARD - E , BLOCK-21, T.S.NO: 2/3 , ERODE MUNICIPAL CORPORATION, ERODE TALUK & DISTRICT

SHRI BALAJI GEOTECH, SALEM					BORE NUMBER - 2			LOCATION:						GROUND WATER LEVEL:NIL	WORK COMMENCED ON 07.07.2022		WORK COMPLETED ON 07.07.2022			
					INDEX TEST			SIEVE ANALYSIS % RETAINED IS SIEVE ANALYSIS							SHEAR TEST		STANDARD PENETRATION TEST			
SOIL PROFILE AND DEPTH IN METRES	DEPTH OF SAMPLING	IS SOIL CLASSIFICATION	NATURAL WET DENSITY	NATURAL MOISTURE CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX	GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	SILT	CLAY	SPECIFIC GRAVITY	COHESION C Ton / M^2	ANGLE OF INTERNAL FRICTION ^{0}	DEPTH OF TESTING M	OBSERVED N VALUE	CORRECTED N VALUE	SAFE BEARING CAPACITY T/m^2
			14.9	24.5	NP	NP	NP	-	2	61	35	2	-	2.65	-	26	1.00	36	38.82	27.17
			15.4	10.5	NP	NP	NP	1	3	62	30	4	-	2.66	-	27.8	2.00	44	44.20	31.84
		SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.00	49	45.28	33.34
	2.00																4.00	>50	50.00	37.58
		SDR															5.00	>50	50.00	38.28
	5.00																			

SM-SILTY SAND, SDR-SOFT DINITEGRATED ROCK, SBC based on SPT N value. NP – Non plastic.

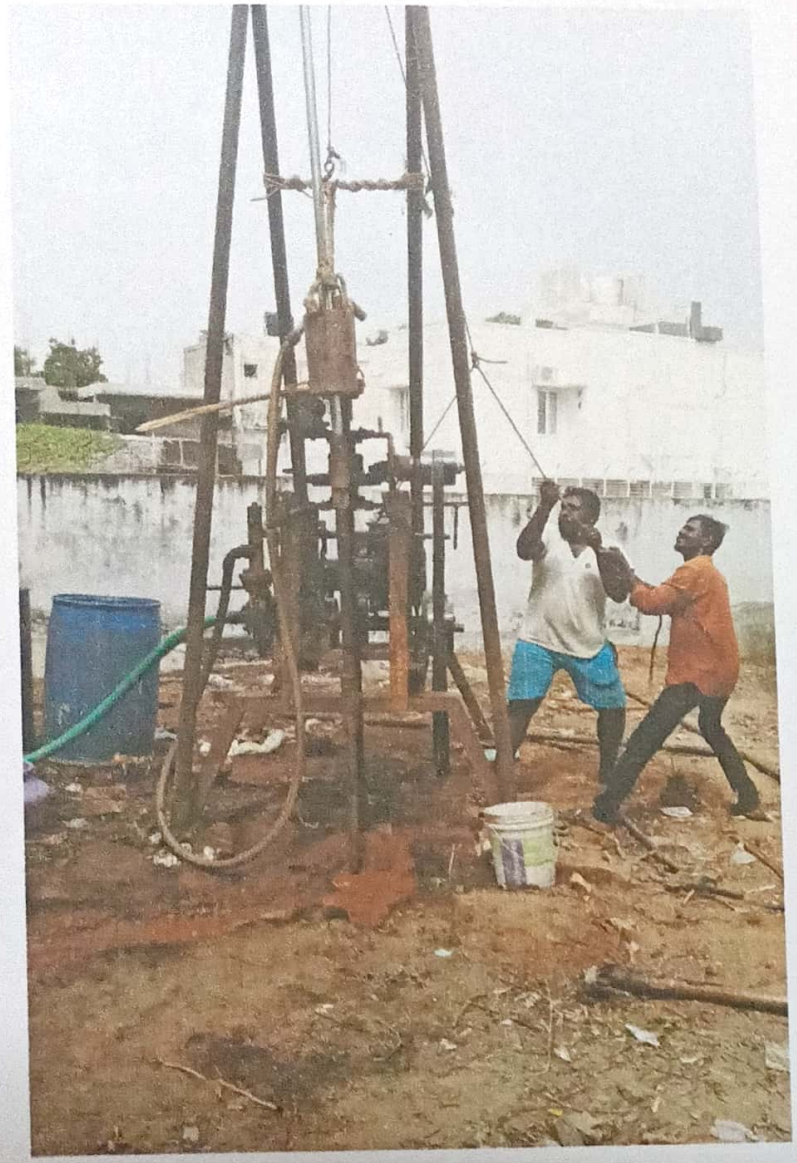
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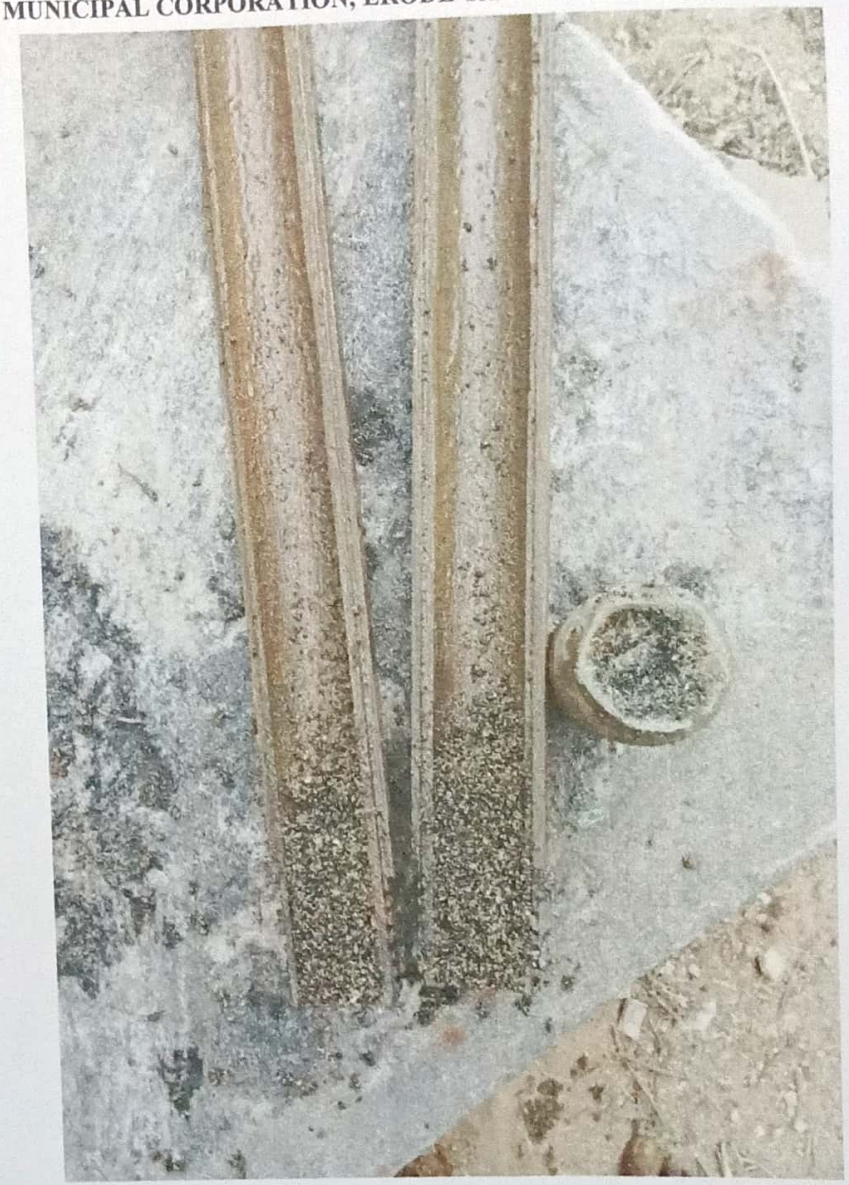
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SITE IMAGES

Name of work: CONDUCTING SOIL EXPLORATION FOR PROPOSED CONSTRUCTION OF R.C.C TERRACED ROOF 30 DWELLINGS RESIDENTIAL BUILDING AT OLD T.S.NO: 6/1 PT,NEW WARD - E , BLOCK-21, T.S.NO: 2/3 , ERODE MUNICIPAL CORPORATION, ERODE TALUK & DISTRICT



SITE IMAGE 1



SITE IMAGE 2

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