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Soil investigation

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Abstract - civil engineering practice faces many challenges and encounters with soil which is used as foundation to support the structures and also commonly used as construction material. This fact necessitates a detailed study of the geological and geotechnical characteristics of the soil, so that a successful solution can be obtained for the various problems for the structures; arising due to the poor and undesirable Geological The and engineering properties of the supporting soil. Geologists work hand in hand with civil engineers particularly geotechnical engineers in almost all areas of civil engineering field. Geology aids the geotechnical engineer owing to the fact that the method of formation of soil mass influences its size, shape and behavior.

1. INTRODUCTION

The objective of the report is restricted to the factual information to be collected investigation period along with laboratory tests results and so as to obtain sequence & extent of soil so as to arrive at design parameters for the foundations from the recommended safe bearing capacity of foundation soil.

2. LITERATURE REVIEW

Soil investigation and laboratory testing are presented and the vibro design principle in particular use of a modification of soil around the stone column are outlined, the effect of subsurface investigation on construction cost over runs by examining the result from the database and subsurface condition cost overruns increase with decreases site investigation expense related to total construction cost.

3. METHODOLOGY

Keeping in mind the general objectives of the project a detailed methodology for undertaking the project is proposed which consists of a set task as given below.

The laboratory tests on soil samples were started immediately after the receipt of the same in the laboratory. Following laboratory tests are carried out to determine the physical and engineering properties of undisturbed and disturbed soil samples.

1. Dry density and moisture content (IS 2720 part - 2 & 29)

2. Particle size analysis - (IS 2720 part - 4 1985)

3. Atterberg's limit - (IS 2720 part - 5 1985)

4. Specific gravity - (IS 2720 part - 3/sec2 1980)

4. GENERALIZE BORE HOLE LOG(SUBSURFACE)

Table 1:

Borehole identity	Generalize depth m	Soil characteristic
BH#1	0.00-4.5	Light brownish to greyish medium dense fine silty sand
	4.5-15	Greyish to yellowish medium plastic very stiff to hard silty clay.
BH#2	0-1.5	Greyish to yellowish loose medium dense fine silty sand
	1.5-15	Greyish medium dense to fine silty sand.

Table 2:

	Generalize depth m	Generalize soil characteristics	N-design	q-design	c-design,KN/m
1	0.0- 4.5	Loose to medium dense fine silty sand	11	26	0
2	4.5-15.0	Stiff to very stiff medium plastic silty clay	21	20	20
3	15 onwards	Medium dense fine to coarse sand	24,25,26,...(Nth+1)...	32	0

5. RESULTS AND DISCUSSION

5.1. LABROTARY TEST FOR BOREHOLE -1

TEST CONDUCTED	RESULTS
Alterberg's Limit	Liquid limit(graph)=48% Flow index(graph)=227 Plastic limit=27.2% Plasticity index=21.3% Liquidity index=0.263 Consistency index=0.734 Toughness index=0.94
Specific gravity	2.66
Water content	7.8%

TEST CONDUCTED	RESULTS
Alterberg's Limit	Liquid limit=49% Flow index=229 Plastic limit=28.4% Plasticity index=22.1% Liquid index=0.294 Consistency index=0.845

	Toughness index=0.97
Specific gravity	2.71
Water content	8.1%

5.2. LABROTARY TEST FOR BOREHOLE-2

Table 4.3.Field Test for Borehole-1

Boring depth in m	Description of strata	Sample type number (m)	Field tests type results	Remarks
0.0	Reddish brown clay silt with sand	Ds @ 0.5		
1.5	Brownish white silty sand	Spt @ 1.5	6,7,8	N=15
3.0	Reddish yellow to white silty sand	Spt @ 3	9,10,12	N=22
4.5	Reddish yellow to white silty sand	Spt @4.5	10,11,15	N=26
6.0	Brownish white silty sand	Spt @6	12,14,16	N=30
7.5	Greenish brown to white sandy slit	Spt @7.5	14,17,19	N=36
9.0	Brownish white silty sand	Spt @9	15,18,20	N=38
10.5	Brownish white silty sand	spt@10.5	18,22,29	N=51
12.0	Brownish white CWR	Spt @12	30,34,46	N=80
13.5	Brownish white CWR	Spt @13.5	46,50b/70	N>100 RS
15.0	Brownish white CWR	Spt @15	50b/R	N>100 RS

Table 4.4: Field Test Borehole-2

Boring depth in m	Description of strata	Sample type number (m)	Field tests type results	Remarks
0.0	Reddish brown clay silt with sand	Ds @ 0.5		
1.5	Brownish white silty sand	Spt @ 1.5	6,7,9	N=16
3.0	Reddish yellow to white silty sand	Spt @ 3	9,11,12	N=23
4.5	Reddish yellow to white silty sand	Spt @4.5	10,13,15	N=28
6.0	Brownish white silty sand	Spt @6	12,15,17	N=32
7.5	Greenish brown to white sandy slit	Spt @7.5	14,16,19	N=35
9.0	Brownish white silty sand	Spt @9	16,18,22	N=40
10.5	Brownish white silty sand	spt@10.5	18,25,30	N=55

12.0	Brownish white CWR	Spt @12	30,35,46	N=81
13.5	Brownish white CWR	Spt @13.5	46,50b/70	N>100 RS
15.0	Brownish white CWR	Spt @15	50b/R	N>100 RS

6. CONCLUSIONS

Sub soil stratification of proposed site up to depth of investigation is as below from 0.0 to 0.3m: Brownish Black Silty Clay of High Plasticity with Little Gravel

From 0.3 to 5.1m: Brownish Yellow Very Stiff Silty Clay of Medium Plasticity with Little Gravel from 5.1 to 10.0m: Yellow Hard Silt Clay of Low Plasticity with Little Gravel

Looking to the proposed type of project RCC Circular Raft footing is recommended along with their Safe Bearing Capacities considering factor of safety of 2.5 as shown in Table - I.

Safe Bearing pressure calculated for 100mm permissible as per I.S 8009 Part I for over consolidated clay as shown in Plate-4

Water table was considered in the analysis of SBC.

Suitability of Soil for back filling: The top layer of soil is of High swelling characteristic, which is not suitable for back filling purpose.

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8. FUTURE SCOPE

Reconnaissance / field trip for studying the general topography and geology of the area/ terrain The field Geotech investigations consisted of conducting 18.0 nos. of bore holes for SPT/DCPT up to maximum depth of 6.0 m or refusal and 14.0 nos. of DCPT upto maximum explored depth of 6.0 m or refusal, below N.S.L whichever is

earlier as per IS code Conducting SPT/DCPT in the bore-hole/trial pits at regular intervals and collecting disturbed/undisturbed soil samples from the bores hole at regular intervals and conducting field density tests as per Indian code of practice.

Conducting Plate Load Test using 75 cm square plate at 1 no of locations and Collection of Disturbed & Undistrubed soil

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