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GEOTECHNICAL INVESTIGATION REPORT

REPORT NO: - GEO-05/2023-24 **DATE: -08.04.2023**

PROJECT NAME: -

SOIL EXPLORATION THROUGH OPEN EXCAVATION AND CONDUCTING STANDARD PENETRATION TEST AT THE FOUNDATION LEVEL FOR THE PROPOSED CONSTRUCTION OF INDIVIDUAL VILLAS (G+1 FLOOR) IN S.F.NO: -347/1B AT TIRUPUR – DHARAPURAM MAIN ROAD, MUTHANAPALAYAM VILLAGE, TIRUPPUR DISTRICT.

NAME OF THE CLIENT: -

M/S. RK PROPERTIES,

MUTHANAPALAYAM VILLAGE, TIRUPPUR DISTRICT.

SUNSTAR FOUNDATION CONSULTANT

(Civil Engineering Consultant & Contractor)

Topographical Surveying, Soil Investigation, Pile Load Test, Plate Load Test, Rock Core Drilling, Earth Resistivity & Laboratory Material Testing

(An ISO 9001: 2015 Certified laboratory)

No: -15/16, First Floor, Kasthuribai 4th Street, Ganapathy, Coimbatore-641006.

Mob: -+91-8300404680,8300404681, E-mail: -sunstarfoundationconsultant@gmail.com

www.sunstarfoundationconsultant.com

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1.INTRODUCTION: -

M/S.RK Properties, Muthanapalayam Village,Tiruppur District has entrusted the work of conducting soil exploration through open excavation and conducting standard penetration test at the foundation level for the Proposed Construction of Individual Villas (G+1 Floor) in S.F.No: -347/1B at Tirupur – Dharapuram Main Road,Muthanapalayam Village,Tiruppur District was awarded to M/s.Sunstar Foundation Consultant. This report presents results of the geotechnical investigation along with foundation recommendations for the proposed structure.

2. SCOPE OF WORK: -

- Conducting Geotechnical Investigation along with suitable foundation recommendation for the proposed structure.
- Determine the soil profile at the site with ground water level observation.
- Conducting SPT's at regular depth intervals.
- Collecting Disturbed Soil (DS) Samples.
- Conducting relevant laboratory tests on Soil samples.
- Submitting report with field observations, laboratory test results along with recommendations and safe bearing pressure at foundations level.

In this report, preliminary details of sub-soil layers encountered, brief account of the strength of the strata based on the field tests, discussion on foundation options and recommendations for foundations are presented.

3. DISCRIPTION OF THE SITE: -

Based on trial pit information, sub surface profile for soil exploration through open excavation and conducting standard penetration test at the foundation level for the Proposed Construction of Individual Villas (G+1 Floor) in S.F.No: -347/1B at Tirupur – Dharapuram Main Road,Muthanapalayam Village,Tiruppur District was the area where the tests were conducted for the trail pit locations-1 to 4 fairly level area with respect to surroundings.

4. FIELD EXPLORATION PROCEDURES: -

4.1. Standard Penetration Test: -

Standard Penetration Tests (SPT) were conducted as per IS 2131-1981. In a SPT test, a standard split spoon sampler is driven at the bottom of the borehole. The penetration resistance in terms of blows for 300mm penetration of the split spoon sampler is measured as 'N' Value. The blows are imparted by a standard weight of 63.5 kg falling through a height of 750 mm. The resistance is measured for 150 mm, 300 mm, and 450 mm penetrations. The resistance of first 150 mm is ignored since those blows are considered as seating blows due to the loosening of the strata. The resistance of next 300 mm is recorded as standard penetration value 'N`. If the sampler is driven less than 450 mm (total) then the penetration resistance is given for the last 300 mm of penetration. If the penetration depth is less than 300 mm and the blow count is more than 50 then the 'N' value is considered as 'Refusal' and actual penetration is recorded with the blows. These tests were conducted at close intervals of 1.50m depth intervals at shallow depths. Disturbed Soil (DS) collected in the SPT sampler was preserved in polythene covers and transported to the laboratory. One more polythene cover was provided to prevent the loss of moisture during the transit period.

4.2. Collection of Samples: -

Soil samples were collected through Split spoon was done up to trail pit termination level.

5. DISCUSSION ON FOUNDATION: -

5.1. Sub surface Conditions: -

Subsurface profile at this site generally consists of gravelly sand with weathered kankar then underlain by well graded gravel. Groundwater accumulation in boreholes was monitored during and after completion of drilling activities. Groundwater was observed in trail pit at depth not met below ground surface. Seasonal and annual fluctuations in ground water levels can be expected.

5.2. Engineering Appraisal: -

Based on field and 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 'N' values.

5.3. 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 correcting the field SPT 'N' values.

1. **Correction due to dilatancy (N').** This correction is based on the assumption that critical void ratio occurs at approximately N = 15, and in fine grained cohesionless soils, the coefficient of permeability is low that the excess pore water pressure developed by the driving impedes the penetration of split spoon sampler, thus increasing the N value.

$$N' = 15 + 0.5\ (N_O - 15)$$

2. **Correction due to overburden pressure**

$$N = 0.77\ N'\ Log_{10}\ (2000/\ P'_O)$$

P'_o effective over burden pressure should be greater than 25 kpa

Net allowable bearing pressure developed by Taraghi and peck (1948)

$$Q_S = 3.5\ (N_{cor} - 3)\ ((B + 0.3)/\ 2B\ )^2\ R_{W2}\ F_D$$

The Allowable Bearing Pressure of Soil = Net Allowable Bearing Pressure of Soil + P'_o

Where

N' = Corrected N value,

N'' = Corrected N value due to dilatancy

B = Size of the Footing = constant 1.00 x1.00m

RW = Water Correction= constant 0.30 to 0.50m

FD = Depth of Factor,

P = Over Burden Pressure

6.BIS CODE & REFERENCES: -

S. NO	CODE NUMBERS	DESCRIPTION
1	IS 1888: 1982	Method of load tests on soils
2	IS 6403: 1981	Code of practice for Determination of Bearing capacity of foundation.
3	IS 1892: 1979	Code of practice for subsurface investigations for foundations.
4	IS 8009(Part-1&2) 1976	Code of practice for calculation of settlement of foundations
5	IS 2131: 1981	Method of standard penetration test for soils
6	IS 2132: 1986	Code of practice for thin-walled tube sampling of soils
7	IS 2720 PART 1 to PART 31 & IS 2720 PART 33 to PART 41	Methods of Test of Soils
8	IS 3043 :1987	Code of practice of Earthling
9	IS 4464: 1985	Code of practice for presentation of drilling information and core description in foundation investigation
10	IS 6935: 1973	Method of determination of water level in a borehole

7. FOUNDATION RECOMMENDATION: -

Based on the sub-soil conditions and possible loads on foundations, following recommendations for conducting soil exploration through open excavation and conducting standard penetration test at the foundation level for the Proposed Construction of Individual Villas (G+1 Floor) in S.F.No: -347/1B at Tirupur – Dharapuram Main Road,Muthanapalayam Village,Tiruppur District.

- The **Isolated/Combined Footing** will be recommended for the proposed structure.
- Rest the Foundation depth at **1.50m** from the Existing Ground Level.
- The recommended SBC of **30.00 Ton/m^2 at 1.50m depth**. Its calculated based on SPT– 'N' values conducted inside the boreholes.

Er.M.ANANDHAKUMAR,B.E,M.I.G.S
Project Engineer,
Sunstar Foundation Consultant.

Dr.E.RAVI,M.E.,Ph.D(Soil Mechanics).,F.I.E,F.I.G.S.,
Chief Geotechnical Consultant ,
Sunstar Foundation Consultant.

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8.OPEN EXCAVATION TRAIL PIT: -

TRAIL PIT	DEPTH OF CONDUCTED (m)	SPT 'N' VALUES	SAFE BEARING CAPACITY (SBC) -Ton/m^2	SOIL PROFILE
TP-1	1.30	35	28.00	From 0.00m – 0.80m – Gravelly Sand From 0.80m – 1.40m – Well Graded Gravel
TP-2	1.30	38	30.62	From 0.00m – 0.90m – Gravelly Sand From 0.90m – 1.40m – Well Graded Gravel
TP-3	2.10	44	35.87	From 0.00m – 0.90m – Gravelly Sand From 0.90m – 2.20m – Well Graded Gravel
TP-4	2.20	47	38.50	From 0.00m – 0.80m – Gravelly Sand From 0.80m – 2.30m – Well Graded Gravel



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3/350/2 Mettukuppam,
OMR Thoraipakkam,
Chennai, India

hello@verified.realestate
+91 9996 12 9996
www.verified.realestate