



Your trusted partner for buying, selling, and managing property,
ensuring hassle-free service with 100% transparency.

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

hello@verified.realestate

+91 9996 12 9996

Official Property Record

Digitally Verified Record - Powered by Verified  RealEstate™



REPORT
ON
SOIL INVESTIGATION FOR CONSTRUCTION
OF
PROPOSED BUSINESS OFFICE BUILDING APARTMENT
AT
PLOT NO C6 (TOWER - E) MORAIS CITY, TRICHY DISTRICT

Client

Mrs. Cecilia Edel Priya,
W/o. J.S. Leyronne Morais,
Plot No. C6,
No.24D, Mahalakshmi Nagar,
KK Nagar Post,
Trichy - 620 021.

By

Time

TIME INSTITUTE FOR MATERIALS TESTING
NO. 25, SANJEEVI NAGAR,
TRICHY - CHENNAI BYEPASS ROAD,
TIRUCHIRAPPALLI,
TAMIL NADU - 620 002.
PH: 0431 2401326

MAY 2023

SUMMARY

Project	:	Construction of Proposed Business Office Building Apartment at Plot No. C6 (Tower- E) Morais City, Trichy District
Project Reference	:	Time /43/ Soil Test / May 2023
Owner	:	Mrs. Cecilia Edel Priya, W/o: J.S. Leyronne Morais, Plot No. C6, No.24D, Mahalakshmi Nagar, KK Nagar Post, Trichy - 620 021.
Type of Structure	:	R.C.C. Framed construction
Location	:	Plot No. C6 (Tower- E) Morais City, Trichy District
Scope	:	Geotechnical investigation for the entire area of construction
Test conducted	:	Two explanatory bore holes up to 6m & 4.5m depth was made and conducted standard penetration tests at every 1.5m depth. The undisturbed soil samples were collected at every 1.5m depth for laboratory test.
FINDINGS		
Soil at shallow depth	:	Red gravels exist up to 2m depth
Hard stratum	:	Weathered rock exists from 4m to 6m depth in Bore hole 1 and 2.4m to 4.5m depth in Bore hole 2
Ground water table	:	Ground water table exist at 3m depth from ground level during investigation.
FOUNDATION		
	:	Based on the existing soil condition, it is recommended to provide foundation at 3m depth.

CONTENTS

1. INTRODUCTION ON SOIL TEST

1.1 – Introduction	-	1
1.2 – Investigation Programme, Procedure and Data	-	2
1.3 – Review of Field and Laboratory Results	-	3
1.4 – Conclusions & Recommendation	-	4

2. SOIL PROFILES

2.1 – Plan of Bore Hole 1 & 2	-	5
2.2 – Bore log details for Bore Hole 1 & 2	-	6
2.4 – Summary of Engineering Geo Properties for Bore hole 1 & 2	-	8
2.5 – Summary of Laboratory test results for Bore Hole 1	-	11
2.6 – Shear Parameters for different layers of Bore Hole 1 & 2	-	12

3. SIEVE ANALYSIS REPORT

3.1 – Sieve Analysis report of sample from Borehole No 1 & 2	-	13
--	---	----

4. CALCULATION OF SAFE BEARING CAPACITY OF THE SOIL

4.1 – Safe bearing capacity calculation based on settlement and Shear	-	14
4.2 – Safe Bearing capacity of soil based on SPT values	-	18
4.3 – Safe Bearing capacity of soil based on Shear Failure Criteria Through Direct Shear test	-	19
4.4 – Comparison of safe bearing capacity of soil Through shear and settlement	-	20

5. RESULT

5.1 – Recommended safe bearing capacity values at different depths	-	21
--	---	----

6. SOIL & ROCK SAMPLE PHOTOS

7. SITE PHOTOS

ANNEXURE

SOIL INVESTIGATION



Time Institute for Materials Testing
टाइम इन्स्टिट्यूट चीजे सोम के लिए



B.N. Krishnaswami, M.E. (Struct. Engg.), Ph.D., Soil & Structural Consultant, Construction Materials Testing Lab
Former Faculty, IIT, Trichy

May 25, 2023

To:

Mrs. Cecilia Edel Priya,
W/o. J. S. Leyronne Morais,
Plot No. C6,
No.24D, Mahalakshmi Nagar,
KK Nagar Post,
Trichy - 620 021.

REPORT ON SOIL INVESTIGATION

(Ref: TIME/43/ SOIL TEST/ MAY 2023)

Sub: Soil Investigation for construction of Proposed Business Office Building Apartment
at Plot No. C6 (Tower- E) Morais City, Trichy District – reg.,

Ref: Based on letter dated: 22.05.2023

1.1 Introduction:

It is proposed to construct a Proposed Business Office Building Apartment at Plot No. C6 (Tower- E) Morais City, Trichy District. A detailed soil investigation was suggested for estimating the safe bearing capacity of the soil, so that suitable type of foundation can be decided for the proposed structure. Time Institute for Materials Testing (TIME) has been requested to undertake the soil investigation at the proposed site. The study was carried out by TIME on 23.05.2023. This report presents complete investigation data and discusses the results to recommend the bearing capacity values at different depths for the proposed structure.

Section 2 describes the soil profile and bore log details of two exploratory bore hole. Section 3 of this report gives the Grain size distribution curves and its analysis. Section 4 of this report presents the calculated safe Bearing capacity values of soil at various depths. Section 5 of this report reviews the test results and the recommended safe bearing capacity values for design of foundation. Section 6 of this report presents the Soil & Rock sample photos. Section 7 of this report presents site photo.

25, Sanjeevi Nagar, Trichy – Chennai Bypass Road, Trichy - 620 002. Tel : + 91 431 2401328, Fax : + 91 431 2401598
Mob : + 91 94433 27935, Email: tmaterialtesting@yahoo.co.in / Web: www.timeinstitute.net

1.2 Investigation Programme, Procedure and Data:

Investigation was carried out in two location at the site through exploratory bore hole. Soil samples were collected from bore hole at different depths for conducting laboratory test. Standard Penetration test was conducted at regular intervals and 'N' values were recorded. Undisturbed soil samples were collected and were preserved and transported to the laboratory for detailed identification tests. Based on the field and laboratory tests on the samples collected, the results are furnished in this report.

An exploratory bore hole was advanced from the existing ground level using truck mounted rotary drilling techniques supplemented by Betonies mud circulation. This drilling procedure with mud circulation is found most suitable for making exploratory bore hole. The mud circulation was employed through the drill rods and letting it out through the side jets provided in the cutting tool thus preventing any disturbance at the bore hole bottom. Mud circulation was used to stabilize the sides and the bottom of the bore hole, and then to bring the soil cuts to the surface. It is important to note that the mud jet is not used to cut the soils as in the case of wash boring technique. Use of drilling mud will also help in preventing the disturbance to the soil at the bore hole bottom during drilling operations. Diameter of the bore hole is about 150mm.

Bore hole was always kept full with the drilling mud so that a positive head is maintained in the bore hole thus preventing any disturbance to the soil within the test zone.

The field tests included Standard penetration test, Disturbed and undisturbed soil sampling, identification of different soil layers, Ground water table observation, complete logging of the bore hole, etc.

Laboratory investigation consisted of classification tests like grain size distribution analysis, determination of specific gravity etc. Unconfined Compression test and Direct shear was conducted on preserved soil samples. All the field and laboratory tests were conducted according to the procedures stipulated in relevant IS codes.

1.3 Review of Field and Laboratory Results:

Sub soil Profile

The original ground level in the presently investigated area was plain terrain.

Bore Hole 1:

The soil below the existing ground level is filled up soil. This layer is extended up to 1m depth. Red soil with gravels mixed exists from 1m to 1.5m depth. Red gravels exist from 1.5m to 2m depth. Gravels with Disintegrated rock particles mixed exists from 2m to 4m depth. Below which weathered rock exists from 4m to 6m depth from the existing ground level. The soil stratification and its variation under present investigation are available in bore log details. The 'N' value is progressively increasing towards depth, due to the soil stratification.

Bore Hole 2:

The soil below the existing ground level is red soil. This layer is extended up to 0.4m depth. Red gravels exist from 0.4m to 1.5m depth. Gravels with Disintegrated rock particles mixed exists from 1.5m to 2.4m depth. Below which weathered rock exists from 2.4m to 4.5m depth from the existing ground level. The soil stratification and its variation under present investigation are available in bore log details. The 'N' value is progressively increasing towards depth, due to the soil stratification.

Ground Water Table

Ground water table exists at 3m depth from the ground level during the soil investigation.

Shear Strength

Standard Penetration test blow counts 'N' is measured at different levels in the bore hole. Mainly these 'N' values are used to assess the shear strength of different soil layers.

Cohesive layers: The classification of 'N' values in moderate to high plasticity medium clay deposits developed by Terzaghi is used for estimating the unconfined compression strength and untrained shear strength of clay and sandy clay layers. The consistency between the N values and the liquidity index values is reviewed while assigning undrained shear strength for soft to medium clay layers.

Non - Cohesive Layers: The sand layers towards depth are of residual type and suitable modifications are made to take care of the presence of plastic fines in the residual soil. Conventional method of estimating the angle of shearing resistance ϕ corresponding to the relative density and the grain size distribution as per the classification suggested by Peck and suitably modified by the R.K. Hough to account for the influence of grain size distribution is adopted here.

1.4 Conclusions & Recommendations:

Shear strength parameters and compressibility parameters of different soil layers are established from the field and laboratory tests.

Based on the existing soil condition, it is recommended to provide foundation at 3m depth.

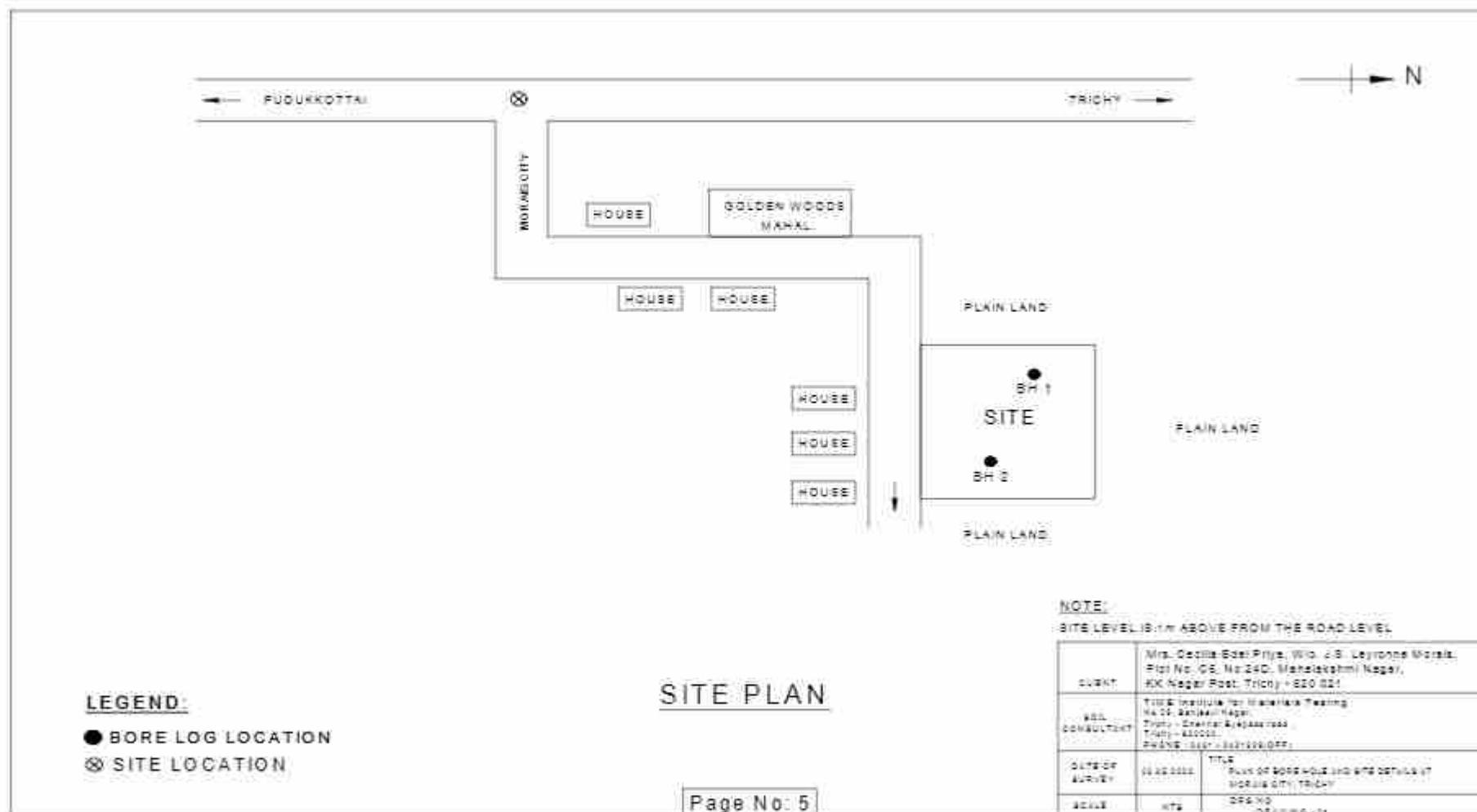
For Time Institute for Materials Testing



Dr. B.N. Krishnaswami.

25th May 2023

SITE LOCATION PLAN



BORE LOG DETAILS



Soil Investigation for construction of Proposed Business Office Building Apartment
at Plot No. C6 (Tower- E) Morais City, Trichy District

2.2 BORE LOG DETAILS FOR BORE HOLE 1

Project	Soil investigation for construction of Proposed Business Office Building Apartment		
Location	Plot No. C6 (Tower- E) Morais City, Trichy District		
Started on	23.05.2023	Ended on	23.05.2023
Depth of G.W.T	4m		
Type of Boring	Calyx drilling		
Site Level	Above 4m from the road level		

Lithology of Bore Hole			SPT Data				Graphical representation of penetration Resistance ("N" Value)
Depth below G.L. (m)	Profile	Soil Description					
			Depth of SPT (m)	0-15cm	15-30cm	30-45cm	N Value
0 - 1m		Filled up soil					
1m - 1.5m		Red soil with gravels mixed					
1.5m - 2m		Red gravels	1.5	Rebound			50
2m - 4m		Gravels with Disintegrated rock particles mixed	3.0	Rebound			52
4m - 6m		Weathered rock	4.5	Rebound			55
			6.0	Rebound			56

Bore terminated at 6m depth from the existing ground level



Soil investigation for construction of Proposed Business Office Building Apartment
at Plot No. C6 (Tower- E) Morais City, Trichy District

2.3 BORE LOG DETAILS FOR BORE HOLE 2

Project	Soil investigation for construction of Proposed Business Office Building Apartment		
Location	Plot No. C6 (Tower- E) Morais City, Trichy District		
Started on	23.05.2023	Ended on	23.05.2023
Depth of G.W.T	3m		
Type of Boring	Calyx drilling		
Site Level	Above 4m from the road level		

Lithology of Bore Hole			SPT Data				Graphical representation of penetration Resistance ('N' Value)
Depth below G.L. (m)	Profile	Soil Description					
			Depth of SPT (m)	0-15cm	15-30cm	30-45cm	N Value
0 - 0.4m		Filled up soil					
0.4m - 1.5m		Red gravels					
1.5m - 2.4m		Gravels with Disintegrated rock particles mixed	1.5	Rebound			51
2.4m - 4.5m		Weathered rock	3.0	Rebound			53
			4.5	Rebound			54

Bore terminated at 4.5m depth from the existing ground level

2.4 Summary of Engineering Geo Properties

Natural Moisture Content:

The natural water content also called the natural moisture content is the ratio of the weight of water to the weight of the solids in a given mass of soil. This ratio is usually expressed as percentage.

$$W = [(W_2 - W_3) / (W_3 - W_1)] \times 100$$

Where,

W_1 = Weight of container gm

W_2 = Weight of container + wet soil gm

W_3 = Weight of container + dry soil

Bulk Density:

The total, or wet, density of soil, ρ , is the ratio of the total mass of soil to its total volume and can be defined as follows:

$$\rho_{\text{bulk}} = M / V$$

Where

M_t = Total Mass of soil

V_t = Total Volume

Dry Density:

The soil dry density, ρ_d , is the ratio of the mass of the solid phase of the soil (i.e., dried soil) to its total volume (solid and pore volumes together) and is defined as follows:

$$\rho_{\text{dry}} = M_s / V_b$$

Where

M_s = Total Mass of dried soil

V_b = Total Volume

Specific gravity:

Specific gravity is the ratio of the weight of a given volume of a material at a standard temperature to the weight of an equal volume of distilled water at the same stated temperature.

$$\text{The specific gravity } G \text{ of the soil} = (W_2 - W_1) / [(W_4 - W_1) - (W_3 - W_2)]$$

Where

W_1 = Weight of density bottle

W_2 = Weight of density bottle + dry soil

W_3 = Weight of bottle + dry soil + water at temperature

W_4 = Weight of density bottle + Water

Void Ratio:

Soil void ratio (e) is the ratio of the volume of voids to the volume of solids:

$$e = (V_v) / (V_s)$$

Where

V_v is the volume of the voids (empty or filled with fluid).

V_s is the volume of solids.

Porosity:

Soil porosity (η), which is defined as the ratio of the volume of voids to the total volume of the soil.

The porosity and the void ratio are inter-related as follows:

$$\eta = (1 - (r_d/G_s)) \times 100$$

$$e = \eta / (1 - \eta) \text{ \& } \eta = e / (1 + e)$$

Where

r_d = Dry Density

G_s = Specific gravity

Summary of Engineering Geo Properties for Bore Holes 1 & 2

Bore hole No.	Depth (m)	Soil Description	Natural Moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/cc)	Specific gravity	Porosity (%)	Void Ratio
Bore Hole 1	1.5	Red gravels	9.16	2.04	1.87	2.66	30	0.42
	3.0	Gravels Disintegrated particles mixed with rock	7.33	2.06	1.92	2.66	28	0.39
	4.5	Weathered rock	5.18	2.08	1.98	2.68	26	0.36
	6.0		5.11	2.09	1.99	2.68	26	0.35
Bore Hole 2	1.5	Gravels Disintegrated particles mixed with rock	7.28	2.07	1.93	2.66	27	0.38
	3.0	Weathered rock	5.31	2.09	1.98	2.68	26	0.35
	4.5		5.25	2.10	2.00	2.68	26	0.34

2.5 Summary of Laboratory Test Results for Bore Holes 1

Bore hole No.	Depth (m)	Soil Description	Gravel (%)	Coarse sand (%)	Medium Sand (%)	Fine sand (%)	Silt (%)	Clay (%)
Bore Hole 1	1.5	Red gravels	46.9	26.1	16.8	7.5	2.7	0.0

2.6 Shear Strength Parameters for Different layers of Bore Holes 1 & 2

Bore Hole No.	Depth below G.L. (m)	Soil Description	N	Shear Strength ' ϕ ' (in degrees)
Bore Hole 1	1.5	Red gravels	50	37.41
	3.0	Gravels with Disintegrated rock particles mixed	52	37.61
	4.5	Weathered rock	55	38.02
	6.0		56	38.23

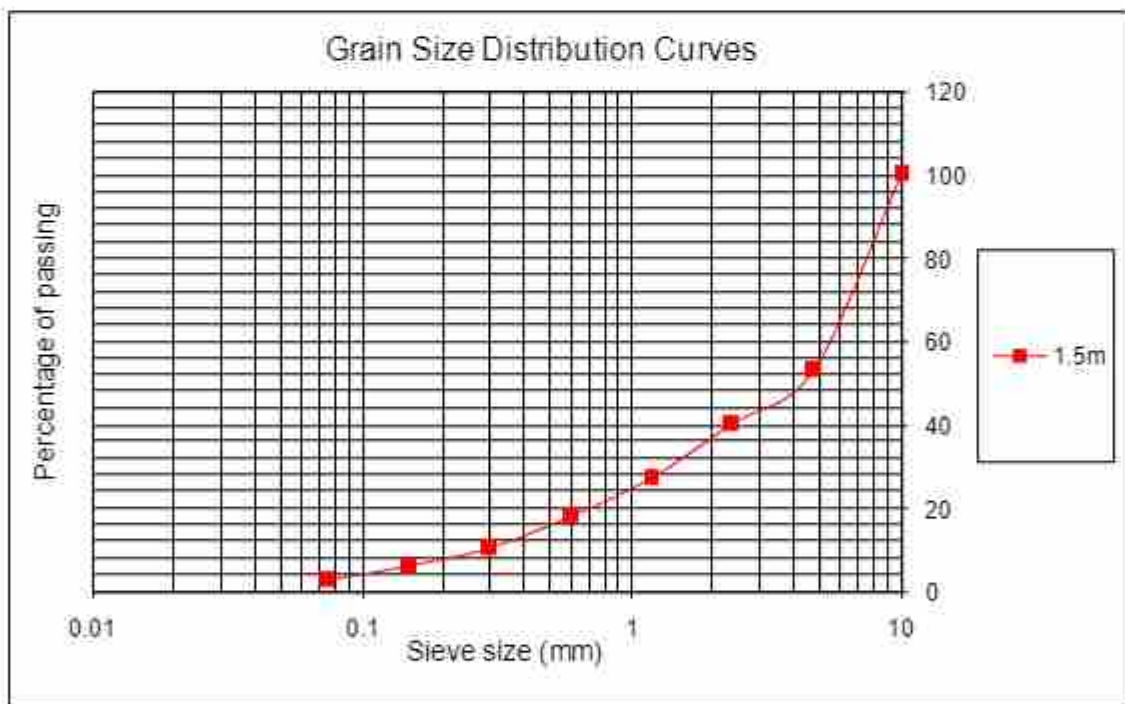
Bore Hole 2	1.5	Gravels with Disintegrated rock particles mixed	51	37.61
	3.0	Weathered rock	53	37.82
	4.5		54	38.02

GRAIN SIZE ANALYSIS

3.1 TEST REPORT ON SIEVE ANALYSIS OF SAMPLE

Bore Hole – 1 @ 1.5m

SIEVE SIZE	PERCENTAGE OF PASSING
	1.5m Depth
10 mm	100
4.75 mm	53.1
2.36 mm	39.9
1.18 mm	27
600 micron	17.8
300 micron	10.2
150 micron	5.9
75 micron	2.7



Description	1.5m Depth
Fineness modulus	4.434

Observation:

The inference from the graph shows that the Red gravels exist at 1.5m depth.

**CALCULATION
OF
SAFE BEARING CAPACITY**

4. CALCULATION OF SAFE BEARING CAPACITY

4.1 Safe bearing capacity calculation based on settlement and Shear

Safe Bearing Capacity calculations based on settlement consideration (SPT value):

Safe Bearing Capacity calculations for shallow foundation will vary based on the width of foundation.

For example, in the case of Individual footing such as isolated, combined etc., we are supposed to use the formula as mentioned below. (Using Teng's Modified formula)

$$q_{na} = 51.4 \times (N - 3) \times \left(\frac{B + 0.3}{2B} \right)^2 \times R_w \times C_d$$

Where,

q_{na}	=	Net safe bearing capacity of soil (kN/m ²) (for 2.5cm permissible settlement)
N	=	Corrected SPT values
B	=	Width of foundation (m) (let us assume 2m)
R_w	=	Correction factor for water table level
C_d	=	Correction factor for depth of embedment

For Bore Hole 1 @ 3m depth SPT 'N' Value = 52

$$\Rightarrow q_{na} = 51.4 \times (52 - 3) \times ((2 + 0.3)/(2 \times 2))^2 \times 0.5 \times 1 = 416.35 \text{ kN/m}^2$$

$$\therefore q_{na} = 41.63 \text{ t/m}^2$$

Safe Bearing Capacity calculations based on shear consideration (Direct Shear):

As Per IS 6403:1981

At 3m depth (Bore Hole 1)

Proving Ring capacity 200kg = 966.2 division

Area of the shear box = 6cm x 6cm = 36cm²

Normal Stress (kg/cm ²)	No. of Division	Stress
0.5	24	0.138
1.0	91	0.523
1.5	158	0.908

$$\begin{aligned}\text{Stress} &= \text{Load} / \text{Area} \\ &= (200/966.2) \times 24 \times (1/36) = 0.138\end{aligned}$$

$$\phi = \tan^{-1}(0.908 - 0.138) = 37.61^\circ$$

Net safe bearing capacity of the soil (for general shear failure as per IS 6403:1981)

$$q_{ult} = C N_c S_c d_c i_c + q (N_q - 1) S_q d_q i_q + 0.5 B \gamma N_r S_r d_r i_r W'$$

Where

C	=	Cohesion in t/m ²
N _c , N _q , N _r	=	Bearing Capacity Factors (From Table 1 of IS 6403 – 1981)
S _c , S _q , S _r	=	Shape Factors (From Table 2 of IS 6403 – 1981)
d _c , d _q , d _r	=	Depth Factors
i _c , i _q , i _r	=	Inclination Factors
q	=	Effective surcharge at the base level of foundation in t/m ²
B	=	Width of footing, diameter of circular footing in m
γ	=	Bulk unit weight of soil in t/m ³
W'	=	Correction factor for location of water table

At 3m depth (Bore hole 1), the Soil profile is Gravels with disintegrated rock particles mixed

If	C	=	0 (Since no Cohesion)
	Φ	=	37.61° (based on laboratory test)
Therefore	N _c	=	61.379;
	N _q	=	49.453;
	N _r	=	80.117

Applying these parameters in the above equation

$$\text{Where } q_{ult} = C N_c S_c d_c i_c + q (N_q - 1) S_q d_q i_q + 0.5 B \gamma N_\gamma S_\gamma d_\gamma i_\gamma W'$$

$$\text{Therefore, } q_{ult} = q (N_q - 1) S_q d_q i_q + 0.5 B \gamma N_\gamma S_\gamma d_\gamma i_\gamma W'$$

Bearing Capacity calculation through shear density of soil 'γ'

There are two relationships of weight of soil to Volume of soil as

- i) Total density or Bulk density
- ii) Dry density

$$\text{Therefore, Total Bulk density, } \gamma_t = \frac{\text{Total Weight of soil}}{\text{Total Volume of soil}} = \frac{W}{V}$$

$$\text{Dry Density } \gamma_d = W_s/V; \quad \text{Whereas } W_s = \text{Total weight of solids}$$

In a particular case the total density will be known as saturated density, when the soil is saturated. Another density of soil will be known as submerged or buoyant density, γ_b when the soil is submerged in water.

$$\text{Where } \gamma_b = \gamma_t - \gamma_w$$

$$\text{Where } \gamma_w = \text{Density of water} = 1 \text{ g/cc or } 1 \text{ t/m}^3$$

Mostly soils submerged in water are saturated.

$$\text{Hence } \gamma_{\text{buoyant}} = \gamma_{\text{sat}} - \gamma_w$$

Based on the above equations,

$$\begin{aligned} \gamma &= \gamma_{\text{sat}} &&= 1.8 \text{ t/m}^3 \\ d &= 3\text{m} \\ \text{Here, } \gamma_b &= \gamma_{\text{sat}} - 1 &&= 1.8 - 1 &&= 0.8 \text{ t/m}^3 \\ \text{Therefore, } q &= \gamma_b \times d &&= 0.8 \times 3 &&= 2.4 \text{ t/m}^2 \end{aligned}$$

$S_q = S_r =$ Shape factor which is equal to 1

$$d_q = d_r = 1 + 0.1 \frac{d_f}{B} \sqrt{N\phi}$$

$= 1$ (Minimum value of 1 can be taken)

$i_q =$ inclination factor $(1 - \alpha/90)^2$

Where $\alpha =$ inclination of the load to the vertical in degree which is equal to zero

$i_q = 1$

$B =$ Width of footing (2m)

$W' = 0.5$

Applying in the above equation

$$\begin{aligned} q_{ult} &= q (N_q - 1) S_q d_q i_q + 0.5 B \gamma N_s S_r d_r i_r W' \\ &= 2.4 \times (49.453 - 1) \times 1 \times 1 \times 1 + 0.5 \times 2 \times 1.8 \times 80.117 \times 1 \times 1 \times 1 \times 0.5 \\ &= 188.39 \text{ t/m}^2 \end{aligned}$$

Applying factor of safety as 3

Then allowable bearing capacity

$$\begin{aligned} q_{na} &= 188.39 / 3 \\ &= 62.80 \text{ t/m}^2 \end{aligned}$$

SAFE BEARING CAPACITY RESULTS

4. Calculation of Safe bearing capacity of the soil:

4.2 Safe Bearing capacity of soil based on SPT values for Bore Holes 1 & 2

Bore Hole No.	Depth (m)	SPT value	Safe Bearing capacity of soil	
			KN/m ²	t/m ²
BH – 1	1.50	50	399.36	39.93
	3.00	52	416.35	41.63
	4.50	55	441.84	44.18
	6.00	56	450.34	45.03

BH – 2	1.50	51	407.85	40.78
	3.00	53	424.85	42.48
	4.50	54	433.35	43.33

4.3 Safe Bearing capacity of soil based on Shear Failure Criteria:

Through Direct Shear test

Bore Hole No.	Depth (m)	Normal Stress (kg/cm ²)	Division	ϕ (in degrees)	Safe Bearing Capacity of Soil (t/m ²)
BH – 1	1.50	0.5 1.0 1.5	24 90 157	37.41°	42.14
	3.00	0.5 1.0 1.5	24 91 158	37.61°	62.80
	4.50	0.5 1.0 1.5	24 93 160	38.02°	86.74
	6.00	0.5 1.0 1.5	24 93 161	38.23°	109.91

BH – 2	1.50	0.5 1.0 1.5	24 90 158	37.61°	43.42
	3.00	0.5 1.0 1.5	24 92 159	37.82°	64.58
	4.50	0.5 1.0 1.5	24 93 160	38.02°	86.74

4.4 Comparison of Safe bearing capacity of soil through Shear and Settlement consideration:

Bore Hole no.	Depth (m)	Safe Bearing Capacity (t/m ²)	
		Shear consideration (Direct Shear)	Settlement consideration
BH – 1	1.50	42.14	39.93
	3.00	62.80	41.63
	4.50	86.74	44.18
	6.00	109.91	45.03

BH – 2	1.50	43.42	40.78
	3.00	64.58	42.48
	4.50	86.74	43.33

5. Result:

5.1 Recommended Safe bearing capacity values at different depths

Considering the lesser value of the above, the Safe Bearing Capacity, values at different depths are recommended below:

Bore Hole	Depth (m)	Safe Bearing Capacity (t/m ²)
BH – 1	1.50	39.93
	3.00	41.63
	4.50	44.18
	6.00	45.03

BH – 2	1.50	40.78
	3.00	42.48
	4.50	43.33

The above test data and findings are relevant and applicable only for the soil conditions existing at the test site. Any change in the soil strata observed during excavation may be reported to the laboratory, which will redefine the safe bearing capacity of the soil.

SOIL & ROCK SAMPLE PHOTOS



Bore Hole No: 1

Depth : 0 to 6m



Bore Hole No: 2
Depth : 0 to 4.5m

SITE PHOTO



Morais City, Trichy District

ANNEXURE



Time Institute for Materials Testing

Soil Division,
#25, Sanjeevi Nagar,
Trichy- Chennai Bypass road, Trichy - 620 002.
Phone: 0431 2401326
Fax: 0431 2401596
Email: tmaterialtesting@yahoo.co.in

Annexure - A

NATURAL MOISTURE CONTENT **(As per IS 2720 (Part - 2) - 1973)**

Project Name : Report on soil investigation for construction of Proposed Business
Office Building Apartment at Plot No. C6 (Tower- E) Morais City, Trichy District

Bore Hole No. : 1

Depth : 3m

Trial	Wt of container (W) gm	Wt of container + wet soil (W ₁) gm	Wt of container + Dry soil (W ₂) gm	Wt of Water (W ₃ = W ₁ -W ₂) gm	Wt of Dry Soil (W ₄ = W ₂ -W) gm	Water Content (%) = (W ₃ -W ₄)*100
1	25.80	57.90	55.70	2.2	29.9	7.36
2	22.10	52.80	50.70	2.1	28.6	7.34
3	20.90	53.30	51.10	2.2	30.2	7.28

Natural Moisture Content = 7.33



Time Institute for Materials Testing

Soil Division,
#25, Sanjeevi Nagar,
Trichy- Chennai Bypass road, Trichy - 620 002
Phone: 0431 2401328
Fax: 0431 2401596
Email: tmaterialtesting@yahoo.co.in

Annexure - B

SPECIFIC GRAVITY TEST

(As per IS 2720 (Part - 3) - 1980)

Project Name : Report on soil investigation for construction of Proposed Business
Office Building Apartment at Plot No. C6 (Tower- E) Morais City, Trichy District
Bore Hole No. : 1
Depth : 3m

Trial	Bottle Wt (W1) gm	Bottle + Sample (W2) gm	Bottle + Sample + Water (W3) gm	Bottle + Water (W4) gm	Specific Gravity
1	32.6	92.6	118.3	80.8	2.667
2	32.6	91.8	117.8	80.8	2.667
3	32.6	92.2	118.0	80.8	2.661

Specific gravity of Fine Aggregate = 2.66



Time Institute for Materials Testing

Soil Division,
#25, Sanjeevi Nagar,
Trichy- Chennai Bypass road, Trichy - 620 002.
Phone: 0431 2401328
Fax: 0431 2401596
Email: tmaterialstesting@yahoo.co.in

Annexure - C

DENSITY CALCULATION

Project Name : Report on soil investigation for construction of Proposed Business
Office Building Apartment at Plot No. C6 (Tower- E) Morais City, Trichy District

Bore Hole No. : 1

Depth : 3m

Sl. No.	Description	Reading
1	Weight of Empty Box (gm)	630.00
2	Weight of Box + Soil (gm)	815.50
3	Weight of Soil (gm)	185.50
4	Volume of Box (cm ³)	90.00
5	Bulk Density (gm/cm ³)	2.06
6	Weight of Container (gm)	25.80
7	Weight of Container + Wet Soil (gm)	57.90
8	Weight of Container + Dry Soil (gm)	55.70
9	Moisture Content (%)	7.36
10	Dry Density (gm/cm ³)	1.92

Result

Bulk Density of Soil = 2.06

Dry Density of Soil = 1.92



Time Institute for Materials Testing

Soil Division,
#25, Sanjeevi Nagar,
Trichy- Chennai Bypass road, Trichy - 620 002.
Phone: 0431 2401326
Fax: 0431 2401596
Email: tmaterialstesting@yahoo.co.in

Annexure - D

POROSITY & VOID RATIO

Project Name : Report on soil investigation for construction of Proposed Business
Office Building Apartment at Plot No. C6 (Tower- E) Morais City, Trichy District

Bore Hole No. : 1

Depth : 3m

Sl. No.	Description	Reading
1	Dry Density γ_d (gm/cm ³)	1.92
2	Specific gravity (G_s)	2.66
	Porosity (%)	$(1 - (\gamma_d/G_s)) \times 100$
		$(1 - (1.92/2.66)) \times 100 = 27.81$
3	Porosity (%)	28
	Void Ratio, (e)	$\eta/(1-\eta)$
		$0.2781/(1-0.2781)$
4	Void Ratio	0.39



Time Institute for Materials Testing

Soil Division,
#25, Sanjeevi Nagar,
Trichy - Chennai Bypass Road, Trichy - 620 002.
Phone: 0431 2401326
Fax: 0431 2401596
Email: tmaterialtesting@yahoo.co.in

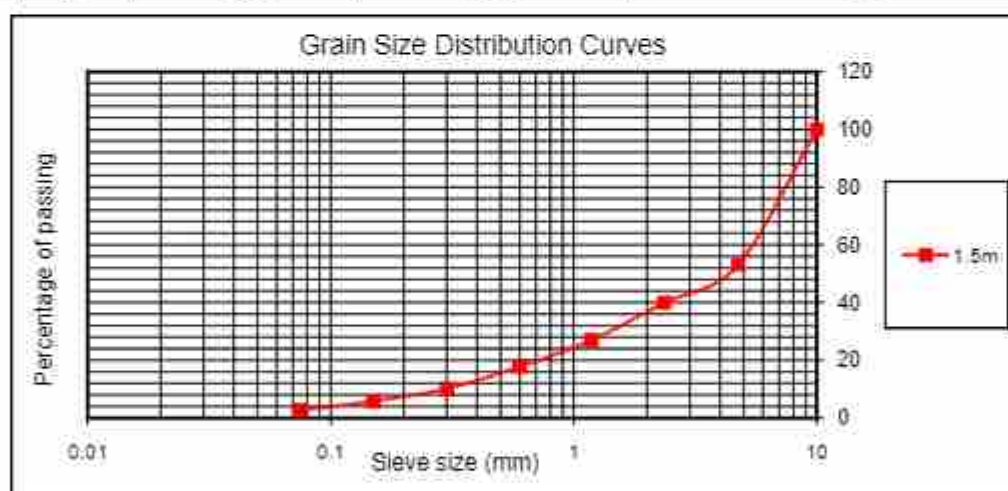
Annexure - E

FINENESS MODULUS TEST

(As per IS 2720 (Part - 4) - 1985)

Project Name : Report on soil investigation for construction of Proposed Business
Office Building Apartment at Plot No. C6 (Tower- E) Morais City, Trichy District
Bore Hole No. : 1
Depth : 1.5m

Sieve size (mm)	Weight retained	Cumulative Weight retained (gm)	Percentage cumulative weight retained (gm)	Percentage of passing
10	0	0.0	0.0	100.0
4.75	46.9	46.9	46.9	53.1
2.36	13.2	60.1	60.1	39.9
1.18	12.9	73.0	73.0	27.0
0.6	9.2	82.2	82.2	17.8
0.3	7.6	89.8	89.8	10.2
0.15	4.3	94.1	94.1	5.9
0.075	3.2	97.3	97.3	2.7
Pan	2.7	100.0	100.0	0.0



Based on Gradation Curve, the percentage component of each materials in the soil sample obtained are as follows (As per IS 1498 - 1970).

Gravel (%)	46.9
Coarse Sand (%)	26.1
Medium Sand (%)	16.8
Fine sand (%)	7.5
Silt & Clay (%)	2.7



Time Institute for Materials Testing

Soil Division,

#25, Sanjeevi Nagar,

Trichy- Chennai Bypass road, Trichy - 620 002

Phone: 0431 2401326

Fax: 0431 2401596

Email: tmaterialtesting@yahoo.co.in

Annexure - F

Direct Shear Test (IS 2720 - Part 13-1986)

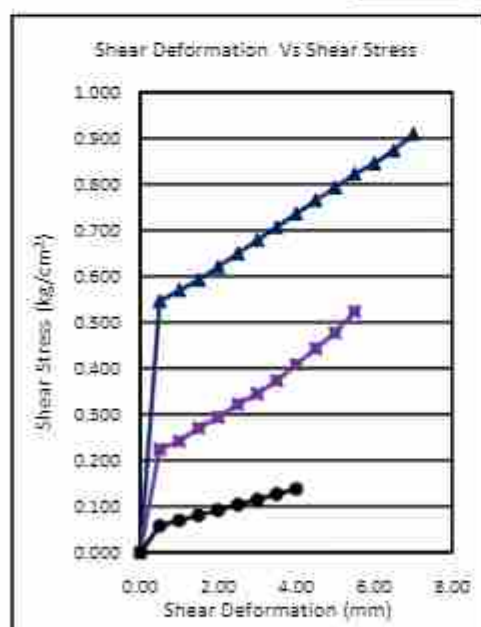
Bore Hole	1
Depth (m)	3m
Date of Test	24.05.2023

L.C. Of Dial Gauge	0.002
Proving ring Constant	0.206998
Area of the specimen (cm ²)	38

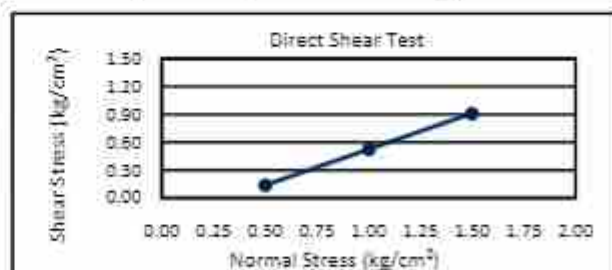
Trial 1			
Normal Stress: 0.5 kg/cm ²			
Horizontal Gauge Reading	Proving Ring Reading	Shear Deformation	Shear Stress (kg/cm ²)
0	0	0.00	0.000
50	10	0.50	0.057
100	12	1.00	0.069
150	14	1.50	0.080
200	16	2.00	0.092
250	18	2.50	0.103
300	20	3.00	0.115
350	22	3.50	0.126
400	24	4.00	0.138

Trial 2			
Normal Stress: 1 kg/cm ²			
Horizontal Gauge Reading	Proving Ring Reading	Shear Deformation	Shear Stress (kg/cm ²)
0	0	0.00	0.000
50	39	0.50	0.224
100	42	1.00	0.241
150	47	1.50	0.270
200	51	2.00	0.293
250	56	2.50	0.322
300	60	3.00	0.345
350	65	3.50	0.374
400	71	4.00	0.408
450	77	4.50	0.443
500	83	5.00	0.477
550	91	5.50	0.523

Trial 3			
Normal Stress: 1.5 kg/cm ²			
Horizontal Gauge Reading	Proving Ring Reading	Shear Deformation	Shear Stress (kg/cm ²)
0	0	0.00	0.000
50	95	0.50	0.545
100	99	1.00	0.569
150	103	1.50	0.592
200	108	2.00	0.621
250	113	2.50	0.650
300	118	3.00	0.678
350	123	3.50	0.707
400	128	4.00	0.736
450	133	4.50	0.765
500	138	5.00	0.793
550	143	5.50	0.822
600	147	6.00	0.845
650	152	6.50	0.874
700	158	7.00	0.908

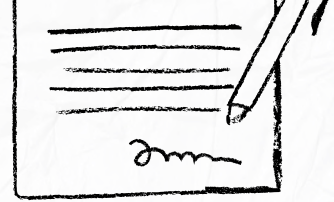


Normal Stress (Kg/cm ²)	Proving Ring Reading at failure	Shear Stress (kg/cm ²)
0.50	24	0.138
1.00	91	0.523
1.50	158	0.908



$$\phi = \tan^{-1} \left(\frac{0.908}{0.138} \right) = 37.61^\circ$$

Angle of Shearing Resistance (ϕ) = 37.61°



our services doesn't just end there



Buying & Selling Services

Property Buying Assistance, Property Selling Support, Market Price Analysis, Owner Outreach and Negotiation.



Legal & Documentation Services

Certified EC, Patta, legal opinions, property verification, due diligence, litigation solutions, and legal heir certificates.



Property Development & Approvals

Building plan approvals, construction, layout and sub-division approvals, zone conversion, and occupancy certification.



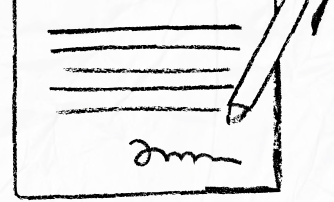
NRI & Investment Services

Escrow Services, Rentals, Litigation Solutions, Property Valuation and Property Management



Compliance & Special Services

Demolition, Vaasthu checks, regularization of unauthorized buildings, and office space solutions.



 **empowering your real estate decisions
with smart tools**



Property Valuation & Cost Estimation

Guideline Value, Apartment Composite Value, Stamp Duty & Registration Fees Calculator, Building Value Calculator, Capital Gains Calculator, Area Unit Converter, Length Unit Converter



Ownership, Compliance & Legal Verification

Encumbrance Certificate (EC) Search, Find Your SRO, Temple Property Check, WAQF Property Check, View Patta/Chitta, View FMB, Patta Analyzer, EC Analyzer



Zoning & Land Use Analysis

Land Use Zone Finder, CRZ Zone Check, Aquifer Zone Check, CBA Check, EWS Check, Road Width Check, Proposed Road Widening Check, FSI Calculator



Property Documentation & Workflow Tools

Forms & Templates, Document Generator, Document Translation, Dictionary



Vastu & Property Management Tools

Home Vastu Shastra, Plot Vastu Shastra, Property Management



We're honored to be part of your
real estate journey

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

hello@verified.realestate
[+91 9996 12 9996](tel:+919996129996)
www.verified.realestate