

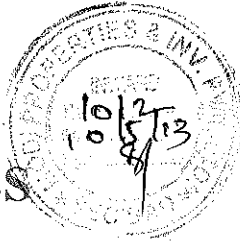


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A REPORT OF THE SOIL INVESTIGATIONS CARRIED OUT TO
M/S. MODI PROPERTIES & INVESTMENTS PVT.LTD, AT THE SITE
PROPOSED FOR CONSTRUCTION OF CLUB HOUSE AND APARTMENT
BLOCK, SITUATED AT NAGARAM VILLAGE & MANDAL,
HYDERABAD.

1. INTRODUCTION:

The authorities of M/s. Modi Properties & Investments Pvt.Ltd, are proposing to construct Club House and Apartment Block in the premises bearing Sy. No: 233, by Name “Paramount Avenue”, situated at Nagaram Village and Mandal, Hyderabad, in an extent of 2 Acres.

The structure consists of Cellar + Stilt + 5 Floors.

The building will comprise of beams and Column framed structure.

Fig.1 shows the site plan.

The aim of this report is to assess the type of soil, to evaluate the nature and depth of foundations, and to determine the safe bearing capacity of the buildings.

2. FIELD INVESTIGATIONS:

Three Trial pits were available for inspection. Undisturbed and disturbed soil samples were collected from the excavated trial pits. The undisturbed soil samples were collected by penetrating M.S sampler tube with tapered bottom edge with a diameter of 75/100mm from the bottom of the pit.

All locations are shown in Fig.1. This is adequate in accordance with IS: 1892-1979 (Code of Practice for Subsurface Investigation of Foundations). Fig.2 gives Logs of Trial Pits.

The site plan is shown in Fig.1.

Logs of trial pits are shown as Fig.2.

In accordance with IS: 1892 – 1979 (Code of Practice for sub-surface investigation of foundations), these are adequate to assess the nature of the uniform ground.

At Trial Pit No. 1, due Northeast of the site, the sub-soil consists of Black Clayey Soil up to 0.3m followed by Soft Disintegrated Rock up to 2.6m underlain by Hard Disintegrated Rock with calcareous lime upto 4.3m.

At Trial Pit No. 2, due Southeast of the site, the sub-soil consists of dumped soil upto 0.4m followed by black clayey soil upto 0.9m underlain by very soft disintegrated rock with calcareous lime upto 2.4m and further underlain by Soft Morum with Calcareous lime upto 4.5m.

At Trial Pit No. 3 due West of the site, the sub-soil consists of black clayey soil upto 0.5m underlain by very soft disintegrated rock with calcareous lime upto 2.5m and further underlain by soft disintegrated rock with Little calcareous lime upto 4.2m.

Water is not found in any of the pits.

3. LABORATORY TESTING:

The Undisturbed samples were tested at the Soil Mechanics Laboratory at Hyderabad. The following Tests were conducted:

- * Specific gravity
- * Bulk density
- * Grain size distribution
- * Direct shear test

All the Tests were conducted in accordance with IS: 2720 (Methods of Tests for Soils).

4. RESULTS:

It is seen that the soil at the site, at significant depth, generally consists of morum. Morum is a residual soil, typical of Hyderabad and its surrounding areas. In its natural state, the soil is compact and hard at bottom depths.

The sub-surface soil is essentially frictional material, with low cohesion.

In accordance with IS: 1498-1970 (Soil Classification), at TP-1, the soil is designated as, GM - SM (Silty gravelly, poorly graded gravel - Sand- Silt mixture/silty sand).Where as at TP-2 & TP-3, the soil is designated as GC (Clayey gravels,poorly graded gravel-sand-clay mixtures).

Keeping in view the nature of the soil, and the field results 'N - Value ' of 15 has been assumed for soft disintegrated rock with calcareous lime. N-Value of 22 has been assumed for the formations resting on Hard Disintegrated Rock with calcareous lime.


5. RECOMMENDATIONS.

ased on Geo-technical investigations, the following recommendations are given.

1. The Sub-Soil consists of silty gravely soils on the top followed by Very soft morum with boulders underlain by soft morum and further underlain by Hard morum at bottom depths.
2. The **SBC** is recommended as **20 Tonnes/Sq m** for the foundations resting on Soft Disintegrated Rock with Calcareous Lime and **25 Tonnes/Sq m** for the foundations resting on Soft Disintegrated Rock with little calcareous lime and **30 Tonnes/Sq m** for the foundations resting on Hard Disintegrated Rock with Little Calcareous Lime.
- 3).The above recommendation is based on the isolated square footings of size **2.0 x 2.0m** at a depth of **1.5m** from cellar level. The actual size and depth will be based on the loads from the super structure.
- 4).It is recommended that every foundation base be examined by competent engineer before placement of PCC bed.
- 5) All foundations pits should be filled back with well compacted morum or gravel.

- 6) Avoid resting of foundation in loose soil or isolated rock boulders.
- 7) All concreting should be done under dry conditions.
- 8) All footings(if they are resting on rock) should be adequately anchored against lateral forces.
- 9) Sand bed of thickness 300mm is recommended below the PCC Layer, if Clay/Calcareous lime occurs.
- 10)Hyderabad and the surrounding areas are now reclassified as **zone II** in Seismic map of India. Necessary Seismic checks may be applied for the tall buildings.

for Geo-Engineering Services



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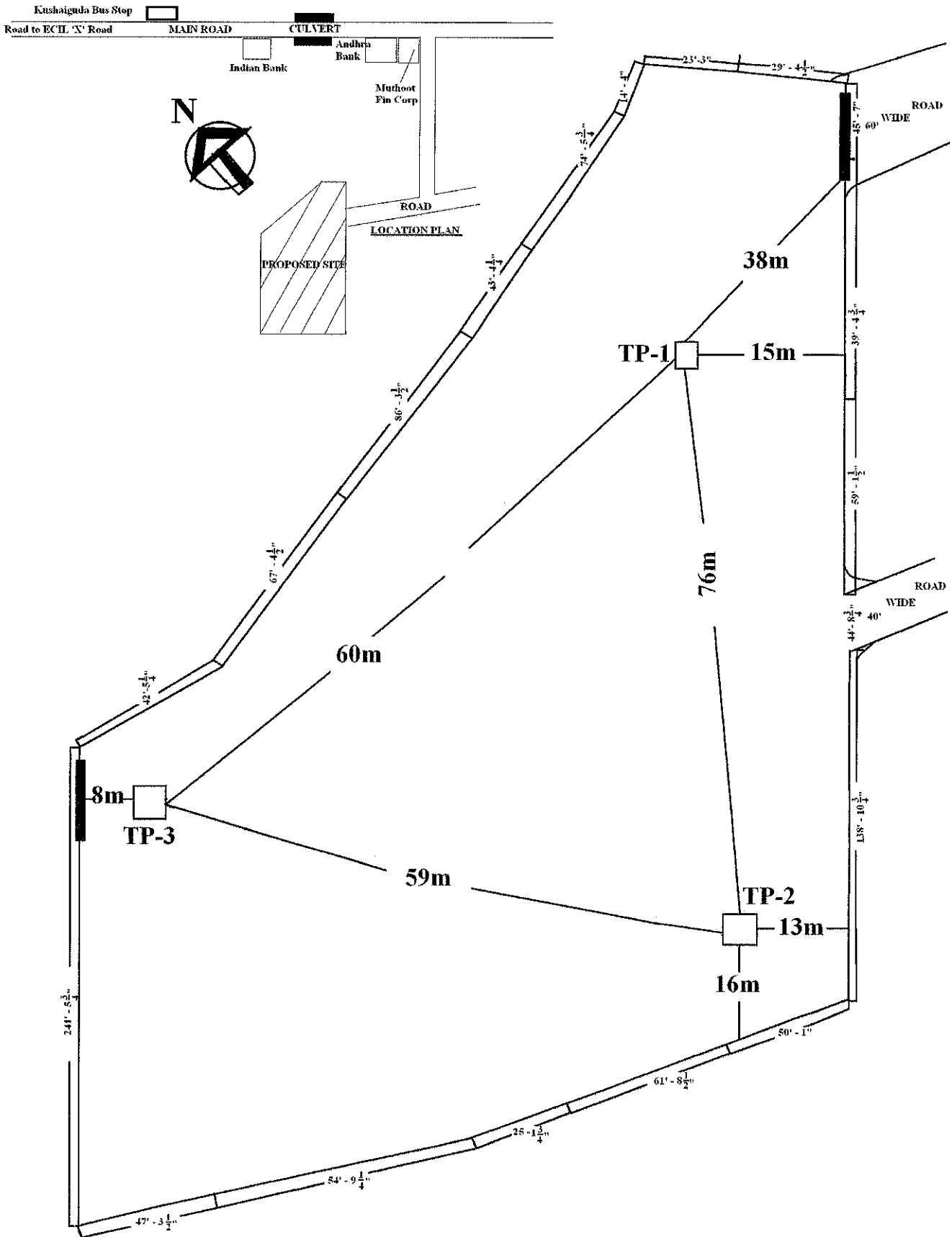
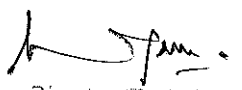


FIG.1: SITE PLAN OF THE PROPOSED CLUB HOUSE & APARTMENT BLOCK SITUATED AT NAGARAM VILLAGE & MANDAL, HYDERABAD.


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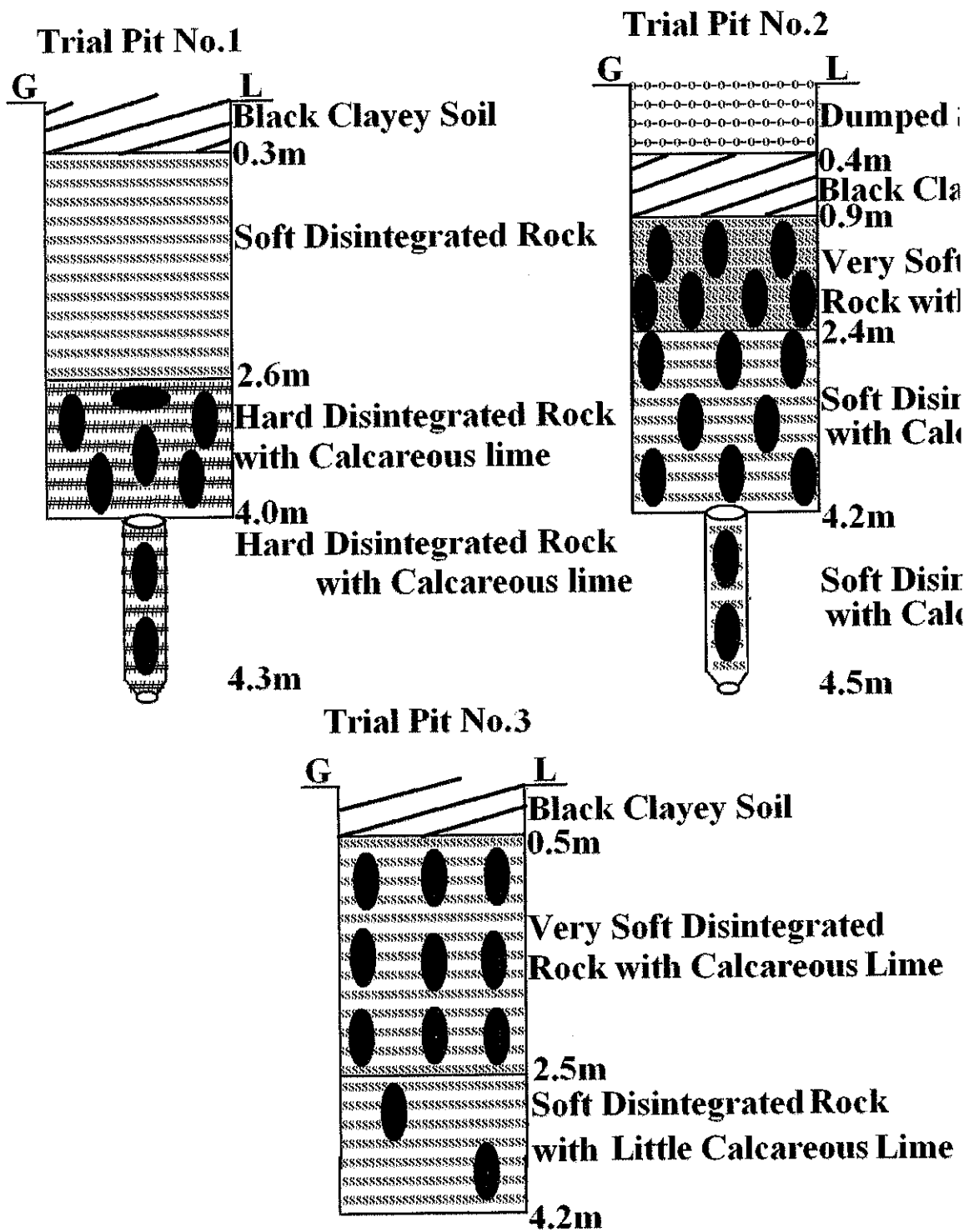


FIG.2: LOGS OF TRIAL PITS

APPENDIX - 1

CALCULATIONS OF BEARING CAPACITY

Trial Pit No.1

*For the foundations resting on Hard Disintegrated Rock
with Calcareous lime.*

Shear Criterion:

Assumed depth of foundation 'D' = 1.5m from cellar level.

Assumed width of foundation 'B' = 2.0m x 2.0m

Cohesion = 'C' = 1.05 Kg/Sq.Cm

Angle of shear resistance = ϕ = 31 deg.

Bearing Capacity Factors for ϕ = 31 deg.

$N_c = 22.9$ $N_q = 13.1$ $N_\gamma = 14.1$

Factor of Safety , F.S = 3.0

Bulk Unit Weight of Trial Pit soil = $\gamma = 1.95$ gm / cc

Water Table correction is not required.

$$q_s = \frac{1}{F} (1.3 C N_c + \gamma D (N_q - 1) + 0.4 \gamma B N_\gamma) + \gamma D$$
$$\frac{1}{3.0} (88.65) + 2.93 = 32.48 \text{ or } 30 \text{ Tonnes/Sq.m}$$

The recommended bearing capacity is 300.0 kN per sq m i.e.30 T/ sq.m.

APPENDIX - 2

CALCULATIONS OF BEARING CAPACITY

Trial Pit No.2

For the foundations resting on Soft Disintegrated Rock
with Calcareous lime.

Shear Criterion:

Assumed depth of foundation 'D' = 1.5m from cellar level.

Assumed width of foundation 'B' = 2.0m x 2.0m

Cohesion = 'C' = 2.05 Kg/Sq.Cm

Angle of shear resistance = ϕ = 28 deg.

Bearing Capacity Factors for ϕ = 28 deg.

Nc = 14.0 Nq = 6.2 N γ = 5.0

Factor of Safety , F.S = 3.0

Bulk Unit Weight of Trial Pit soil = γ = 1.80 gm / cc

Water Table correction is not required.

$$q_s = \frac{1}{F} (1.3 C N_c + \gamma D (N_q - 1) + 0.4 \gamma B N_\gamma) + \gamma D$$
$$\frac{1}{3.0} (58.55) + 2.70 = 22.22 \text{ or } 20 \text{ Tonnes/Sq.m}$$

The recommended bearing capacity is 200.0 kN per sq m i.e.20 T/ sq.m.


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APPENDIX - 3

CALCULATIONS OF BEARING CAPACITY

Trial Pit No.3

For the foundations resting on Soft Disintegrated Rock
with Little Calcareous lime.

Shear Criterion:

Assumed depth of foundation 'D' = 1.5m from cellar level.

Assumed width of foundation 'B' = 2.0m x 2.0m

Cohesion = 'C' = 1.75 Kg/Sq.Cm

Angle of shear resistance = ϕ = 29 deg.

Bearing Capacity Factors for ϕ = 29 deg.

Nc = 16.6

Nq = 8.1

N γ = 7.2

Factor of Safety , F.S = 3.0

Bulk Unit Weight of Trial Pit soil = Y = 1.90 gm / cc

Water Table correction is not required.

$$q_s = \frac{1}{F} \left(1.3 C N_c' + YD (N_q' - 1) + 0.4 Y B N_\gamma' \right) + YD$$
$$\frac{1}{3.0} \left(66.87 \right) + 2.85 = 25.14 \text{ or } 25 \text{ Tonnes/Sq.m}$$

The recommended bearing capacity is 250.0 kN per sq m i.e.25 T/ sq.m.

TABLE -1

SUMMARY OF SOIL PROPERTIES

Property / TP No	TP - 1 Sample	TP - 2 Sample	TP - 2 Sample
Soil	GM - SM	GC	GC
Specific gravity	2.55	2.15	2.35
Density, gm/ cc	1.95	1.80	1.90
Grain size distribution			
Gravel >4.75 mm	30	22	23
Coarse sand 4.75 – 2mm	25	18	20
Medium sand 2- 0.425mm	23	20	23
Fine sand, 0.425-0.075mm	18	22	25
Silt 0.075 – 0.002mm	02	04	02
Clay < 0.075 mm	02	14	07
Cohesion, Kg/Sq.cm	1.05	2.05	1.90
Angle of internal friction, degrees	31	28	29

