REPORT OF SOIL INVESTIGATIONS
FOR THE PROPOSED BUILDINGS AT
NAGARAM (V), KEESARA (M)
R. R. DISTRICT

Prepared by

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1. INTRODUCTION

Sri B. Anand Kumar & others are proposing to construct residential buildings at Sy. No. 176, situated at Nagaram (V), Keesara (M), R. R. District.

Fig. 1 shows the Site plan. The area of the site is 3 acres 04 guntas.

The buildings comprise RCC framed structures with S + 5 floors.

The aim of this Report is to evaluate the nature and depth of soils at the site, and to determine the safe bearing capacity of the foundations accordingly.

2. FIELD INVESTIGATIONS

The site was first visited on 28-4-2006. Based on Five Trial Pits excavated to a depth of 1.4 m, SBC was tentatively recommended as 15 t / sq m for foundations at 2 m depth. It was stated that SBC will be finalized later after detailed investigations in different blocks proposed.

On the request of the client, the site was visited again on 6 June 2006. Fourteen Trial pits were excavated at the locations shown as TP1 – TP14 in Fig. 1. The pits are excavated to a depth of about 2 m only. These were examined in detail.

The locations of the pits are as follows:

TP1 : Recreational Area	TP2 & TP3 : Block A
TP4 & TP5 : Block B	TP6 & TP7 : Block C1
TP8 & TP9 : Block C2	TP10 & TP11 : Block C3
TP12 & TP13 : Block D	TP10 & TP11 : Block C3
TP14 : Commercial Centre	

The entire site is located adjacent to a tank, and major part of the site is in the zone of old inflow channels to the tank.

The sub soil profile in TP1 & TP2 consists of 0.5 – 1.0 m thick B. C. soil, followed by sandy morum up to 1.5 m depth. In TP3, the bottom soil comprises sandy morum with chalky gravel.

The sub soil profile in TP4 to TP6 consists of B. C. soil in the top 0.1-0.4 m, followed by white chalky / clayey morum to 2.1 m depth.

The sub soil profile in TP7 to TP9 consists of B. C. soil in the top 1.0 m, followed by chalky morum. In TP7, SDR is also seen.

In Trial Pits TP10 to TP14, 0.3-0.8 m thick B. C. soil is followed by black clayey morum.

Heavy seepage of water is seen in all the pits.

Samples were procured from the bottom of the Pits in accordance with IS: 2720.

Fig. 2 gives typical sub soil profiles in the pits.

3. LABORATORY TESTING

The undisturbed soil samples from the Pits were tested in 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 (Code of Practice for Testing of Soils).

4. RESULTS

Table 1 gives the results of physical and engineering tests on the soil samples. At 2 m depth the soils are sandy morum / chalky / clayey morum. They are designated as GM / GC as per IS:1498. In general, the bottom soil is soft and in submerged conditions.

Isolated foundations are recommended.

Correction is needed for water table.

Appendix gives the calculations for SBC.

5. RECOMMENDATIONS

Based on Field and Laboratory investigations, the following Recommendations are given:

a) The entire site is located adjacent to a tank, and major part of the site is in the zone of old inflow channels to the tank.

b) The bottom soil in different blocks at the site is as follows:

Recreational Area & Block A: Sandy morum

Blocks B, C1 & C2: White chalky / clayey morum

Blocks C3, D & Commercial Centre: Black clayey morum

c) Heavy seepage of water is seen in all the pits.

d) SBC is for different blocks is recommended as follows.

Location	**TP No.**	**Soil**	**SBC, t / sq m**
Recreational Area & Block A	1, 2 & 3	Sandy morum	25
Blocks B, C1 & C2	4, 5, 6, 7, 8 & 9	White chalky/clayey morum	20
Blocks C3, D & Commercial Centre	10, 11, 12, 13 & 14	Black clayey morum	15

e) This is based on the assumption of isolated footings of width 2 m. The actual size would be based on the loads from the super structure.

f) Low SBC is recommended in view of clayey / chalky content of the bottom soil in most of the pits and in view of submerged conditions.

g) Compacted sand bed of 300 mm thickness is recommended below PCC beds for clayey soils.

h) All foundation pits should be filled back with well-compacted gravelly morum. The clayey / chalky soil from the site should not be used for this purpose.

i) All concreting should be done in dry conditions.

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TABLE 1
SUMMARY OF SOIL PROPERTIES
PROPOSED BUILDINGS AT NAGARAM, KEESARA (M), R. R. DISTRICT

Property	Location													
	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	TP10	TP11	TP12	TP13	TP14
Soil	Sandy morum	Sandy morum	Sandy/ Chalky morum	Ch. / Cl. Morum	Ch. / Cl. Morum	Ch. / Cl. Morum	Ch. Morum	Ch. / Cl. Morum	Ch. / Cl. Morum	Bl. Clayey morum	Bl. Clayey morum	Bl. Clayey morum	Bl. Clayey morum	Bl. Clayey morum
Specific gravity	2.57	2.58	2.56	2.57	2.56	2.58	2.59	2.58	2.57	2.55	2.56	2.57	2.55	2.56
Density, KN / cu m	18.8	18.9	18.8	18.6	18.6	18.7	18.9	18.8	18.6	17.4	17.5	17.8	17.6	17.9
Grain size distribution														
Gravel > 4.75 mm	12	14	12	15	14	16	22	18	13	10	12	14	11	14
Coarse sand, 4.75 - 2 mm	25	22	24	18	18	20	16	20	15	16	20	19	18	20
Medium sand, 2 - 0.425 mm	20	20	18	10	14	12	13	15	18	20	14	18	16	15
Fine sand, 0.425 - 0.075 mm	14	18	21	16	15	20	19	13	20	17	20	18	21	15
Silt, 0.075 - 0.002 mm	21	20	15	22	21	18	20	18	20	19	19	12	16	20
Clay, < 0.002 mm	8	6	10	19	18	14	10	16	14	18	15	19	18	16
Shear Parameters														
Cohesion	6	4	7	16	12	14	8	10	12	15	16	14	15	12
Angle of internal friction, deg	32	33	32	30	31	30	32	30	31	28	29	29	30	30

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APPENDIX

CALCULATION OF BEARING CAPACITY

PROPOSED BUILDINGS AT NAGARAM, KEESARA (M), R. R. DISTRICT

Recreational Area & Block A (Based on TP1):

Assumed depth of foundation... 2.5 m

Assumed width of foundation... 2 m

Unit wt. = 18.8 KN / cu m r' = 9.0 KN / cu m

Cohesion = 6 KN / sq m (Neglected) Angle of internal friction = 32 deg.

Correction is needed for water table.

Using IS Code 6403 – 1981 formula:

Nc' = 36.53 Nq' = 24.36 Nr' = 32.65

Net, Ult B.C. = 1.3 c' Nc' + r' D (Nq' – 1) + 0.4 r' B Nr'

= 760.6 KN per sq m

With a F.S. of 3.0, SBC = 253.6 KN per sq m

Recommended Safe Bearing Capacity is 25 tonnes per sq m.

Blocks B, C1 & C2 (Based on TP4):

Assumed depth of foundation... 2.5 m

Assumed width of foundation... 2 m

Unit wt. = 18.6 KN / cu m r' = 8.8 KN / cu m

Cohesion = 16 KN / sq m Angle of internal friction = 30 deg.

Correction is needed for water table.

Using IS Code 6403 – 1981 formula:

Nc' = 23.15 Nq' = 12.75 Nr' = 14.52

Net, Ult B.C. = 1.3 c' Nc' + r' D (Nq' – 1) + 0.4 r' B Nr'

= 678.5 KN per sq m

With a F.S. of 3.0, SBC = 226 KN per sq m

Recommended Safe Bearing Capacity is 20 tonnes per sq m.

Blocks C3, D & Commercial Centre (Based on TP10):

Assumed depth of foundation... 2.5 m

Assumed width of foundation... 2 m

Unit wt. = 17.4 KN / cu m r' = 7.6 KN / cu m

Cohesion = 15 KN / sq m Angle of internal friction = 28 deg.

Correction is needed for water table.

Using IS Code 6403 – 1981 formula:

Nc' = 20.28 Nq' = 10.88 Nr' = 11.64

Net, Ult B.C. = 1.3 c' Nc' + r' D (Nq' – 1) + 0.4 r' B Nr'

= 519.5 KN per sq m

With a F.S. of 3.0, SBC = 173 KN per sq m

Recommended Safe Bearing Capacity is 15 tonnes per sq m.

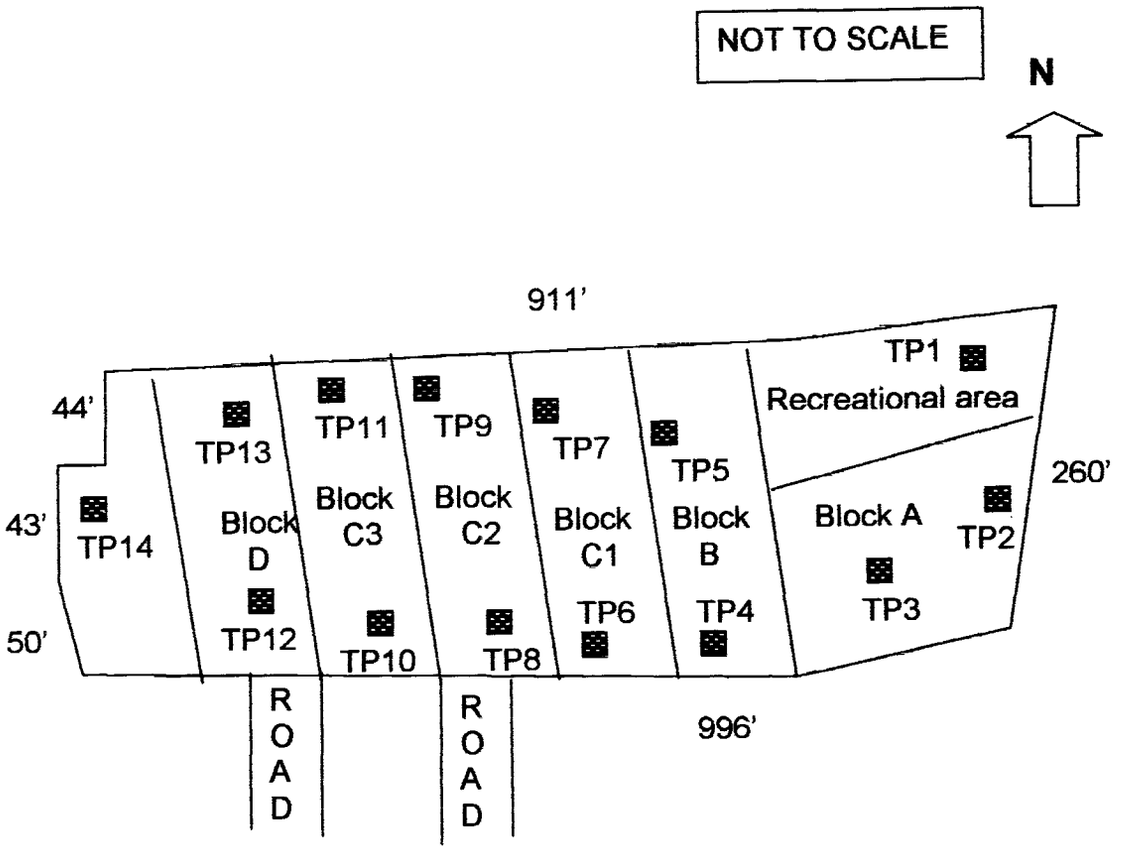

Fig. 1. Layout Plan for Residential Buildings at Nagaram, Keesara (M), showing locations of trial pits.

■ Location of Trial Pit

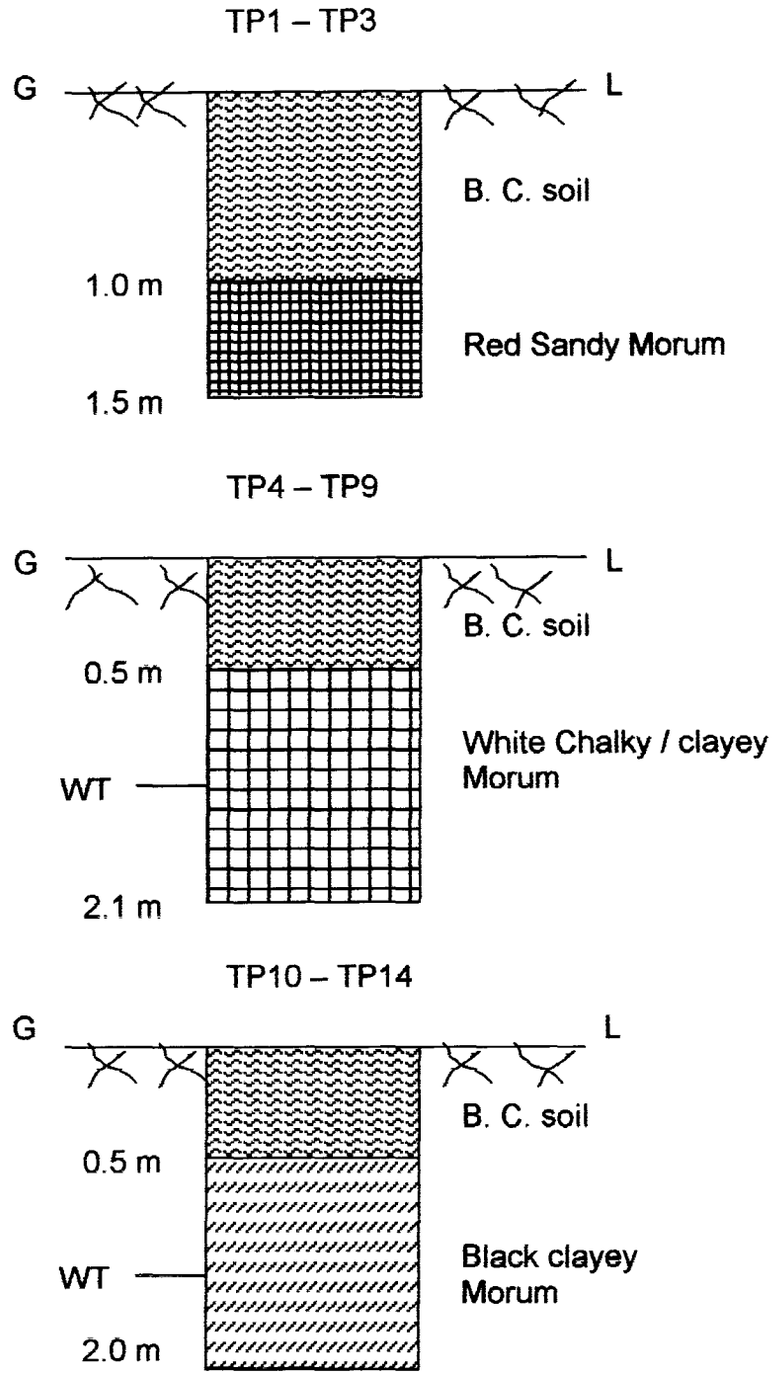

Fig. 2. Typical Logs of Trial Pits (TP) – Nagaram.