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Geotechnical investigation report for Proposed Residensial building (G+1-Floor) location

CLIENT

Naaval Properties And Developers LLP

S.F.Nos. 9/1B, 10/2A1B and 13/1A,
Kannankurichi village and Town Panchayat,
Salem Taluk, Salem District, Tamil Nadu.

PREPARED BY

MPAC

Myrtle Project And Consultancy Pvt. Ltd,
(An ISO/IEC 17025:2017 NABL Accredited Laboratory)
4/24, First Floor, Shivaya Nagar Main Road,
Alagapuram, Salem, Tamil Nadu.



Site Address	:	**S.F.Nos. 9/1B, 10/2A1B and 13/1A, Kannankurichi village and Town Panchayat, Salem Taluk, Salem District, Tamil Nadu.**
S4 - SBC @ 2.0m	:	**15.68 t/m2**
S4 - SBC @ 2.6m	:	**28.04 t/m2**
S5 - SBC @ 1.9m	:	**22.85 t/m2**
S3 - SBC @ 1.4m	:	**20.88 t/m2**
S2 - SBC @ 1.6m	:	**23.35 t/m2**
S1 - SBC @ 2.0m	:	**24.03 t/m2**
S1 - SBC @ 2.2m	:	**25.97 t/m2**
Water Table	:	**Not Detected**
Proposed Structure	:	**Residensial building (G+1-Floor)**
Inspection date	:	**05.07.2021**
Revision	:	**00**
Report Issued	:	**09.07.2021**
Job No.	:	**MPAC/TN/JD/2021 088**

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1.0 Introduction

Naaval Properties And Developers LLPneeds to erect Residensial building (G+1-Floor) at Naaval

Properties And Developers LLP, Opp to the Modern theater, yercaud, Salem.

The field work and laboratory tests for the geotechnical investigation were conducted by Myrtle project & Consultancy Pvt. Ltd. The fieldwork was investigated on 05.07.2021.This report present results of the geotechnical investigation along with foundation recommendations for proposed Residensial building (G+1-Floor)

2.0 Objective

The main objectives of the proposed project are:

- To determine the nature and characteristics of the subsoil below the Ground level by conducting field and laboratory tests,
- To determine the safe bearing capacity of the soil and designing the foundation.
- To determine the settlement of foundation for maximum pressure.

3.0 Exploration program

3.1 Scope

- Collection of disturbed soil samples at regular depth intervals for finding index and engineering properties of soil.
- Submitting report with laboratory test results and recommendations for foundations.

3.2 Testing Procedure

a.For Trial Pit,

Five numbers of trial pit is made at the central borehole location to further investigate the strata properties. Pit size shall be as follows:

i. For hard strata where soil does not collapse: 1m (L) x 1m (W) x 2m (D)
ii. For Gravel – Boulder type Strata : 2m (L) x 2m (W) x 2.5m (D)
iii. For Hard Murrum: 2m (L) x 2m (W) x 2.5m (D)

b. Sampling

Sufficient number of soil samples is collected in adherence to following steps for visual identification and preliminary laboratory tests.

1. Sampling is done at every change in stratum or at depth of not more than 2.0m whichever is less.
2. All samples are marked with date, test pit number, depth of sampling, etc.
3. The top surface of the sample in-situ is marked.

3.3 Laboratory Testing Program

After Soil Investigation, Collection of soil samples from site were brought to the Geotechnical & Materials testing laboratory of **MYRTLE PROJECT AND CONSULTANCY PVT LTD**. for determining soil properties and further examination in accordance with IS: 1498-1970. Selected samples were subjected to the following physical tests.

1.For Soil Samples

- ☐ Moisture Content (IS 2720 (Part 2) : 1973)
- ☐ Specific Gravity of Soil (IS 2720 (Part 3) : 1980)
- ☐ Liquid limit (IS 2720 (Part 5) : 1985)
- ☐ Plastic Limit (IS 2720 (Part 5) : 1985)
- ☐ Grain Size Distribution In Soils (IS 2720 (Part 4) : 1985)
- ☐ Free Swell Index (IS 2720 (Part 40) : 1977)
- ☐ Determination of Shear parameters (IS 2720 (Part 13) : 1986), IS 2720 (Part 10) : 1991)
- ☐ Bulk Density & Dry Density (IS 2720 (Part 29) : 1975)
- ☐ Chemical Analysis of soil (IS 2720 - Part 26-1987 & Part 27-1977)
- ☐ Chemical Analysis of Water (IS 3025 -Part 11-1983,Part 32-1988 & Part 24-1986).

2. For Hard Strata

- ☐ Specific Gravity of Rock (IS 1122:1974)
- ☐ Density of Rock (IS 13030 : 1991)
- ☐ Water Content of Rock (IS 13030 : 1991)

3. Visual Observation

- ☐ Texture, Color, Structure ,Composition & Grain Size

4.0 Geological Conditions

a.	Tower Proposed area Terrain	:	Plain
b.	Flood history	:	On Aug 12, 2018 Heavy Rain occurred in Salem District.
c.	Earthquake history	:	On July 22, 2018 Earthquake occurred in Salem District.
d.	Earthquake zone	:	III
e.	Ground Water Table level	:	Not Detected
f.	Water bodies near by site	:	-

Myrtle Project And Consultancy Pvt. Ltd. Salem

5.0 Subsurface Soil Description

Based on Trial Pit information, sub surface soil profile of the proposed Construction of Residensial building (G+1-Floor) is given below

TRIAL PIT	LAYERS	DEPTH (m)		TYPE OF SOIL
		From	To	
S4	I	0	0.7	Back Filling
	II	0.7	2.1	Brown Colored Sandy Soil (SP)
	III	2.1	2.6	Weathered Rock
	IV	Below 2.6		Hard Rock
S5	I	0	0.3	Back Filling
	II	0.3	1.3	Brown Colored Sandy Soil (SP)
	III	1.3	1.9	Weathered Rock
	IV	Below 1.9		Hard Rock
S3	I	0	1	Brown Colored Sandy Soil (SP)
	II	1	1.4	Weathered Rock
	IV	Below 1.4		Hard Rock
S2	I	0	0.3	Back Filling
	II	0.3	1.2	Brown Colored Sandy Soil (SP)
	III	1.2	1.6	Weathered Rock
	IV	Below 1.6		Soft Rock
S1	I	0	0.5	Back Filling
	II	0.5	1.8	Brown Colored Sandy Soil (SP)
	III	1.8	2.2	Weathered Rock
	IV	Below 2.2		Hard Rock

Special Notes:

1 Here Hard Rock is obtained @ different depths like 2.6m, 1.6m, 1.4m, 1.9m
2 Surface Hard Rock also available in this plot area.
3 So, up to 2 m Hard Strata should be blasted.
4 Foundation Should be placed at 2m depth.

Foundation Recommendations

a. Based on the Trial pit information, laboratory test results and nature of soil, the recommendations for the proposed structure was **Isolated or Raft foundation.**

b. The Recommendation of PCC thickness will depend on the soil condition after excavation.

Closure

Subsurface conditions encountered during construction may vary somewhat from the conditions encountered during site investigated. In case significant variations are encountered during construction, we request to be consulted to enable us to review further the recommendations given in this report in light of these variations.

6.0 Field & Laboratory test Results

6.1 Bore log sheet & Recommendation

Project		Geotechnical investigation report for Proposed Residensial building (G+1-Floor) location				
Site ID						
Site Name						
Depth (m)		Description	Pattern	SBC Value (t/m2)	Cohesion (kPa)	Angle of Internal friction (°)
From	To					
0	0.7	Back Filling				
0.7	1	Brown Colored Sandy Soil (SP)				
1	2			15.68 t/m2	N/A	24
2	2.1					
2.1	2.6	Weathered Rock		28.04 t/m2	N/A	27
Below 2.6		Hard Rock				

S5

Project		Geotechnical investigation report for Proposed Residensial building (G+1-Floor) location				
Site ID						
Site Name						
Depth (m)		Description	Pattern	SBC Value (t/m2)	Cohesion (kPa)	Angle of Internal friction (°)
From	To					
0	0.3	Back Filling				
0.3	1	Brown Colored Sandy Soil (SP)				
1	1.3					
1.3	1.9	Weathered Rock		22.85 t/m2	N/A	27
Below 1.9		Back Filling				

S3

Project		Geotechnical investigation report for Proposed Residensial building (G+1-Floor) location				
Site ID						
Site Name						
Depth (m)		Description	Pattern	SBC Value (t/m2)	Cohesion (kPa)	Angle of Internal friction (°)
From	To					
0	1	Brown Colored Sandy Soil (SP)				
1	1.4	Weathered Rock		20.88 t/m2	N/A	28
Below 1.4		Hard Rock				

S2

Project		Geotechnical investigation report for Proposed Residensial building (G+1-Floor) location				
Site ID						
Site Name						
Depth (m)		Description	Pattern	SBC Value (t/m2)	Cohesion (kPa)	Angle of Internal friction (°)
From	To					
0	0.3	Back Filling				
0.3	1.2	Brown Colored Sandy Soil (SP)				
1.2	1.6	Weathered Rock		23.35 t/m2	N/A	28
Below 1.6		Hard Rock				

S1

Project		Geotechnical investigation report for Proposed Residensial building (G+1-Floor) location				
Site ID						
Site Name						
Depth (m)		Description	Pattern	SBC Value (t/m2)	Cohesion (kPa)	Angle of Internal friction (°)
From	To					
0	0.5	Back Filling				
0.5	1.8	Brown Colored Sandy Soil (SP)				
1.8	2	Weathered Rock		24.03 t/m2	N/A	27
2	2.2			25.97 t/m2	N/A	27
Below 2.2		Hard Rock				

Recommendation:

S4 - SBC @ 2.0m	15.68 t/m2
S4 - SBC @ 2.6m	28.04 t/m2
S5 - SBC @ 1.9m	22.85 t/m2
S3 - SBC @ 1.4m	20.88 t/m2
S2 - SBC @ 1.6m	23.35 t/m2
S1 - SBC @ 2.0m	24.03 t/m2
S1 - SBC @ 2.2m	25.97 t/m2
Water Table	Not Detected
Type of Foundation	Isolated or Raft foundation



6.2 Grain size & Physical analysis

S4

Depth (m)	Particle size analysis (%)				Moisture Content (%)	Atterberg limits			FSI %	Specific Gravity	Bulk Density (kg/m³)	Dry Density (kg/m³)
	Gravel	Sand	Silt	Clay		WL%	WP%	IP%				
Top	-	-	-	-	-	-	-	-	-	-	-	-
1.0	9.00	72.00	19.00	0.00	12.90	-	-	-	-	2.63	1690	1497
2.0	-	-	-	-	9.80	-	-	-	-	2.65	1720	1566
2.6	-	-	-	-	7.20	-	-	-	-	2.70	1790	1670

S5

Depth (m)	Particle size analysis (%)				Moisture Content (%)	Atterberg limits			FSI %	Specific Gravity	Bulk Density (kg/m³)	Dry Density (kg/m³)
	Gravel	Sand	Silt	Clay		WL%	WP%	IP%				
Top	-	-	-	-	-	-	-	-	-	-	-	-
1.0	10.00	74.00	16.00	0.00	13.40	-	-	-	-	2.62	1710	1508
1.9	-	-	-	-	10.20	-	-	-	-	2.70	1780	1615

S3

Depth (m)	Particle size analysis (%)				Moisture Content (%)	Atterberg limits			FSI %	Specific Gravity	Bulk Density (kg/m³)	Dry Density (kg/m³)
	Gravel	Sand	Silt	Clay		WL%	WP%	IP%				
Top	10.00	75.00	15.00	0.00	11.10	-	-	-	-	2.63	1730	1557
1.0	-	-	-	-	8.50	-	-	-	-	2.66	1730	1594
1.4	-	-	-	-	7.30	-	-	-	-	2.71	1810	1687

S2

Depth (m)	Particle size analysis (%)				Moisture Content (%)	Atterberg limits			FSI %	Specific Gravity	Bulk Density (kg/m³)	Dry Density (kg/m³)
	Gravel	Sand	Silt	Clay		WL%	WP%	IP%				
Top	-	-	-	-	-	-	-	-	-	-	-	-
1.0	13.00	78.00	9.00	0.00	9.60	-	-	-	-	2.64	1780	1624
1.6	-	-	-	-	7.10	-	-	-	-	2.70	1820	1699

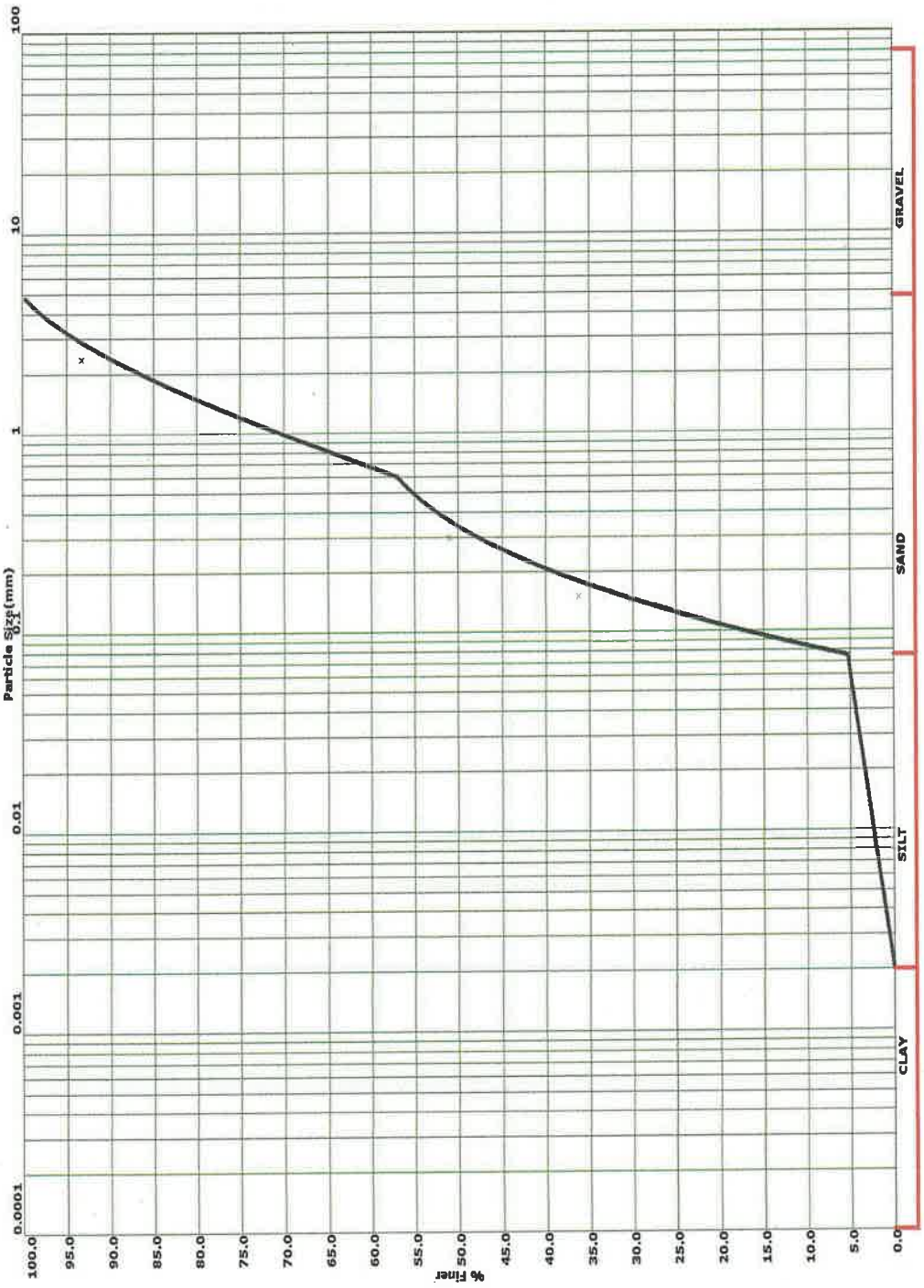
S1

Depth (m)	Particle size analysis (%)				Moisture Content (%)	Atterberg limits			FSI %	Specific Gravity	Bulk Density (kg/m³)	Dry Density (kg/m³)
	Gravel	Sand	Silt	Clay		WL%	WP%	IP%				
Top	-	-	-	-	-	-	-	-	-	-	-	-
1.0	10.00	72.00	18.00	0.00	12.90	-	-	-	-	2.63	1690	1497
2.0	-	-	-	-	9.80	-	-	-	-	2.65	1720	1566
2.6	-	-	-	-	7.20	-	-	-	-	2.71	1790	1670

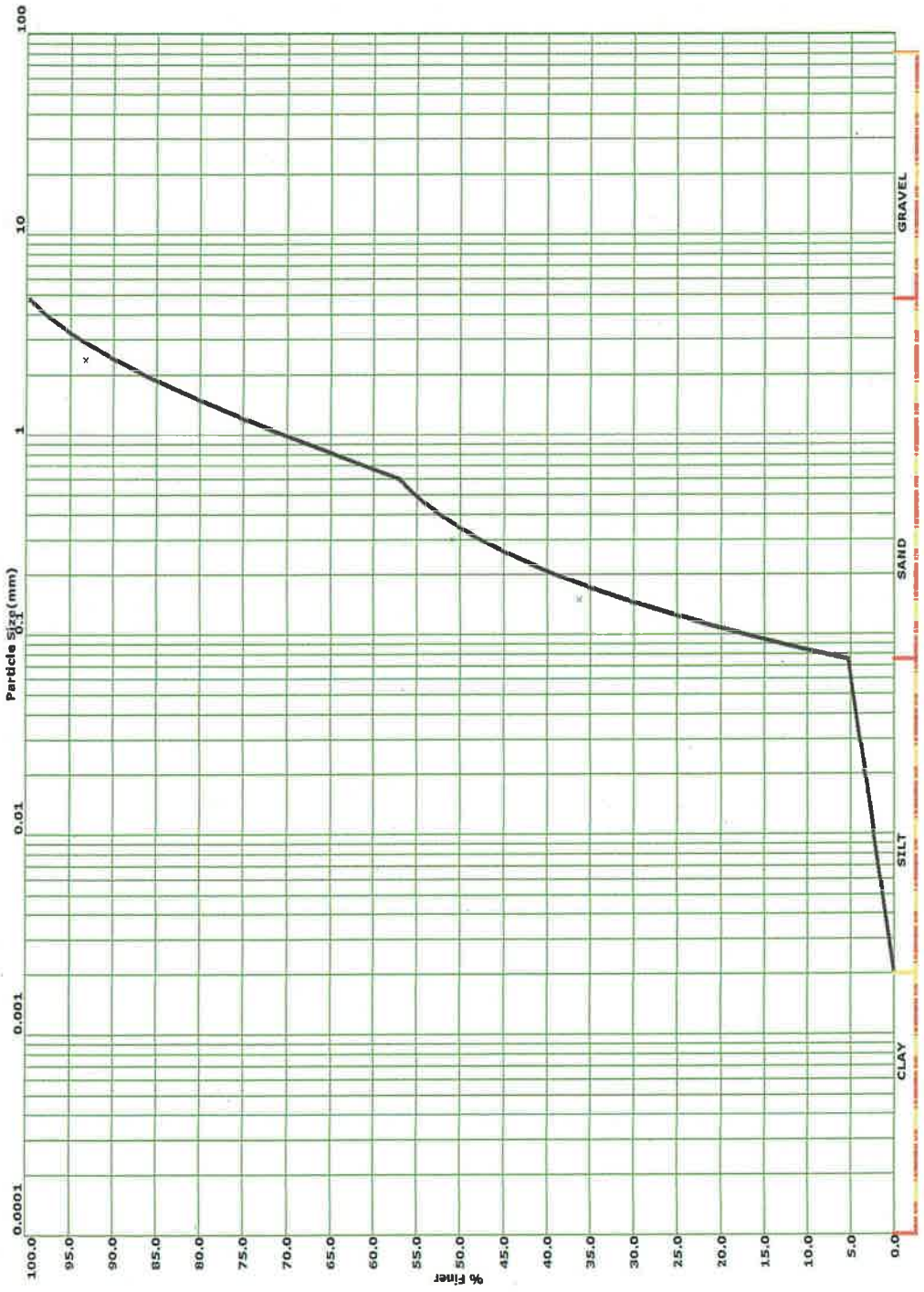
6.3 Chemical analysis

S.NO	Name of the test	Soil sample	Name of the test	Water sample
1	pH Value	7.13	pH Value	–
2	Chlorides as Cl (%)	0.068	Chlorides as Cl (mg/l)	–
3	Sulphates as SO_4 (%)	0.042	Sulphates as SO_4 (mg/l)	–

Particle size Analysis Graph



Particle size Analysis Graph



MODEL CALCULATION

7.0(a) TYPICAL BEARING CAPACITY COMPUTATIONS@2m

7.1(a) COMPUTATION OF BEARING CAPACITY AS PER IS:6403

Geometrical Data :

Shape of the Foundation		Square	
Depth of Foundation Below F.G.L.	=	2.30	m
Depth of Below N.G.L	=	2.00	m
Height of Filling to Reach F.G.L	=	0.30	m
Breadth of Footing (B)	=	3.00	m
Length of Footing (L)	=	3.00	m
B/L	=	1.00	
Inclination of Vertical Load with the Vertical (a)	=	0.00	

Soil Data :

Type of Effective Bearing Strata	=	Sand	
Design Overburden SPT-value of the Bearing Strata	=	-	
Type of Shear Failure	=	General	
Angle of Shearing Resistance	=	24.00	

Design Parameters:

Bulk Density of Soil above the foundation depth (g)	=	17.20	kN/m3
Water Table Correction Factor (w')	=	0.50	
Effective Overburden pressure at foundation level (q)	=	34.10	kN/m2

Bearing Capacity Factors

Nc	=	N/A	
Nq	=	9.808	
Ng	=	9.782	

Shape Factors

S_c	=	N/A	
S_q	=	1.20	
S_g	=	0.80	

Depth Factors

Dc	=	N/A	
Dq	=	1.000	
Dg	=	1.000	

Inclination Factor

Ic	=	N/A	
Iq	=	1.00	
Ig	=	1.00	

Ultimate Bearing Capacity (Qu):

Qu=q*(Nq-1)*Sq*Dq*Iq + 0.5*B*g*Ng*Sg*Dg*Ig*w'	=	461.37	kPa

Safe Bearing Capacity (Qsafe) :

Factor of Safety (F.O.S.)	=	3.00	
Qsafe	=	153.79	kPa
Qsafe	=	**15.68**	**t/m2**

7.2(a) Computation Of Settlement For Maximum Pressure And Size of Footing: (As Per IS:8009-Part-I)

(I) Immediate Settlement :

The Immediate Elastic Settlement	=	qB(1-m2)*I/Es	
Bearing Pressure(q)	=	153.79	kPa
Poission'S Ratio	=	0.28	
Modulus of Elasticity	=	33500.00	kPa
Size Of Footing Considered For Maxium Settlement	=	3.00	m
Influence Factor	=	0.95	
Depth Correction Factor	=	0.81	
Elastic Settlement	=	12.06	mm
Elastic Settlement After Correction (Multiply By Depth Correction Factor)	=	9.77	mm

(II)Consolidation Settlement:

Consolidation Settlement	=	0.00	mm

Consolidation Settlement Will Not Occur In This Soil Strata

Total Settlement @2m

Total Settlement = Elastic Settlement + Consolidation Settlement	=	9.77	mm
Total Settlement	=	9.77	<40mm



Certification 09.07.2021

Naaval Properties And Developers LLP has Proposed to build a Residensial building (G+1-Floor) at S.F.Nos. 9/1B, 10/2A1B and 13/1A, Kannankurichi village and Town Panchayat, Salem Taluk, Salem District, Tamil Nadu. Geotechnical Investigation was conducted at site on 05.07.2021 .After analysis of the test reports, it is recommended as

Recommendation:

S4 - SBC @ 2.0m	15.68 t/m2
S4 - SBC @ 2.6m	28.04 t/m2
S5 - SBC @ 1.9m	22.85 t/m2
S3 - SBC @ 1.4m	20.88 t/m2
S2 - SBC @ 1.6m	23.35 t/m2
S1 - SBC @ 2.0m	24.03 t/m2
S1 - SBC @ 2.2m	25.97 t/m2
Water Table	Not Detected
Type of Foundation	Isolated or Raft foundation

This is to certify that the soil stratum has a capacity to withstand Residensial building (G+1-Floor)

The Geo-Technical investigation was conducted as per IS 6403:1981.

The above certificate has been issued for the exclusive use of Naaval Properties And Developers LLP to their services.

The responsibility of Myrtle Project And Consultancy Pvt. Ltd. Shall be limited to technical advice on matters referred by Naaval Properties And Developers LLP All procedural / Legal / Operational matters will be the responsibility of Naaval Properties And Developers LLP

From Myrtle Project And Consultancy Pvt. Ltd.

Myrtle Project And Consultancy Pvt. Ltd. MPAC Salem

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Chartered Engineer - M 1623251
Chartered Structural Engineer- CM/LM/ISE-223
Indian Geotechnical Society Member-LM-4177

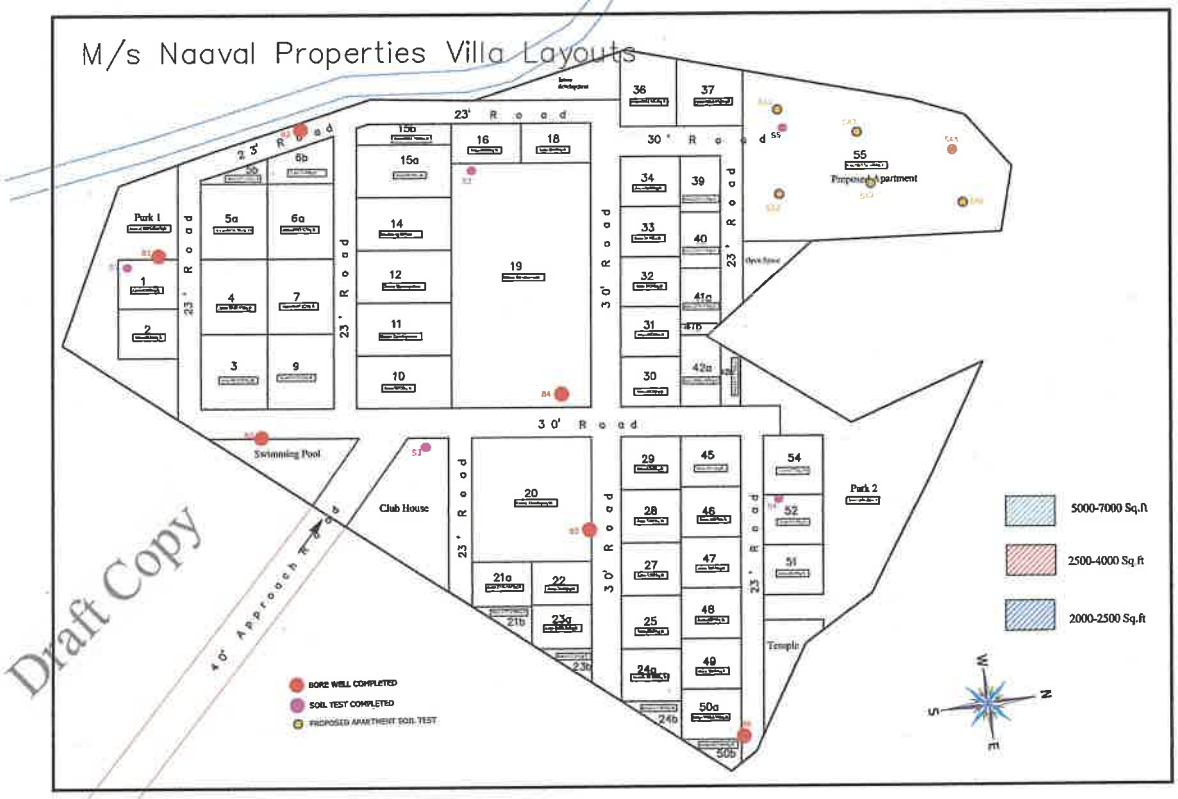
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M/s Naaval Properties Villa Layouts
23' Road
30' Road
Park 1
Swimming Pool
Club House
Park 2
Temple
Proposed Apartment
Open Space
40' Approach Road
BORE WELL COMPLETED
SOIL TEST COMPLETED
PROPOSED APARTMENT SOIL TEST
5000-7000 Sq.ft
2500-4000 Sq.ft
2000-2500 Sq.ft
Draft Copy


Latitude: 11,709068
Longitude: 76,171907
Elevation: 419,33±19 m
Accuracy: 9,8 m
Time: 05-07-2021 11:09


Latitude: 11,709033
Longitude: 76,171899
Elevation: 421,76±15 m
Accuracy: 7,6 m
Time: 05-07-2021 11:12


Latitude: 11,709097
Longitude: 76,171909
Elevation: 418,16±12 m
Accuracy: 9,4 m
Time: 05-07-2021 11:13


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Elevation: 422,73±11 m
Accuracy: 16,8 m
Time: 05-07-2021 11:12


Latitude: 11,707965
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Elevation: 413,36±17 m
Accuracy: 34,0 m
Time: 05-07-2021 12:37
Note: tp 5


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Elevation: 423,58±11 m
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Time: 05-07-2021 11:21


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Note: tp 5


Latitude: 11,709083
Longitude: 78,771361
Elevation: 424,87±14 m
Accuracy: 16,3 m
Time: 05-07-2021 11:21



our services doesn't just end there

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

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