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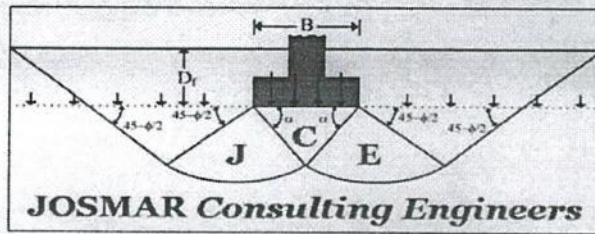
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Geotechnical Engineering Division

Geotechnical Investigation Report

For

Executive Engineer & ADO,
TNHB Anna Nagar Division

Site:

Survey No: 251/1
Padi Village,
Ambattur Taluk,
Thiruvallur District.

REPORT NO: JCE/GEOTECH/2018/035(A)

Rev-0

26/04/2018

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EXECUTIVE ENGINEER & ADO
ANNA NAGAR DIVISION
Tamil Nadu Housing Board,
Thirumangalam, Chennai - 600101.





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Client File # 18-I-035(A)
Executive Engineer & ADO,
TNHB Anna Nagar Division.

26th April 2018

Site:
Survey No: 251/1
Padi Village,
Ambattur Taluk,
Thiruvallur District.

**SUB : GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED
CONSTRUCTION OF (STILT +7) RESIDENTIAL BUILDING AT PADI
VILLAGE, AMBATTUR TALUK, THIRUVALLUR DISTRICT.**

Dear Sir,

We are pleased to hereby transmit one (01) original and one (01) photocopy of our final Geotechnical Investigation Report for the above captioned project.

Should you have any questions, please do not hesitate to contact this office.

Please note that our final report is deemed acceptable to you, if we do not hear from you in writing within 10 calendar days from the date that you received it.

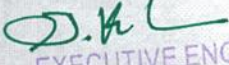
It has been a pleasure being of service to you on this project. Assuring you of our continued co-operation, we remain.

Yours Truly,

FOR JOSMAR CONSULTING ENGINEERS
(Geotechnical, Structural & Materials Consultant)


Er. P.KALPANA. M.E.
Geotechnical Engineer




EXECUTIVE ENGINEER & ADO
ANNA NAGAR DIVISION
Tamil Nadu Housing Board,
Thirumangalam, Chennai - 600101.

**GEOTECHNICAL INVESTIGATION REPORT FOR THE
PROPOSED CONSTRUCTION OF (STILT +7) RESIDENTIAL BUILDING AT PADI
VILLAGE, AMBATTUR TALUK, THIRUVALLUR DISTRICT.**

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S.K.L
**EXECUTIVE ENGINEER & ADO
ANNA NAGAR DIVISION
Tamil Nadu Housing Board,
Thirumangalam, Chennai - 600101.**



**GEOTECHNICAL INVESTIGATION REPORT FOR THE
PROPOSED CONSTRUCTION OF (STILT +7) RESIDENTIAL BUILDING AT PADI
VILLAGE, AMBATTUR TALUK, THIRUVALLUR DISTRICT.**

INTRODUCTION

This report presents the results of the geotechnical investigations carried out by JOSMAR Consulting Engineers—Geotechnical & Foundation Engg Division, for the proposed construction of (Stilt +7) Residential Building at Survey No: 251/1 Padi Village, Ambattur Taluk, Thiruvallur District.

This work was authorized by the Client (**Executive Engineer & ADO, TNHB Anna Nagar Division**); vide their acceptance through mail dated on 24.03.2018. **Four boreholes have been requested by the client, even though it is the area measured about 79825.37Sq.ft (1.83 Acres). Four boreholes have been drilled; our recommendation was based on those four boreholes only.**

Standard Penetration Test bore holes were drilled at the site in case of BH-1 to BH-4 were drilled up to a depth of 28.00m below the existing ground level respectively.

The investigation consists of drilling four boreholes, soil sampling, field and laboratory testing and preparation of a Geotechnical Report for the Proposed Construction of (Stilt +7) Residential Building at Survey No: 251/1 Padi Village, Ambattur Taluk, Thiruvallur District.

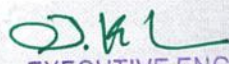
SCOPE OF WORK

The scope of this investigation is to:

- i) Determine the soil profile at the site, with ground water observation.
- ii) Recommend a suitable foundation system and safe bearing pressure at foundation level.

Four (4) boreholes were drilled to a maximum depth of 28.00m. Soil samples were collected for visual identification, classification and laboratory testing.

The key plan & borehole locations plan are presented in Appendix-A. The borehole log is presented in Appendix -B. The laboratory test results are presented in Appendix-C. Pile capacity calculation is presented in Appendix- D.


EXECUTIVE ENGINEER & ADO
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**GEOTECHNICAL INVESTIGATION REPORT FOR THE
PROPOSED CONSTRUCTION OF (STILT +7) RESIDENTIAL BUILDING AT PADI
VILLAGE, AMBATTUR TALUK, THIRUVALLUR DISTRICT.**

SITE DESCRIPTION

The site for the proposed construction of (Stilt +7) Residential Building at Survey No: 251/1 Padi Village, Ambattur Taluk, Thiruvallur District.

The top surface of the site is same as the adjacent road level. The site is bounded by Industrial Building in the West direction, Residential building at South direction; while there is a road at North & East Directions.

EXPLORATION PROGRAM & TECHNIQUES

After the visual inspection of the site, the subsurface investigation was carried out as mentioned below:

Four (4) exploration boreholes were drilled to a maximum depth of 28.00m

BH - 1 was started on 26th March 2018 and completed on 27th March 2018

BH - 2 was started on 27th March 2018 and completed on 28th March 2018

BH - 3 was started on 29th March 2018 and completed on 30th March 2018

BH - 4 was started on 30th March 2018 and completed on 31th March 2018

Boreholes were drilled at the site, as shown in the AutoCADD drawing in order to obtain an average soil property of the site. Rotary drilling was performed using water as drilling fluid in the sub soil with casing pipe to stabilize the boreholes up to the required depth. Field testing and sampling will be conducted in accordance with IS: 2131-1981.

Standard Penetration Test (SPT) would be performed on the sub soil. In this test, a standard split spoon (IS: 9640-1980) of length about 450 mm and external/internal diameter of 51/35 mm initially penetrates the soil for 15cm to bypass the expected accumulated sludge at the bottom of the hole by means of a 63.5 kg (140 lb) hammer falling freely along a guide from a height of 760 mm.

The total number of blows (N) required, to advance the spoon into the bore, for another two successive 15cm (a total of 30 cm) is recorded as a measure of the soil relative density or consistency.

D.K.L

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The fieldwork was carried out under the close supervision of our engineer in accordance with Indian Standard mentioned earlier.

LABORATORY TESTING PROGRAM

All the extracted soil samples were brought to the Geotechnical & Materials Testing Laboratory of JOSMAR Consulting Engineers for further examination in accordance with IS: 1498-1970. Selected samples were subjected to the following physical tests.

1. Natural Moisture Content (IS: 2720 Part II)
2. Sieve Analysis (IS: 2720 Part IV)
3. Liquid limit (IS: 2720 Part V)
4. Plastic Limit and Plasticity Index (IS: 2720 Part VI)
5. Differential Free Swell Test (IS: 2720 Part XL)

The laboratory test results are given in Appendix "C".

SUBSURFACE SOIL DESCRIPTION

Based on boreholes information, sub surface soil profile at the proposed construction of (Stilt +7) Residential Building is given below:

BH-1

- 0.00 - 2.60m Filling Soil
- 2.60 - 26.50m Grayish, Blackish, Clayey Silty with medium to high swelling and medium to high plasticity (CI-CH)
- 26.50 - 28.00m Grayish, poorly graded sand, gravelly sand with fines (SP)

BH-2

- 0.00 - 2.50m Filling Soil
- 2.50 - 3.50m Brownish, Clayey Silty with high swelling and high plasticity (CH)
- 3.50 - 5.00m Brownish, grayish silty sands poorly graded sand silt mixtures (SM)
- 5.00 - 26.50m Grayish, Blackish, Clayey Silty with low to high swelling and low to high plasticity (CL-CH)
- 26.50 - 28.00m Grayish, poorly graded sand, gravelly sand with fines (SP)


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BH-3

0.00 - 3.70m Filling Soil

3.70 - 26.50m Grayish, Blackish, Clayey Silty with medium to high swelling and medium to high plasticity (CI-CH)

26.50 - 28.00m Grayish, poorly graded sand, gravelly sand with fines (SP)

BH-4

0.00 - 1.50m Filling Soil

1.50 - 26.50m Grayish, Blackish, Clayey Silty with medium to high swelling and medium to high plasticity (CI-CH)

26.50 - 28.00m Grayish, poorly graded sand, gravelly sand with fines (SP)

Borehole data indicates,

In case of BH-1, the top surface of the soil consists of Filling Soil at a depth of 2.60m. This layer is followed by Grayish, Blackish, clayey silt with medium to high swelling and medium to high plasticity (CI-CH) was found up to a depth of 26.50m where their standard penetrations test result indicates Firm (medium) to hard consistency. This layer is followed by Grayish, poorly graded sand, gravelly sand with fines (SP) was found up to a depth of 28.00m where their standard penetrations test result indicates very dense relative density. Further drilling was not feasible by rotatory drilling due to very dense strata.

In case of BH-2, the top surface of the soil consists of Filling Soil at a depth of 2.50m. This layer is followed by Brownish, clayey silt with high swelling and high plasticity (CH) was found up to a depth of 3.50m where their standard penetrations test result indicates Firm (medium) consistency. This layer is followed by Brownish, grayish silty sands poorly graded sand silt mixtures (SM) was found up to a depth of 5.00m where their standard penetrations test result indicates medium dense relative density. This layer is followed by Grayish, Blackish, Clayey Silty with low to high swelling and low to high plasticity (CL-CH) was found up to a depth of 26.50m where their standard penetrations test result indicates Stiff to hard consistency. This layer is followed by Grayish, poorly graded sand, gravelly sand with fines (SP) was found up to a depth of 28.00m where their standard penetrations test result indicates very dense relative density. Further drilling was not feasible by rotatory drilling due to very dense strata.


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**GEOTECHNICAL INVESTIGATION REPORT FOR THE
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VILLAGE, AMBATTUR TALUK, THIRUVALLUR DISTRICT.**

In case of BH-3, the top surface of the soil consists of Filling Soil at a depth of 3.70m. This layer is followed by Grayish, Blackish, clayey silt with medium to high swelling and medium to high plasticity (CI-CH) was found up to a depth of 26.50m where their standard penetrations test result indicates Firm (medium) to hard consistency. This layer is followed by Grayish, poorly graded sand, gravelly sand with fines (SP) was found up to a depth of 28.00m where their standard penetrations test result indicates very dense relative density. Further drilling was not feasible by rotatory drilling due to very dense strata.

In case of BH-4, the top surface of the soil consists of Filling Soil at a depth of 1.50m. This layer is followed by Grayish, Blackish, clayey silt with medium to high swelling and medium to high plasticity (CI-CH) was found up to a depth of 26.50m where their standard penetrations test result indicates Firm (medium) to hard consistency. This layer is followed by Grayish, poorly graded sand, gravelly sand with fines (SP) was found up to a depth of 28.00m where their standard penetrations test result indicates very dense relative density. Further drilling was not feasible by rotatory drilling due to very dense strata.

GROUND WATER

Ground water table was observed at 3.80m below the ground level from nearby well during the time of field investigation. However, it may fluctuate due to seasonal variations and local sewerage disposal practices.

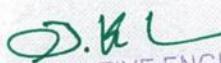
FOUNDATION ANALYSIS

From the above bore logs the top soil consists of filling soil was found up to a depth of 2.60m 2.50m, 3.70m 1.50m and below that the clay & sand layers were occurred. Hence based on the borehole information and laboratory test results in addition to the nature of the structure, we recommend Pile foundation for the proposed structure is given below.

FOUNDATION RECOMMENDATION:

PILE FOUNDATION (BCIS) (26.00m Depth)

Pile foundation system shall be adopted for the proposed structure by terminating the Piles in the deep strata. It is a normal practice to adopt same Pile lengths, for better interaction and to achieve uniform settlements.


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VILLAGE, AMBATTUR TALUK, THIRUVALLUR DISTRICT.**

Under each column there should be a pile cap to transfer the support load to the carrying piles. The bottom level of the all pile caps shall be kept at 1.0 m below the ground level in case of bored in situ pile. The plan and dimensions of pile caps could be estimated according to the required number of piles and considered centre to center spacing between piles.

Bored In situ Pile Foundation

A Pile length of 26.00m has been analysed below and the corresponding Pile capacities are given. Selection of Pile length was estimated according to soil profile and soil stiffness as obtained from SPT values.

PILE CAPACITIES

Bedrock was not encountered up to a maximum explored depth. Hence, the Piles utilizing friction and also end bearing capacities shall be adopted for the proposed structures. The Pile capacities of the bored, cast in situ piles are worked out considering a depth of 26.00 meter below ground level as the top of pile level. Estimation of Pile capacities are given below with reference to the boreholes drilled at site.

PILE CAPACITY CALCULATIONS				
Pile Depth (m)	Pile Diameter (mm)	Factor of Safety = 2.5 Allowable Pile Load Capacity (kN)	Lateral load bearing capacity(kN)	Uplift Resistance (kN)
26.00	600	1010	80.8	860
26.00	800	1420	113.6	1150
26.00	1200	1870	149.6	1440

Note:

The above recommendation is given by assuming similar soil strata in the whole site area. In case of any variations in the soil profile the above recommendation need to be validated.

D.K.

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**GEOTECHNICAL INVESTIGATION REPORT FOR THE
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VILLAGE, AMBATTUR TALUK, THIRUVALLUR DISTRICT.**

In view of the ground water which is expected to have salts that could corrode the steel bars and affect the concrete strength, necessary measures can be considered by the designer of the building.

PILE GROUPING

The group efficiency shall be worked out based on number of Piles in a group. Piles shall have a minimum spacing of 2.5 times diameter centre to centre or minimum 1.5 times diameter as clear spacing in order to mobilise frictional resistance, which is a key factor in achieving better Pile capacities. Larger spacing is always preferable, in case of bored piles.

PILE GROUP EFFICIENCY

Pile group efficiency will depend on the pattern of arrangement of piles and number of piles in a group. An efficiency of about 60 to 70% shall be considered for the onsite soil condition, in general. However, it shall be decided based on pile load tests. Sequence of casting of Piles shall be such that the adjacent Piles do not get affected during Pile drilling. Tremmie concrete shall be carried out in order to minimise segregation. Water-cement ratio shall also be controlled in order not to be affected by water, existing inside the Pile boring. Gradual pull out of Pile casing is necessary, to avoid necking of Piles.

UPLIFT CAPACITY

Uplift capacity of piles shall be considered as 50% of the ultimate frictional capacity of Piles.

PILE TESTING

The group efficiency shall be worked out based on number of Piles in a group. However, Pile load tests are recommended to observe the performance of the Piles and to re-confirm the theoretical Pile capacities. Load tests to be carried out after a minimum period of 1 week after driving of Pile.

Pile load tests should be conducted by loading up to 1.5 times the service load on working Pile, while minimum two (2) times the service load on Pilot Piles. A minimum of (two) 2 pile load test can be conducted for this project.


EXECUTIVE ENGINEER & ADO
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Tamil Nadu Housing Board,
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**GEOTECHNICAL INVESTIGATION REPORT FOR THE
PROPOSED CONSTRUCTION OF (STILT +7) RESIDENTIAL BUILDING AT PADI
VILLAGE, AMBATTUR TALUK, THIRUVALLUR DISTRICT.**

BACKFILLING AND COMPACTION

Excavated material cannot be used as general backfill material. As per general practice the backfill material should not contain more than 15 % fines passing 0.075 mm sieve, retain 40% on 4.75mm size sieve while the maximum size of gravel allowed is 50mm. Backfilling materials shall be placed in horizontal layers not exceeding 25 cm thickness and each layer shall be compacted to at least 95% of the maximum dry density.

EXCAVATION

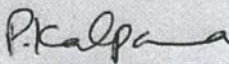
Excavation through the overburden soil can be carried out by conventional equipment such as dozers and porcelain excavators.

GENERAL COMMENTS

The recommendations for foundation design and construction are based on the information obtained from the borehole drilled at site. When foundation construction is underway, the recommendations of this report should be checked through field inspection, to validate the information for use during the construction stage. Any variation in underground conditions revealed by the borehole should be brought to our attention for alternate recommendations, if needed.

Yours Truly,

FOR JOSMAR CONSULTING ENGINEERS


Er.P.KALPANA. M.E.
Geotechnical Engineer





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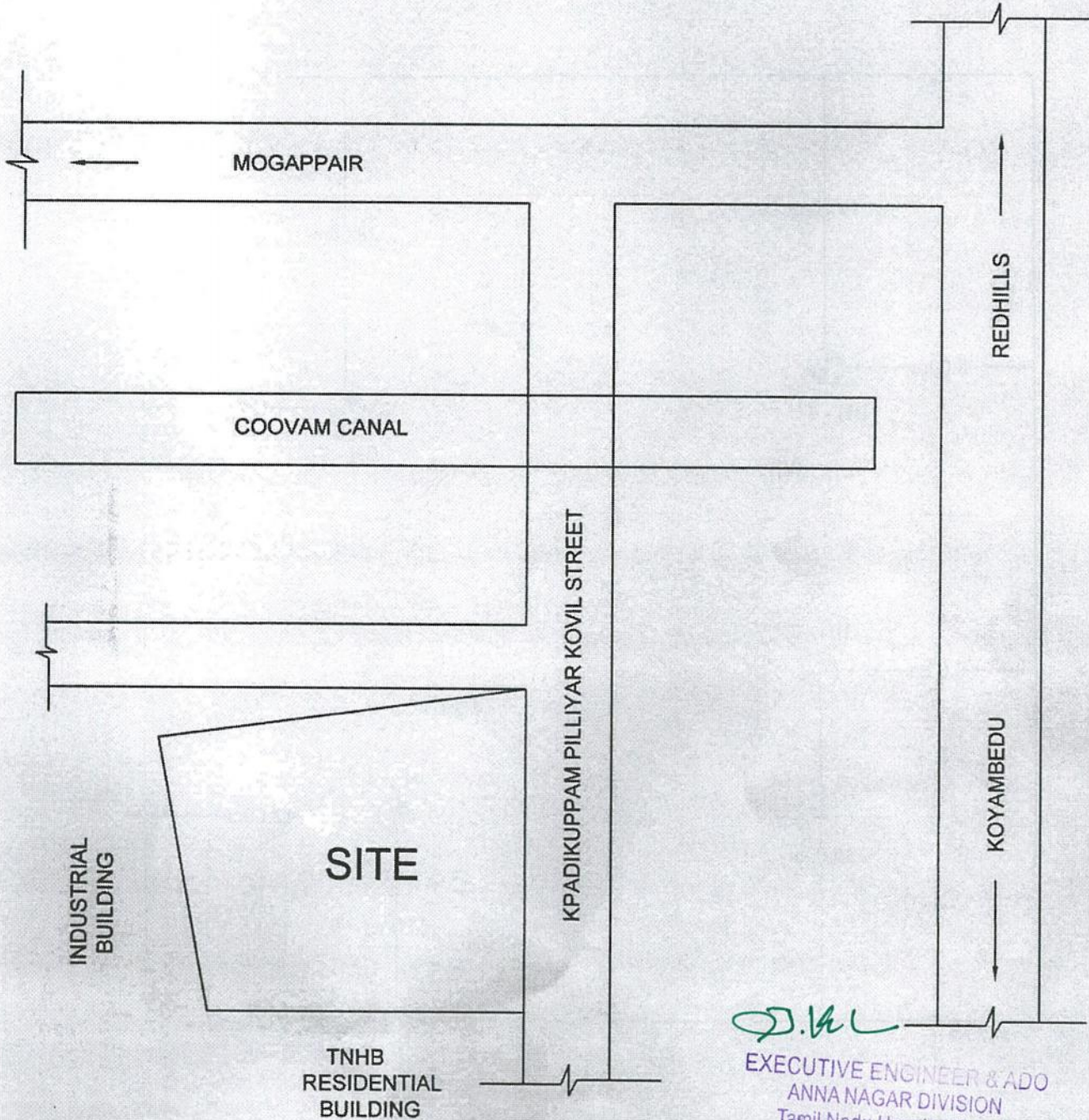
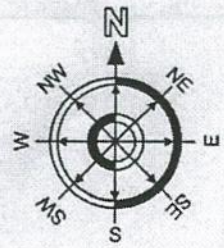
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(STILT + 7) RESIDENTIAL BUILDING AT PADI VILLAGE, AMBATTUR TALUK,
THIRUVALLUR DISTRICT**

**APPENDIX A
KEY PLAN &
BOREHOLE LOCATION PLAN**

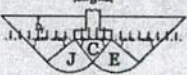

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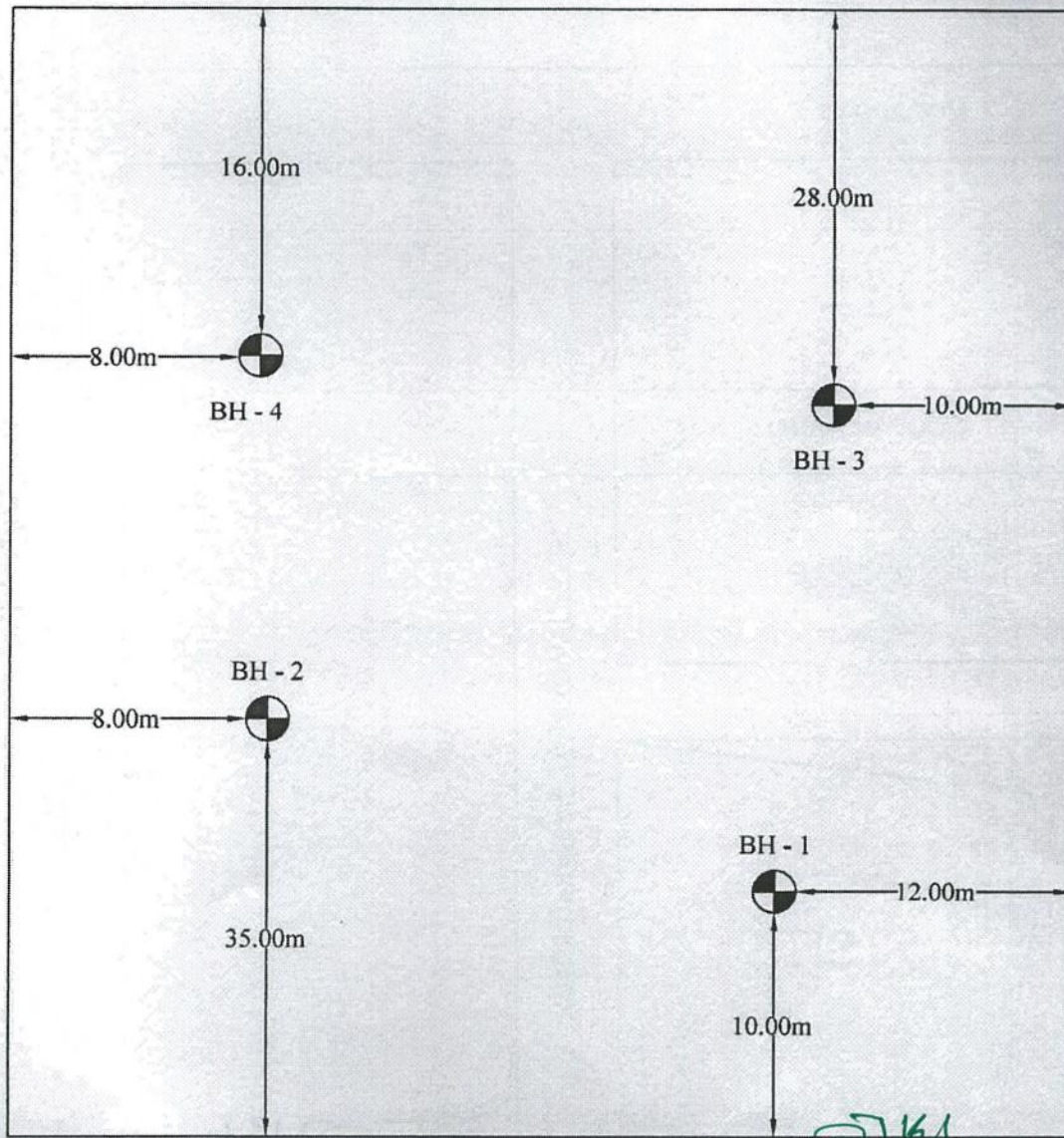
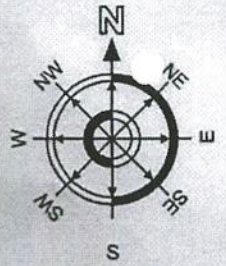
KEY PLAN



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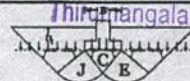
Title : KEY PLAN	Executive Engineer & ADO, TNHB Anna Nagar Division		 JOSMAR CONSULTING ENGINEERS Chennai 42 NO: 9, OFFICERS COLONY, 90 FEET BYE PASS ROAD, OPP TO INDIAN OVERSEAS BANK VELACHERY, CHENNAI - 600 042. PHONE NO: 044-22593067/76, E-mail : josmar.consultants@gmail.com
Site : Survey No: 251/1 Padi Village, Ambattur Taluk, Thiruvallur District.	Scale : N T S	File no : 1	
	DATE: 19.04.2018	Drg no : 1	
	Drw by: T.P	Sheet no : 1/2	

BORE HOLE LOCATION



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Title : BORE HOLE LOCATION	Executive Engineer & ADO, TNHB Anna Nagar Division	
Site : Survey No: 251/1 Padi Village, Ambattur Taluk, Thiruvallur District.	Scale : 1 : 1	File no : 2
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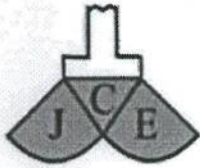
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**APPENDIX B
BOREHOLE LOGS &
CROSS SECTIONAL BOREHOLE LOGS**

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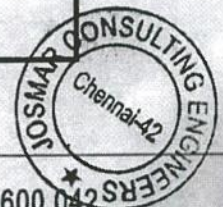
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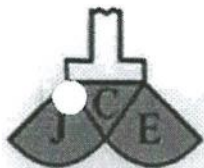
BOREHOLE LOG

Executive Engineer &ADO, TNHB Anna Nagar Division		Ele . Of G.L : 0.00m	
Client :		Water Table :	3.80m
Project :	(Stilt+7) Residential Building	Type Of Boring :	Rotary
Location :	Padi Village,Ambattur Taluk	Dia of Boring :	150mm
B.H. No :	1	Started on :	26.03.2018
Final Depth :	28.00 m	Ended on :	27.03.2018
Address :	Survey No: 251/1 ,Padi Village, Ambattur Taluk, Thiruvallur District.		

Depth (m)	G W L	S Y M B O L	DESCRIPTION	SPT COUNT				Relative Density /Consistency
				0 -15 cm	15 -30 cm	30 -45 cm	N- Value	
0.0								
0.5								
1.0			Filling soil					
1.5								
2.0								
2.5								
3.0			Greyish,Blackish, Clayey Silty with medium to high swelling and medium to high plasticity (CI-CH)	4	6	7	11	Stiff
3.5								
4.0			Ditto	4	5	7	12	Stiff
4.5								
5.0			Ditto	3	5	5	10	Stiff
5.5								
6.0			Ditto	4	5	6	11	Stiff
6.5								
7.0			Ditto	4	5	6	11	Stiff
7.5								
8.0			Ditto	4	6	6	12	Stiff
8.5								
9.0								
9.5								
10.0								

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BOREHOLE LOG

Executive Engineer & ADO, : TNHB Anna Nagar Division		Ele . Of G.L. : 0.00m	
Client	Water Table : 3.80m		
Project	: (Stilt+7) Residential Building	Type Of Boring : Rotary	
Location	: Padi Village, Ambattur Taluk	Dia of Boring : 150mm	
B.H. No	: 1	Started on : 26.03.2018	
Final Depth	: 28.00 m	Ended on : 27.03.2018	
Address	: Survey No: 251/1 ,Padi Village, Ambattur Taluk, Thiruvallur District.		

Depth (m)	G W L	S Y M B O L	DESCRIPTION	SPT COUNT				Relative Density /Consistency
				0 -15 cm	15 -30 cm	30 -45 cm	N- Value	
10.5			Ditto	6	7	8	15	Stiff
11.0								
11.5			Ditto	6	6	7	13	Stiff
12.0								
12.5								
13.0								
13.5								
14.0			Ditto	5	6	8	14	Stiff
14.5								
15.0								
15.5								
16.0			Ditto	1	2	2	4	Firm (Medium)
16.5								
17.0								
17.5								
18.0			Ditto	2	2	3	5	Firm (Medium)
18.5								
19.0								
19.5								
20.0			Ditto	8	10	14	24	Very Stiff
20.5								

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BOREHOLE LOG

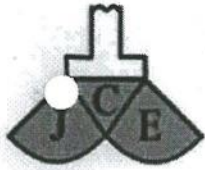
Client		Executive Engineer & ADO, : TNHB Anna Nagar Division		Ele. Of G.L. : 0.00m				
Project		: (Stilt+ 7) Residential Building		Water Table : 3.80m				
Location		: Padi Village, Ambattur Taluk		Type Of Boring : Rotary				
B.H. No		: 1		Dia of Boring : 150mm				
Final Depth		: 28.00 m		Started on : 26.03.2018				
Address		: Survey No: 251/1, Padi Village, Ambattur Taluk, Thiruvallur District.		Ended on : 27.03.2018				
Depth (m)	G W L	S Y M B O L	DESCRIPTION	SPT COUNT				Relative Density /Consistency
				0 -15 cm	15 -30 cm	30 -45 cm	N- Value	
21.0								
21.5								
22.0			Ditto	12	18	20	36	Hard
22.5								
23.0								
23.5								
24.0			Ditto	18	25	27	52	Hard
24.5								
25.0								
25.5								
26.0			Ditto	21	27	32	57	Hard
26.5								
27.0								
27.5			Grayish, poorly graded medium sand with fines(SP)					
28.0					50/0cm		50	Very dense
28.5								
29.0								
29.5								
30.0								
30.5			Bore hole terminated at a depth of 28.00m in very dense strata					
31.0								


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Tamil Nadu Housing Board,

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BOREHOLE LOG

			Executive Engineer & ADO, : TNHB Anna Nagar Division		Ele . Of G.L : 0.00m			
Client					Water Table : 3.80m			
Project	: (Stilt+ 7) Residential Building				Type Of Boring : Rotary			
Location	: Padi Village,Ambattur Taluk				Dia of Boring : 150mm			
B.H. No	: 2				Started on : 27.03.2018			
Final Depth	: 28.00 m				Ended on : 30.03.2018			
Address	: Survey No: 251/1 ,Padi Village, Ambattur Taluk, Thiruvallur District.							
Depth (m)	G W L	S Y M B O L	DESCRIPTION	SPT COUNT				Relative Density /Consistency
				0 -15 cm	15 -30 cm	30 -45 cm	N- Value	
0.0			Filling soil					
0.5								
1.0								
1.5								
2.0								
2.5			Brownish, Clayey Silty with high swelling and high plasticity (CH)					
3.0				3	3	4	7	Firm (medium)
3.5			Brownish, grayish silty sands poorly graded sand silt mixtures (SM)					
4.0								
4.5				8	10	10	20	Medium Dense
5.0			Greyish,Blackish, Clayey Silty with low to high swelling and low to high plasticity (CL-CH)					
5.5				3	3	4	7	Stiff
6.0			Ditto					
6.5				4	4	4	8	Stiff
7.0			Ditto					
7.5				3	5	5	10	Stiff
8.0								
8.5								
9.0								
9.5								
10.0								

D.K.L.

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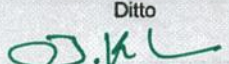


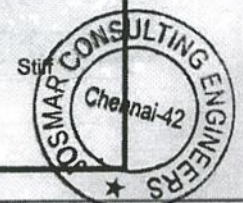
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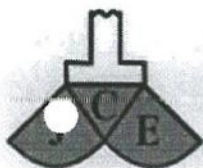
BOREHOLE LOG

		Executive Engineer & ADO, : TNHB Anna Nagar Division	Ele. Of G.L. : 0.00m
Client			Water Table : 3.80m
Project		: (Stilt+ 7) Residential Building	Type Of Boring : Rotary
Location		: Padi Village, Ambattur Taluk	Dia of Boring : 150mm
B.H. No		: 2	Started on : 27.03.2018
Final Depth		: 28.00 m	Ended on : 30.03.2018
Address		: Survey No: 251/1, Padi Village, Ambattur Taluk, Thiruvallur District.	

Depth (m)	G W L	S Y M B O L	DESCRIPTION	SPT COUNT				Relative Density /Consistency
				0 -15 cm	15 -30 cm	30 -45 cm	N- Value	
10.5			Ditto	2	4	5	9	Stiff
11.0								
11.5			Ditto	5	7	9	16	Very Stiff
12.0								
12.5								
13.0								
13.5								
14.0			Ditto	2	2	3	5	Stiff
14.5								
15.0								
15.5			Ditto	2	3	5	8	Stiff
16.0								
16.5								
17.0								
17.5								
18.0			Ditto	3	5	5	10	Stiff
18.5								
19.0								
19.5								
20.0			Ditto	5	7	7	14	Stiff
20.5								


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BOREHOLE LOG

Client		Executive Engineer & ADO, : TNHB Anna Nagar Division		Ele. Of G.L. : 0.00m				
Project		: (Stilt+ 7) Residential Building		Water Table : 3.80m				
Location		: Padi Village, Ambattur Taluk		Type Of Boring : Rotary				
B.H. No		: 2		Dia of Boring : 150mm				
Final Depth		: 28.00 m		Started on : 27.03.2018				
Address		: Survey No: 251/1, Padi Village, Ambattur Taluk, Thiruvallur District.		Ended on : 30.03.2018				
Depth (m)	G W L	S Y M B O L	DESCRIPTION	SPT COUNT				Relative Density /Consistency
				0-15 cm	15-30 cm	30-45 cm	N-Value	
21.0								
21.5								
22.0			Ditto	11	13	17	30	Hard
22.5								
23.0								
23.5								
24.0			Ditto	15	17	22	39	Hard
24.5								
25.0								
25.5			Ditto					
26.0				20	26	31	57	Hard
26.5								
27.0								
27.5			Grayish, poorly graded medium sand with fines(SP)					
28.0					100/0cm		100	Very Dense
28.5								
29.0			Bore hole terminated at a depth of 28.00m in very dense strata					
29.5								
30.0								
30.5								
31.0								

[Signature]

EXECUTIVE ENGINEER & ADO

ANNA NAGAR DIVISION

Tamil Nadu Housing Board,

Thirumangalam, Chennai - 600101.



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BOREHOLE LOG

Client : Executive Engineer &ADO, TNHB Anna Nagar Division		Ele . Of G.L : 0.00m	
Project : (Stilt+ 7) Residential Building		Water Table : 3.80m	
Location : Padi Village, Ambattur Taluk		Type Of Boring : Rotary	
B.H. No : 3		Dia of Boring : 150mm	
Final Depth : 28.00 m		Started on : 29.03.2018	
Address : Survey No: 251/1 ,Padi Village, Ambattur Taluk, Thiruvallur District.		Ended on : 30.03.2018	

Depth (m)	G W L	S Y M B O L	DESCRIPTION	SPT COUNT				Relative Density /Consistency
				0 -15 cm	15 -30 cm	30 -45 cm	N- Value	
0.0								
0.5								
1.0								
1.5								
2.0			Filling soil					
2.5								
3.0								
3.5								
4.0			Blackish, Clayey Silty with medium to high swelling and medium to high plasticity (CI-CH)	3	3	5	8	Firm (Medium)
4.5								
5.0								
5.5								
6.0			Ditto	4	6	9	15	Very Stiff
6.5								
7.0								
7.5			Ditto	5	7	10	17	Very Stiff
8.0								
8.5								
9.0			Ditto	2	3	3	6	Firm (Medium)
9.5								
10.0								

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BOREHOLE LOG

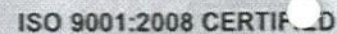
Client	Executive Engineer & ADO, : TNHB Anna Nagar Division	Ele. Of G.L	: 0.00m
Project	: (Stilt+ 7) Residential Building	Water Table	: 3.80m
Location	: Padi Village, Ambattur Taluk	Type Of Boring	: Rotary
B.H. No	: 3	Dia of Boring	: 150mm
Final Depth	: 28.00 m	Started on	: 29.03.2018
Address	: Survey No: 251/1 ,Padi Village, Ambattur Taluk, Thiruvallur District.	Ended on	: 30.03.2018

Depth (m)	G W L	S Y M B O L	DESCRIPTION	SPT COUNT				Relative Density /Consistency
				0-15 cm	15-30 cm	30-45 cm	N- Value	
10.5			Ditto	2	3	4	7	Firm (Medium)
11.0								
11.5			Ditto	2	3	3	6	Firm (Medium)
12.0								
12.5								
13.0								
13.5			Ditto	9	12	15	27	Very Stiff
14.0								
14.5								
15.0			Ditto	6	10	15	25	Very Stiff
15.5								
16.0								
16.5								
17.0								
17.5			Ditto	1	2	2	4	Firm (Medium)
18.0								
18.5								
19.0								
19.5								
20.0			Ditto	10	12	15	27	Hard
20.5								

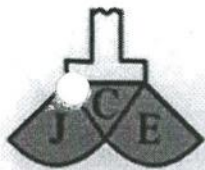
Ditto

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Tamil Nadu Housing Board,
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BOREHOLE LOG

Client		: Executive Engineer& ADO, TNHB Anna Nagar Division		Ele . Of G.L		: 0.00m	
Project		: (Stilt+ 7) Residential Building		Water Table		: 3.80m	
Location		: Padi Village,Ambattur Taluk		Type Of Boring		: Rotary	
B.H. No		: 4		Dia of Boring		: 150mm	
Final Depth		: 28.00 m		Started on		: 30.03.2018	
Address		: Survey No: 251/1 ,Padi Village, Ambattur Taluk, Thiruvallur District.		Ended on		: 31.03.2018	

Depth (m)	G W L	S Y M B O L	DESCRIPTION	SPT COUNT				Relative Density /Consistency
				0 -15 cm	15 -30 cm	30 -45 cm	N- Value	
0.0								
0.5								
1.0			Filling soil					
1.5								
2.0			Brownish ,Blackish, Clayey Silty with medium to high swelling and medium to high plasticity (CI-CH)	4	5	6	11	Stiff
2.5								
3.0			Ditto	5	7	9	16	Very Stiff
3.5								
4.0								
4.5			Ditto	6	6	7	13	Stiff
5.0								
5.5								
6.0			Ditto	9	12	13	25	Very Stiff
6.5								
7.0								
7.5			Ditto	8	10	13	23	Very Stiff
8.0								
8.5								
9.0			Ditto	3	5	7	12	Stiff
9.5								
10.0								

23.14.1

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ANNA NAGAR DIVISION

Tamil Nadu Housing Board,

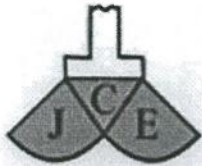
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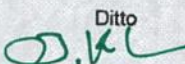


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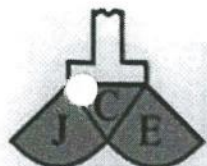
BOREHOLE LOG

Client		Executive Engineer & ADO, : TNHB Anna Nagar Division		Ele. Of G.L. : 0.00m	
Project		: (Stilt+ 7) Residential Building		Water Table : 3.80m	
Location		: Padi Village, Ambattur Taluk		Type Of Boring : Rotary	
B.H. No		: 4		Dia of Boring : 150mm	
Final Depth		: 28.00 m		Started on : 30.03.2018	
Address		: Survey No: 251/1, Padi Village, Ambattur Taluk, Thiruvallur District.		Ended on : 31.03.2018	

Depth (m)	G W L	S Y M B O L	DESCRIPTION	SPT COUNT				Relative Density /Consistency
				0-15 cm	15-30 cm	30-45 cm	N-Value	
10.5			Ditto	5	6	8	14	Stiff
11.0								
11.5			Ditto	7	7	8	15	Stiff
12.0								
12.5								
13.0								
13.5								
14.0			Ditto	1	2	2	4	Soft
14.5								
15.0								
15.5								
16.0			Ditto	1	1	2	3	Soft
16.5								
17.0								
17.5								
18.0			Ditto	2	2	3	5	Firm (medium)
18.5								
19.0								
19.5								
20.0			Ditto	5	6	9	15	Stiff
20.5								


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BOREHOLE LOG

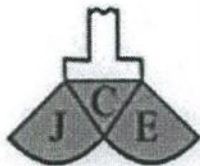
Client : Executive Engineer & ADO, : TNHB Anna Nagar Division		Ele. Of G.L : 0.00m	
Project : (Stilt+ 7) Residential Building		Water Table : 3.80m	
Location : Padi Village, Ambattur Taluk		Type Of Boring : Rotary	
B.H. No : 4		Dia of Boring : 150mm	
Final Depth : 28.00 m		Started on : 30.03.2018	
Address : Survey No: 251/1, Padi Village, Ambattur Taluk, Thiruvallur District.		Ended on : 31.03.2018	

Depth (m)	G W L	S Y M B O L	DESCRIPTION	SPT COUNT				Relative Density /Consistency
				0 -15 cm	15 -30 cm	30 -45 cm	N- Value	
21.0								
21.5								
22.0			Ditto	5	6	9	15	Stiff
22.5								
23.0								
23.5								
24.0			Ditto	9	14	19	33	Hard
24.5								
25.0								
25.5			Ditto	17	25	38	63	Hard
26.0								
26.5								
27.0								
27.5			Brownish, yellowish, poorly graded medium sand with fines (SP)					
28.0					50/0 cm		50	Very dense
28.5								
29.0								
29.5								
30.0								
30.5								
31.0								

Bore hole terminated at a depth of 28.00m in very dense strata

[Signature]
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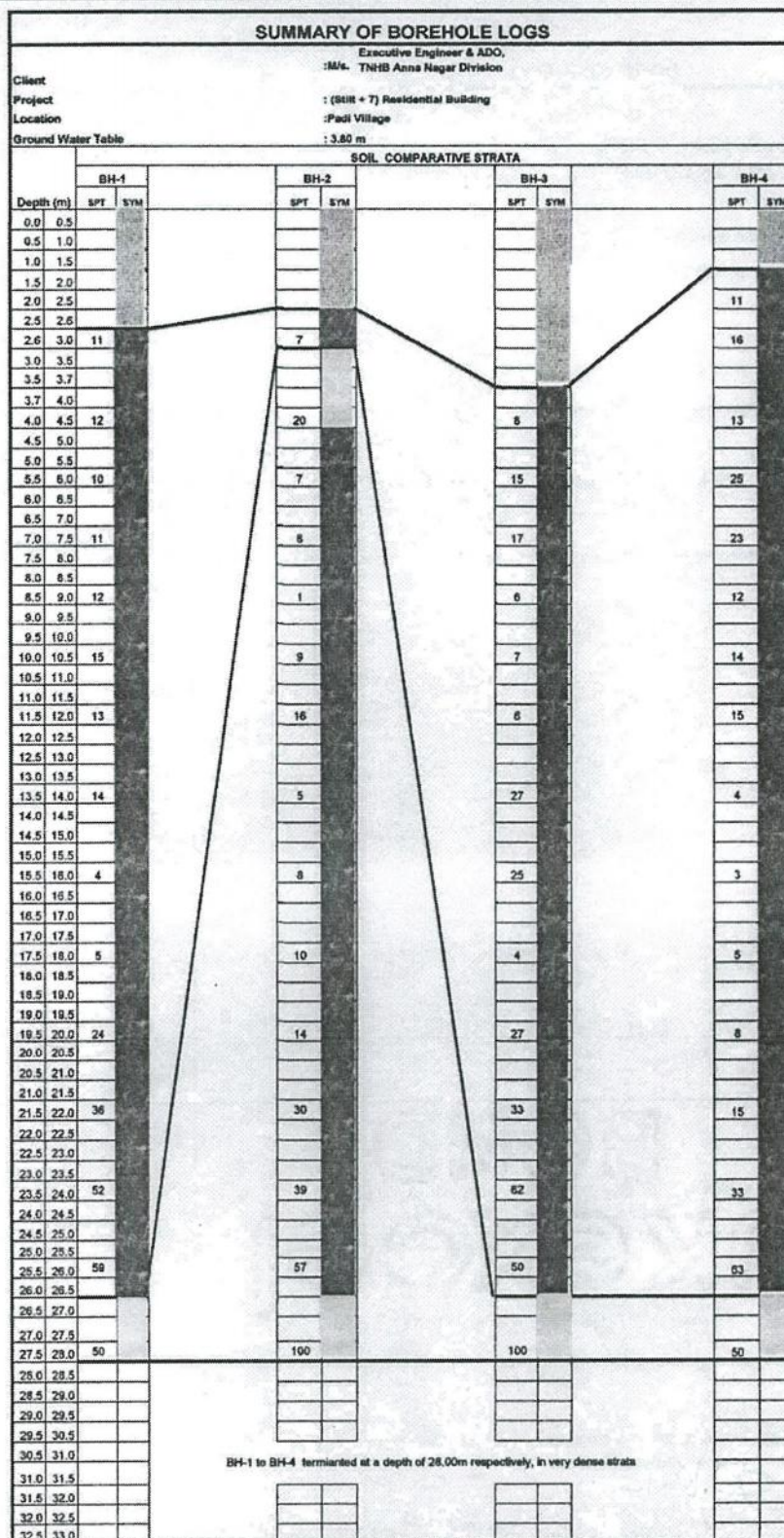


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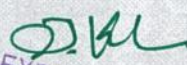


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**GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF
(STILT + 7) RESIDENTIAL BUILDING AT PADI VILLAGE, AMBATTUR TALUK,
THIRUVALLUR DISTRICT**

**APPENDIX C
LABORATORY TEST
RESULTS**


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**GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF
(STILT + 7) RESIDENTIAL BUILDING AT PADI VILLAGE, AMBATTUR TALUK,
THIRUVALLUR DISTRICT**

PHYSICAL ANALYSIS OF SOIL- BH -1

DEPTH m	W _N %	W _L %	W _P %	I _P %	FSI %	IS	GRAVEL %	COARSE %	MEDIUM %	FINE %	SILT + CLAY %
3.00	24	48	26	22	30	CI	-	-	6	21	73
4.50	21	52	28	24	45	CH	-	-	4	9	84
6.00	31	69	37	32	65	CH	-	-	-	7	93
7.50	27	47	24	23	30	CI	-	-	13	11	76
9.00	35	70	43	27	69	CH	-	-	-	2	98
10.50	30	72	42	30	75	CH	-	-	2	6	92
12.00	56	74	43	31	68	CH	-	-	-	2	98
14.00	52	72	44	28	68	CH	-	-	-	6	94
16.00	48	56	28	28	45	CH	-	-	6	5	83
18.00	42	48	26	22	33	CI	-	-	12	12	76
20.00	43	54	30	24	48	CH	-	-	10	6	84
22.00	45	52	29	23	45	CH	-	-	11	8	81
24.00	43	53	28	25	43	CH	-	-	8	5	87
26.00	43	54	29	25	45	CH	-	-	10	5	85
28.00	11	NON PLASTIC				SP	42	24	27	5	4

D.K.L

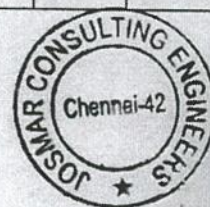
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Tamil Nadu Housing Board,
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**GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF
(STILT + 7) RESIDENTIAL BUILDING AT PADI VILLAGE, AMBATTUR TALUK,
THIRUVALLUR DISTRICT**

PHYSICAL ANALYSIS OF SOIL- BH -2

DEPTH m	W _N %	W _L %	W _P %	I _p %	FSI %	IS	GRAVEL %	COARSE %	MEDIUM %	FINE %	SILT + CLAY %
3.00	26	69	40	29	55	CH	-	-	-	7	93
4.50	19	NON PLASTIC				SM	-	-	-	63	37
6.00	31	70	42	28	65	CH	-	-	-	2	98
7.50	33	72	40	32	68	CH	-	-	-	2	98
9.00	31	71	42	29	69	CH	-	-	-	2	98
10.50	34	38	19	19	15	CI	-	-	-	32	68
12.00	28	43	23	20	25	CI	-	-	-	30	70
14.00	26	28	18	10	13	CL	-	-	13	41	46
16.00	30	44	24	20	20	CI	-	-	19	9	72
18.00	50	50	28	22	45	CH	-	-	9	11	80
20.00	36	29	16	13	15	CL	-	-	24	31	45
22.00	43	68	40	28	65	CH	-	3	2	5	90
24.00	43	55	29	26	48	CH	-	-	5	7	88
26.00	41	64	35	29	60	CH	-	4	3	2	91
28.00	9	NON PLASTIC				SP	40	24	24	10	2



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 Tamil Nadu Housing Board,
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**GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF
(STILT + 7) RESIDENTIAL BUILDING AT PADI VILLAGE, AMBATTUR TALUK,
THIRUVALLUR DISTRICT**

PHYSICAL ANALYSIS OF SOIL- BH -3

DEPTH m	W _N %	W _L %	W _P %	I _P %	FSI %	IS	GRAVEL %	COARSE %	MEDIUM %	FINE %	SILT + CLAY %
4.50	35	73	40	33	68	CH	-	-	-	4	96
6.00	25	59	36	23	45	CH	-	-	-	11	89
7.50	24	58	32	26	48	CH	-	-	-	17	83
9.00	36	69	38	31	65	CH	-	6	-	4	90
10.50	37	68	37	31	60	CH	-	-	-	7	93
12.00	38	65	34	31	63	CH	-	-	-	10	90
14.00	25	58	31	27	48	CH	-	-	-	15	85
16.00	27	57	35	22	45	CH	-	-	-	16	84
18.00	24	48	26	22	35	CI	-	-	14	11	75
20.00	26	53	27	26	48	CH	-	-	-	16	84
22.00	25	55	28	27	45	CH	-	-	-	13	87
24.00	24	44	24	20	30	CI	-	-	13	8	79
26.00	23	45	24	21	28	CI	-	-	17	12	71
28.00	6	NON PLASTIC				SP	-	34	49	13	4

D.K.L

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**GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF
(STILT + 7) RESIDENTIAL BUILDING AT PADI VILLAGE, AMBATTUR TALUK,
THIRUVALLUR DISTRICT**

PHYSICAL ANALYSIS OF SOIL- BH -4

DEPTH m	W _N %	W _L %	W _P %	I _P %	FSI %	IS	GRAVEL %	COARSE %	MEDIUM %	FINE %	SILT + CLAY %
2.00	24	48	26	22	25	CI	-	-	12	9	79
3.00	18	35	19	16	18	CI	6	12	11	8	63
4.50	26	47	25	22	30	CI	-	-	10	20	70
6.00	10	34	19	15	18	CI	-	-	42	52	6
7.50	14	69	40	29	65	CH	-	-	43	46	11
9.00	18	68	43	25	63	CH	-	10	14	11	65
10.50	35	39	22	17	78	CI	-	-	-	5	95
12.00	36	72	43	29	68	CH	-	-	-	8	92
14.00	23	73	41	32	70	CH	-	-	23	23	54
16.00	40	70	40	30	65	CH	-	-	-	2	98
18.00	38	71	41	30	68	CH	-	-	-	3	97
20.00	35	74	42	32	65	CH	-	-	-	6	94
22.00	38	70	40	30	65	CH	-	-	-	7	93
24.00	39	71	42	29	68	CH	-	-	-	8	92
26.00	37	72	43	29	69	CH	-	-	-	6	94
28.00	10	NON PLASTIC				SP	6	26	63	5	-

(Signature)

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**GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF
(STILT + 7) RESIDENTIAL BUILDING AT PADI VILLAGE, AMBATTUR TALUK,
THIRUVALLUR DISTRICT**

ABBREVIATION :

W_N	=	Natural Moisture content (%)
W_L	=	Liquid limit (%)
W_P	=	Plasticity Limit (%)
I_P	=	Plasticity Index (%)
F.S.I	=	Free Swell Index (%)
IS	=	Indian Standard Classification
CL	=	Low compressibility Clay of $W_L < 35\%$
CI	=	Inorganic Clay of $35\% < W_L < 50\%$
CH	=	High Compressibility Clay of $W_L > 50\%$
SP	=	Poorly graded sand
GP	=	Poorly graded gravel
SW	=	Well graded sand
SM	=	Silty sand
GW	=	Well graded gravel



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**GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF
(STILT + 7) RESIDENTIAL BUILDING AT PADI VILLAGE, AMBATTUR TALUK,
THIRUVALLUR DISTRICT**

Correlations of SPT N values with Common properties of soils

A) Granular Soil

Standard Penetration No., SPT N	Description	Relative Density, Dr %	Approx. Angle of Internal Friction, Φ°	Approx. Rang of Most. Unit Wt., γ kN/m ³
< 4	Very loose	< 20	< 29	11-16
4-10	Loose	20-40	29-30	14-18
10-30	Medium Dense	40-60	30-36	17-20
30-50	Dense	60-80	36-41	17-22
> 50	Very Dense	> 80	> 41	20-29

B) Cohesive Soil

Standard Penetration No., SPT N	Description	Unconfined Compressive Strength, kPa	Approx. Rang of Most. Unit Wt., γ kN/m ³
< 2	Very Soft	0-25	14.4-16
2-4	Soft	25-50	16-17.4
4-8	Firm (medium)	50-100	17.6-19.2
8-15	Stiff	100-200	19.2-20.8
15-30	Very Stiff	200-400	20.8-22.4
> 30	Hard	> 400	> 20

Note: These values are most appropriate values in general. However, the soil properties vary between sites to site and hence it shall be used only for guidance



(Signature)

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GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF
(STILT + 7) RESIDENTIAL BUILDING AT PADI VILLAGE, AMBATTUR TALUK,
THIRUVALLUR DISTRICT

Keeping Samples:

1. Samples will be kept up to 15 days from the date of submission of report.
2. Sample disposal will be carried out for every 15 days.



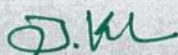
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**GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED CONSTRUCTION OF
(STILT + 7) RESIDENTIAL BUILDING AT PADI VILLAGE, AMBATTUR TALUK,
THIRUVALLUR DISTRICT**

APPENDIX D

PILE CAPACITY CALCULATION



EXECUTIVE ENGINEER & ADO
ANNA NAGAR DIVISION
Tamil Nadu Housing Board,
Thirumangalam, Chennai - 600101.



Project : (Stilt + 7) Residential Building
Executive Engineer & ADO,
Client : TNHB Anna Nagar Division
Site : Padi Village, Ambattur Village

DESIGN OF PILE FOUNDATION (Refer: BH - 2)

1.0 Type of Installation of Pile

1.1 Geometrical Data

Assumed Diameter of pile(D) : 600.00 mm
Length of Pile : 26.00 m

1.2 Design of Pile for Vertical Compression

1.2.1 Computation of Skin Resistance:

1.2.1.1

Layer- II & IV

Brownish, Greyish, Blackish, Clayey
Silty with low to high swelling and
low to high plasticity (CL-CH)

Type of Strata :
Length of strata, l_c : 22.00 m
Average SPT of the strata, N : 17
Bulk Density of the strata, γ : 18.00 kN/m³
Undrained Shear Strength (Cu) : 85.00 kN/m²
Adhesion, σ : 0.52
Skin Resistance of the pile, q_s : 1832.00 kN
($q : \sigma * Cu * \pi * d * l_c$)

1.2.1.2

Layer-III

Brownish, grayish silty sands poorly
graded sand silt mixtures (SM)

Type of Strata :
Average SPT of the strata, N : 20
Bulk Density of the strata, γ : 18.00 kN/m³
Angle of Shearing Resistance - Limited to a Maximum of
tan phi : 32 Deg
Top of Strata : 0.62
Bottom of Strata : 3.50 m
Average Thickness of Strata, l_c : 5.00 m
Effective overburden pressure at the middle of the strata, σ_{middle} : 1.50 m
Coef. Earth Pressure at Rest : 182.00 kN/m²
Skin Resistance of the pile, q_s : 1.10
($q_s : \sigma * k * \tan \phi * \pi * d * l_c$) : 353.31 kN

1.2.2 Computation of End Bearing Resistance:

Greyish, Blackish, Clayey Silty with
low to high swelling and low to high
plasticity (CL-CH)

Type of Bearing Strata :
Dia of pile : 0.60 m
Cross-Sectional Area of pile, A_p : 0.2826 m²
R.L of bottom of pile : 26.00 m
Minimum SPT-value of the Bearing Strata : 57
Unconfined compressive strength (c_u) : 150 kN/m²
Bearing Capacity Factor (N_c) : 9
Ultimate End Bearing Resistance (Q_p) : 381.51 kN
($Q_p = A_p * N_c * c_u$)

1.3.0

Ultimate Load Carrying Capacity ($Q_s + Q_p$) : 2566.82
Safe Load Carrying Capacity ($Q_{safe} = Q_u / 2.5$) : 1026.7 kN
say : 1010 kN

Lateral Load Bearing Capacity : 80.8 kN

Ultimate uplift resistance : 2185.31 kN
Safe Uplift resistance : 874.12 kN

Say

EXECUTIVE ENGINEER
ANNA NAGAR DIVISION
Tamil Nadu Housing Board,
Thirumangalam, Chennai - 600 031



Project : (Stilt +7) Residential Building
 Client : Executive Engineer & ADO,
 Site : TNHB Anna Nagar Division
 Padi Village, Ambattur Village

DESIGN OF PILE FOUNDATION (Refer: BH - 2)

1.0 Type of Installation of Pile

1.1 Geometrical Data

Assumed Diameter of pile(D) : 800.00 mm
 Length of Pile : 26.00 m

1.2 Design of Pile for Vertical Compression

1.2.1 Computation of Skin Resistance:

1.2.1.1

Layer- II & IV

Brownish, Grayish, Blackish, Clayey
 Silt with low to high swelling and
 low to high plasticity (CL-CH)

Type of Strata :
 Length of strata, l_c : 22.00 m
 Average SPT of the strata, N : 17
 Bulk Density of the strata, γ : 18.00 kN/m³
 Undrained Shear Strength (C_u) : 85.00 kN/m²
 Adhesion, σ : 0.52
 Skin Resistance of the pile, q_s : 2442.67 kN
 $(q_s : \sigma * C_u * \pi * d * l_c)$

1.2.1.2

Layer-III

Brownish, Grayish silty sands, poorly
 graded sand-silt mixtures (SM)

Type of Strata :
 Average SPT of the strata, N : 20
 Bulk Density of the strata, γ : 18.00 kN/m³
 Angle of Shearing Resistance - Limited to a Maximum of : 32 Deg
 $\tan \phi$: 0.62
 Top of Strata : 3.50 m
 Bottom of Strata : 5.00 m
 Average Thickness of Strata, l_c : 1.50 m
 Effective overburden pressure at the middle of the strata, σ_{middle} : 182.00 kN/m²
 Coef. Earth Pressure at Rest : 1.10
 Skin Resistance of the pile, q_s : 471.08 kN
 $(q_s : \sigma * k * \tan \phi * \pi * d * l_c)$

1.2.2 Computation of End Bearing Resistance:

Greyish, Blackish, Clayey Silt with
 low to high swelling and low to high
 plasticity (CL-CH)

Type of Bearing Strata :
 Dia of pile : 0.80 m
 Cross-Sectional Area of pile, A_p : 0.5024 m²
 R.L of bottom of pile : 26.00 m
 Minimum SPT-value of the Bearing Strata : 57
 Unconfined compressive strength (c_u) : 150 kN/m²
 Bearing Capacity Factor (N_c) : 9
 Ultimate End Bearing Resistance (Q_p) : 678.24 kN
 $(Q_p = A_p * N_c * c_u)$

1.3.0

Ultimate Load Carrying Capacity ($Q_s + Q_p$) : 3591.98
 Safe Load Carrying Capacity ($Q_{safe} = Q_u / 2.5$) : 1436.8 kN
 say 1420 kN

Lateral Load Bearing Capacity

113.6 kN

Ultimate uplift resistance

2913.74 kN

Safe Uplift resistance

1165.50 kN

Say 1150 kN
 EXECUTIVE ENGINEER & ADO
 ANNA NAGAR DIVISION
 Tamil Nadu Housing Board,



Project : (Stilt + 7) Residential Building
Executive Engineer & ADO,
Client : TNHB Anna Nagar Division
Site : Padi Village, Ambattur Village

DESIGN OF PILE FOUNDATION (Refer: BH - 2)

1.0 Type of Installation of Pile

1.1 Geometrical Data

Assumed Diameter of pile(D) : 1000.00 mm
Length of Pile : 26.00 m

1.2 Design of Pile for Vertical Compression

1.2.1 Computation of Skin Resistance:

1.2.1.1

Layer- II & IV

Brownish, Greyish, Blackish, Clayey
Silt with low to high swelling and low
to high plasticity (CL-CH)

Type of Strata :
Length of strata, l_c : 22.00 m
Average SPT of the strata, N : 17
Bulk Density of the strata, γ : 18.00 kN/m³
Undrained Shear Strength (Cu) : 85.00 kN/m²
Adhesion, σ : 0.52
Skin Resistance of the pile, q_s : 3053.34 kN
($q_s = \sigma \cdot Cu \cdot \pi \cdot d \cdot l_c$)

1.2.1.2

Layer-III

Brownish, Grayish silty sands, poorly
graded sand silt mixtures (SM)

Type of Strata :
Average SPT of the strata, N : 20
Bulk Density of the strata, γ : 18.00 kN/m³
Angle of Shearing Resistance - Limited to a Maximum of : 32 Deg
 $\tan \phi$: 0.62
Top of Strata : 3.50 m
Bottom of Strata : 5.00 m
Average Thickness of Strata, l_c : 1.50 m
Effective overburden pressure at the middle of the strata, σ_{middle} : 182.00 kN/m²
Coef. Earth Pressure at Rest : 1.10
Skin Resistance of the pile, q_s : 588.84 kN
($q_s = \sigma \cdot k \cdot \tan \phi \cdot \pi \cdot d \cdot l_c$)

1.2.2 Computation of End Bearing Resistance:

Type of Bearing Strata : Greyish, Blackish, Clayey Silt with
low to high swelling and low to high
plasticity (CL-CH)
Dia of pile : 1.00 m
Cross-Sectional Area of pile, A_p : 0.785 m²
R.L of bottom of pile : 26.00 m
Minimum SPT-value of the Bearing Strata : 57
Unconfined compressive strength(c_u) : 150 kN/m²
Bearing Capacity Factor(N_c) : 9
Ultimate End Bearing Resistance (Q_p) : 1059.75 kN
($Q_p = A_p \cdot N_c \cdot c_u$)

1.3.0

Ultimate Load Carrying Capacity ($Q_s + Q_p$) : 4701.93
Safe Load Carrying Capacity ($Q_{safe} = Q_u / 2.5$) : 1880.8 kN
say 1870 kN
Lateral Load Bearing Capacity : 149.6 kN

Ultimate uplift resistance : 3642.18 kN
Safe Uplift resistance : 1456.87 kN
Say 1440 kN

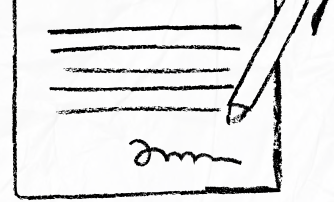
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ANNA NAGAR DIVISION

Tamil Nadu Housing Board,

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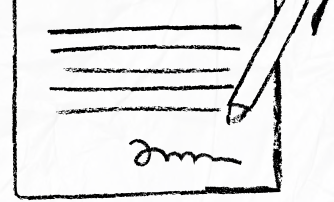
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