

9

E-mail : niel.consultants@gmail.com  
Off. : 0532-2540193, Mob. : 09455343434



# NORTH INDIA ENGINEERS' LAB & CONSULTANTS

62, INDUSTRIAL ESTATE

Motilal Nehru National Institute of Technology, Allahabad - 211 004

**Experts in : Laboratory and Field Testing of Civil Engineering  
Design Solutions for Civil Engineering**

No. 015G/NIEL/UPAVP/2017

Dated: 07.03.2017

To,  
The Executive Engineer  
Construction Division-14  
Office Complex, Sector-9,  
Vrindavan Yojana, Lucknow

डायरी नं०.....८३.....  
फाईल नं०.....५-५७.....  
लेटर नं०.....०५.....  
दिनांक.....१०/०३/२०१७.....

Subject: Regarding Geotechnical Investigation Report of LIG & EWS Site

Dear Sir,

In reference to your letter No. 06/Y-57(PMY)/01 dated 03.01.2017, the Report of Geotechnical Investigation conducted at Awadh Vihar Yojana, Sector-05, Lucknow for LIG & EWS site is enclosed herewith.

The report is checked and vetted by M.N.N.I.T., Allahabad.

For any further query/clarification, please feel free to contact the undersigned.

Thanking You.

Yours Sincerely

*Utkarsh*  
07/03/2017  
(Er. Utkarsh Tiwari)  
Director



AE / JE (CT)  
M  
10/3/17

A  
Report  
on  
Sub-Soil Exploration  
for  
Design of Foundation  
of  
Multi Storeyed Buildings (EWS & LIG)  
at  
Awadh Vihar Yojna, Sector-05, Lucknow (U.P.)

*Submitted to*

**U.P.Avas Avam Vikas Parishad**  
Construction Div.-14, Lucknow (U.P.)

*by*



**GEOTECHNICAL ENGINEERING LABORATORY**  
**NORTH INDIA ENGINEERS' LAB & CONSULTANTS**

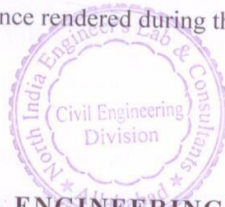
(An ISO 9001:2008 Certified Company)  
Shed No.62, Industrial Estate, M.N.N.I.T. Allahabad  
Allahabad



## ACKNOWLEDGEMENT

The team is thankful to Er. P.K.Singh, Executive Engineer of U.P. Avam Avam Vikas Parishad, Construction Division-14, Lucknow for the sponsoring the project and co-operation extended during the field investigations.

Team is also thankful to the staff of North India Engineers' Lab & Consultants for their co-operation and assistance rendered during the project.



*Utkarsh*  
27/02/2017  
(Er. Utkarsh Tiwari)  
Director

**GEOTECHNICAL ENGINEERING LABORATORY  
NORTH INDIA ENGINEERS' LAB & CONSULTANTS  
(An ISO 9001:2008 Certified Company)  
Shed No.62, Industrial Estate, M.N.N.I.T. Allahabad  
Allahabad**

**Geotechnical Investigation for the Design  
of  
Foundation for Multi Storeyed Buildings (EWS & LIG)  
at  
Awadh Vihar Yojana, Sector-05, Lucknow**

**Project** : Sub-soil Exploration for the Design of Foundation for Multi Storeyed Buildings (EWS & LIG).  
**Agency** : U.P. Avas Avam Vikas Parishad, Construction Division-14, Lucknow  
**Site** : Awadh Vihar Yojana, Sector-5, Lucknow

The investigations have been carried out according to the requirements and limitations of the client during January-February, 2017.

**Team** : Evaluation of the Geotechnical properties of the soils of various strata & subsequent analysis, and the final report for the project have been carried out by the team comprising of:

- (i) Er. Utkarsh Tiwari.
- (ii) Dr. S.G.Tripathi, Ph.D. (Geotech.)

The team acknowledge the assistance given by Shri. Dinesh Kumar Soni, Laboratory Technician and Mr.R.K.Shukla & Mr.Vaibhav Singh, Laboratory Assistant for supervision of the field and laboratory works.

The assistance rendered by the staff of U.P. Avas Avam Vikas Parishad, Construction Division-14, Lucknow during the field investigation work is also acknowledged.

Report checked 2016

*Rensau*  
7/3/17



*Uttam*



## 1.0 INTRODUCTION

The proper design of Civil Engineering Structure requires adequate knowledge of subsurface condition of the site of the structure. The aim of the present Geotechnical Investigations has been to determine the sub-soil characteristics for the design of Foundation for multi storeyed buildings (EWS & LIG) for at Awadh Vihar Yojana, Sector-5, Lucknow.

The investigations were carried out to evaluate the load bearing and settlement characteristics of the soil for the design of foundation as required by the agency. Other allied properties of soils were also studied and are reported herein in this report.

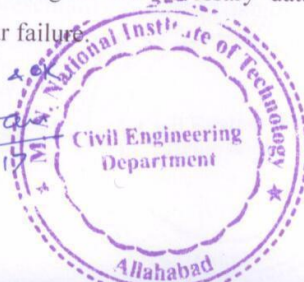
The basic consideration in the design of the foundations is that of safety, dependability, functional utility and economy. Amongst these, tolerable settlement and safety against shear failure are of far most important w.r.t. soil conditions. Therefore for a safe and functional foundation, the allowable bearing pressure is worked out from shear as well as permissible settlement considerations.

For the evaluation of safe ultimate load bearing capacity of soil failing in shear, various theoretical analysis and empirical formulae are available e.g. Terzaghi (1943), Skempton (1951), Meyerhoff (1951, 1953), Hansen (1972) Chan and Davidson (1973) etc. These formulae give value of load bearing capacity of soil as function of shear strength parameters shape, depth, inclination of the foundation and several other parameters. Further field tests, such as standard penetration tests, provide empirical relationships for assessing allowable bearing pressure from 'N-value'.

In the present investigations, the strength parameters viz. Cohesion ( $C_u$ ) and angle of internal friction ( $\Phi_u$ ) have been evaluated from the Triaxial Test/Direct shear test, using undisturbed/Remoulded samples of various strata recovered during the field investigations. In addition SPT test have been carried out to supplement the results of laboratory studies. The results of field and laboratory investigation carried out would provide the designer the necessary data for evaluating the allowable bearing pressure for shear failure.

Report checked

7/3/17



Utkarsh



The settlement studies are based on consolidation properties of the soil, for which Oedometer tests have been carried out. Using Terzaghi's analysis or Scot's method using Undisturbed / Remoulded Samples recovered from field. The value of settlements has been obtained.

The studies reported herein i.e.  $C_u$ ,  $\Phi_u$  parameters,  $C_c$  and other characteristics of soil strata would provide the designer with necessary data for the selection of the type of foundation and thereby the design of the foundation.

## 2.0 FIELD WORK AND LABORATORY INVESTIGATIONS

### 2.1 Field Work

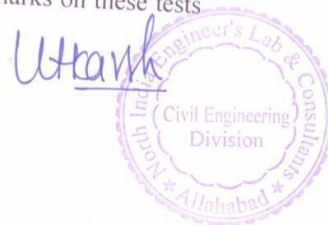
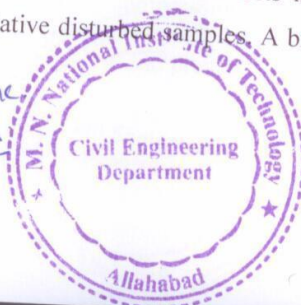
The number, type, location, size and depth of explorations of boreholes are dependent upon the nature and size of project and on the degree of complexity and critical nature of the surface conditions.

In the present case, the field work consists of advancing three bore holes at the site of U.P. Avas Avam Vikas Parishad, CD-14, Lucknow at Awadh Vihar Yojana, Sector-05 in Lucknow District as decided by the department. The borehole was of 12.5 cm. in diameter. Four boreholes ( Nos.1, 3, 5 & 6) were explored up to 20.0m and two bore holes (Nos. 2 & 4) up to 30.0m below G.L. The field work consisted of drilling of bore hole, preparation of bore-log charts based on field identification, conducting standard penetration test (SPT) at every 1.5 m. depth. Disturbed and undisturbed samples were collected for various laboratory tests. The location of water table was also to be observed in the investigated bore holes.

### 2.2 Laboratory Investigations:

These were carried out on disturbed/undisturbed soil samples collected during the fieldwork for determination of moisture content, specific gravity, bulk and dry densities, triaxial tests (unconsolidated undrained), Direct Shear Tests and Oedometer tests using undisturbed samples, and classification tests including determination of Atterberg's limits on representative disturbed samples. A brief remarks on these tests are as follows:

Report checked & OK  
Rewan  
7/3/17



(i) **Soil Classification Tests:**

These tests were performed as per IS: 2720(Part IV) 1965, IS: 1498-1970 and IS:, 2720 (Part V)- 1970. The soil classification is based on Mechanical analysis and Atterberg's limits on disturbed representative samples from bore holes according to IS soil classification system. The results are reported in the form of bore log chart for the boreholes.

(ii) **Bulk Density, Moisture Content and Specific Gravity of Soils:**

These tests were carried out as per IS: 2720(Part-III/ Sec.-1 & 2, 1980), IS: 2720 (Part II),1973. The Bulk Density and Moisture content in the field were determined from undisturbed samples recovered from the liners and dry density was computed from these. Specific gravity of the soil of these samples was also determined in the laboratory. The results are given in bore log chart for the boreholes.

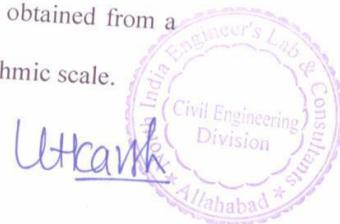
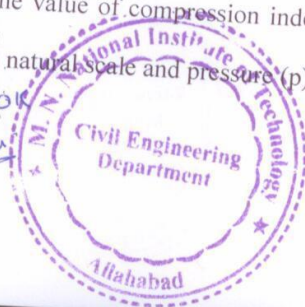
(iii) **Shear Strength Tests:**

These tests were performed as per IS: 2720 (Part-13)-1986 and IS: 2720 (Part-11)-1993. The Direct Shear tests and triaxial shear strength tests were carried out using at least three undisturbed / remoulded samples in each case. Strength envelopes were plotted to determine the values of shear strength parameters  $C_u$  and  $\phi_u$ . These values are also given in the respective bore log charts.

(iv) **Consolidation Tests:**

These tests were carried out as per IS: 2720(Part-15)-1986. Consolidated tests were performed on undisturbed/remoulded samples from the given location as per above-mentioned IS code. The value of compression index  $C_c$  was obtained from a plot between void ratio (e) on natural scale and pressure (p) on logarithmic scale.

Report checked & OK  
Rensau  
7/3/17



Utkanth

### 3.0 TEST RESULTS

The results of various tests conducted at site and in the laboratory are given in the bore-log charts. The location of borehole was decided by the agency.

### 4.0 DISCUSSION OF TEST RESULTS

The results for the various boreholes are discussed as follows.

#### 4.1 Strata and their Engineering Properties:

The soil classification according to IS classification indicates presence of four types of strata viz. CI, CL, ML & SM. The general characteristics associated with these types of strata are given below:

##### 4.1.2 Stratum CI:

This stratum consists of silty clay with medium plasticity and also experience high volume changes when subjected to moisture fluctuations. Sometimes a little moisture can produce high differential settlements. This type of soil is more or less impervious in nature. This stratum was found between 6.0 m to 7.2m in bore hole No. 1. In bore hole No. 4, it was present at the top up to 2.5m depth, between 9.0m to 17.5m and at the bottom from 21.0m to depth of exploration of 30.0m. This stratum was also found at bottom depth from 18.0m to depth of exploration of 20.0m in bore hole No.5.

##### 4.1.3 Stratum CL:

This type of soil is characterised by presence of inorganic clays of low plasticity. These soils have very low permeability and low compressibility. This stratum was encountered at middle depth between 6.5m to 13.5 in bore hole No.5 only.





#### 4.1.4 Stratum ML :

This stratum is characterized by presence of inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with none to low plasticity. It has none to low dry strength and exhibit a quick reaction. This stratum was observed with varying thicknesses at various depths in all the investigated bore holes. It has good bearing value in the natural condition. In general, this foundation soils are of semi-pervious to impervious in nature and it is suggested that measures to control permeability may be considered because it is susceptible to liquefaction.

#### 4.1.5 Stratum SM:

The stratum SM contains fine sand with appreciable percentage of fines which are predominantly sand size. This strata is semi-impervious, has fairly good strength when compacted even in saturated condition. Further its susceptibility to volume changes such as shrinkage & swelling is little. At present site, this stratum was present only in bore hole No.6 between 13.0m to 17.0 m depth.

#### 4.2 N - Value:

Standard penetration tests have been carried out and N-values are determined at every 1.5m depth and these have been reported in the bore log chart. At the present site N - values indicated that the consistency of soil is stiff at shallow depths and hard consistency at lower depths.

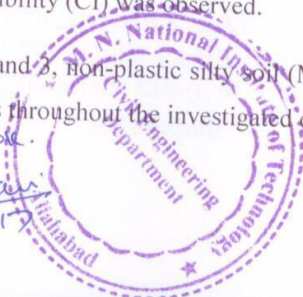
### 5.0 BEARING CAPACITY AND RECOMMENDATIONS

The sub soil investigation work was carried out to find the soil parameters in order to design the foundation for Multi-storeyed buildings (EWS & LIG) of U.P. Avas Avam Vikas Parishad, Construction Division-14, Lucknow at Awadh Vihar Yojana, Sector-05, in Lucknow District. Four boreholes (Nos. 1, 3, 5 & 6) were investigated at site up to a depth of 20.0m & the other two bore hole (Nos. 2 & 4) up to a depth of 30.0m from the existing ground level.

At the present site, in bore hole No. 1, non-plastic silty soil (ML) was found with varying thicknesses at different depths accept from 6.0m to 7.2m depth where clay with medium compressibility (CI) was observed.

In bore hole Nos. 2 and 3, non-plastic silty soil (ML) was found with varying thicknesses at various depths throughout the investigated depth.

Report checked & ok.  
R. K. Saini  
7/3/17



Uttrankh



In bore hole No. 4, clay with medium compressibility (CI) was present at top up to 2.5 m followed by non-plastic silty soil (ML) up to 9.0m depth. After this stratum, clay with medium compressibility (CI) was found up to 17.5m. Again, non-plastic silty soil (ML) was found up to 21.0m depth followed by clay with medium compressibility (CI) up to depth of exploration of 30.0m.

In bore Hole No. 5, non-plastic silty soil (ML) was present at the top up to 6.5m followed by clay with low compressibility (CL) up to 13.5m depth. After this stratum, again non-plastic silty soil (ML) was found up to 18.0m depth followed by clay with medium compressibility (CI) up to depth of exploration of 20.0m.

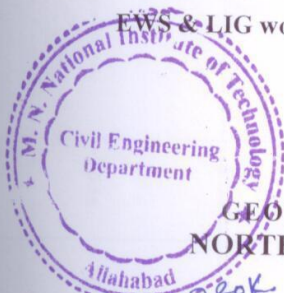
In bore hole No. 6, non-plastic silty soil (ML) was present at the top up to 13.0m with variable thicknesses from existing ground level followed by non-plastic silty sand (SM) up to 17.0m depth. After this stratum, again non-plastic silty soil (ML) was present up to depth of exploration of 20.0m.

At the present site, water table was encountered at a depth of **14.0m** in all the investigated bore holes.

Based on soil test results and N-values, the net safe bearing capacity / allowable bearing pressure for a raft foundation placed at a depth of **1.5m , 3.0m and 4.5m** below existing ground level comes out to be **11.0 t/m<sup>2</sup> , 13.0 t/m<sup>2</sup> and 15.0 t/m<sup>2</sup>** respectively with respect to settlement. The allowable settlement was considered as 50mm.

Typical curves of grain size distribution, tri-axial test and direct shear test for each bore hole are presented after the bore-log charts.

**Final load on foundation would be determined by the structural designer and final type & dimensions of the foundation for multi storeyed buildings for EWS & LIG would be decided by the design engineer using bore log charts.**



Report checked by  
*[Signature]*  
7/3/17

*[Signature]*  
27/02/2017  
(Er. Utkarsh Tiwari)  
Director

**GEO TECHNICAL ENGINEERING LABORATORY**  
**NORTH INDIA ENGINEERS' LAB & CONSULTANTS**  
(An ISO 9001:2008 Certified Company)  
Shed No.62, Industrial Estate, M.N.N.I.T. Allahabad  
Allahabad





North India Engineers' Lab & Consultants

**Geotechnical Engineering Division**  
**North India Engineers' Lab & Consultants**  
 Shed No. 62, Industrial Estate, M.N.N.I.T. Allahabad

**BORE LOG CHART**

Site: U.P.A.V.P., Lucknow

Structure: EWS, Multi Storeyed Building

Bore Hole No.: 1

Depth metre	SPT Value	Soil Description	Classification	Particle Size Distribution %				Natural Moisture Content %	Bulk Unit Weight gm/cc	Dry Unit Weight gm/cc	Specific Gravity	Atterberg's Limits in %			Shear Strength Parameters $C_u$ kg/cm <sup>2</sup>	$\phi_u$ Degree	Compression Index (Cc)
				Gravel	Sand	Silt	Clay					L.L.	P.L.	P.I.			
0.0																	
1.5	9	Non-Plastic Silty Soil	ML	1.56	6.76	88.75	2.93	10.6	1.94	1.75	2.64	Non-Plastic			0.03	18	---
3.0	18																
4.5	13																
6.0	18																
7.2		Clay with Medium Compressibility	CI	0.00	0.20	71.57	28.23	21.4	2.15	1.77	2.70	39	19	20	0.89	6	0.195
7.5	17																
9.0	20																
10.5	17	Non-Plastic Silty Soil	ML	0.78	28.02	70.06	1.14	20.3	2.16	1.80	2.64	Non-Plastic			0.02	19	---
12.0	28																
13.5	16																
15.0	11																
16.5	34	Non-Plastic Silty Soil	ML	0.02	10.02	81.27	8.69	21.4	2.30	1.89	2.64	Non-Plastic			0.05	15	---
18.0	37																
19.5	41																
20.0																	

Soils checked ok.  
 9/3/13

North India Engineers' Lab & Consultants  
 Civil Engineering  
 Division

Director  
 Testing Officer



North India Engineers' Lab & Consultants

**Geotechnical Engineering Division**  
**North India Engineers' Lab & Consultants**  
 Shed No. 62, Industrial Estate, M.N.N.I.T. Allahabad

**BORE LOG CHART**

Site: U.P.A.V.P., Lucknow

Structure: EWS, Multi Storeyed Building

Bore Hole No.: 2

Depth metre	SPT Value	Soil Description	Classification	Particle Size Distribution					Natural Moisture Content %	Bulk Unit Weight gm/cc	Dry Unit Weight gm/cc	Specific Gravity	Atterberg's Limits in %			Shear Strength Parameters		Compression Index (C <sub>c</sub> )
				Gravel	Sand	Silt	Clay	%					L.L.	P.L.	P.I.	C <sub>u</sub> kg/cm <sup>2</sup>	Φ <sub>u</sub> Degree	
0.0																		
1.5	27	Non-Plastic Silty Soil	ML	0.00	12.82	87.18	0.00	9.7	1.84	1.68	2.64	Non-Plastic			0.02	20		
3.0	18																	
4.5	17																	
6.0	13	Non-Plastic Silty Soil	ML	0.34	4.88	87.2	7.58	18.5	1.93	1.63	2.64	Non-Plastic			0.06	17		
7.5	12																	
9.0	18																	
10.5	50																	
11.0																		
14.0	20	Non-Plastic Silty Soil	ML	1.04	36.96	61.01	0.99	22.05	2.08	1.70	2.64	Non-Plastic			0.03	19		



*Report closed & OK*  
*Devsan*  
 7/13/19



*Uthank*

*Divash Contd...*



North India Engineers' Lab & Consultants  
 10/10, Sector 14B, Gurgaon

**Geotechnical Engineering Division**  
**North India Engineers' Lab & Consultants**  
 Shed No. 62, Industrial Estate, M.N.N.I.T. Allahabad  
**BORE LOG CHART**

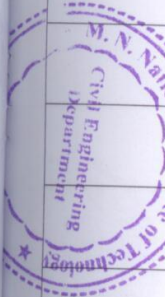
Site: U.P.A.V.P., Lucknow

Structure: EWS, Multi Storeyed Building

Bore Hole No.: 3

Depth metre	SPT Value	Soil Description	Classification	Particle Size Distribution					Natural Moisture Content %	Bulk Unit Weight gm/cc	Dry Unit Weight gm/cc	Specific Gravity	Atterberg's Limits in %			Shear Strength Parameters		Compression Index (C <sub>c</sub> )
				Gravel	Sand	Silt	Clay	%					L.L.	P.L.	P.I.	C <sub>u</sub> kg/cm <sup>2</sup>	φ <sub>u</sub> Degree	
0.0																		
1.5	13																	
3.0	14	Non-Plastic Silty Soil	ML	1.54	19.72	78.74	0.00	9.3	1.89	1.73	2.64	Non-Plastic	0.02	21				
4.5	17																	
4.8																		
6.0	19																	
7.5	25	Non-Plastic Silty Soil	ML	0.06	7.00	82.09	10.85	19.6	2.10	1.76	2.64	Non-Plastic	0.15	15				
9.0	18																	
10.5	26																	
11.0																		
12.0	18																	
13.5	25																	
15.0	29																	
16.5	35	Non-Plastic Silty Soil	ML	0.22	9.42	87.47	2.89	23.6	2.19	1.77	2.64	Non-Plastic	0.03	23				
18.0	42																	
19.5	47																	
20.0																		

*Results checked & OK  
 7/13/19*



*Chauhan*



*DM/AM*



www.niel.org  
 www.niel.com  
 www.niel.in

**Geotechnical Engineering Division**  
**North India Engineers' Lab & Consultants**  
 Shed No. 62, Industrial Estate, M.N.N.I.T. Allahabad

**BORE LOG CHART**

Site: U.P.A.V.P., Lucknow

Structure: JIG, Multi Storeyed Building

Bore Hole No.: 4

Depth metre	SPT Value	Soil Description	Classification	Particle Size Distribution %				Natural Moisture Content %	Bulk Unit Weight gm/cc	Dry Unit Weight gm/cc	Specific Gravity	Atterberg's Limits in %			Shear Strength Parameters		Compression Index (Cc)
				Gravel	Sand	Silt	Clay					L.L.	P.L.	P.I.	$C_u$ kg/cm <sup>2</sup>	$\phi_u$ Degree	
0.0																	
1.5	11	Clay with Medium Compressibility	CI	1.03	3.68	75.49	19.80	17.1	2.34	2.00	2.70	36	20	16	0.69	8	0.171
2.5																	
3.0	13																
4.5	15	Non-Plastic Silty Soil	ML	0.15	7.23	83.74	8.88	18.2	2.24	1.90	2.64	Non-Plastic			0.13	17	---
6.0	34																
7.5	31																
9.0	35																
10.5	39																
12.0	42																
13.5	44	Clay with Medium Compressibility	CI	2.01	4.49	65.56	27.94	24.5	2.05	1.65	2.72	43	21	21	0.89	7	0.220
16.5	>50																
17.5	>50																

*Keyhole charted & OK.  
 Resonance  
 21/3/15*

*Uttrak*

*Shankar*





North India Engineers' Lab & Consultants

**Geotechnical Engineering Division**  
**North India Engineers' Lab & Consultants**  
 Shed No. 62, Industrial Estate, M.N.N.I.T. Allahabad

**BORE LOG CHART**

Site: U.P.A.V.P., IIG, Lucknow

Structure: Multi Storeyed Building

Bore Hole No.: 4

Depth metre	SPT Value	Soil Description	Classification	Particle Size Distribution					Natural Moisture Content %	Bulk Unit Weight gm/cc	Dry Unit Weight gm/cc	Specific Gravity	Atterberg's Limits in %			Shear Strength Parameters		Compression Index (C <sub>c</sub> )
				Gravel	Sand	Silt	Clay	%					L.L.	P.L.	P.I.	C <sub>u</sub> kg/cm <sup>2</sup>	Φ <sub>u</sub> Degree	
18.0	32																	
19.5	30	Non-Plastic Silty Soil	ML	4.16	3.55	83.96	8.33	26.3	1.87	1.48	2.64	Non-Plastic			0.14	17	---	
21.0	28																	
22.5	34																	
24.0	43																	
25.5	>50	Clay with Medium Compressibility	CI	7.36	4.33	68.43	19.88	20.6	1.99	1.65	2.70	38	17	21	0.70	8	0.186	
27.0	>50																	
28.5	>50																	
30.0	>50																	

*Soils checked to 0.15 m  
 11/3/15*



*Uttrak*



*Dinesh*

Responsible Officer



North India Engineers' Lab & Consultants

**Geotechnical Engineering Division**  
**North India Engineers' Lab & Consultants**  
 Shed No. 62, Industrial Estate, M.N.N.I.T. Allahabad

**BORE LOG CHART**

Site: U.P.A.V.P., Lucknow

Structure: LIG, Multi Storedyed Building

Bore Hole No.: 5

Depth metre	SPT Value	Soil Description	Classification	Particle Size Distribution					Natural Moisture Content %	Bulk Unit Weight gm/cc	Dry Unit Weight gm/cc	Specific Gravity	Atterberg's Limits in %			Shear Strength Parameters		Compression Index (C <sub>c</sub> )
				Gravel	Sand	Silt	Clay	%					L.L.	P.L.	P.I.	C <sub>u</sub> kg/cm <sup>2</sup>	Φ <sub>u</sub> Degree	
0.0																		
1.5	11																	
3.0	12	Non-Plastic Silty Soil	ML	0.41	7.67	81.63	10.29	5.29	1.53	1.45	2.64	Non-Plastic				0.17	14	---
4.5	13																	
6.0	15																	
6.5																		
7.5	17																	
9.0	20																	
10.5	24	Clay with Low Compressibility	CI	9.83	3.21	70.34	16.62	26.0	1.99	1.58	2.68	34	18	16	0.53	10	0.157	
12.0	32																	
13.5	17																	
15.0	21																	
16.5	26	Non-Plastic Silty Soil	ML	0.07	26.00	68.02	5.91	16.8	2.21	1.90	2.64	Non-Plastic				0.06	19	---
18.0	25																	
19.5	35	Clay with Medium Compressibility	CI	2.36	3.38	59.91	34.35	28.8	1.89	1.47	2.72	42	20	22	0.93	7	0.214	
20.0																		



*Results checked by*  
*Prakash*

*Utkarsh*



*Dinash*  
 Testing Officer





North India Engineers' Lab & Consultants

Geotechnical Engineering Division  
**North India Engineers' Lab & Consultants**  
 Shed No. 62, Industrial Estate, M.N.N.I.T. Allahabad

**BORE LOG CHART**

Site: U.P.A.V.P., Lucknow

Structure: IIG, Multi Storeyed Building

Bore Hole No.: 6

Depth metre	SPT Value	Soil Description	Classification	Particle Size Distribution %				Natural Moisture Content %	Bulk Unit Weight gm/cc	Dry Unit Weight gm/cc	Specific Gravity	Atterberg's Limits in %			Shear Strength Parameters $C_u$ kg/cm <sup>2</sup>	$\Phi_u$ Degree	Compression Index (C <sub>c</sub> )
				Gravel	Sand	Silt	Clay					L.L.	P.L.	P.I.			
0.0																	
1.5	8																
3.0	12	Non-Plastic Silty Soil	ML	0.22	6.22	90.57	2.99	12.1	1.89	1.69	2.64		Non-Plastic	0.03	21	---	
4.5	13																
6.0	15																
7.5	18																
9.0	20																
10.5	22	Non-Plastic Silty Soil	ML	0.96	3.68	81.87	13.49	16.6	1.94	1.66	2.64		Non-Plastic	0.17	13	---	
12.0	19																
13.0																	
13.5	32																
15.0	39	Non-Plastic Silty Sand	SM	49.50	9.59	37.44	3.47	25.4	1.99	1.59	2.62		Non-Plastic	0.03	25	---	
16.5	39																
17.0																	
18.0	42																
19.5	50	Non-Plastic Silty Soil	ML	3.22	4.94	81.11	10.73	25.7	2.14	1.70	2.64		Non-Plastic	0.15	15	---	



Water Table: 14.00 m

*Penetration values etc.*

*Recessor*

*Utank*



*D. Singh*  
Testing Officer