Experiment No: 5

Experiment Name: Subsoil Exploration

Introduction:

The report presents the field test results of the geotechnical investigation and soil properties carried out for the Jamia Usmania Husainabad (Bakhrabaj), Rajshahi. Rajshahi University of Engineering and Technology, Bangladesh was awarded the opportunity of the proposed work for sub-soil investigation including necessary laboratory test to know the soil condition of the area corresponding to shear resistance, unconfined compressive strength and bearing capacity for shallow and deep foundation. This report contents relevant data and graphs for necessary cases.

Purpose:

Sub soil investigation is a predominant feature fore designing foundation of important structure. Both laboratorey and field test data arre important to obtain information required by the structural engineers to design the appropraite type of foundation. The purpose of the investigation is to ascertain depth seqvence and thickness, shearing resistance and unconfined aompressive stress characterristics of sub soil and eventually to establish theire physical properties fort safe and economic design of foundation.

Scope of works:

The main scopes of the investigation work were:

(i) Reconnaissance survey of the site and fixing the exact points for bore holes.

(ii) To determine the sequence of strata and depth of each strata with the help of wash boring

iii) Execution of standard penetration test at 3-10ft. intervals of depth up to 90 ft to ascertain relative state of compaction and to closely evaluate allowable bearing capacity.

iv) Collection of representative disturbed and undisturbed samples of the soil for laboratory tests and physical identification.

v) Execution of various laboratory tests with some selected samples to determine characteristics of the soil

Field Work:

1. Execution of Boring by Wash Boring Method:

The exploratory borings were executed at the fixed points by the wash boring method in the following way. A small depth was made to hold a 2-inch diameter test pipe for boring. The test pipe was driven vertically into the ground to a sufficient depth. The test pipe was moved up and down manually by dhenky method. The palm of a hand for water pumping held the top and of the pipe. The pipe system was always kept full with water.

2. Execution of standard Penetration Test: The standard penetration test were performed at 3-10ft interval up to 60ft depth from GL. The tests were executed by using a split spoon sampler

of 1.38" inner and 2" outer diameter having an overall length of 1'-6" and a 140 lb. hammer falling freely from a constant height of 30 inches on the drilled rod. The number of blows (N) necessary to produce the penetration of two six inches were recorded.

3. Collection of Undisturbed Sample:

The soil sample is collected from cohesive layers in thin walled sampler tubes known as Shelby tube. The tubes are 1.875 inch in diameter having 1/16th inch wall thickness. The length of tubes are usually 18 to 24 inches.

4. ~~Collected~~ Collection of disturbed sample: Disturbed soil samples were extracted at every S.P.T depths from the borehole during operation. The samples were collected by split spoon sampler.

Laboratory test:

The following laboratory test were carried out to know the characteristics of soil:

i) Physical identification test

ii) Moisture content test

iii) Wet and dry density test.

iv) Specific gravity test

v) Grain size distribution test.

vi) Unconfined compressive strength test

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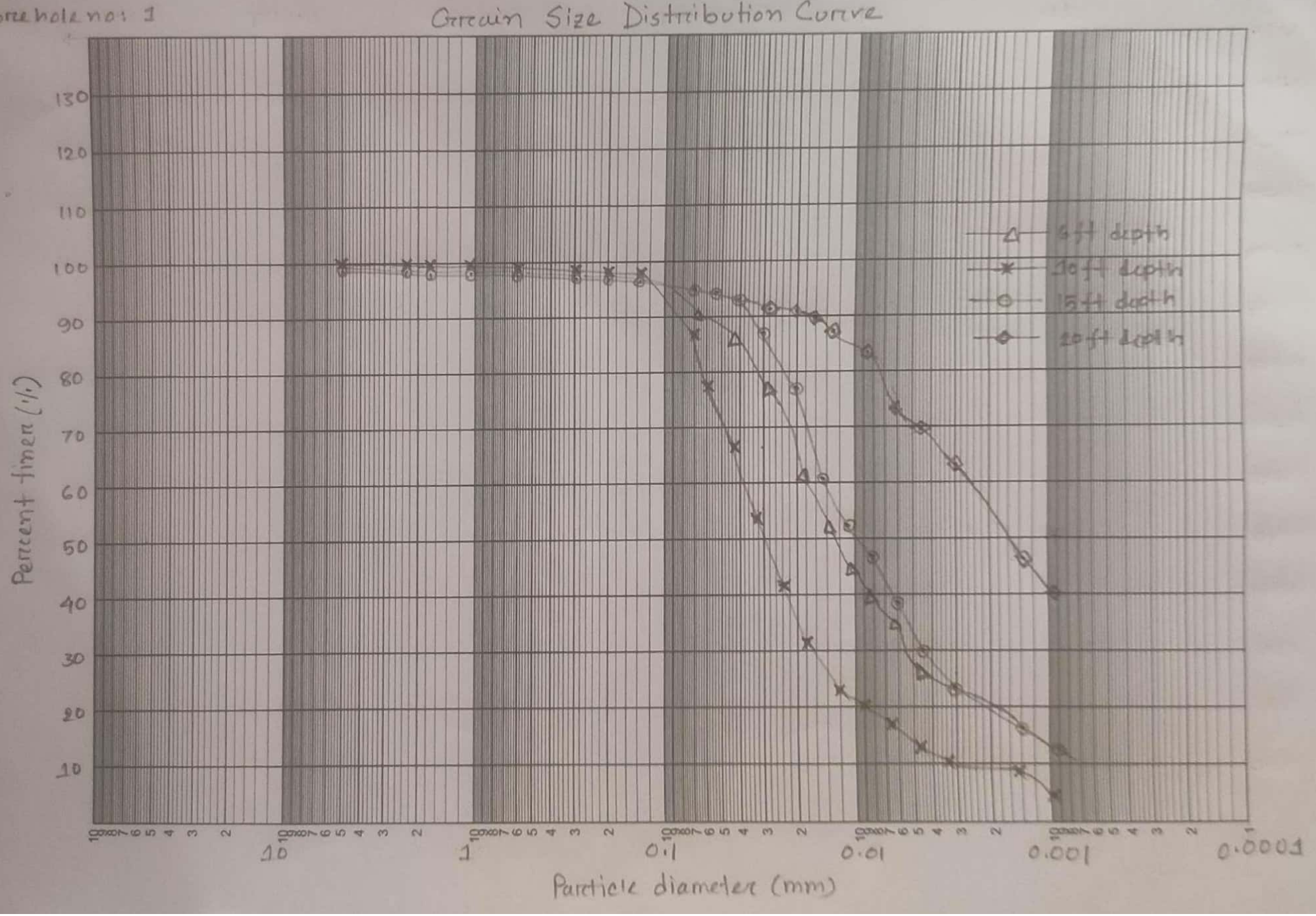
Name of the Client: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi	Boring number : 01
Project title: Jamia Usmania Husainabad (Bakhrabaj) Rajshahi	Type of Boring : Wash
Location : Rajshahi	Date : 12-09-13

FIELD BORE LOG

Depth in ft	Description of Soil Strata			S.P.T		Cu kg/cm²	w (%)	γ_d (gm/cc)	Sp. Gra.
	Type	Color	Bore log	N-value	N-graph				
03	Silty clay loam	Pale brown		3		---	30.91	1.56	2.71
06	Silty clay loam	Pale brown		3		---	30.47	1.56	2.70
10	Silty loam	Pale brown		2		---	31.50	1.53	2.69
15	Silty clay loam	Light brownish gray		7		---	27.60	1.57	2.71
20	Clay	Grayish brown		8		0.58	26.76	1.57	2.72
30	Silty clay	Gray		11		0.66	25.98	1.58	2.71
40	Silty Clay	Gray		18		1.10	24.60	1.62	2.71
50	Silty clay	Gray		13		0.66	25.25	1.60	2.71
60	Stiff clay	Gray		11		0.79	25.78	1.67	2.71

Project title : Jamia Usmania Husainabad (Bakhtiabaj) Rajshahi
Location : Rajshahi
Borehole no: 1



Project title : Jamia Usmania Husainabad (Bakhrabaj), Rajshahi

Location : Rajshahi

Table for allowable bearing capacity of sand for shallow foundation :

Borre Hole No	Depth in ft (D)	Field SPT (Ncor)	Allowable Bearing pressure based on tolerable Settlement (tsf) (Meyerhof, 1965) Width of footing (ft)						
			4ft	5ft	6ft	7ft	8ft	9ft	10ft
BH-01	3	5	0.94	0.90	0.85	0.82	0.79	0.77	0.76
	6	4	0.75	0.72	0.68	0.65	0.63	0.62	0.61
	10	2	0.38	0.36	0.34	0.33	0.32	0.31	0.30
	15	8	1.50	1.44	1.36	1.31	1.27	1.23	1.21

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Project title: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi

Location : Rajshahi

Table for allowable bearing capacity of clay for shallow foundation:

Bore hole No	Depth D (ft)	Field SPT (N)	Allowable B.C for square footing recommended by Terzaghi & peck		B.C from SPT for square footing recommended by Terzaghy and peck	Shear Strength Cu (kg/sq.cm)	Normal moisture content w%	Bulk density γ (gm/cc)	Allowable B.C for square footing by using UC test result (tsf)	Allowable BC for strip footing by using uc test result tsf
			N	BC(tsf)	BC (tsf)					
1	3	5	4 to 8	0.6 to 1.2	0.75	—	—	—	—	—
	6	4	4 to 8	0.6 to 1.2	0.60	—	—	—	—	—
	10	2	2 to 4	0.3 to 0.6	0.30	—	—	—	—	—
	15	8	4 to 8	0.6 to 1.2	1.20	—	—	—	—	—

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Project title : Jamia Usmania Husainabad (Bakhrabaj), Rajshahi

Location : Rajshahi

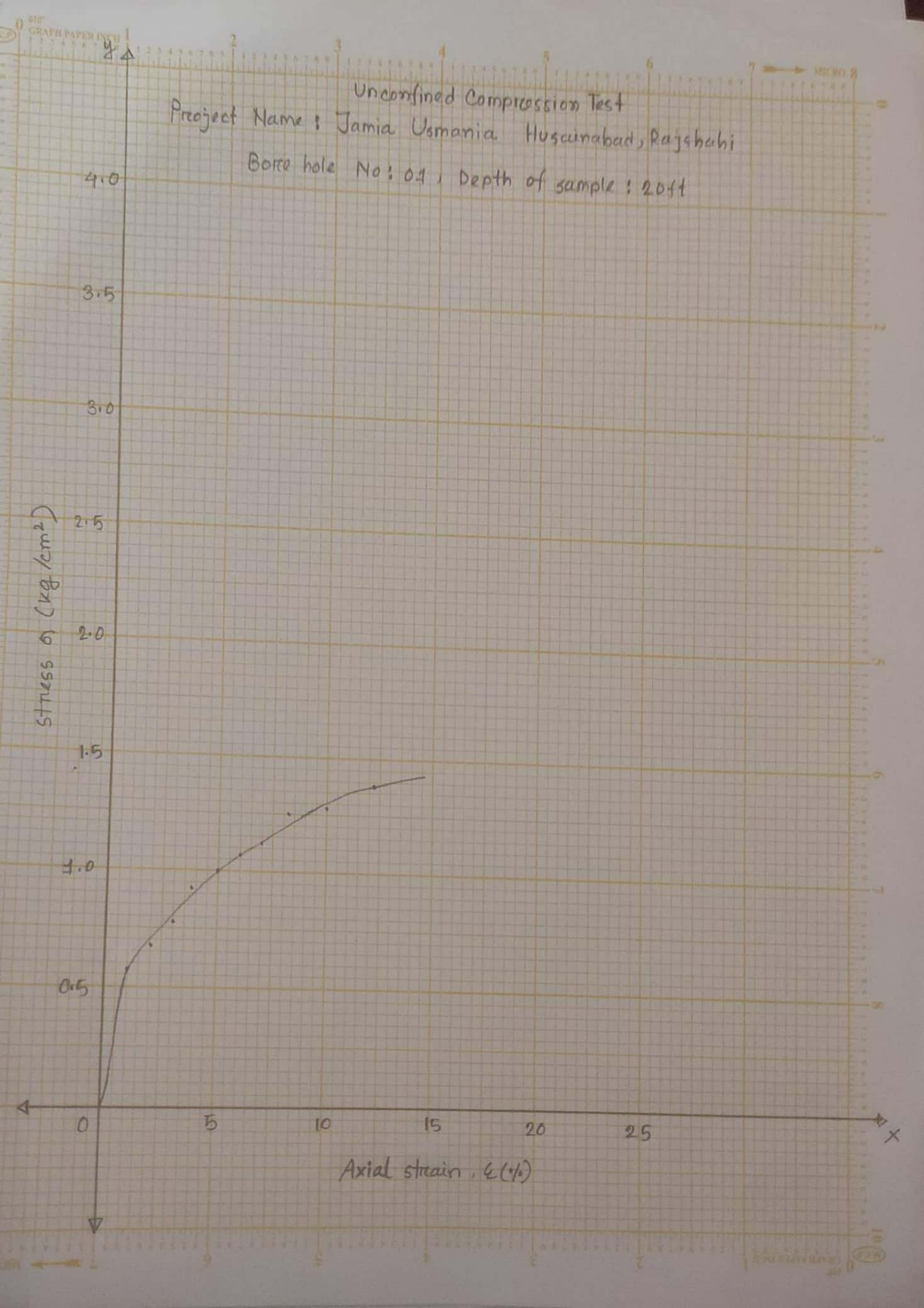
Allowable bearing capacity for pile foundation

Borehole no	Depth D (ft)	SPT		Shearing Parameters		Meyerhof Factor	Allowable B.C based on S.P.T	
				Friction Angle (ϕ)	Cohesion Cu (kg/sq.cm)	N_q^*	Skin friction (tsf) F.S = 3	Toe bearing (tsf) F.S = 3
		N	N_{corr}					
BH-01	3	3	5	28.59	–	48	0.03	4.36
	6	3	4	28.29	–	48	0.03	4.31
	10	2	2	27.70	–	47	0.01	4.11
	15	7	8	29.47	–	52	0.05	4.90
	20	8	9	–	0.58	–	0.18	1.62
	30	11	11	–	0.66	–	0.20	1.84
	40	18	16	–	1.10	–	0.34	3.07
	50	13	11	–	0.66	–	0.20	1.84
	60	11	8	–	0.79	–	0.24	2.20

Unconfined Compression Test

Project Name : Jamia Usmania Husainabad, Rajshahi

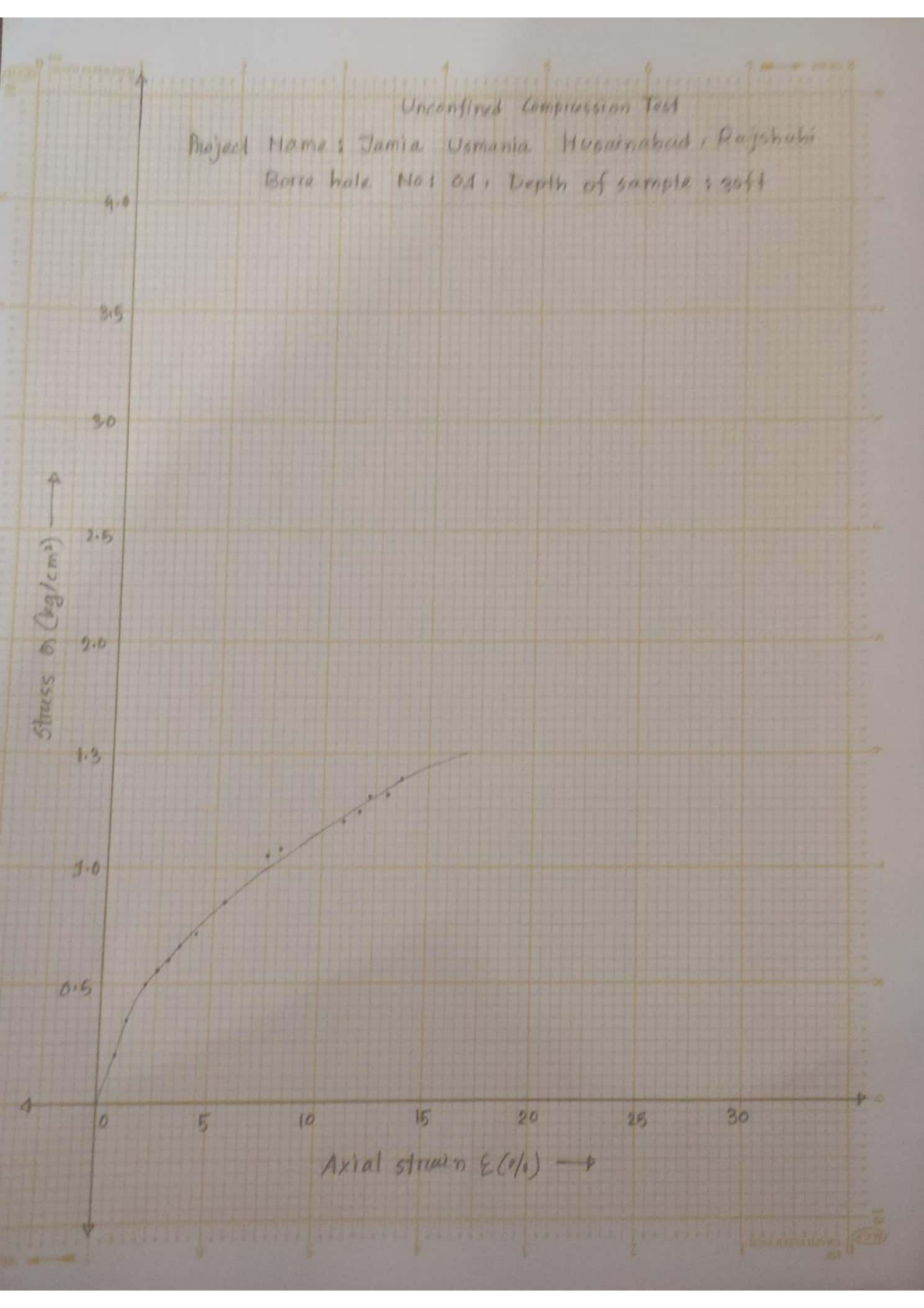
Bore hole No: 01 , Depth of sample : 20ft



Unconfined Compression Test

Project Name : Jamia Usmania Hussainabad, Rajshahi

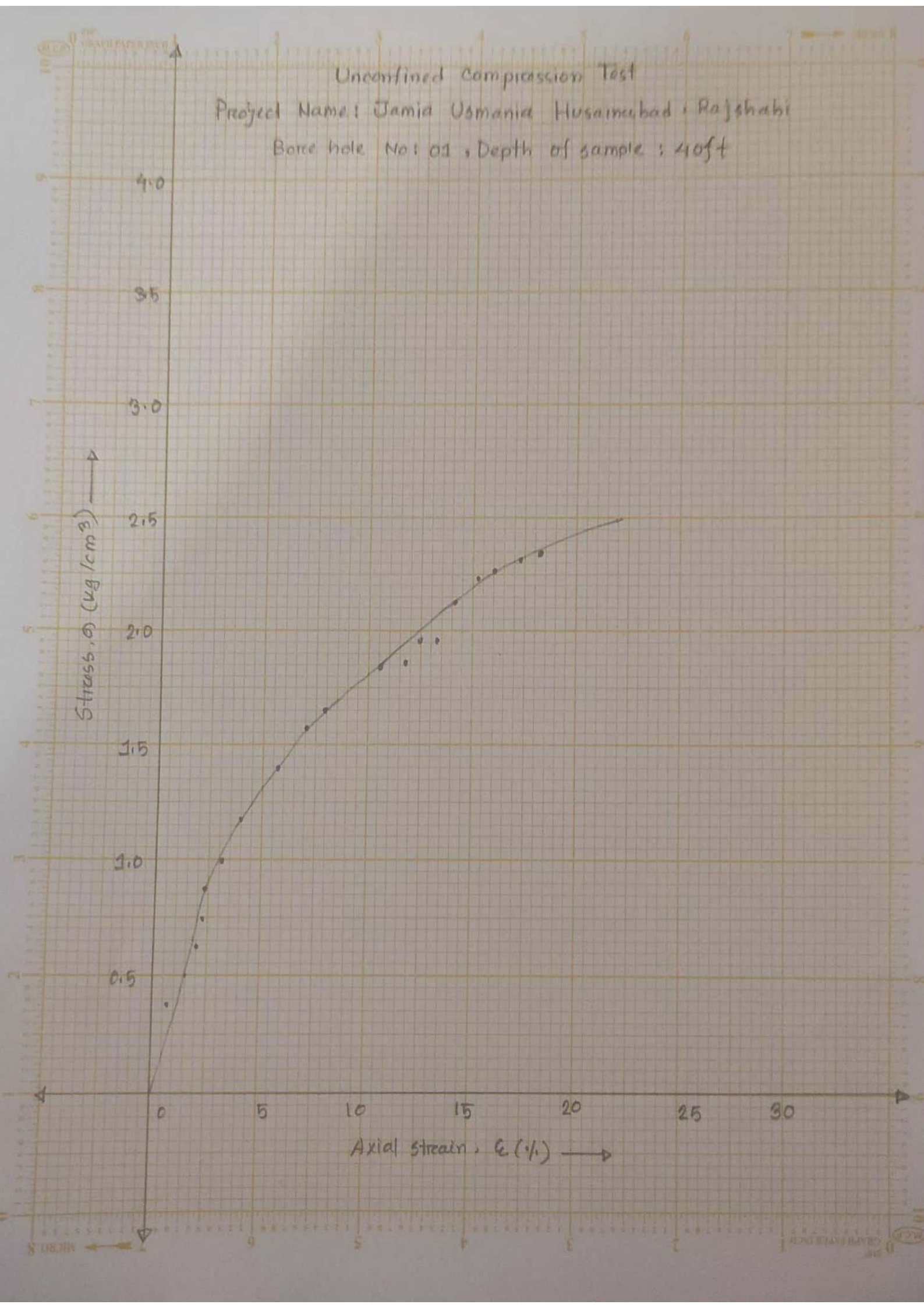
Bore hole No : 01 ; Depth of sample : 30ft



Unconfined Compression Test

Project Name: Jamia Usmania Husainabad, Rajshahi

Bore hole No: 01, Depth of sample: 40ft



Unconfined Compression test

Project Name: Jamia Usmania Husainabad, Rajshahi

Bore hole : 01 , Depth of Sample : 50ft