Memo No: CECON/2013/088

Dated: 09-11-2013

REPORT ON SUB-SOIL INVESTIGATION

[Jamia Usmania Husainabad (Bakhrabaj), Rajshahi]

Department of Civil Engineering

Rajshahi University of Engineering & Technology

Rajshahi, Bangladesh

11 November, 2013

06-080

Name of the Project:

Subsoil Exploration Report
of
Jamia Usmania Husainabad (Bakhrabaj), Rajshahi

Executing Agency: **Department of Civil Engineering**
Rajshahi University of Engineering & Technology
Rajshahi-6204
Bangladesh

Date of Field Tests: 12-13 September 2013

CONTENTS

1. 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 & 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. Discussion and recommendation about the appropriate type of foundation for the probable load have been made with the results obtained in the field and laboratory test. In this report, a brief description of the field-testing method has been presented.

2. PURPOSE

Sub-soil investigation is a predominant feature for designing foundation of important structure in an intelligent, economic and satisfactory manner. Both the results of fields and laboratory test are essential to obtain information required by the structural engineers to design the appropriate type of foundation. The purpose of the investigation is to ascertain depth sequence and thickness, shearing resistance and unconfined compressive stress characteristics of sub-soil and eventually to establish their physical properties for safe and economic design of foundation.

3. 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- 10 ft 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.
(vi) To ascertain relative state of compaction and evaluate the allowable bearing capacity.

4. FIELD WORK

4.1 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 end of the pipe. The up and down movement of the pipe helped the cutting bit to disintegrate the soil and make it loose. The water was circulated through the pipe upward and along the sides of the pipes downward. The pipe was emerged through the hole. The pipe system was always kept full with water.

4.2 Execution of Standard Penetration Test

The standard penetration tests were performed at 3-10 ft interval up to 60 ft depth from GL (Ground level). The tests were executed by using a split spoon sampler of 1.38 inch inner and 2 inches 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 was recorded in two different stages at six inches first and twelve inches last for executing the test, the spilt spoon sample was attached to the lower end of the drilled rod and the rod was lowered into the bore. The upper end of the rod was fitted with a socket on which a 140 lb. hammer was allowed to fall freely from the required height of 30 inches.

4.3 Collection of Undisturbed Samples

Undisturbed soil sampling is very important in soil investigation for determination of some important properties; such as shear strength, unit weight, void ratio, compression index, unconfined compressive strength, angle of internal friction etc. The soil sample is collected from cohesive layers in thin walled sampler tubes known as Shelby tubes. The Shelby tubes are 1.875 inch in diameter having $1/16^{th}$ inch wall thickness. The lengths of the tubes are usually 18 to 24 inches. The hole is washed and cleaned for some time before collection of a sample at a specified depth from the hole and then Shelby tube attached at the head of the pipe. The pipe with the tube is pressed down into the ground. The tube was filled with soil sample after penetration test was performed. The sample was collected after the Shelby tube was taken out of the hole and the ends were cleaned and sealed with paraffin wax in order to prevent any change in moisture content.

4.4 Collection of Disturbed Samples

Disturbed soil samples were extracted at every S.P.T. depths from the borehole during operation. The samples were collected by means of split spoon sampler. This sampler was attached to the bottom of the drilling rod in place of the cutting bit and lowered into the hole at the desired depth. It was driven into the soil up to a measured depth by means of hammering in a prescribed manner and then removed from the holes.

5. LABORATORY TEST

The following laboratory tests 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

6. CONCLUSION AND RECOMMENDATION

For the construction Jamia Usmania Husainabad (Bakhrabaj), Rajshahi the sub-soil exploration of different location consists of 05 exploratory borings of different depths up to 90 ft from the ground level is performed.

The field and laboratory test results indicate that the soil up to 90 ft from G.L. is dominant by silty clay loam, silty loam sand clay. The SPT results vary from 02 to 24 up to 90 ft depth for all bore holes.

The allowable bearing capacity of the proposed site at 10 ft depth for BH-01, BH-02, BH-03 & BH-04 are 0.34 tsf, 1.18 tsf, 0.84 tsf & 1.02 tsf respectively. The allowable bearing capacity of the proposed site at 15 ft depth for BH-01, BH-02, BH-03 & BH-04 are 1.35 tsf, 0.51 tsf, 1.01 tsf & 1.52 tsf respectively. The average allowable bearing capacity of the proposed site at 10 ft and 15 ft are 0.845 tsf and 1.09 tsf. However there is a ditch at the location of BH-05 (shown in location map). The depth of ditch is 14 ft and below this depth 3.5 ft is a soft clay layer (organic decomposed mud). Hence the ditch area should be filled with sand with proper compaction up to the foundation level. After that the soil strata at 15 ft depth from the ground level may be suitable for shallow foundation using 3-4 ft compacted sand. Deep Foundation may be suggested if the structure is heavily loaded or multistory buildings.

However, the design engineer shall choose suitable and appropriate type of foundation after calculating the overall structural load, loading pattern etc. of the proposed building.

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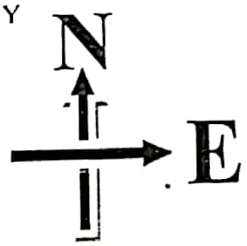
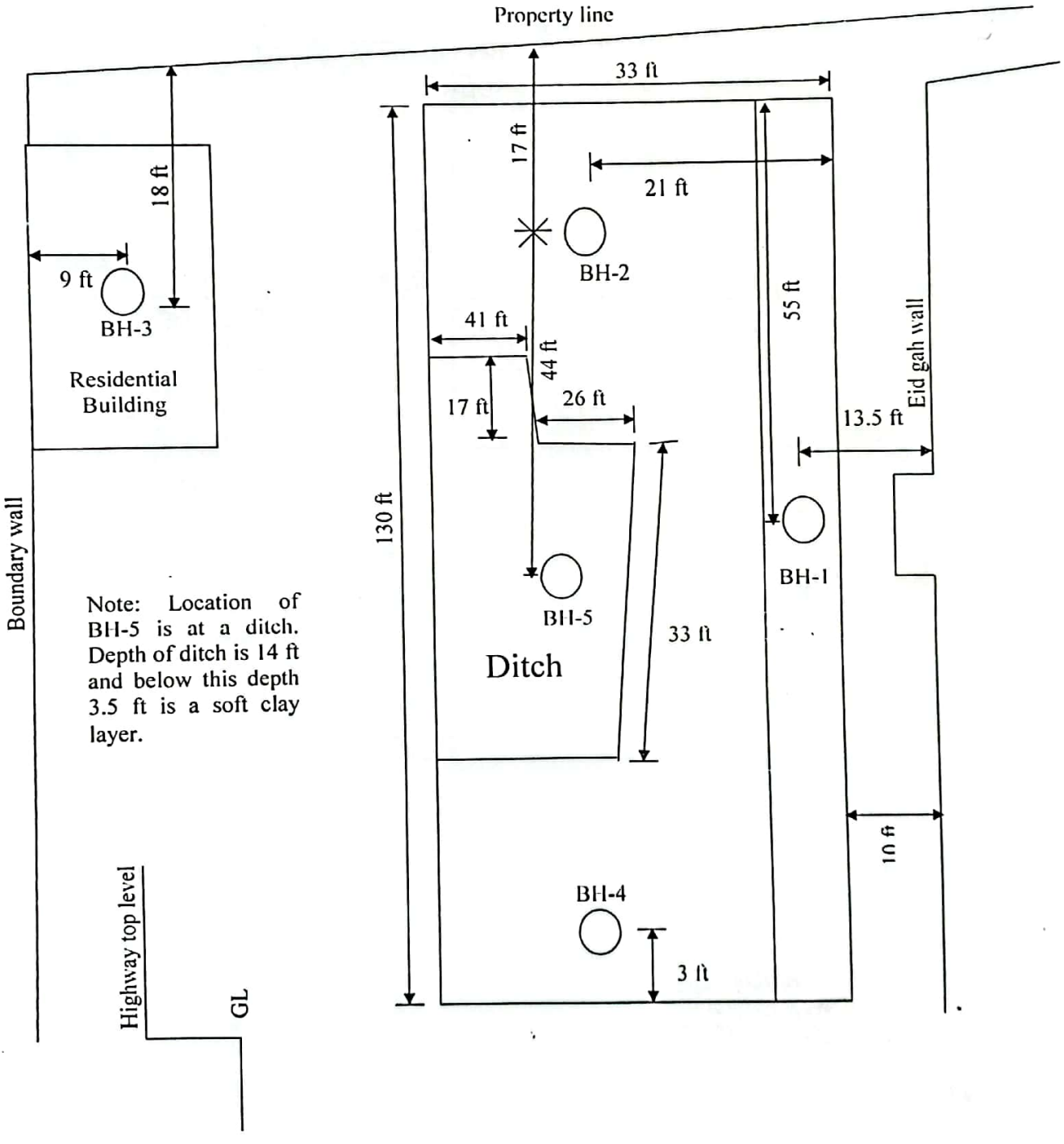
Name of the Client: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Project Title: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Location: Rajshahi





Note: Location of BH-5 is at a ditch. Depth of ditch is 14 ft and below this depth 3.5 ft is a soft clay layer.

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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		C_u Kg/cm^2	w (%)	γ_d (gm/cc)	Sp. Gr.
	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	1.57	2.72

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Name of the Client: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi	Boring Number: 02
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		C_u Kg/cm^2	w (%)	γ_d (gm/cc)	Sp. Gr.
	Type	Color	Bore Log	N-Value	N-Graph				
03	Silty clay	Very pale brown		8		---	27.12	1.57	2.71
06	Silty clay loam	Pale brown		2		---	31.22	1.52	2.71
10	Silty loam	Light brownish gray		6		---	28.00	1.56	2.67
15	Silty loam	Gray		3		---	30.98	1.55	2.71
20	Clay	Dark gray		8		0.56	27.22	1.58	2.72
30	Silty clay	Pale brown		10		0.59	26.08	1.58	2.71
40	Silty clay	Gray		13		0.69	25.20	1.60	2.71
50	Silty clay	Gray		14		0.68	24.98	1.61	2.71
60	Stiff clay	Grayish brown		13		0.62	25.12	1.60	2.72

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Name of the Client: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi	Boring Number: **03**
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		C_u Kg/cm^2	w (%)	γ_d (gm/cc)	Sp. Gr.
	Type	Color	Bore Log	N-Value	N-Graph				
3	Silty clay	Very pale brown		3		---	30.98	1.55	2.71
06	Silty clay loam	Yellow		4		---	30.25	1.56	2.71
10	Silty loam	Brownish yellow		4		---	30.44	1.56	2.69
15	Clay	Light brownish yellow		5		0.37	29.56	1.56	2.72
20	Clay	Dark gray		9		0.75	27.01	1.57	2.72
30	Silty clay	Very pale brown		8		0.71	27.76	1.57	2.71
40	Silty clay	Gray		11		0.60	26.23	1.61	2.71
50	Silty clay	Gray		6		0.39	29.78	1.57	2.71
60	Stiff clay	Dark gray		10		0.82	27.04	1.60	2.72

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Name of the Client: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi	Boring Number: **04**
Project Title: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi	Type of Boring: Wash
Location: Rajshahi	Date: **13-09-13**

FIELD BORE LOG

Depth in ft.	Description of Soil Strata			S.P.T		C_u Kg/cm^2	w (%)	γ_d (gm/cc)	Sp. Gr.
	Type	Color	Bore Log	N-Value	N-Graph				
03	Silty clay	pale brown		4		---	30.22	1.56	2.71
06	Silty loam	Pale brown		3		---	30.98	1.56	2.69
10	Silty clay	Pale brown		5		0.36	30.01	1.56	2.71
15	Silty clay loam	Pale brown		8		---	27.75	1.56	2.71
20	Clay	Grayish brown		8		0.48	28.12	1.56	2.72
30	Silty clay	Light gray		10		0.51	27.12	1.56	2.71
40	Silty clay	Gray		24		0.56	24.20	1.56	2.71
50	Stiff clay	Gray		13		0.50	25.20	1.56	2.72
60	Stiff clay	Gray		10		0.55	27.13	1.56	2.72

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Name of the Client: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi	Boring Number: **05**
Project Title: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi	Type of Boring: Wash
Location: Rajshahi	Date: **13-09-13**

FIELD BORE LOG

Depth in ft.	Description of Soil Strata			S.P.T		C_u Kg/cm^2	w (%)	γ_d (gm/cc)	Sp. Gr.
	Type	Color	Bore Log	N-Value	N-Graph				
03	---	---	---	---	---	---	---	---	---
06	---	---		---	---	---	---	---	---
10	---	---		---	---	---	---	---	---
15	---	---		---	---	---	---	---	---
20	Silty loam	Light brownish gray		4		---	30.25	1.55	2.69
30	Silty clay	Light gray		7		0.44	28.92	1.57	2.71
40	Silty clay loam	Light gray		5		---	29.98	1.56	2.71
50	Clay	Pale brown		8		0.47	28.12	1.58	2.72
60	Silty clay	Light gray		9		0.48	29.12	1.59	2.71
70	Silty clay	Gray		11		0.39	27.07	1.60	2.71
80	Stiff clay	Gray		13		0.69	26.87	1.61	2.72
90	Stiff clay	---		11		0.53	27.77	1.6	2.72

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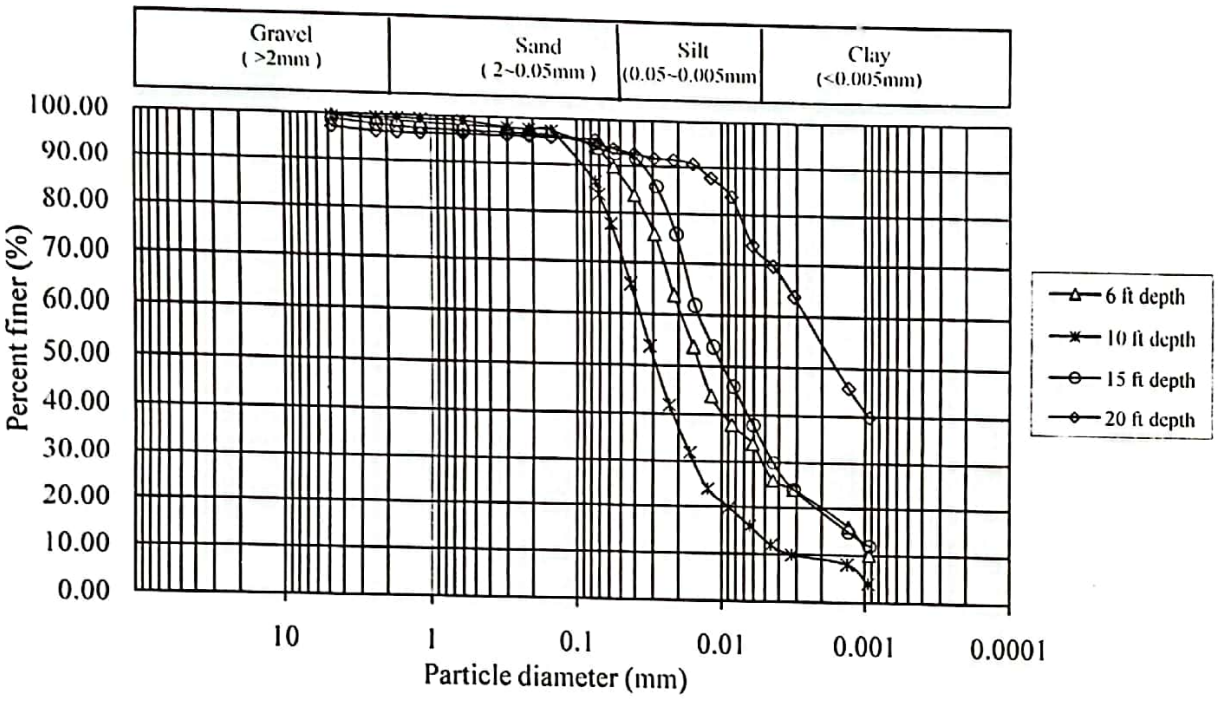
Project Title: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Location : Rajshahi
Bore Hole No.: 01

Grain Size Distribution Curve



Symbol	Depth (ft)	Gravel(%)	Sand(%)	Silt(%)	Clay (%)
△	6	2.0	10.0	60.0	28.0
×	10	1.0	27.0	60.0	12.0
●	15	2.0	6.0	60.0	32.0
◆	20	3.5	0.5	25.0	71.0

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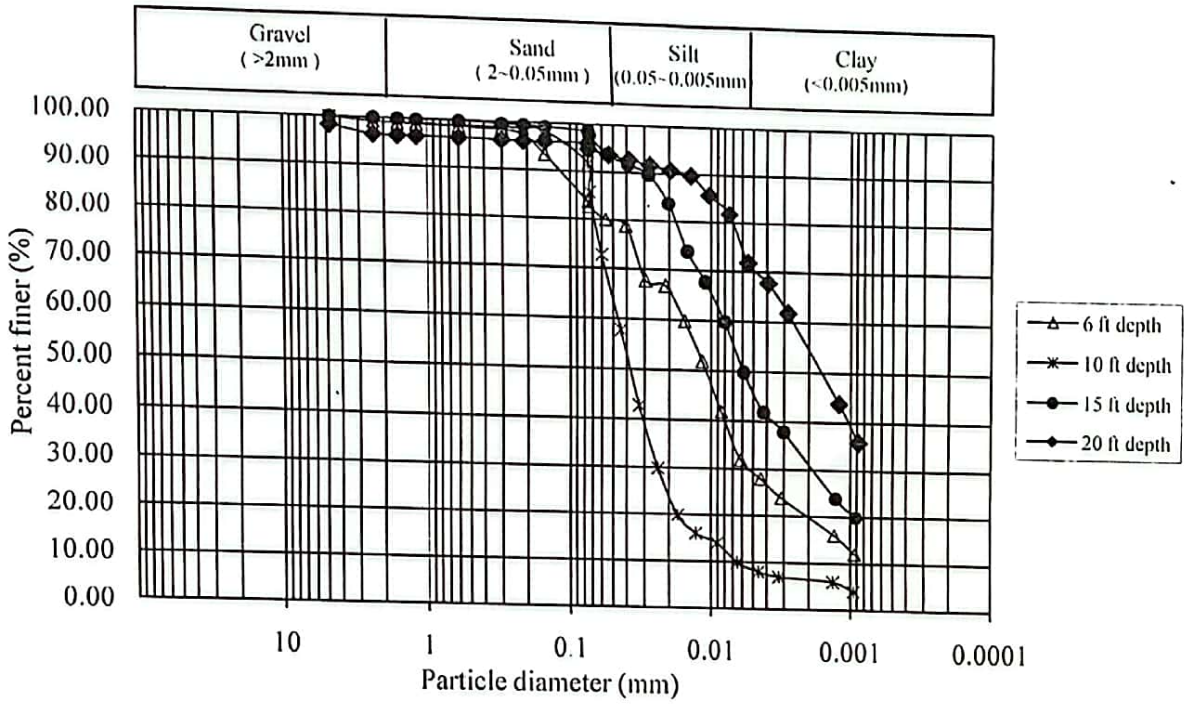
Project Title: Jamia Usmania Husainabad (Bakhrabaj) ,Rajshahi
Location : Rajshahi
Bore Hole No.: 02

Grain Size Distribution Curve



Symbol	Depth (ft)	Gravel(%)	Sand (%)	Silt(%)	Clay (%)
△	6	1.0	19.0	50.0	30.0
×	10	1.0	37.0	52.0	10.0
●	15	---	6.0	49.0	45.0
◆	20	3.5	1.5	25.0	70.0

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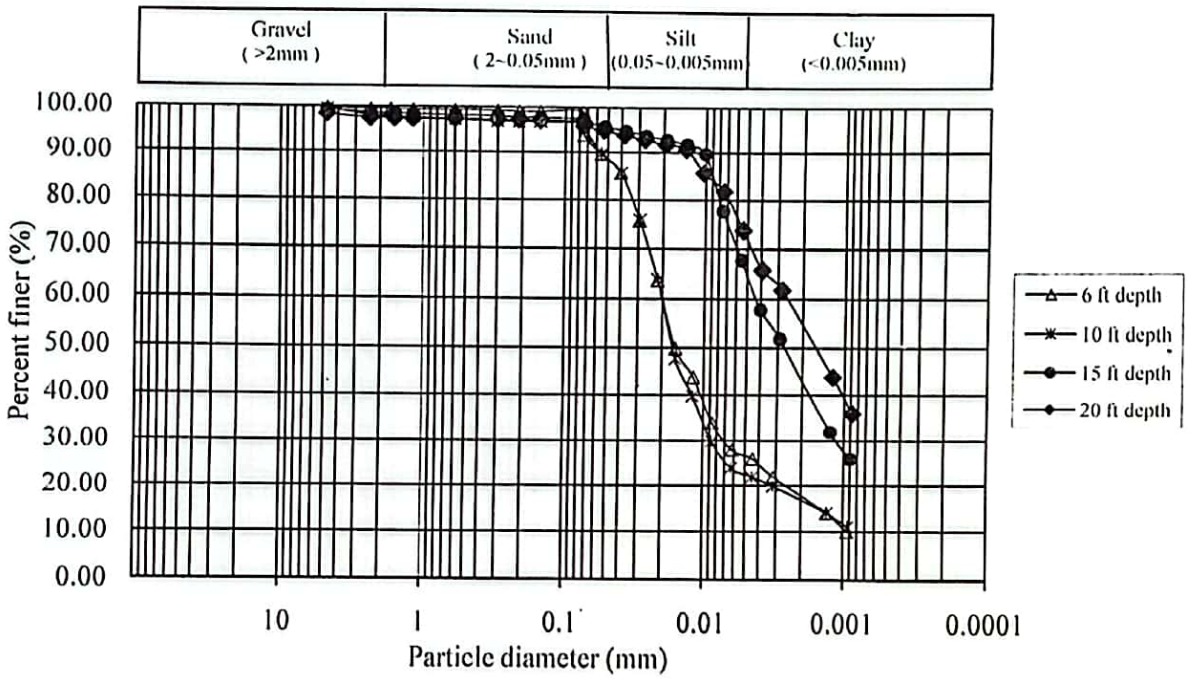
Project Title: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Location : Rajshahi
Bore Hole No.: 03

Grain Size Distribution Curve



Symbol	Depth (ft)	Gravel(%)	Sand (%)	Silt(%)	Clay (%)
△	6	0.5	9.5	62.0	28.0
×	10	2.0	9.0	68.0	21.0
●	15	1.5	3.5	37.0	58.0
◆	20	2.5	2.5	25.0	70.0

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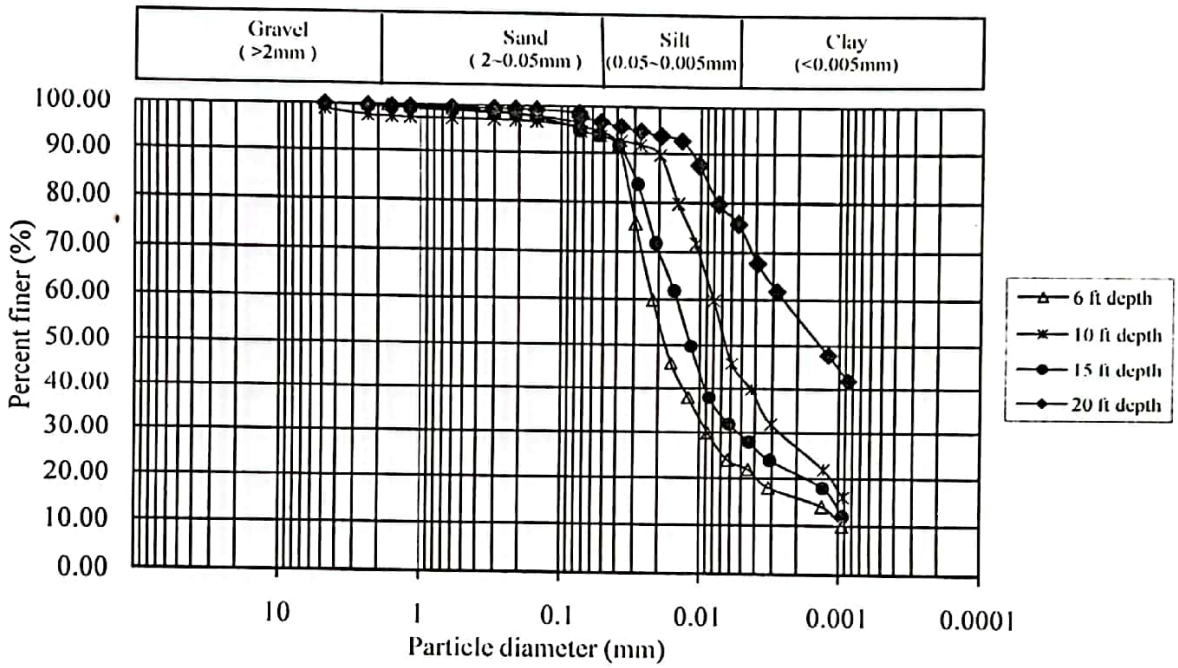
Project Title: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Location : Rajshahi
Bore Hole No.: 04

Grain Size Distribution Curve



Symbol	Depth (ft)	Gravel(%)	Sand (%)	Silt(%)	Clay (%)
△	6	---	5.0	72.0	23.0
X	10	2.0	4.0	53.0	41.0
●	15	---	5.0	65.0	30.0
◆	20	---	3.0	22.0	75.0

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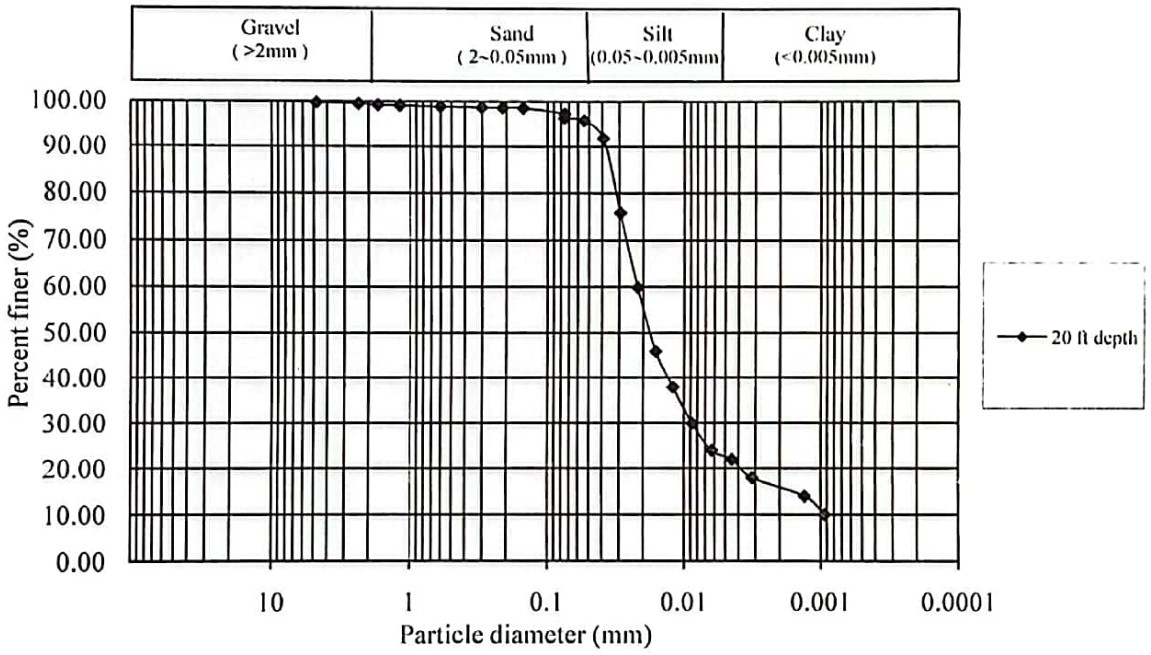
Project Title: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Location : Rajshahi
Bore Hole No.: 05

Grain Size Distribution Curve



Symbol	Depth (ft)	Gravel(%)	Sand (%)	Silt(%)	Clay (%)
△	6	---	---	---	---
X	10	---	---	---	---
●	15	---	---	---	---
◆	20	---	6.0	72.0	22.0

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Project Title : Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Location: Rajshahi

Table for allowable bearing capacity of sand for shallow foundation

Bore Hole No.	Depth in ft (D)	Field SPT (N_{cor})	Allowalable Bearing Pressure Based On Tolerable Settlement (tsf) (Meyerhof,1965)						
			Width of Footing (ft)						
			4 ft	5 ft	6 ft	7 ft	8 ft	9 ft	10 ft
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
BH-02	3	13	2.44	2.34	2.21	2.12	2.06	2.01	1.97
	6	3	0.56	0.54	0.51	0.49	0.47	0.46	0.45
	10	7	1.31	1.26	1.19	1.14	1.11	1.08	1.06
	15	3	0.56	0.54	0.51	0.49	0.47	0.46	0.45
BH-03	3	5	0.94	0.90	0.85	0.82	0.79	0.77	0.76
	6	5	0.94	0.90	0.85	0.82	0.79	0.77	0.76
	10	5	0.94	0.90	0.85	0.82	0.79	0.77	0.76
	15	6	1.13	1.08	1.02	0.98	0.95	0.93	0.91
BH-04	3	6	1.13	1.08	1.02	0.98	0.95	0.93	0.91
	6	4	0.75	0.72	0.68	0.65	0.63	0.62	0.61
	10	6	---	---	---	---	---	---	---
	15	9	1.69	1.62	1.53	1.47	1.42	1.39	1.36
BH-05	3	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

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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 Terzaghi & Peck	Shear strength, Cu	Normal moisture content w %	Bulk density, Y	Allowable B.C.for square footing by using UC test result	Allowable B.C. for strip footing by using UC test result
			N	B C. (tsf)	B.C. (tsf)	(kg/sq cm)		(gm/cc)	(tsf)	(tsf)
1	3	5	4 to8	0.6 to 1.2	0.75	---	---	---	---	---
	6	4	4 to8	0.6 to 1.2	0.60	---	---	---	---	---
	10	2	2 to 4	0.3 to 0.6	0.30	---	---	---	---	---
	15	8	4 to8	0.6 to 1.2	1.20	---	---	---	---	---
2	3	13	8 to 16	1.2 to 2.4	1.95	---	---	---	---	---
	6	3	2 to 4	0.3 to 0.6	0.45	---	---	---	---	---
	10	7	4 to8	0.6 to 1.2	1.05	---	---	---	---	---
	15	3	4 to8	0.6 to 1.2	0.45	---	---	---	---	---
3	3	5	4 to8	0.6 to 1.2	0.75	---	---	---	---	---
	6	5	4 to8	0.6 to 1.2	0.75	---	---	---	---	---
	10	5	4 to8	0.6 to 1.2	0.75	---	---	---	---	---
	15	6	8 to16	1.2 to 2.4	0.90	---	---	---	---	---
4	3	6	4 to8	0.6 to 1.2	0.90	---	---	---	---	---
	6	4	4 to8	0.6 to 1.2	0.60	---	---	---	---	---
	10	6	8 to16	1.2 to 2.4	0.90	0.36	30.01	2.03	1.02	0.83
	15	9	8 to16	1.2 to 2.4	1.35	---	---	---	---	---
5	3	---	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---	---

Testing Officer

সহকারী অধ্যাপক
পুরকৌশল বিভাগ
রাজশাহী প্রকৌশল ও প্রযুক্তি বিশ্ববিদ্যালয়

Heaven's Light is our Guide
DEPARTMENT OF CIVIL ENGINEERING
RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY

Project Title: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Location: Rajshahi

Allowable Bearing Capacity for Pile Foundation

Bore hole no.	Depth D (ft)	SPT N	SPT N_{cor}	Shearing Parameters: Friction Angle, (ϕ°)	Shearing Parameters: Cohesion, C_u (kg/sq.cm)	Meyerhof Factor Nq*	Allowable B.C. based on S.P.T.: Skin friction (tsf) F.S. = 3	Allowable B.C. based on S.P.T.: Toe bearing (tsf) F.S. = 3
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
BH-02	3	8	13	30.91	---	60	0.09	5.99
	6	2	3	28.00	---	48	0.02	4.25
	10	6	7	29.17	---	52	0.05	4.84
	15	3	3	28.00	---	48	0.02	4.25
	20	8	9	---	0.56	---	0.173	1.561
	30	10	10	---	0.59	---	0.183	1.644
	40	13	11	---	0.69	---	0.214	1.923
	50	14	11	---	0.68	---	0.211	1.895
	60	13	10	---	0.62	---	0.192	1.728
BH-03	3	3	5	28.59	---	48	0.03	4.36
	6	4	5	28.59	---	48	0.03	
	10	4	5	28.59	---	48	0.03	4.36
	15	5	6	----	0.37	---	0.115	1.031
	20	9	10	----	0.75	---	0.232	2.090
	30	8	8	----	0.71	---	0.220	1.979
	40	11	10	----	0.6	---	0.186	1.672
	50	6	5	----	0.39	---	0.121	1.087
	60	10	8	----	0.82	---	0.254	2.285

Testing Officer

Heaven's Light is our Guide
DEPARTMENT OF CIVIL ENGINEERING
RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY

Project Title: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Location: Rajshahi

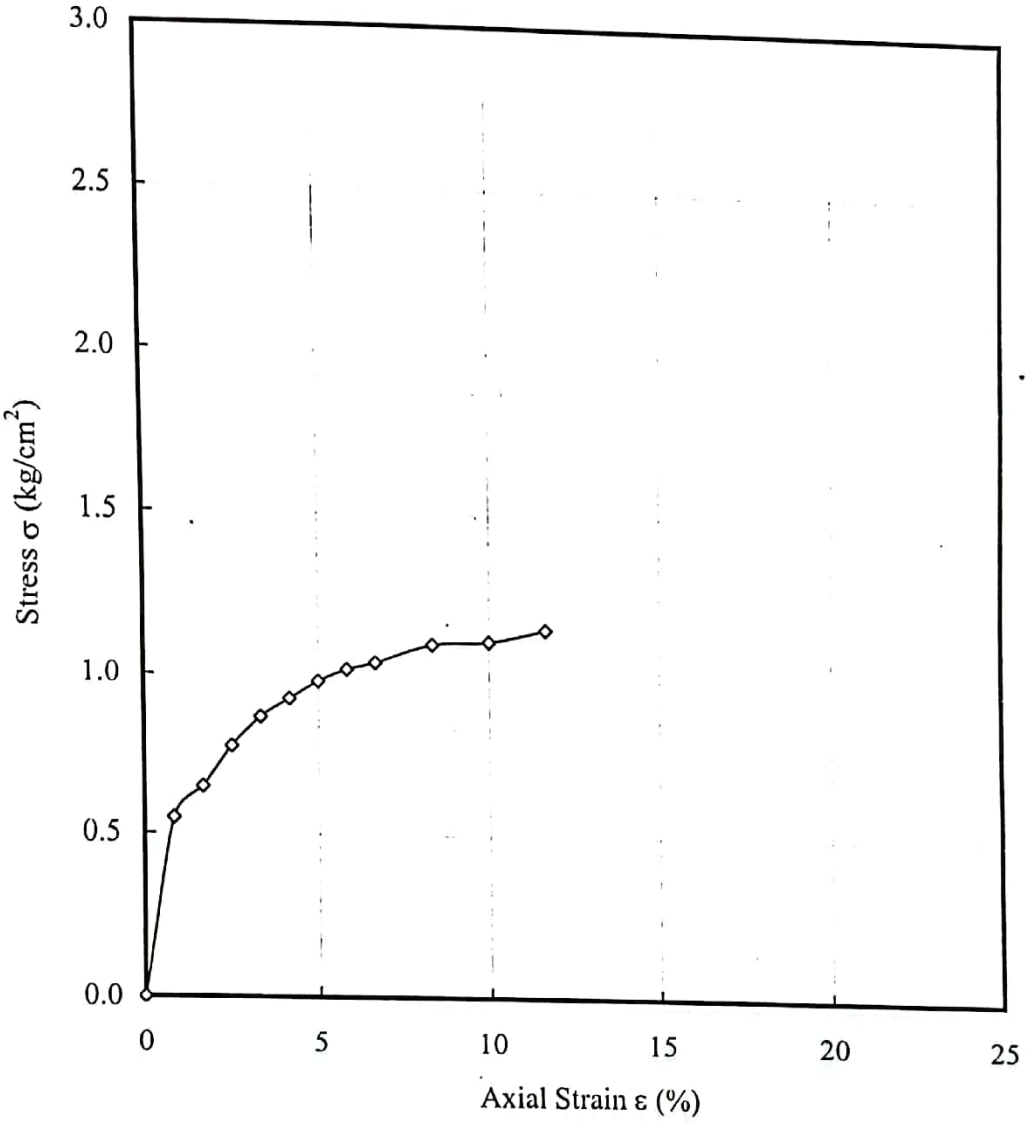
Allowable Bearing Capacity for Pile Foundation

Bore hole no.	Depth D (ft)	SPT N	SPT N_{cor}	Shearing Parameters: Friction Angle, (ϕ^{o})	Shearing Parameters: Cohesion, C_u (kg/sq.cm)	Meyerhof Factor Nq*	Allowable B.C. based on S.P.T: Skin friction (tsf) F.S. = 3	Allowable B.C. based on S.P.T: Toe bearing (tsf) F.S. = 3
BH-04	3	4	6	28.88	---	48	0.04	4.41
	6	3	4	28.29	---	48	0.03	4.31
	10	5	6	---	0.36	---	0.11	1.00
	15	8	9	29.76	---	52	0.06	4.95
	20	8	9	---	0.48	---	0.149	1.34
	30	10	10	---	0.51	---	0.158	1.42
	40	24	21	---	0.56	---	0.173	1.56
	50	13	11	---	0.50	---	0.155	1.39
	60	10	8	---	0.55	---	0.170	1.53
BH-05	3	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---
	20	4	5	28.59	---	48	0.03	4.36
	30	7	9	---	0.44	---	0.14	1.23
	40	5	6	28.88	---	48	0.04	4.41
	50	8	9	31.8	0.47	62	0.146	1.31
	60	9	9	31.8	0.48	62	0.149	1.34
	70	11	10	32.6	0.39	71	0.121	1.09
	80	13	11	34.1	0.69	80	0.214	1.92
	90	11	10	34.1	0.53	67	0.164	1.48

Testing Officer

পরীক্ষাধীন অধ্যাপক
পুরকৌশল বিভাগ
রাজশাহী প্রকৌশল ও প্রযুক্তি বিশ্ববিদ্যালয়

Unconfined Compression Test
Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi.
Bore Hole No: 01, Depth of Sample: 20ft



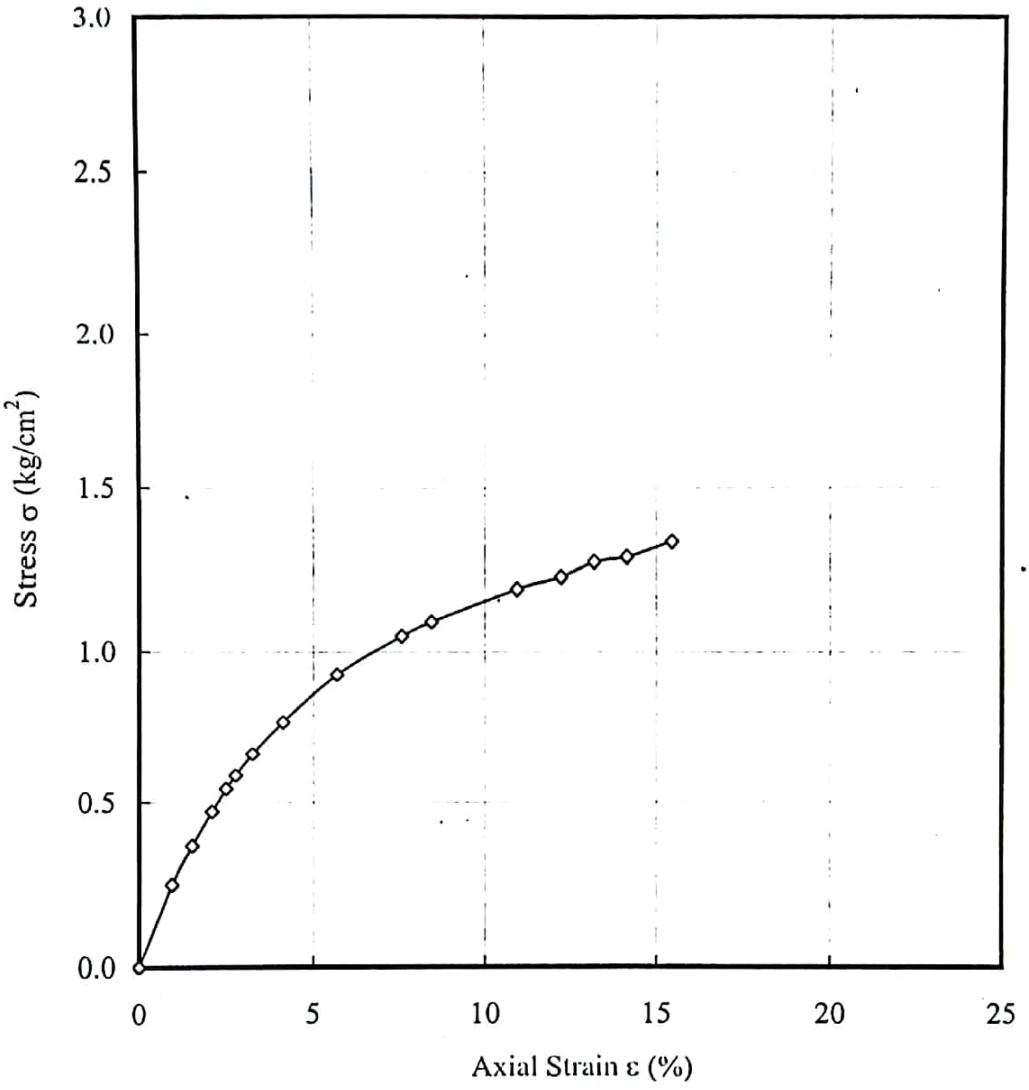
Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi.

Bore Hole No: 01, Depth of Sample: 30ft



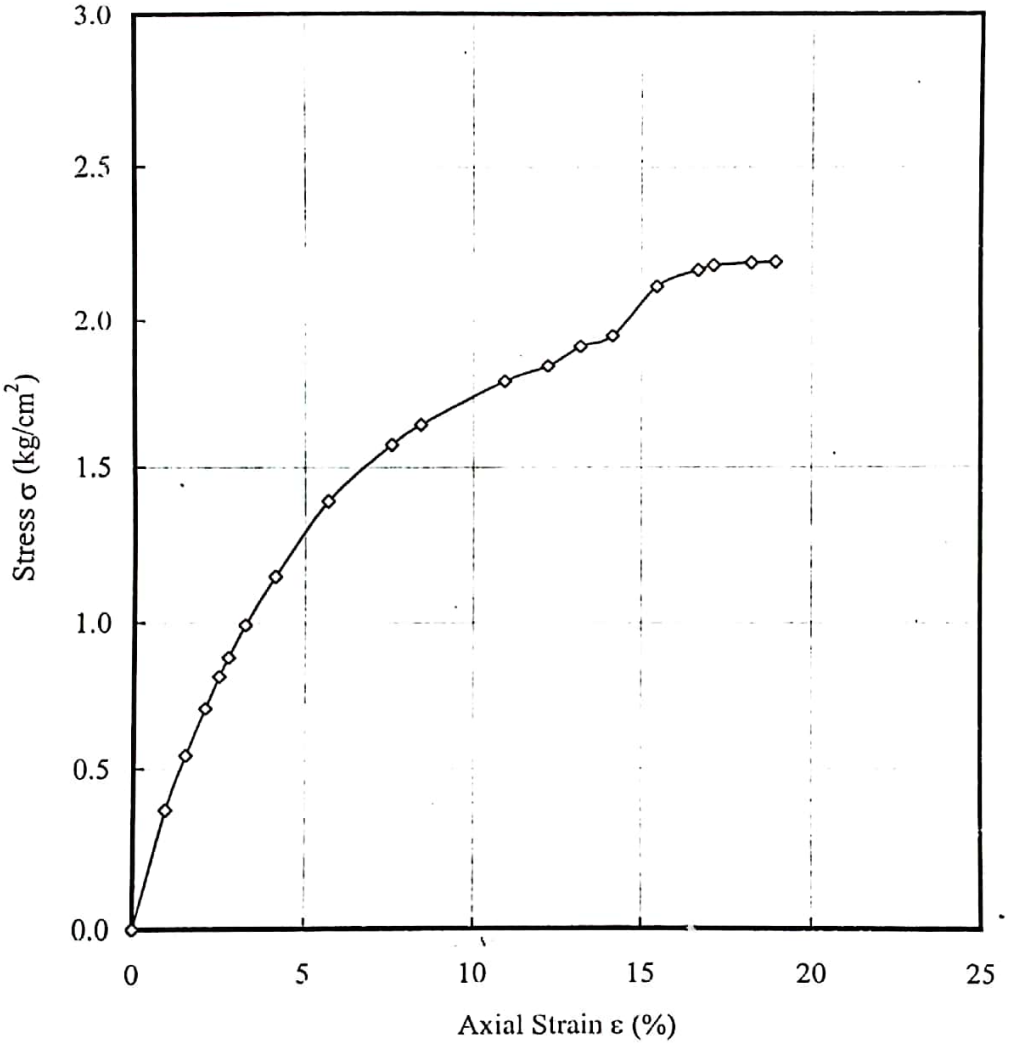
Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi.

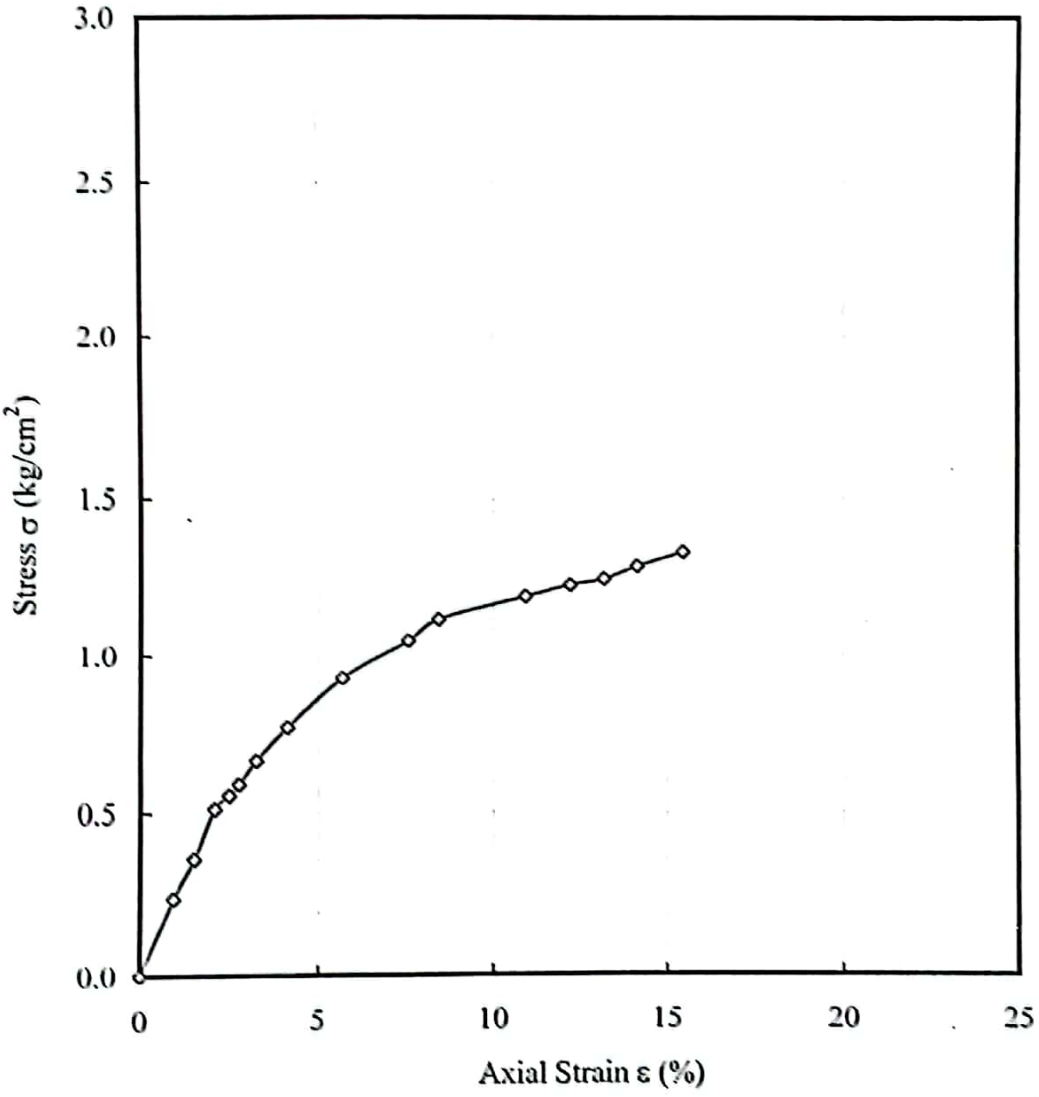
Bore Hole No: 01, Depth of Sample: 40ft



Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test
Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi.
Bore Hole No: 01, Depth of Sample: 50ft

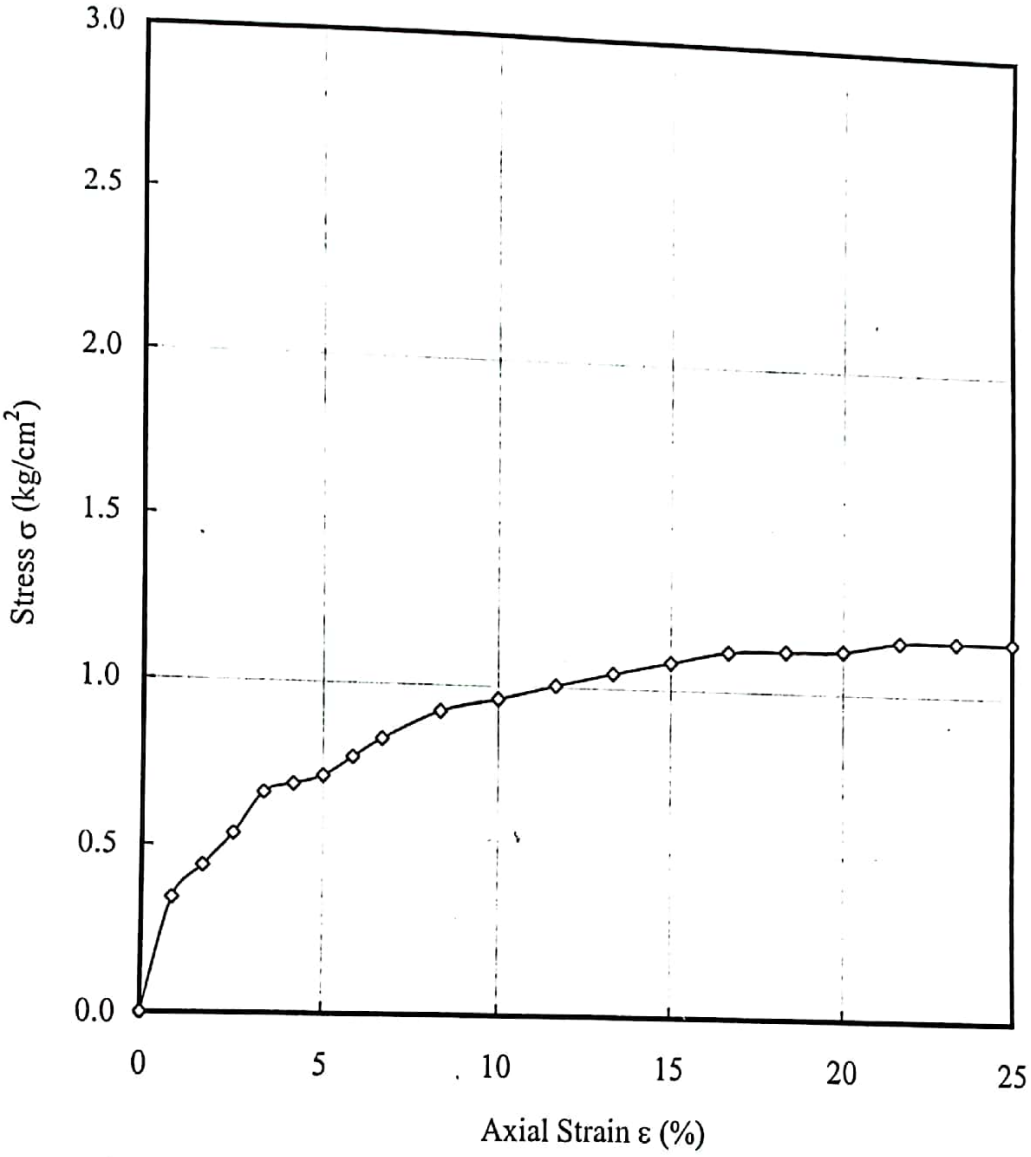


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 02, Depth of Sample: 20ft



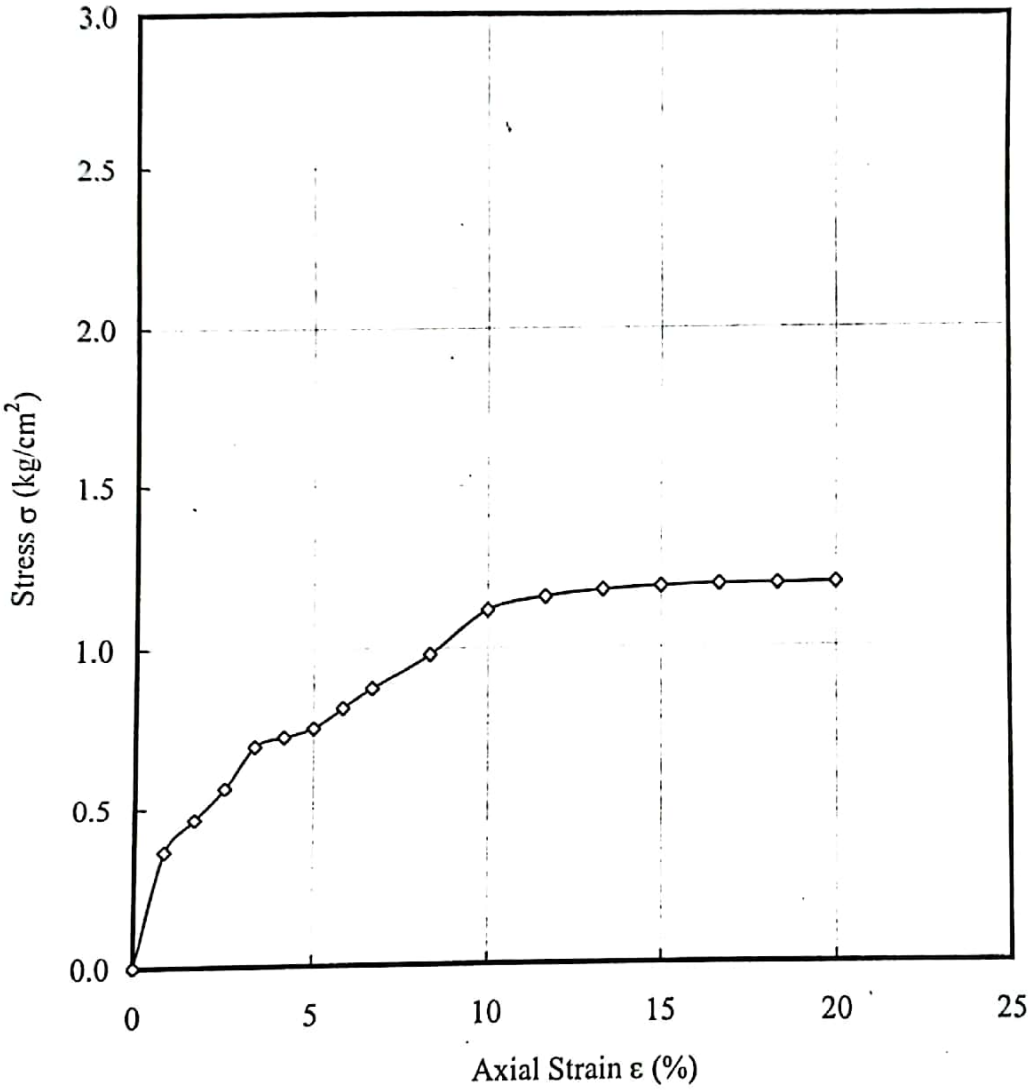
Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi

Bore Hole No: 02, Depth of Sample: 30ft



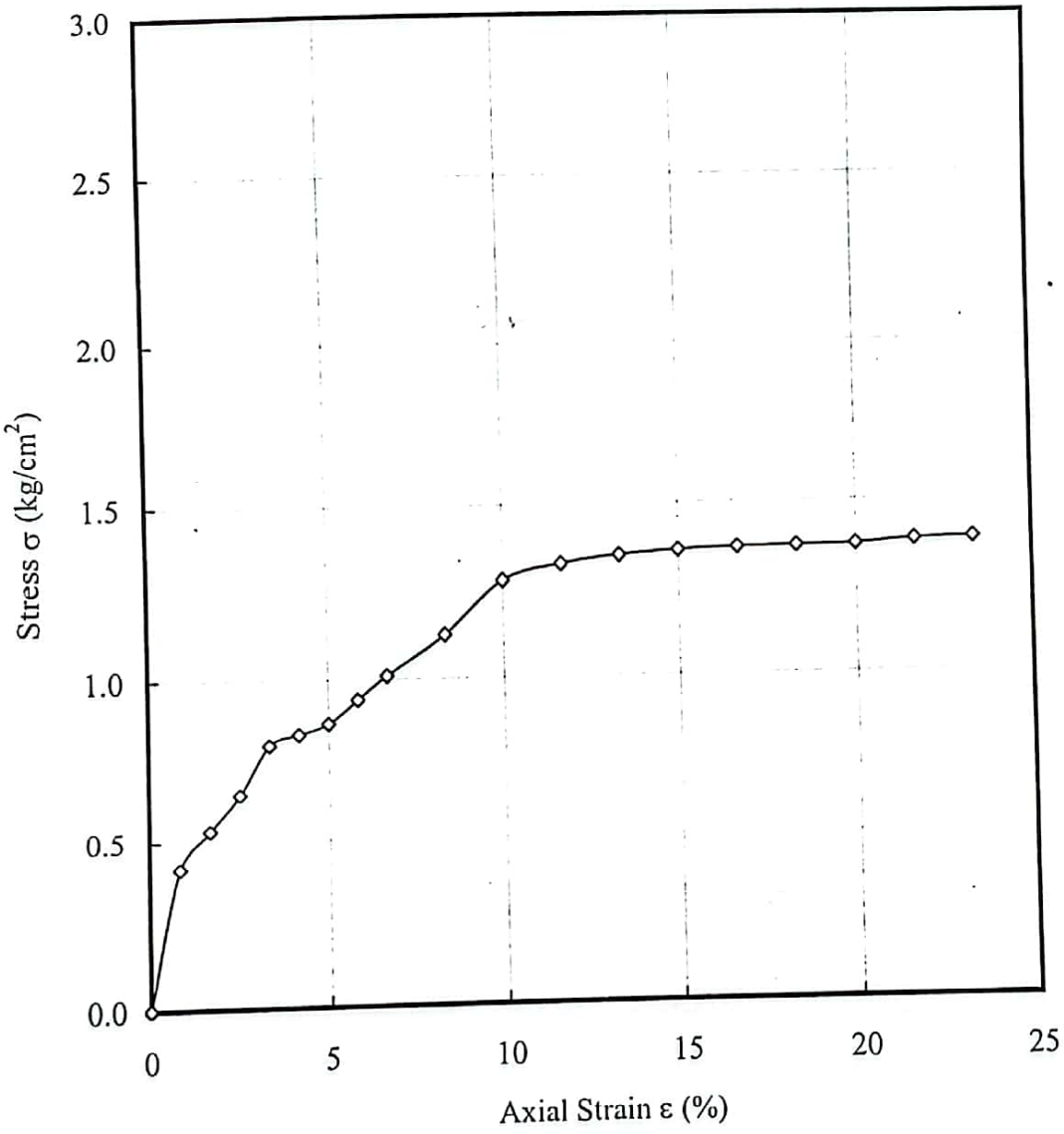
Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi

Bore Hole No: 02, Depth of Sample: 40ft

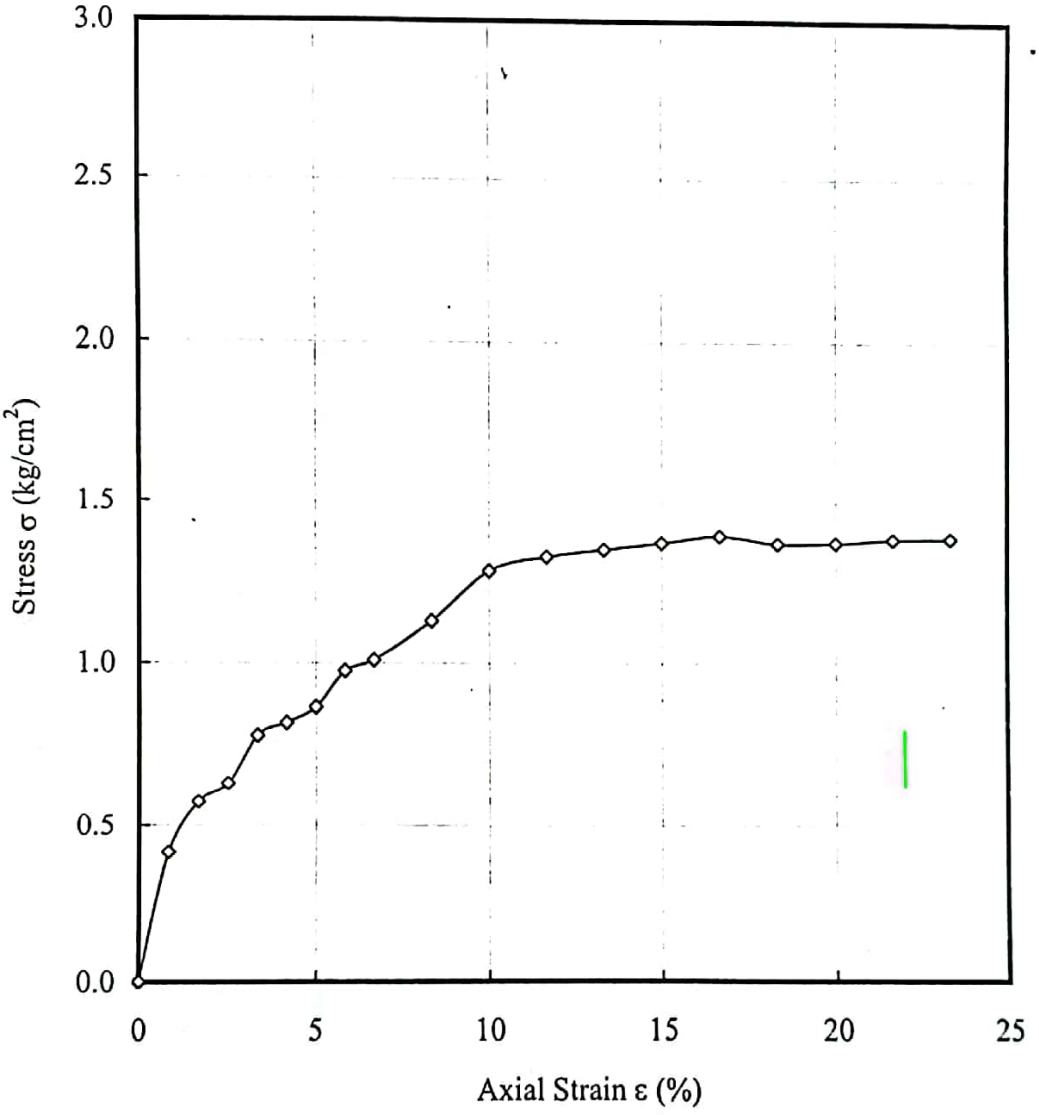


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 02, Depth of Sample: 50ft

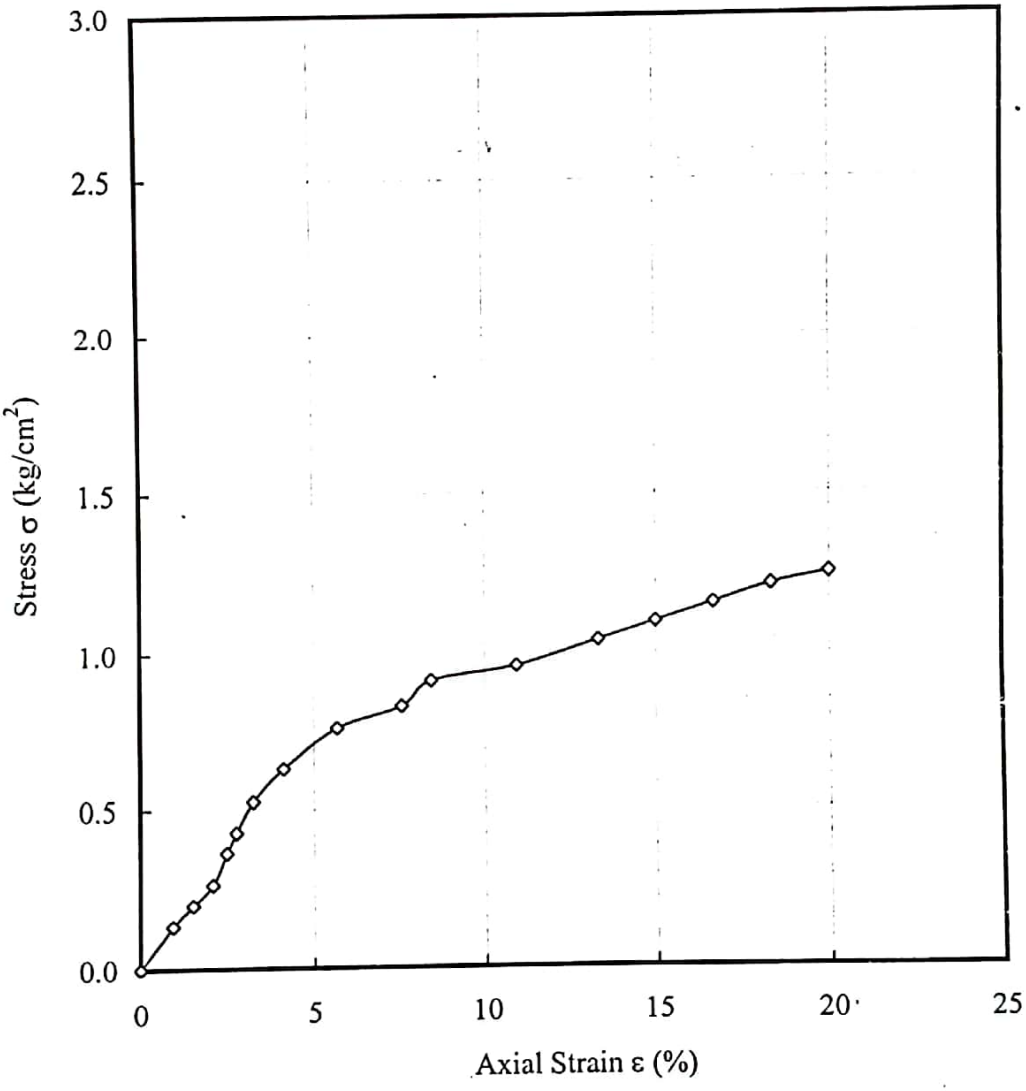


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 02, Depth of Sample: 60ft

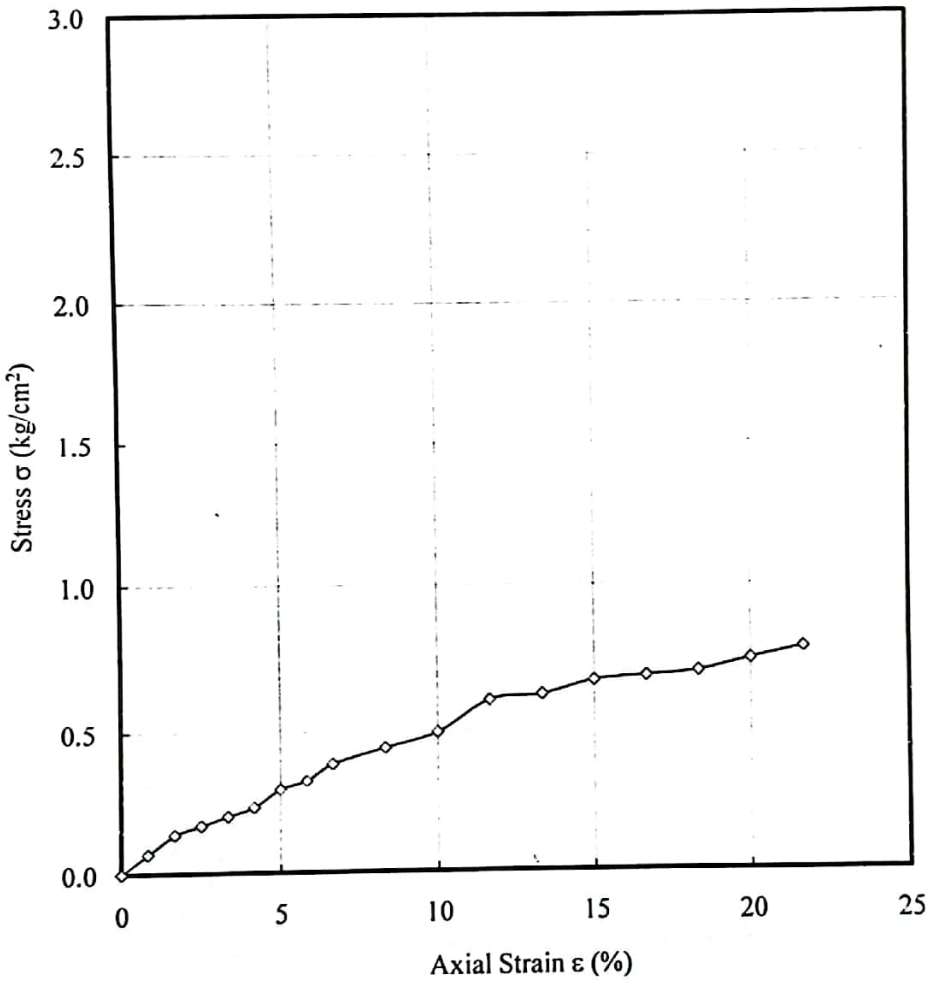


Testing Officer

Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 03, Depth of Sample: 15ft

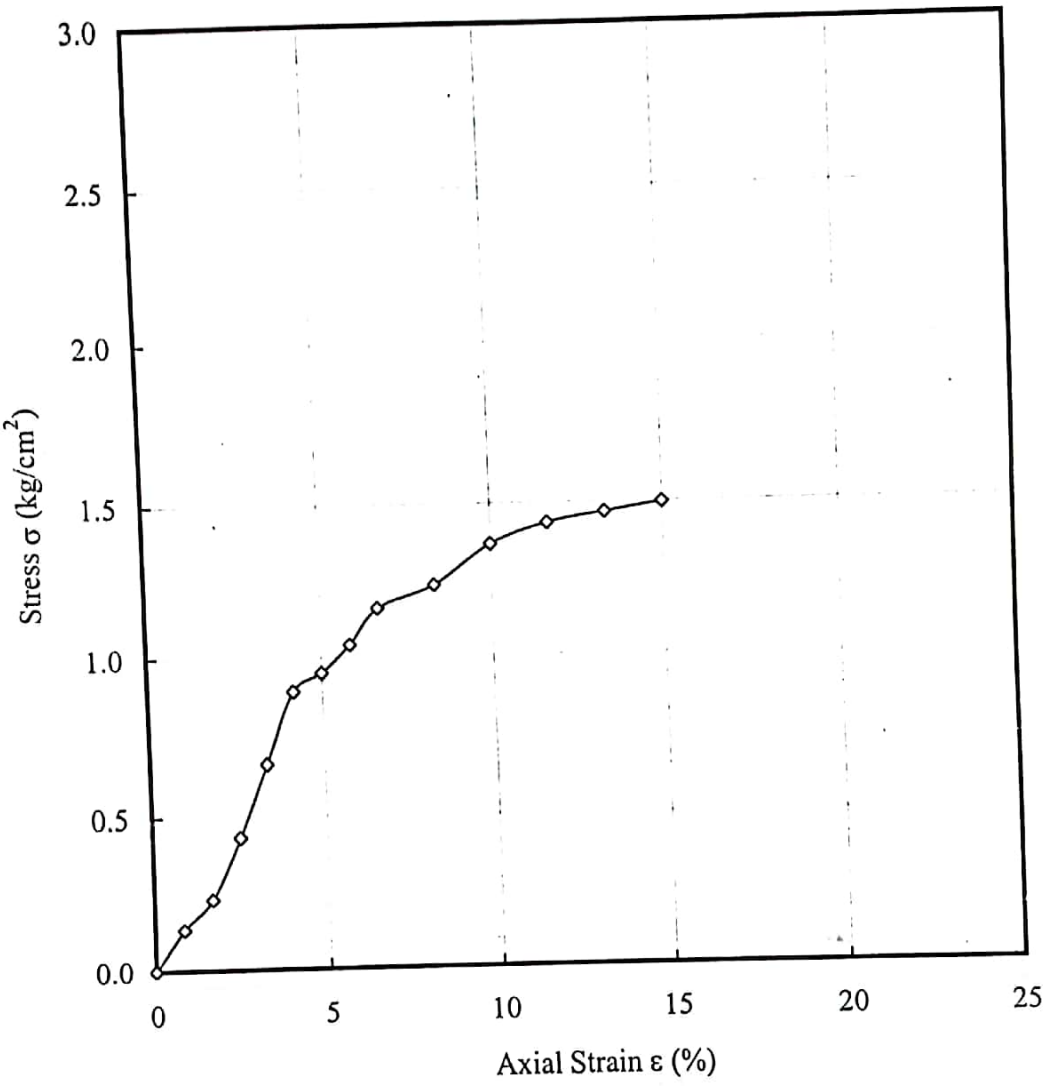


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 03, Depth of Sample: 20ft

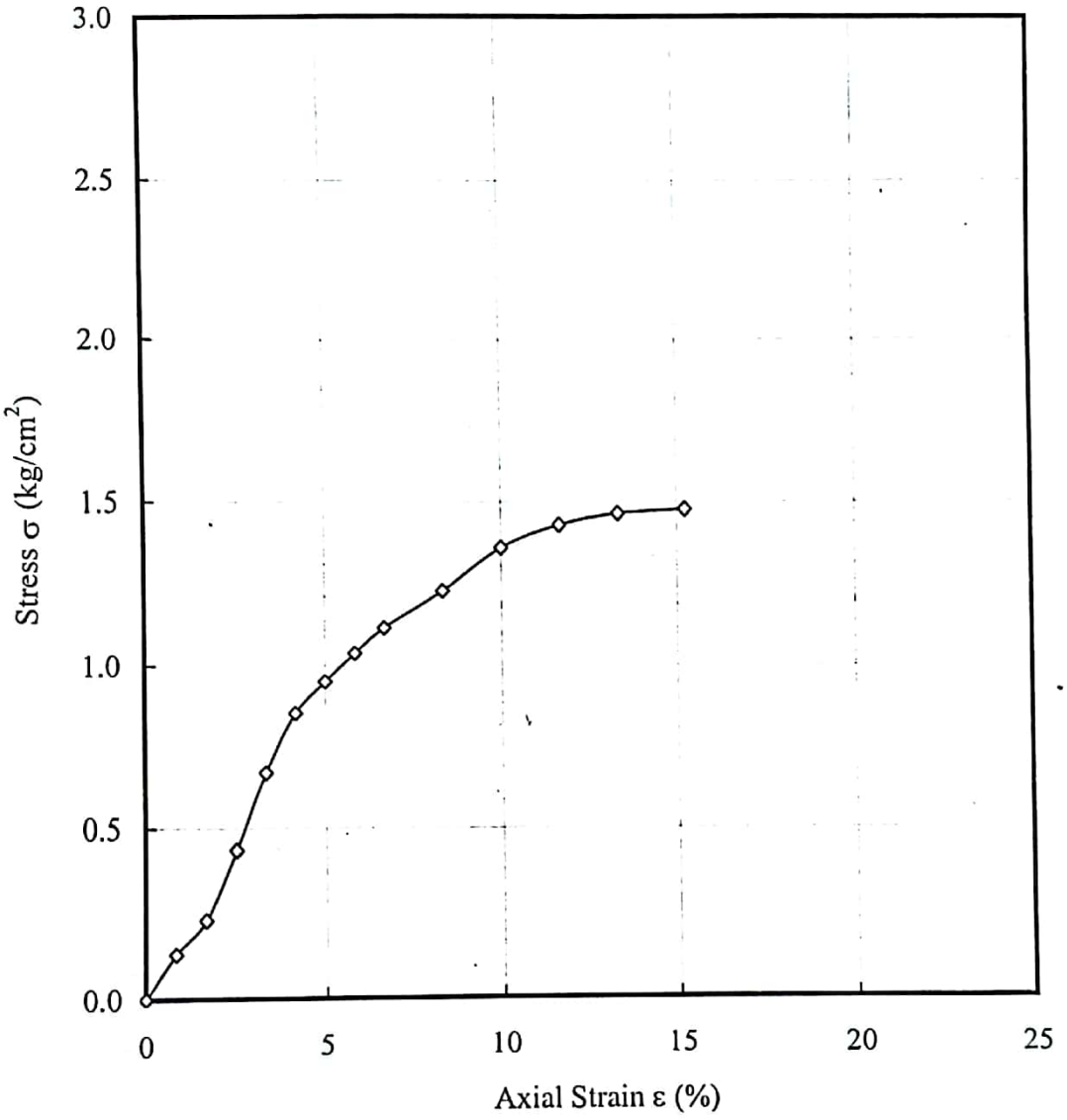


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 03, Depth of Sample: 30ft

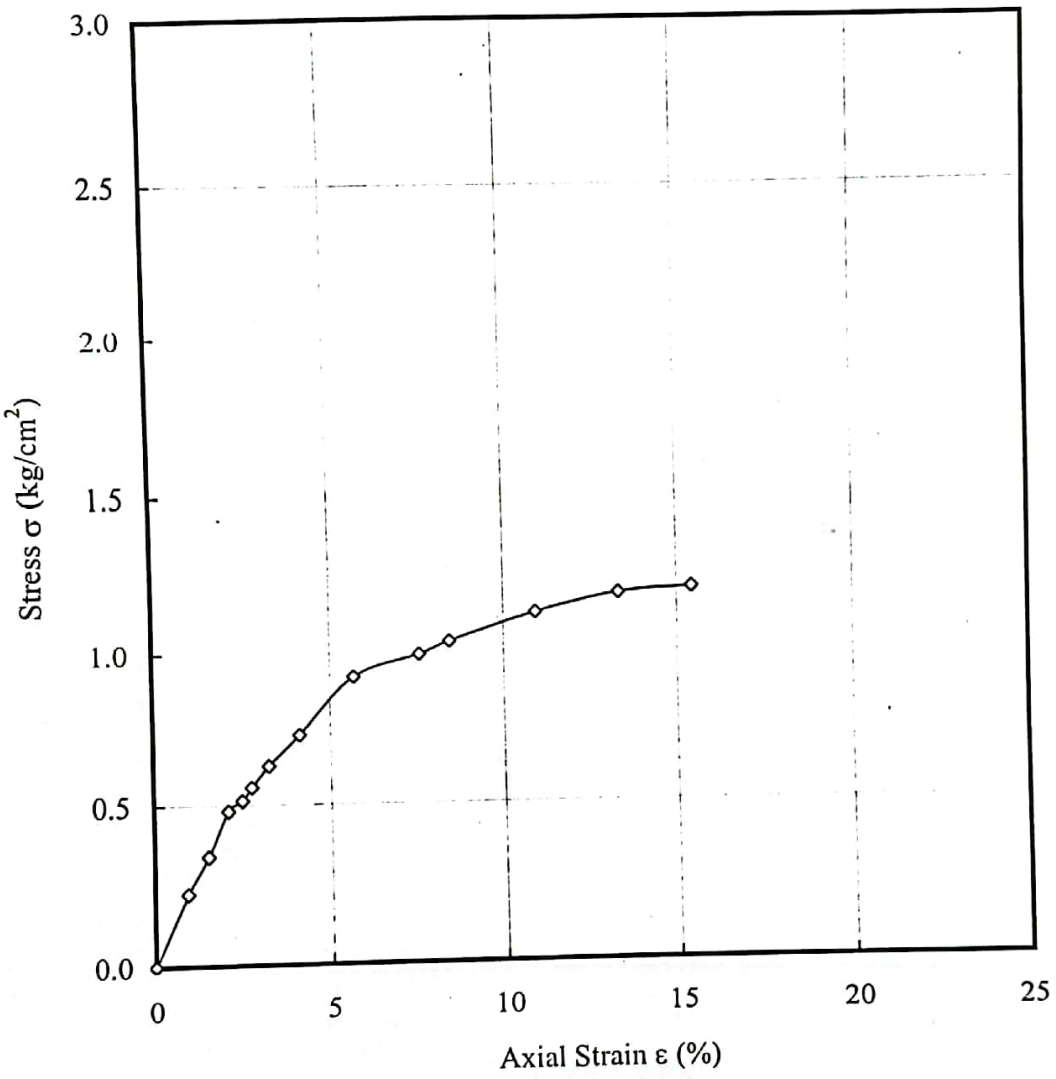


Testing Officer

Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 03, Depth of Sample: 40ft

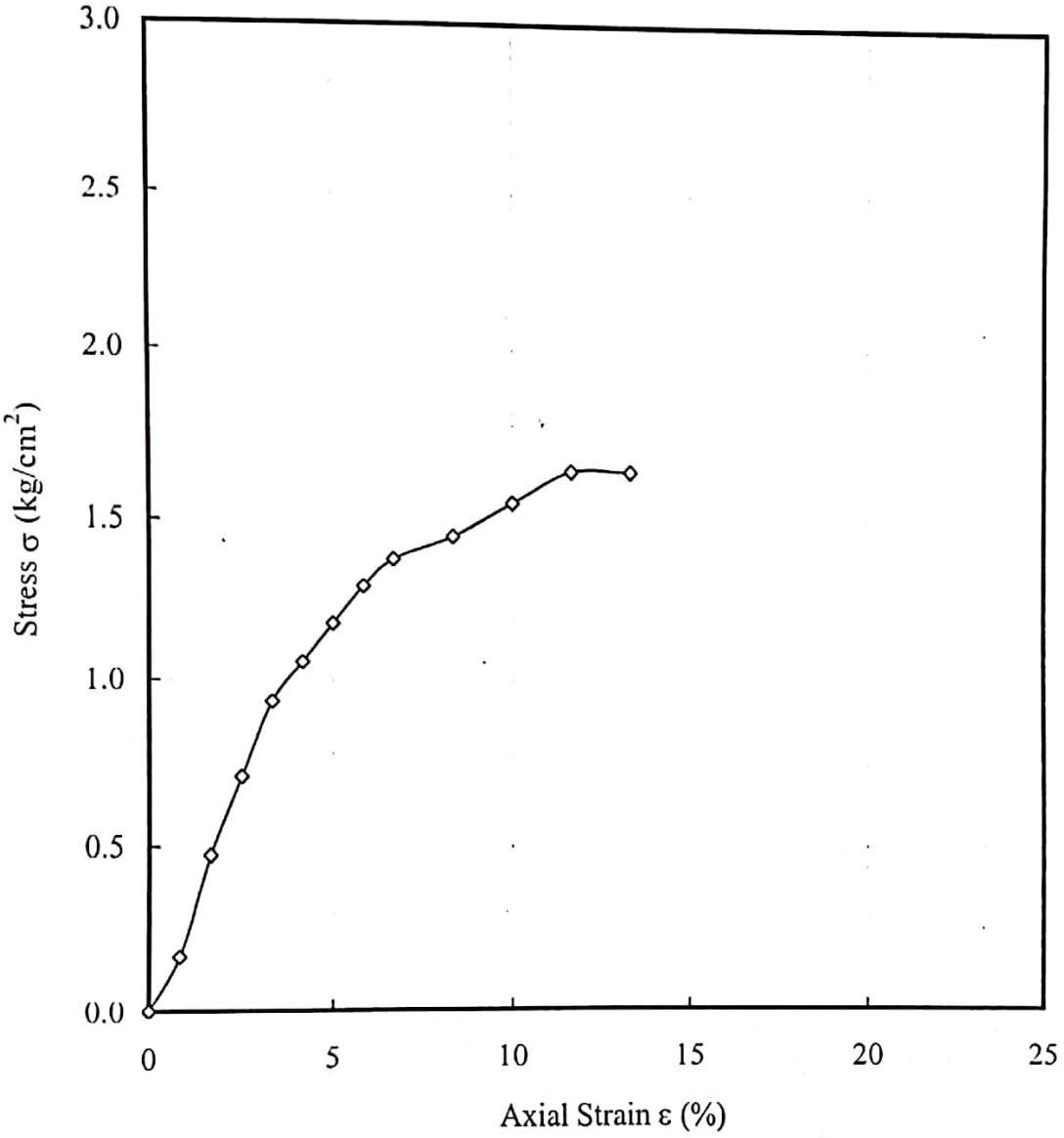


Testing Officer

Assistant Professor
Department of Civil Engineering
[illegible] University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 03, Depth of Sample: 60ft

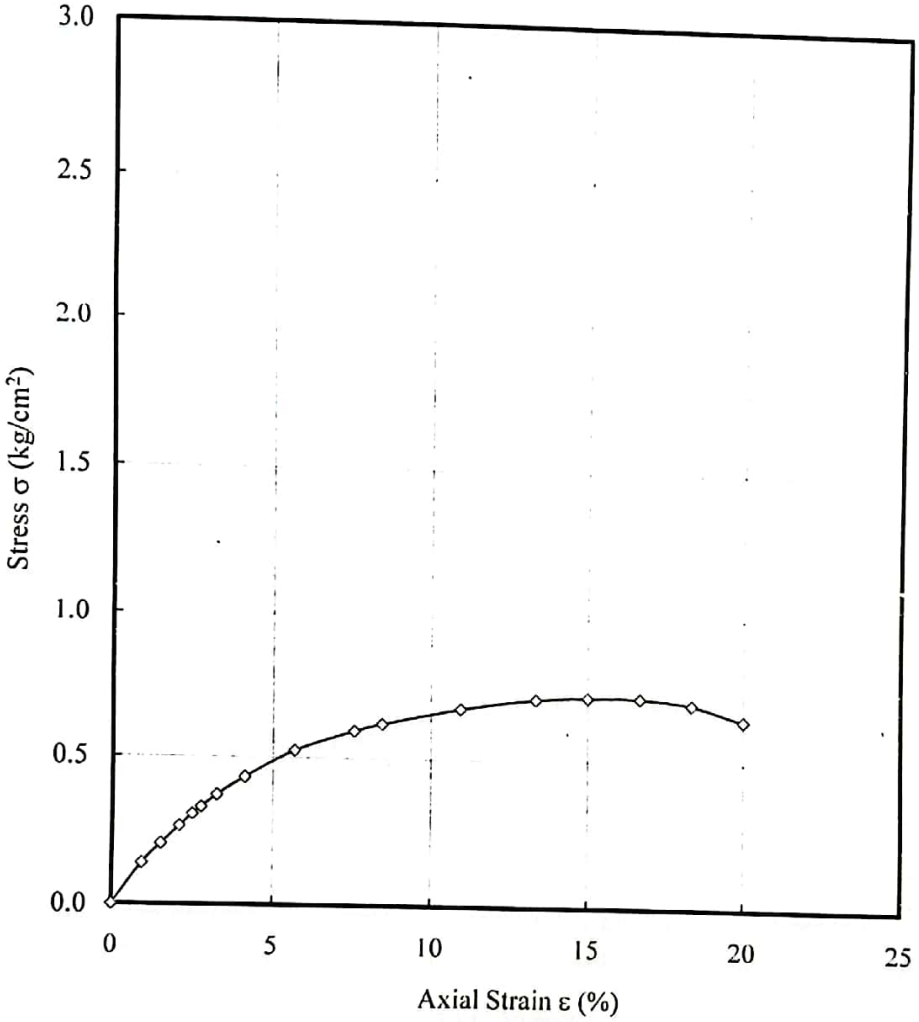


Testing Officer

Assistant Professor
Department of Civil Engineering
[illegible] University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 04, Depth of Sample: 10ft

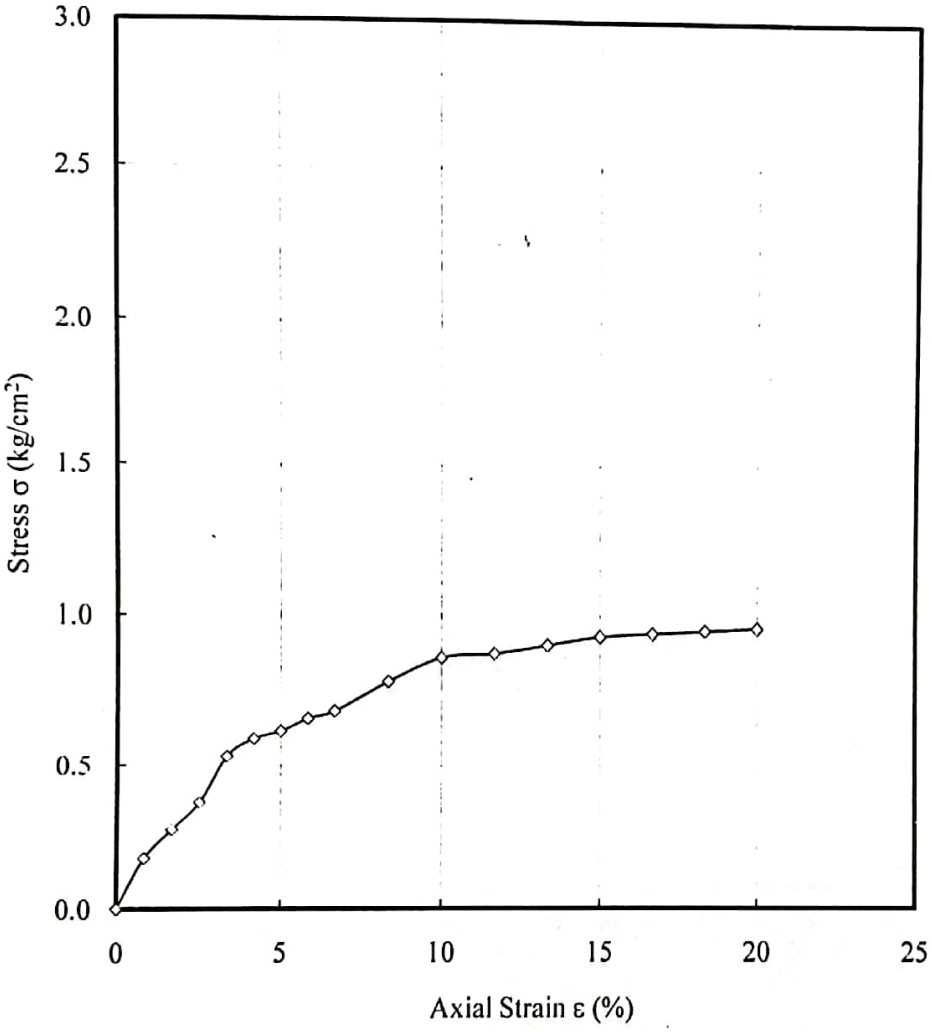


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 04, Depth of Sample: 20ft

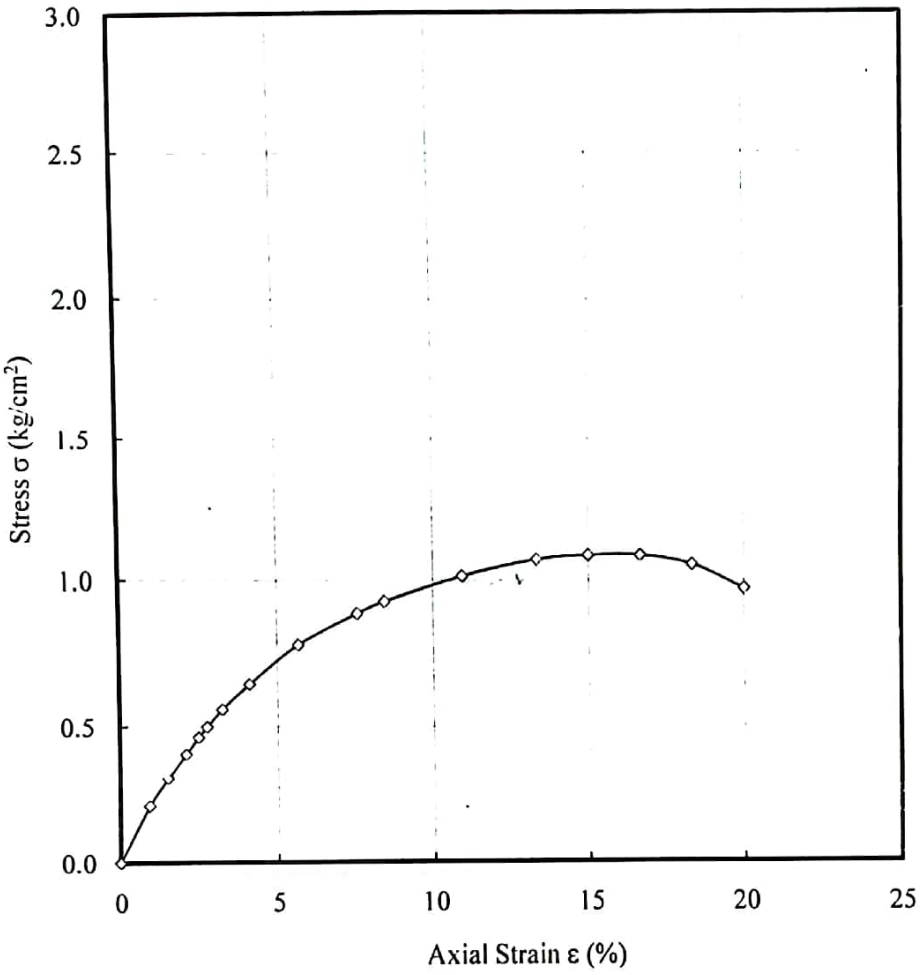


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 04, Depth of Sample: 30ft

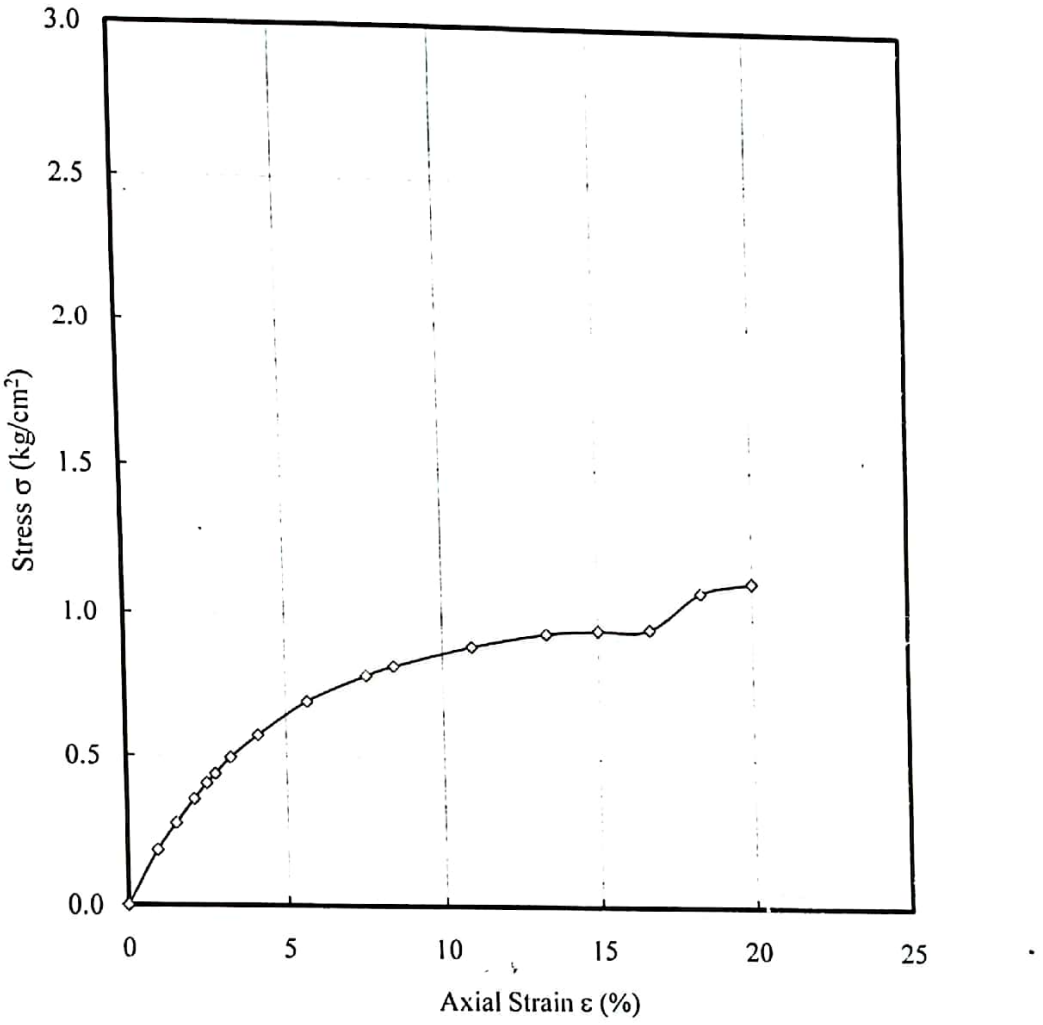


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 04, Depth of Sample: 40ft

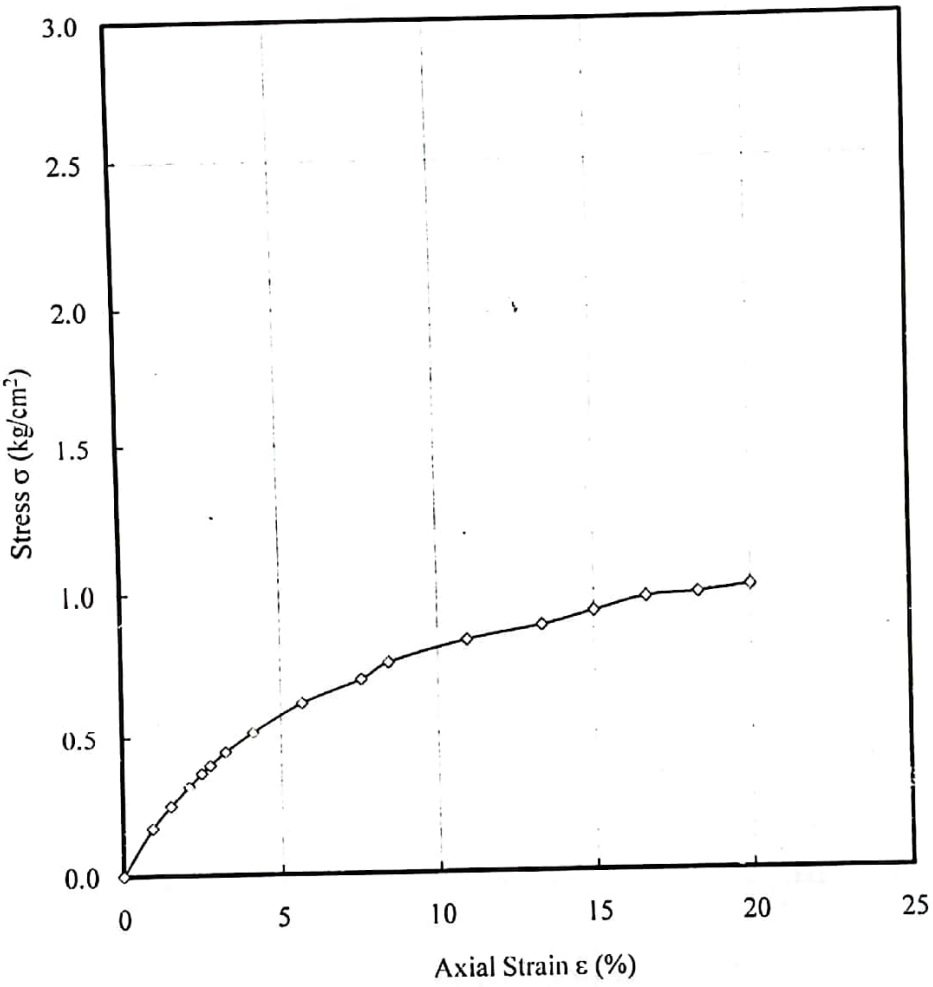


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 04, Depth of Sample: 50ft

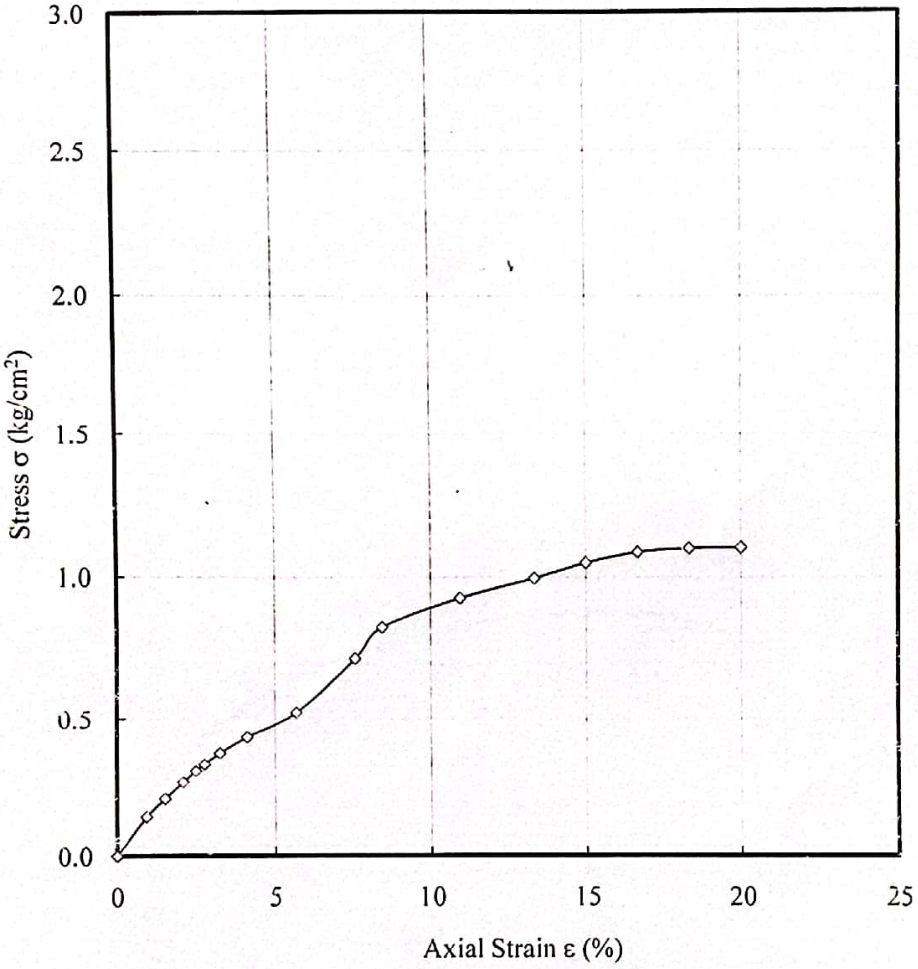


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project NameJamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 04, Depth of Sample: 60ft

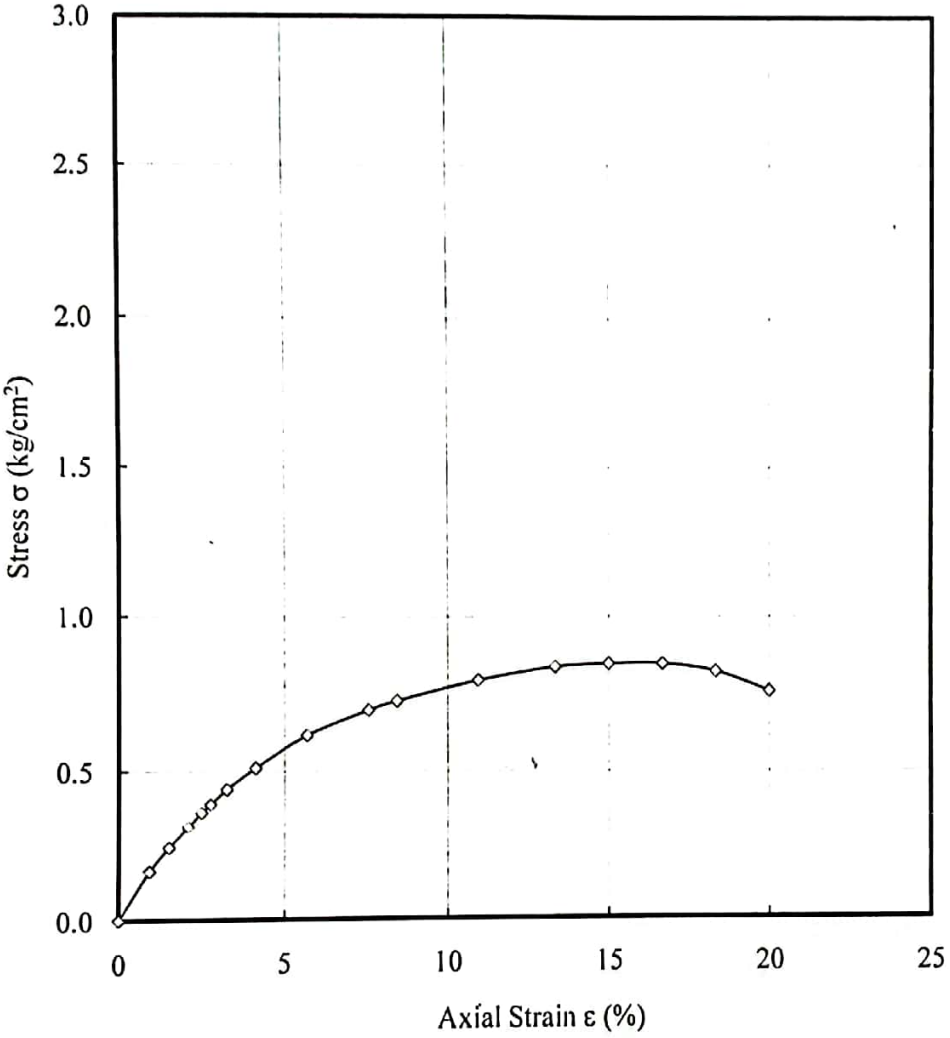


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 05, Depth of Sample: 30ft

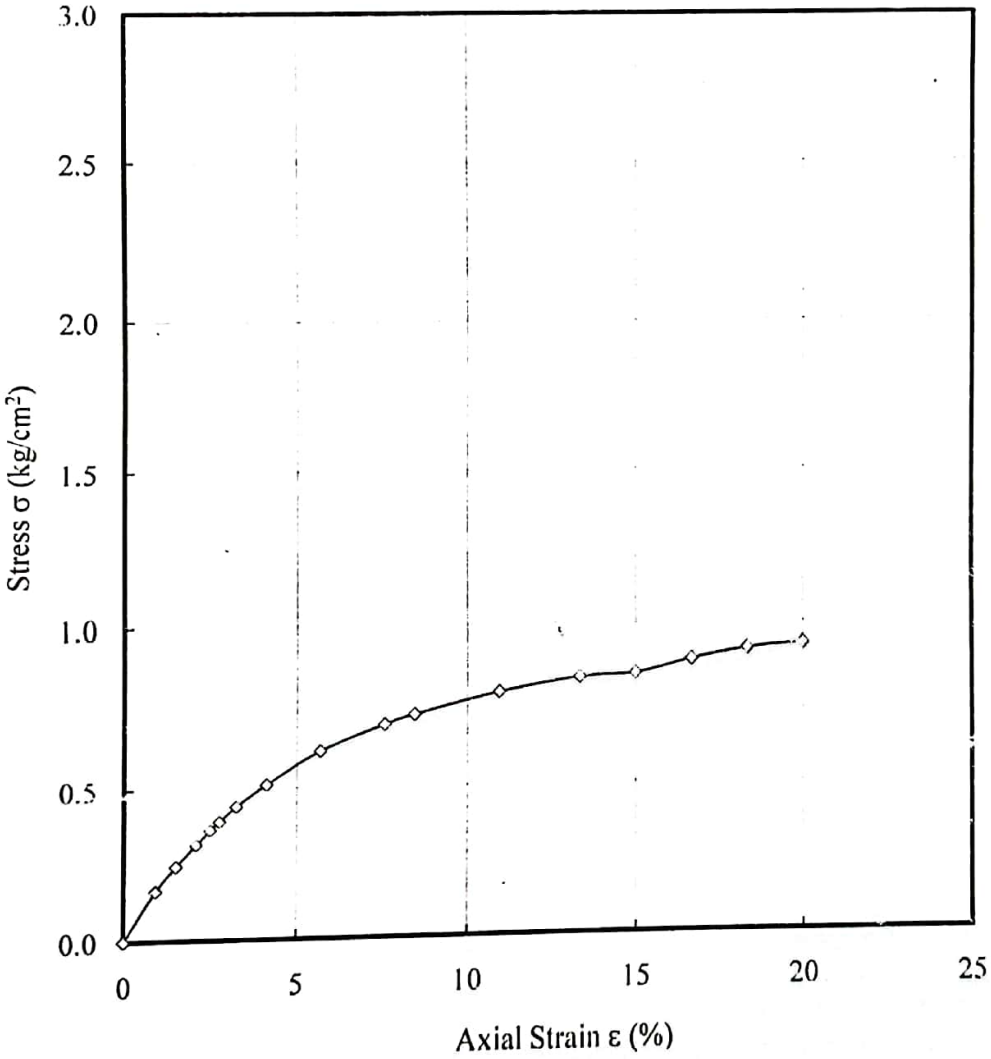


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 05, Depth of Sample: 50ft

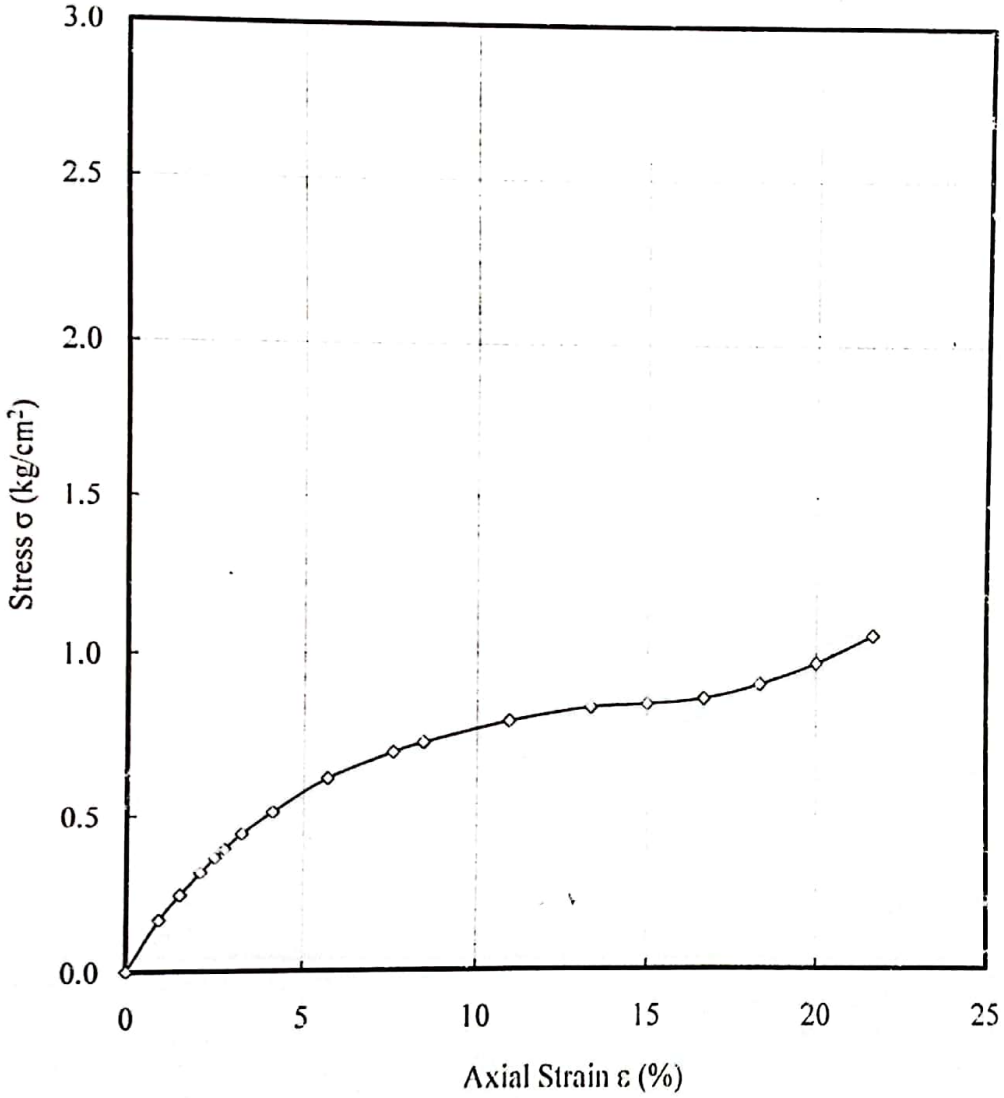


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 05, Depth of Sample: 60ft

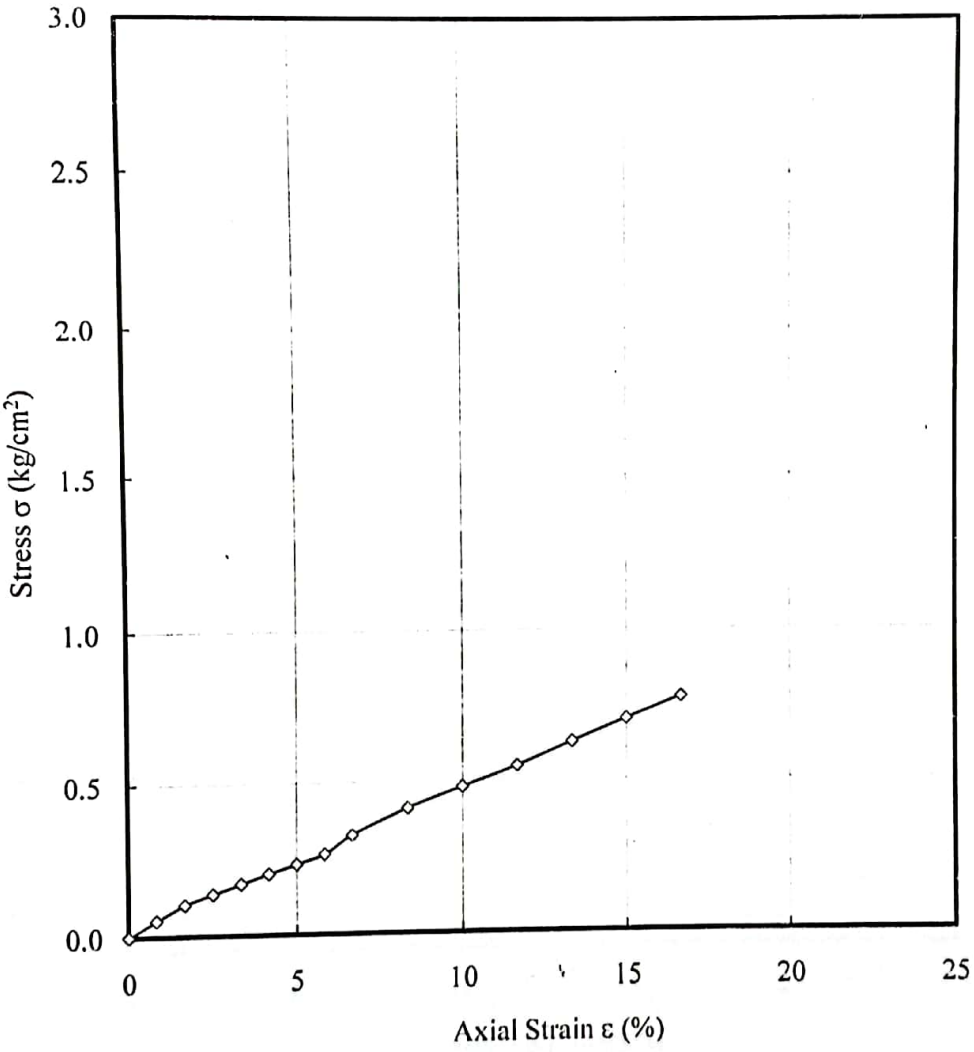


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 05, Depth of Sample: 70ft

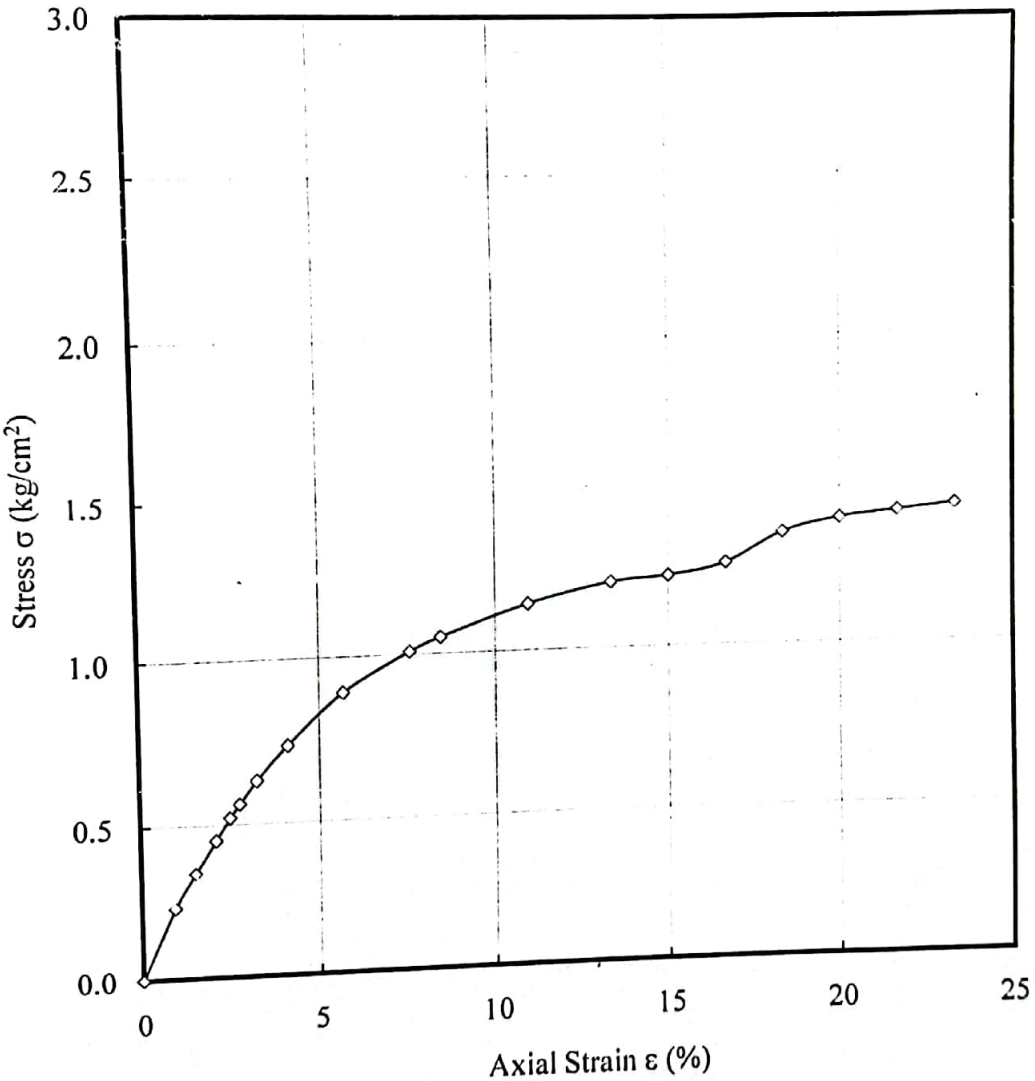


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 05, Depth of Sample: 80ft

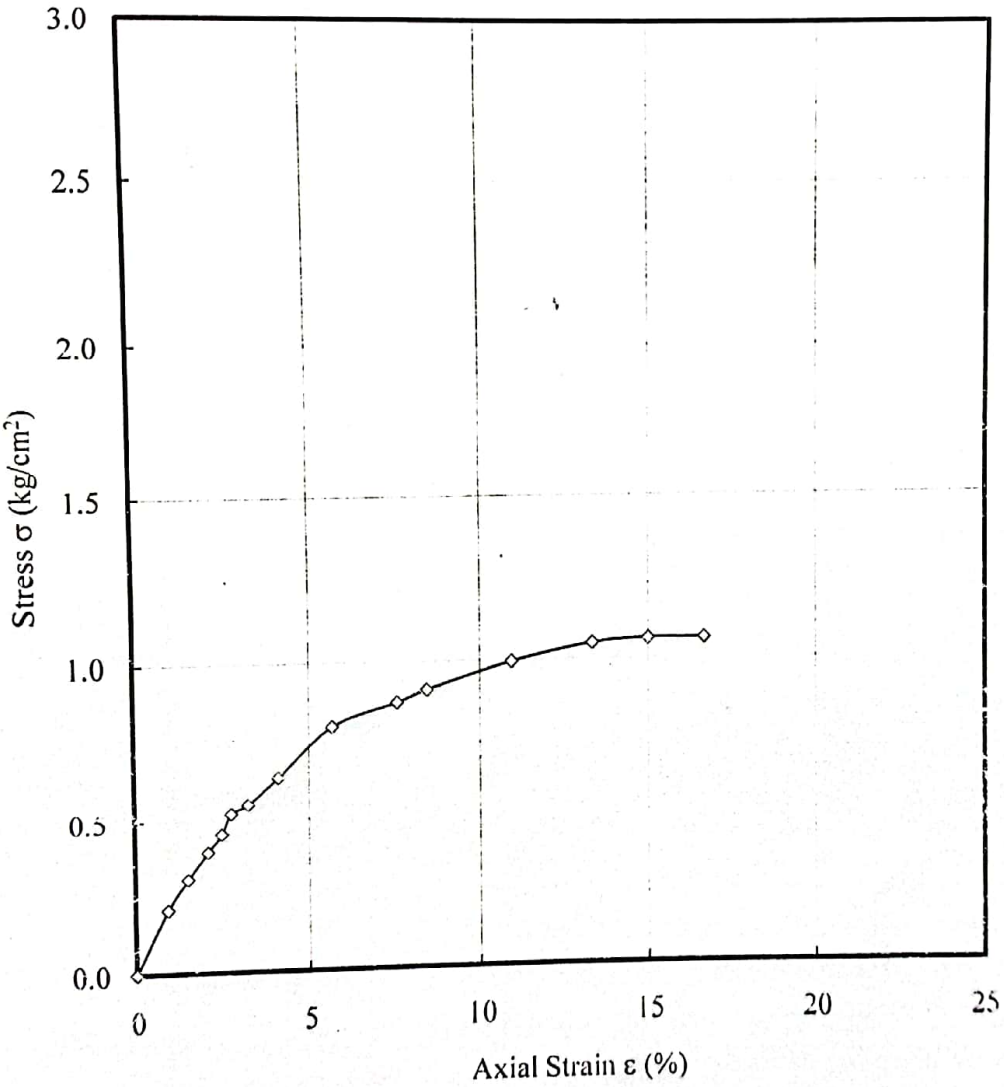


Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology

Unconfined Compression Test

Project Name: Jamia Usmania Husainabad (Bakhrabaj), Rajshahi
Bore Hole No: 05, Depth of Sample: 90ft



Testing Officer

Assistant Professor
Department of Civil Engineering
Rajshahi University of Engineering & Technology