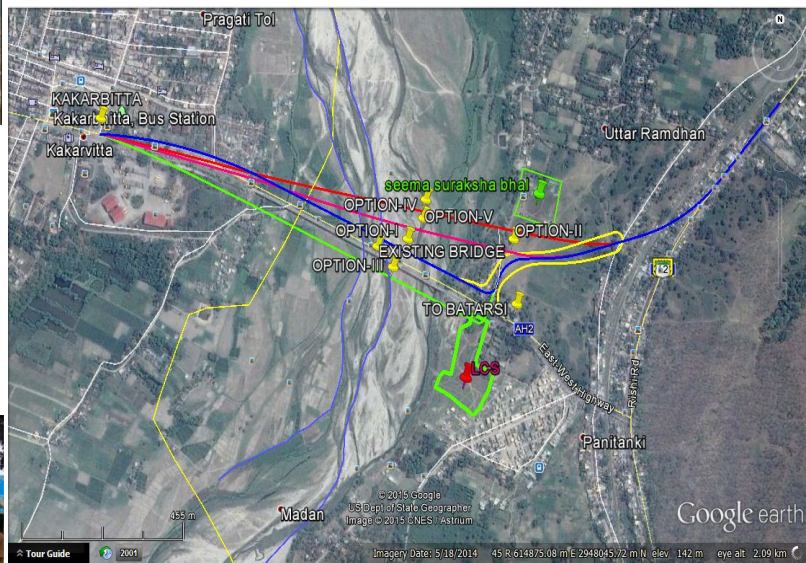


ADB TA No. 8116-IND
TA SUBPROJECT NO. 25
DETAILED DESIGN OF THE SASEC SUBREGIONAL
ROAD CONNECTIVITY PROJECT



Funded by:

Asian Development Bank

Implementation Agency:

Ministry of Road Transport and Highways
Government of India

DETAILED PROJECT REPORT FOR MECHI BRIDGE

**Volume-IV
Geotechnical Report**

Sheladia Associates Inc (ADB TA Consultant)



February 2016

A

REPORT ON

**GEOTECHNICAL INVESTIGATION FOR
PREPAIRING DPR FOR ADB TA No. 8116-IND:
TA SUB PROJECT No.25 - DETAILED DESIGN
OF THE SASEC SUB REGIONAL
CONNECTIVITY - REG.
MAJOR BRIDGE ACROSS MECHI RIVER**

For :

**THE GENERAL MANAGER
SHELADIA ASSOCIATES INC. USA
SECUNDERABAD**

By :

PNT DESIGNS PVT LTD.

A-229 (A), Road No.5, I.P.I.A., Jhalawar Road
KOTA-324005 (Raj.)

Mob.09929866699, 9414188818

**GEOTECHNICAL INVESTIGATION FOR PREPAIRING DPR FOR ADB TA No. 8116-
IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL
CONNECTIVITY - REG.**

MAJOR BRIDGE AT MECHE RIVER

ABSTRACT

The Vertical & Lateral safe load carrying capacity of the foundation of Major Bridge at Mechi River recommended as follows:

Location of Borehole	RL of BH (m)	Diameter of Pile (m)	Length of Pile below cut off (m)	Vertical Safe Load capacity	Lateral Safe Load capacity	Uplift load carrying capacity
BH-1 (A1)	128.707	1.50	18.0	850 ton	150.0 ton	60.0 ton
BH-2 (P1)	123.165	1.50	20.0	850 ton	150.0 ton	100.0 ton
BH-3 (P2)	121.388	1.50	20.0	850 ton	150.0 ton	100.0 ton
BH-4 (P3)	120.956	1.50	20.0	850 ton	150.0 ton	100.0 ton
BH-5 (P4)	120.950	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-6 (P5)	121.081	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-7 (P6)	121.632	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-8 (P7)	120.957	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-9 (P8)	120.564	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-10 (P9)	121.765	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-11 (P10)	121.973	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-12 (P11)	122.147	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-13 (P12)	122.120	1.50	20.0	850 ton	150.0 ton	100.0 ton
BH-14 (P13)	122.769	1.50	20.0	850 ton	150.0 ton	100.0 ton
BH-15 (P14)	122.670	1.50	20.0	850 ton	150.0 ton	100.0 ton
BH-16 (A2)	128.542	1.50	18.0	850 ton	150.0 ton	60.0 ton

Note : The casing was required upto almost full depth of exploration. Therefore, construction of pile casing shall be required upto full length of the pile.

MAJOR BRIDGE AT MECHE RIVER
THE STRATA AT GLANCE AND SILT FACTOR

Borehole No.	Type of strata	Depth	Silt Factor,
1	2	3	4
BH-1 (A1)	Silty Sand (SM) mixed with Gravels	0.00-3.00m	2.35-2.64
	Boulders	3.00-4.50m	--
	Sandy Silt	4.50-6.00m	0.59
	Gravelly Sand	6.00-24.00m	--
	Silty Sand (SM)	24.00-27.00m	2.09
	Gravelly Sand / Boulders	27.00-42.30m	--
BH-2 (P1)	Silty Sand (SM) mixed with Gravels	0.00-15.00m	2.45-2.94
BH-3 (P2)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	3.01
	Gravelly Sand	1.50-4.50m	2.33-2.65
	Boulders	4.50-6.00m	--
	Gravelly Sand	6.00-21.00m	2.68
	Sandy Silt	21.00-24.00m	--
	Gravelly Sand	24.00-38.00m	--
BH-4 (P3)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.86
	Silty Sand (SM)	1.50-7.50m	0.61-1.80
	Gravelly Sand	7.50-18.00m	3.43
	Fine Sand	18.00-21.00m	1.77
	Gravelly Sand	21.00-30.00m	3.68
BH-5 (P4)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.98

Borehole No.	Type of strata	Depth	Silt Factor,
1	2	3	4
	Sandy Gravels	1.50-4.50m	4.57-4.78
	Sandy Silt	4.50-6.00m	0.98
	Fine Sand	6.00-7.50m	1.47
	Silty Sand (SM)	7.50-9.00m	0.96
	Fine Sand	9.00-21.00m	1.83-1.85
	Sandy Gravels	21.00-27.00m	5.72
	Gravelly Sand	27.00-30.00m	3.07
BH-6 (P5)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.71
	Boulders	1.50-3.00m	--
	Fine Sand	3.00-6.00m	1.24
	Silty Sand (SM)	6.00-9.00m	1.01
	Sandy Silt	9.00-15.00m	1.61
	Gravelly Sand / Boulders	15.00-36.00m	--
BH-7 (P6)	Silty Sand (SM) mixed with Gravels	0.00-3.00m	2.85
	Silty Sand (SM)	3.00-7.50m	0.73-0.97
	Gravelly Sand	7.50-9.00m	2.49
	Sandy Silt	9.00-12.00m	0.58
	Silty Sand (SM)	12.00-15.00m	1.18
	Sandy Silt	15.00-18.00m	0.76
	Silty Sand (SM)	18.00-21.00m	1.11
	Gravelly Sand mixed Boulders	21.00-36.00m	--
BH-8 (P7)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.40

Borehole No.	Type of strata	Depth	Silt Factor,
1	2	3	4
	Gravelly Sand	1.50-6.00m	3.58-3.68
	Silty Sand (SM)	6.00-21.00m	0.79-1.47
	Fine Sand	21.00-30.00m	1.37
BH-9 (P8)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.82
	Gravelly Sand	1.50-6.00m	3.92
	Silty Sand	6.00-9.00m	1.10
	Sandy Silt	9.00-15.00m	0.66
	Silty Sand	15.00-21.00m	1.23
	Sandy Silt	21.00-24.00m	0.76
	Silty Sand	24.00-36.00m	0.97-1.05
BH-10 (P9)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.87
	Coarser Sand	1.50m-4.50m	2.94
	Gravelly Sand	4.50-7.50m	2.92
	Fine Sand	7.50-9.00m	1.94
	Silty Sand	9.00-15.00m	0.89
	Sandy Silt	15.00-21.00m	0.45
	Silty Sand	21.00-24.00m	0.85
	Sandy Silt	24.00-30.00m	0.75
	Gravel / Boulders	30.00-36.00m	--
BH-11 (P10)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.92
	Sandy Gravels	1.50-3.00m	5.42

Borehole No.	Type of strata	Depth	Silt Factor,
1	2	3	4
	Boulders	3.00-4.50m	--
	Silty Gravels (GM) mixed with Sand	4.50-6.00m	4.24
	Sandy Silt	6.00-7.50m	0.84
	Gravels /Boulders	7.50-12.00m	--
	Fine Sand	12.00-15.00m	1.11
	Silty Sand	15.00-21.00m	1.17
	Gravels / Boulders	21.00-24.00m	--
	Silty Sand	24.00-30.00m	1.95-2.21
	Fine Sand	30.00-36.00m	1.50
BH-12 (P11)	Gravelly Sand	0.00-4.50m	2.80-3.78
	Fine Sand	4.50-18.00m	1.01-1.27
	Gravelly Sand	18.00-27.00m	3.81
	Silty Sand (SM)	27.00-39.30m	1.28
BH-13 (P12)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.97
	Fine Sand	1.50-3.00m	0.96
	Gravel / Boulders	3.00-4.50m	Non Erodible
	Sandy Gravels	4.50-6.00m	4.07
	Fine Sand	6.00-9.00m	1.75
	Gravelly Sand	9.00-12.00m	2.30
	Fine Sand	12.00-36.30m	1.18-1.89
BH-14 (P13)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.59
	Fine Sand	1.50-3.00m	1.05
	Gravel / Boulders	3.00-4.50m	--

Borehole No.	Type of strata	Depth	Silt Factor,
1	2	3	4
	Sandy Gravels	4.50-6.00m	4.40
	Sandy Silt	6.00-7.50m	1.35
	Fine Sand	7.50-12.00m	1.71
	Sandy Gravels	12.00-15.00m	5.42
	Sandy Silt	15.00-18.00m	1.98
	Gravelly Sand	18.00-21.00m	3.09
	Gravel / Boulders	21.00-24.00m	--
	Fine Sand	24.00-36.00m	1.00-1.09
BH-15 (P14)	Silty Sand (SM) mixed with Gravels	0.00-7.50m	2.88-3.24
	Sandy Silt	7.50-9.00m	1.09
	Fine Sand	9.00-12.00m	1.91
	Gravels/ Boulders	12.00-15.00m	--
	Sandy Silt mixed with Gravels	15.00-21.00m	3.11
	Gravels/ Boulders	21.00-24.00m	--
	Fine Sand	24.00-36.00m	1.53-1.85
BH-16 (A2)	Highly Weathered Rock (Bouldery Strata)	0.00-6.00m	--
	Silty Sand (SM) mixed with Gravels	6.00-9.00m	3.36
	Gravels/ Boulders	9.00-15.00m	--
	Gravelly Sand	15.00-18.00m	2.86
	Silty Sand (SM)	18.00-24.00m	1.29
	Gravels/ Boulders	24.00-39.00m	--

CONTENTS

S. No.	TOPIC	PAGE NO.
1.0	INTRODUCTION	1
2.0	SCOPE OF WORK	1
3.0	FIELD INVESTIGATION	2
4.0	LABORATORY INVESTIGATION	4
5.0	INTERPRETATION OF TEST RESULTS	4
6.0	SILT FACTOR	9
7.0	STRATA AT A GLANCE	10
8.0	CALCULATION OF ALLOWABLE BEARING PRESSURE	15
9.0	CONCLUSION & RECOMMENDATION	15
	REFERENCES	17
	APPENDIX-A1 to A16 & B1 to B16	
	TABLES	
	PARTICLE SIZE ANALYSIS	
	SITE PLAN	

1.0 INTRODUCTION

It is proposed to carry out Geotechnical Investigation for the Construction of Major Bridge across Mechi River AT CH-00+884. The site plan is shown in Fig.1.

The Schedule of work and the locations of bore holes were decided by Engineer In-charge. The details are given in the following sections.

2.0 SCOPE OF WORK

Geotechnical investigation was planned for :-

S.No	Description of Item
1	Mobilization and demobilization of Standard drilling Rigs (four Nos.) , temporary platforms Or floatation barge of safe and suitable make (for location of BHs in case falling in water condition) to the Project site including all tools / equipments, materials, trained man-power and a qualified Geologist / geotechnical Engineer to carry out the Geotechnical Investigation (GI) works as per IS,/ IRC specifications all complete.
2.	Setting-up of rigs at planned locations, drilling / boring of 150mm nominal diameter boreholes in all type of soil strata, collection of disturbed and undisturbed samples at regular interval and conducting SPTs as per IS / IRC procedures. Recording of Ground Water Table, collection of ground water samples from each BH, storing of all soil and water samples with proper Identification tags including preparation of Field-Logs and carrying out all relevant laboratory Tests on soil / water samples collected as per the standards and instruction by the Engineer's representative all complete for depths below Bed Level / Existing Ground Level.
	(a). From Bed / Ground Level to 20m depths.
	(b). From 20m to 40m depths

S.No	Description of Item
	(c). From 40m to 50m depths
3.	The same as above under Item No. 2) but in Soil strata (both Cohesive or Cohesion less including gravels and boulders) having SPT "N">100 but CR<10%
4.	Same as under Item No. 2 above but drilling / coring in Rock Stratum (CR is greater than10%) using NX Size double tube core-cutter fitted with Diamond drill-bits of standard make at all depths, collection of rock-core samples in wooden boxes with proper Identification markings, conducting relevant laboratory tests on core samples as per technical specification and IRC / IS specifications and as per instruction by the Engineer all complete.
5.	Arranging Floating Platform for Setting of Drilling Machine at Water location :
	a) Stagnant water above 1.0m
	b) Stagnant water above 1.5m
	c) Stagnant water above 2.0m
6.	Submission of Report compiling results of all the Field and Laboratory Tests on soil, water and rock strata investigated for all the locations, Geotechnical assessment and recommendation for foundations of the Structures / High embankment all complete within schedule.
7.	Wooden core box with lid for core sample collection.

Accordingly, Sixteen boreholes were performed at the proposed locations. Soil/ rocks samples were collected for further testing in the laboratory.

3.0 FIELD INVESTIGATION

3.1 Boring

Sixteen bore holes (i.e. BH-1(A1), BH-2(P1), BH-3(P2), BH-4(P3), BH-5(P4), BH-6(P5), BH-7(P6), BH-8(P7), BH-9(P8), BH-10(P9), BH-11(P10), BH-12(P11), BH-13(P12), BH-14(P13), BH-15(P14) & BH-16(A2)) were made at the location as shown in Fig.1. Boring was made by

power driven rig up to the maximum depth of exploration i.e. 42.30m, 15.00m, 38.00m, 30.00m, 30.00m, 36.00m, 36.00m, 30.00m, 36.00m, 36.00m, 36.00m, 39.30m, 36.30m, 36.00m, 36.00m & 39.00m at BH-1(A1), BH-2(P1), BH-3(P2), BH-4(P3), BH-5(P4), BH-6(P5), BH-7(P6), BH-8(P7), BH-9(P8), BH-10(P9), BH-11(P10), BH-12(P11), BH-13(P12), BH-14(P13), BH-15(P14) & BH-16(A2)) respectively. The soil/rock samples were collected as required for laboratory testing.

3.2 Standard Penetration Test (SPT)

Standard penetration tests (SPT) were conducted in the bore holes as per IS 2131-1981. The numbers of blows for first 15 cm penetration are considered as seating drive and are not taken into account. The number of blows required for last 30 cm penetration is taken as SPT number (“N” values). If number of blows for last 30 cm penetration exceeds 100, it is said to be the refusal. SPT Test was conducted at regular interval of 1.5m. Tests results are shown in Table:1-16.

3.3 Water Table

The water table was observed at the depth of 8.00m at BH-1(A1), 2.00m at BH-2(P1), 1.00m at BH-3(P2), 0.60m at BH-4(P3) & BH-5(P4), 0.50m at BH-6(P5), BH-7(P6) & BH-8(P7), 0.00m at BH-9(P8), 1.50m at BH-10(P9), BH-11(P10), BH-12(P11) & BH-11(P12), 2.00m at BH-14(P13) & BH-15(P14) and 2.50m at BH-16(A2) at the time of investigation (Nov.’2015 – Dec.’2015).

4.0 LABORATORY INVESTIGATION

The following laboratory tests were conducted on soil & rock samples obtained from test bore holes:

A. Soil

- a. Natural Moisture Content
- b. Specific gravity
- c. Sieve & Hydrometer analysis
- d. Liquid Limit, Plastic Limit, Shrinkage Limit
- e. Bulk/ Dry Density & Differential Free Swell
- f. c-Ø Analysis
- g. Unconfined Compressive Strength (UCS Test)

B. Rock

- a) Uniaxial Compressive strength
- b) Water absorption
- c) Specific gravity
- d) Density

The samples were identified and classified as per IS: 1498-1970. The tests of samples were conducted as per relevant Indian Standard Codes of Practice and tests results are shown in Table: 1-16.

5.0 INTERPRETATION OF TEST RESULTS

5.1 Strata at the Site

BH-1(A1) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 3.00m. It is followed by Boulders upto the depth of 4.50m & Sandy Silt upto the depth of 6.00m. Below this, Gravelly Sand was found upto the depth of 24.00m. It is followed by Silty Sand

(SM) upto the depth of 27.00m. Beyond this, Gravelly Sand / Boulders was found upto the depth of exploration i.e. 42.30m. The bore log is shown in Table-1.

BH-2(P1) : The strata at the site mainly consists of Silty Sand (SM) mixed with Gravels up to the depth of exploration i.e. 15.00m. The bore log is shown in Table-2.

BH-3(P2) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 1.50m. It is followed by Gravelly Sand upto the depth of 4.50m & Boulders upto the depth of 6.00m. Below this, Gravelly Sand was found upto the depth of 21.00m. It is followed by Sandy Silt upto the depth of 24.00m. Beyond this, Gravelly Sand was found upto the depth of exploration i.e. 38.00m. The bore log is shown in Table-3.

BH-4(P3) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 1.50m. It is followed by Silty Sand (SM) upto the depth of 7.50m. Below this, Gravelly Sand was found upto the depth of 18.00m. It is followed by fine Sand upto the depth of 21.00m. Beyond this, Gravelly Sand was found upto the depth of exploration i.e. 30.00m. The bore log is shown in Table-4.

BH-5(P4) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 1.50m. It is followed by Sandy Gravels upto the depth of 4.50m & Sandy Silt upto the depth of 6.00m. Below this, Fine Sand was found upto the depth of 7.50m. It is followed by Silty Sand (SM) upto the depth of 9.00m & Fine Sand upto the depth of 21.00m. Beyond this, Sandy Gravels was found upto the depth of 27.00m. It is

followed by Gravelly Sand upto the depth of exploration i.e. 30.00m. The bore log is shown in Table-5.

BH-6(P5) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 1.50m. It is followed by Boulders upto the depth of 3.00m & Fine Sand upto the depth of 6.00m. Below this, Silty Sand (SM) was found upto the depth of 9.00m. It is followed by Sandy Silt upto the depth of 15.00m. Beyond this, Gravelly Sand / Boulders was found upto the depth of exploration i.e. 36.00m. The bore log is shown in Table-6.

BH-7(P6) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 3.00m. It is followed by Silty Sand (SM) upto the depth of 7.50m & Gravelly Sand upto the depth of 9.00m. Below this, Sandy Silt was found upto the depth of 12.00m. It is followed by Silty Sand (SM) upto the depth of 15.00m & Sandy Silt upto the depth of 18.00m. Beyond this, Silty Sand (SM) was found upto the depth of 21.00m. It is followed by Gravelly Sand mixed with Boulders upto the depth of exploration i.e. 36.00m. The bore log is shown in Table-7.

BH-8(P7) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 1.50m. It is followed by Gravelly Sand upto the depth of 6.00m. Below this, Silty Sand was found upto the depth of 21.00m. Beyond this, Fine Sand was found upto the depth of exploration i.e. 30.00m. The bore log is shown in Table-8.

BH-9(P8) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 1.50m. Below this, Gravelly Sand was found upto the depth of 6.00m. Beyond this, Silty Sand(SM) / Sandy Silt

was found upto the depth of exploration i.e. 36.00m. The bore log is shown in Table-9.

BH-10(P9) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 1.50m. It is followed by Coarser Sand upto the depth of 4.50m & Gravelly Sand upto the depth of 7.50m. Below this, Fine Sand was found upto the depth of 9.00m. It is followed by Silty Sand (SM) / Sandy Silt upto the depth of 30.00m. Beyond this, Gravels / Boulders was found upto the depth of exploration i.e. 36.00m. The bore log is shown in Table-10.

BH-11(P10) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 1.50m. It is followed by Sandy Gravels upto the depth of 3.00m & Boulders upto the depth of 4.50m. Below this, Silty Gravels (GM) mixed with Sand was found upto the depth of 6.00m. It is followed by Sandy Silt upto the depth of 7.50m & Gravels/ Boulders upto the depth of 12.00m. Beyond this, Fine Sand / Silty Sand (SM) was found upto the depth of exploration i.e. 36.00m. However a layer of Gravels/ Boulders was found at the depth between 21.00-24.00m. The bore log is shown in Table-11.

BH-12(P11) : The upper layer of the strata consists of Gravelly Sand up to the depth of 4.50m. It is followed by Fine Sand upto the depth of 18.00m. Below this, Gravelly Sand was found upto the depth of 27.00m. Beyond this, Silty Sand (SM) was found upto the depth of exploration i.e. 39.30m. The bore log is shown in Table-12.

BH-13(P12) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 1.50m. It is followed by Fine Sand upto the depth of 3.00m & Gravels/ Boulders upto the depth of 4.50m. Below this, Sandy Gravels was found upto the depth of 6.00m. It is followed by Fine Sand upto the depth of 9.00m & Gravelly Sand upto the depth of 12.00m. Beyond this, Fine Sand was found upto the depth of exploration i.e. 36.30m. The bore log is shown in Table-13.

BH-14(P13) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 1.50m. It is followed by Fine Sand upto the depth of 3.00m & Gravels/ Boulders upto the depth of 4.50m. Below this, Sandy Gravels was found upto the depth of 6.00m. It is followed by Sandy Silt/ Fine Sand upto the depth of 18.00m. However a layer of Sandy Gravels was found at the depth between 12.00-15.00m. Beyond this, Gravelly Sand was found upto the depth of 21.00m. It is followed by Gravels / Boulders upto depth of 24.00m & Fine Sand upto the depth of exploration i.e. 36.00m. The bore log is shown in Table-14.

BH-15(P14) : The upper layer of the strata consists of Silty Sand (SM) mixed with Gravels up to the depth of 7.50m. It is followed by Sandy Silt upto the depth of 9.00m & Fine Sand upto the depth of 12.00m. Below this, Gravels/ Boulders was found upto the depth of 24.00m. However, a layer of Sandy Silt mixed with Gravels was found between the depth of 15.00-21.00m. Beyond this, Fine Sand was found upto the depth of exploration i.e. 36.00m. The bore log is shown in Table-15.

BH-16(A2) : The upper layer of the strata consists of Highly Weathered Rock (Boudery Strata) up to the depth of 6.00m. It is followed by Silty

Sand (SM) mixed with Gravels upto the depth of 9.00m & Gravels/ Boulders upto the depth of 15.00m. Below this, Gravelly Sand was found upto the depth of 61800m. It is followed by Silty Sand (SM) upto the depth of 24.00m. Beyond this, Gravels/ Boulders was found upto the depth of exploration i.e. 39.00m. The bore log is shown in Table-16.

6.0 SILT FACTOR

In order to determine maximum score depth the silt factor of the bad material is required to be determine. The silt factor (f) depends upon the average size of bed material and given by Lacey equation as follows :

$$K_{sf} = 1.76 \sqrt{d_m}$$

Where d_m = the weighted mean diameter in millimeter

Also, in case of soil having $\phi < 15^0$ and c (cohesion of soil) > 0.2 kg/ cm², ‘Ksf’ calculated as follows :

$$K_{sf} = F (1 + \sqrt{c}) \text{ where } c \text{ is in kg/cm}^2$$

Where F = 1.50 for $\phi > 10^0$ and $< 15^0$
 = 1.75 for $\phi > 5^0$ and $< 10^0$
 = 2.00 for $\phi < 5^0$

7.0 THE STRATA AT GLANCE AND SILT FACTOR

Borehole No.	Type of strata	Depth	Silt Factor,
1	2	3	4
BH-1 (A1)	Silty Sand (SM) mixed with Gravels	0.00-3.00m	2.35-2.64
	Boulders	3.00-4.50m	--
	Sandy Silt	4.50-6.00m	0.59
	Gravelly Sand	6.00-24.00m	--
	Silty Sand (SM)	24.00-27.00m	2.09
	Gravelly Sand / Boulders	27.00-42.30m	--
BH-2 (P1)	Silty Sand (SM) mixed with Gravels	0.00-15.00m	2.45-2.94
BH-3 (P2)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	3.01
	Gravelly Sand	1.50-4.50m	2.33-2.65
	Boulders	4.50-6.00m	--
	Gravelly Sand	6.00-21.00m	2.68
	Sandy Silt	21.00-24.00m	--
	Gravelly Sand	24.00-38.00m	--
BH-4 (P3)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.86
	Silty Sand (SM)	1.50-7.50m	0.61-1.80
	Gravelly Sand	7.50-18.00m	3.43
	Fine Sand	18.00-21.00m	1.77
	Gravelly Sand	21.00-30.00m	3.68
BH-5 (P4)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.98
	Sandy Gravels	1.50-4.50m	4.57-4.78

Borehole No.	Type of strata	Depth	Silt Factor,
1	2	3	4
	Sandy Silt	4.50-6.00m	0.98
	Fine Sand	6.00-7.50m	1.47
	Silty Sand (SM)	7.50-9.00m	0.96
	Fine Sand	9.00-21.00m	1.83-1.85
	Sandy Gravels	21.00-27.00m	5.72
	Gravelly Sand	27.00-30.00m	3.07
BH-6 (P5)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.71
	Boulders	1.50-3.00m	--
	Fine Sand	3.00-6.00m	1.24
	Silty Sand (SM)	6.00-9.00m	1.01
	Sandy Silt	9.00-15.00m	1.61
	Gravelly Sand / Boulders	15.00-36.00m	--
BH-7 (P6)	Silty Sand (SM) mixed with Gravels	0.00-3.00m	2.85
	Silty Sand (SM)	3.00-7.50m	0.73-0.97
	Gravelly Sand	7.50-9.00m	2.49
	Sandy Silt	9.00-12.00m	0.58
	Silty Sand (SM)	12.00-15.00m	1.18
	Sandy Silt	15.00-18.00m	0.76
	Silty Sand (SM)	18.00-21.00m	1.11
	Gravelly Sand mixed Boulders	21.00-36.00m	--
BH-8 (P7)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.40
	Gravelly Sand	1.50-6.00m	3.58-3.68

Borehole No.	Type of strata	Depth	Silt Factor,
1	2	3	4
	Silty Sand (SM)	6.00-21.00m	0.79-1.47
	Fine Sand	21.00-30.00m	1.37
BH-9 (P8)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.82
	Gravelly Sand	1.50-6.00m	3.92
	Silty Sand	6.00-9.00m	1.10
	Sandy Silt	9.00-15.00m	0.66
	Silty Sand	15.00-21.00m	1.23
	Sandy Silt	21.00-24.00m	0.76
	Silty Sand	24.00-36.00m	0.97-1.05
BH-10 (P9)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.87
	Coarser Sand	1.50m-4.50m	2.94
	Gravelly Sand	4.50-7.50m	2.92
	Fine Sand	7.50-9.00m	1.94
	Silty Sand	9.00-15.00m	0.89
	Sandy Silt	15.00-21.00m	0.45
	Silty Sand	21.00-24.00m	0.85
	Sandy Silt	24.00-30.00m	0.75
	Gravel / Boulders	30.00-36.00m	--
BH-11 (P10)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.92
	Sandy Gravels	1.50-3.00m	5.42
	Boulders	3.00-4.50m	--

Borehole No.	Type of strata	Depth	Silt Factor,
1	2	3	4
	Silty Gravels (GM) mixed with Sand	4.50-6.00m	4.24
	Sandy Silt	6.00-7.50m	0.84
	Gravels /Boulders	7.50-12.00m	--
	Fine Sand	12.00-15.00m	1.11
	Silty Sand	15.00-21.00m	1.17
	Gravels / Boulders	21.00-24.00m	--
	Silty Sand	24.00-30.00m	1.95-2.21
	Fine Sand	30.00-36.00m	1.50
BH-12 (P11)	Gravelly Sand	0.00-4.50m	2.80-3.78
	Fine Sand	4.50-18.00m	1.01-1.27
	Gravelly Sand	18.00-27.00m	3.81
	Silty Sand (SM)	27.00-39.30m	1.28
BH-13 (P12)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.97
	Fine Sand	1.50-3.00m	0.96
	Gravel / Boulders	3.00-4.50m	Non Erodible
	Sandy Gravels	4.50-6.00m	4.07
	Fine Sand	6.00-9.00m	1.75
	Gravelly Sand	9.00-12.00m	2.30
	Fine Sand	12.00-36.30m	1.18-1.89
BH-14 (P13)	Silty Sand (SM) mixed with Gravels	0.00-1.50m	2.59
	Fine Sand	1.50-3.00m	1.05
	Gravel / Boulders	3.00-4.50m	--
	Sandy Gravels	4.50-6.00m	4.40

Borehole No.	Type of strata	Depth	Silt Factor,
1	2	3	4
	Sandy Silt	6.00-7.50m	1.35
	Fine Sand	7.50-12.00m	1.71
	Sandy Gravels	12.00-15.00m	5.42
	Sandy Silt	15.00-18.00m	1.98
	Gravelly Sand	18.00-21.00m	3.09
	Gravel / Boulders	21.00-24.00m	--
	Fine Sand	24.00-36.00m	1.00-1.09
BH-15 (P14)	Silty Sand (SM) mixed with Gravels	0.00-7.50m	2.88-3.24
	Sandy Silt	7.50-9.00m	1.09
	Fine Sand	9.00-12.00m	1.91
	Gravels/ Boulders	12.00-15.00m	--
	Sandy Silt mixed with Gravels	15.00-21.00m	3.11
	Gravels/ Boulders	21.00-24.00m	--
	Fine Sand	24.00-36.00m	1.53-1.85
BH-16 (A2)	Highly Weathered Rock (Bouldery Strata)	0.00-6.00m	--
	Silty Sand (SM) mixed with Gravels	6.00-9.00m	3.36
	Gravels/ Boulders	9.00-15.00m	--
	Gravelly Sand	15.00-18.00m	2.86
	Silty Sand (SM)	18.00-24.00m	1.29
	Gravels/ Boulders	24.00-39.00m	--

8.0 CALCULATION OF ALLOWABLE BEARING PRESSURE**8.1 Type and Depth of Foundation**

Pile foundation has been analyzed. The calculation sheets for safe bearing capacity in vertical and lateral for different borehole locations are attached as Appendix-A1 to A16 and B1 to B16.

9.0 CONCLUSION AND RECOMMENDATION

Based on field exploration and laboratory investigation of Soil & Rock, the following are the conclusion and recommendation:

1. The proposed site for Geotechnical Investigation for the Construction of Major Bridge across Mechi River AT CH-00+884. The site plan is shown in Fig.1.
2. The Strata is as classified in section 5.1
3. The water table was observed at the depth of 8.00m at BH-1(A1), 2.00m at BH-2(P1), 1.00m at BH-3(P2), 0.60m at BH-4(P3) & BH-5(P4), 0.50m at BH-6(P5), BH-7(P6) & BH-8(P7), 0.00m at BH-9(P8), 1.50m at BH-10(P9), BH-11(P10), BH-12(P11) & BH-11(P12), 2.00m at BH-14(P13) & BH-15(P14) and 2.50m at BH-16(A2) at the time of investigation (Nov.'2015 – Dec.'2015).
4. The Vertical & Lateral safe load carrying capacity of the foundation of Major Bridge at Mechi River recommended as follows:

Location of Borehole	RL of BH (m)	Diameter of Pile (m)	Length of Pile below cut off (m)	Vertical Safe Load capacity	Lateral Safe Load capacity	Uplift load carrying capacity
BH-1 (A1)	128.707	1.50	18.0	850 ton	150.0 ton	60.0 ton
BH-2 (P1)	123.165	1.50	20.0	850 ton	150.0 ton	100.0 ton
BH-3 (P2)	121.388	1.50	20.0	850 ton	150.0 ton	100.0 ton

Location of Borehole	RL of BH (m)	Diameter of Pile (m)	Length of Pile below cut off (m)	Vertical Safe Load capacity	Lateral Safe Load capacity	Uplift load carrying capacity
BH-4 (P3)	120956	1.50	20.0	850 ton	150.0 ton	100.0 ton
BH-5 (P4)	120.950	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-6 (P5)	121.081	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-7 (P6)	121.632	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-8 (P7)	120.957	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-9 (P8)	120.564	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-10 (P9)	121.765	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-11 (P10)	121.973	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-12 (P11)	122.147	1.50	20.0	850 ton	150.0 ton	70.0 ton
BH-13 (P12)	122.120	1.50	20.0	850 ton	150.0 ton	100.0 ton
BH-14 (P13)	122.769	1.50	20.0	850 ton	150.0 ton	100.0 ton
BH-15 (P14)	122.670	1.50	20.0	850 ton	150.0 ton	100.0 ton
BH-16 (A2)	128.542	1.50	18.0	850 ton	150.0 ton	60.0 ton

Note : The casing was required upto almost full depth of exploration. Therefore, construction of pile casing shall be required upto full length of the pile.

All the above recommendations are based upon the field data collected from limited test locations and results of laboratory tests carried out on samples recovered from test bore holes and our experience in this regard. In case the proposed structure is located away from the test locations and /or the actual geotechnical conditions during excavation of foundation trench are found different from what has been reported above, the consultants are to be referred for suggestions prior to taking up of actual construction work at site.

FOR PNT DESIGNS PVT. LTD.,



[Handwritten Signature]

DIRECTOR

REFERENCES

1. IS: 1904-1978 Code of practice for design and construction of foundation on soil- General Requirement.
2. IS: 6403-1981 Code of practice for determination of bearing capacity of shallow foundations.
3. IS: 8009
Part I 1976 Code of practice for calculation of settlement of foundations.
4. IS: 1498-1970 Classification & Identification of soil for general engineering purpose.
5. IS: 2131-1981 Method of standard penetration test for soil
6. IS: 4968
Part I 1976 Method of subsurface soundings of soils
7. Ranjan & Rao
(1992) Basic and Applied Soil Mechanics :
Wiley Eastern Limited, Delhi
8. IS:13063:1991 Structural safety of building on shallow foundations on rocks- code of Practice
9. IS:12070-1987 Code of practice for design and construction of shallow foundation on rocks
10. IS:9143-1979 Method for the determination of unconfined compressive strength of rock materials
11. 11315 Part-11
1985 Methods for the quantitative description of discontinuities in rock mass - Core recovery and rock quality designation.
12. IS:2720 Methods of determination of Engineering Properties of soil.
13. IRC:78-2014 Standard Specifications and Code of Practice for Road Bridges.

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-1 (A1)

Bored Cast in Situ Piles

Scour Depth below Ground Level 8.500 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	
Soil Strata : From To	0.0 - 2.0m	2.0 - 8.50m	8.50 - 15.00m	15.00 -20.0m	
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	
Length of Pile (L), below cut-off	18 m	18 m	18 m	18 m	
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	
SPT Value (N)		0	50	50	
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	
Angle of internal friction of soil (ϕ)	0	0	38	38	
(Against Average SPT value, as per IS-6403)					
Thickness of soil layer (h)	0.0 m	6.500 m	6.5 m	5.0 m	
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	65 kn/m ²	
Effective over burden pressure over the bottom of strata	0	0	65	115	
Adhesion (α)		0.5	0.5	0.5	
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	
Avg. Effective over burden pressure P_d =		0	32.5	90	
Angle of wall friction $\delta = \phi$		0	38	38	
(it is equal to angle of internal friction)					
$A_s = 3.142 \cdot D \cdot h$		30.63	30.63	23.57	
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	777.86	1656.99	0.00
(for Cohesive soils)	No skin resistance is considered for this layer	0	0	0	
$\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$					
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$	2434.85 kN			
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$		2434.85 kN			

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		18 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	115 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= Ap*(1/2*D* γ *Nr+Pd*Nq)+(Ap*Nc*Cp)=		21446.85 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	23881.71 kN
Safe load carrying capacity	Qsafe=	9552.68 kN
The Safe load carrying capacity of pile=	955 t	955 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 695.67 kN = 69.57 t

The recommended uplift load carrying capacity is = 60.00 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-2 (P1)

Bored Cast in Situ Piles

Scour Depth below Ground Level 6.500 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 6.50m	6.50 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	4.500 m	8.5 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	85 kn/m ²	135 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	85	135	140
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	42.5	110	137.5
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		21.21	40.06	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	1330.19	2025.21	1012.60
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		4368.01 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			4368.01 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	140 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= $A_p \cdot (1/2 \cdot D \cdot \gamma \cdot N_r + P_d \cdot N_q) + (A_p \cdot N_c \cdot C_p)$ =		25864.72 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	30232.72 kN
Safe load carrying capacity	Qsafe=	12093.09 kN
The Safe load carrying capacity of pile=	1209 t	1209 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 1248.00 kN = 124.80 t

The recommended uplift load carrying capacity is = 100.00 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-3 (P2)

Bored Cast in Situ Piles

Scour Depth below Ground Level 6.500 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 6.50m	6.50 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	4.500 m	8.5 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	85 kn/m ²	135 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	85	135	140
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	42.5	110	137.5
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		21.21	40.06	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	1330.19	2025.21	1012.60
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		4368.01 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			4368.01 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	140 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= Ap*(1/2*D*\gamma*Nr+Pd*Nq)+(Ap*Nc*Cp)=		25864.72 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	30232.72 kN
Safe load carrying capacity	Qsafe=	12093.09 kN
The Safe load carrying capacity of pile=	1209 t	1209 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 1248.00 kN = 124.80 t

The recommended uplift load carrying capacity is = 100.00 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-4 (P3)

Bored Cast in Situ Piles

Scour Depth below Ground Level 6.500

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 6.5m	6.50 - 7.50m	7.50 -18.0m	18.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	35	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	37	38	38
Thickness of soil layer (h)	0.0 m	4.500 m	1.0 m	10.5 m	4.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	10 kn/m ²	115 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	10	115	140
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	5	62.5	127.5
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	37	38	38
$A_s = 3.142 \cdot D \cdot h$		21.21	4.71	49.49	18.85
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	17.76	2416.44	1877.92
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		4312.12 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			4312.12 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	140 KN/m ²

Total End bearing resistance of the pile (Qp)

$Q_p = A_p \cdot (1/2 \cdot D \cdot \gamma \cdot N_r + P_d \cdot N_q) + (A_p \cdot N_c \cdot C_p) =$		25864.72 kN
Ultimate load carrying capacity	Q _u = Q _s + Q _p =	30176.84 kN
Safe load carrying capacity	Q _{safe} =	12070.74 kN
The Safe load carrying capacity of pile =	1207 t	1207 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 1232.03 kN = 123.20 t

The recommended uplift load carrying capacity is = 100 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-5 (P4)

Bored Cast in Situ Piles

Scour Depth below Ground Level 9.000 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 9.0m	9.0 - 15.00m	15.00 -20.0m	20.0 -22m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	7.000 m	6.0 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	60 kn/m ²	110 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	60	110	130
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	30	85	120
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		32.99	28.28	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	662.80	1564.93	883.73
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		3111.46 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			3111.46 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	130 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= Ap*(1/2*D* γ *Nr+Pd*Nq)+(Ap*Nc*Cp)=		24097.57 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	27209.03 kN
Safe load carrying capacity	Qsafe=	10883.61 kN
The Safe load carrying capacity of pile=	1088 t	1088 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 888.99 kN = 88.90 t

The recommended uplift load carrying capacity is = 70 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-6 (P5)

Bored Cast in Situ Piles

Scour Depth below Ground Level 9.000 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 9.0m	9.0 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	7.000 m	6.0 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	60 kn/m ²	110 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	60	110	130
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	30	85	120
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		32.99	28.28	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	662.80	1564.93	883.73
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		3111.46 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			3111.46 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	130 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= $Ap \cdot (1/2 \cdot D \cdot \gamma \cdot Nr + Pd \cdot Nq) + (Ap \cdot Nc \cdot Cp)$ =		24097.57 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	27209.03 kN
Safe load carrying capacity	Qsafe=	10883.61 kN
The Safe load carrying capacity of pile=	1088 t	1088 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 888.99 kN = 88.90 t

The recommended uplift load carrying capacity is = 70 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-7 (P6)

Bored Cast in Situ Piles

Scour Depth below Ground Level 9.000 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 9.0m	9.0 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	7.000 m	6.0 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	60 kn/m ²	110 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	60	110	130
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	30	85	120
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		32.99	28.28	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	662.80	1564.93	883.73
(for Cohesive soils) $\alpha \cdot C_u \cdot A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		3111.46 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			3111.46 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	130 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= $Ap \cdot (1/2 \cdot D \cdot \gamma \cdot Nr + Pd \cdot Nq) + (Ap \cdot Nc \cdot Cp)$ =		24097.57 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	27209.03 kN
Safe load carrying capacity	Qsafe=	10883.61 kN
The Safe load carrying capacity of pile=	1088 t	1088 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 888.99 kN = 88.90 t

The recommended uplift load carrying capacity is = 70 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-8 (P7)

Bored Cast in Situ Piles

Scour Depth below Ground Level 9.000 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 9.0m	9.0 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	7.000 m	6.0 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	60 kn/m ²	110 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	60	110	130
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	30	85	120
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		32.99	28.28	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	662.80	1564.93	883.73
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		3111.46 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			3111.46 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	130 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= Ap*(1/2*D* γ *Nr+Pd*Nq)+(Ap*Nc*Cp)=		24097.57 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	27209.03 kN
Safe load carrying capacity	Qsafe=	10883.61 kN
The Safe load carrying capacity of pile=	1088 t	1088 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 888.99 kN = 88.90 t

The recommended uplift load carrying capacity is = 70 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-9 (P8)

Bored Cast in Situ Piles

Scour Depth below Ground Level 9.000 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 9.0m	9.0 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	7.000 m	6.0 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	60 kn/m ²	110 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	60	110	130
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	30	85	120
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		32.99	28.28	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	662.80	1564.93	883.73
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		3111.46 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			3111.46 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	130 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= Ap*(1/2*D* γ *Nr+Pd*Nq)+(Ap*Nc*Cp)=		24097.57 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	27209.03 kN
Safe load carrying capacity	Qsafe=	10883.61 kN
The Safe load carrying capacity of pile=	1088 t	1088 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 888.99 kN = 88.90 t

The recommended uplift load carrying capacity is = 70 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-10 (P9)

Bored Cast in Situ Piles

Scour Depth below Ground Level 9.000 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 9.0m	9.0 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	7.000 m	6.0 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	60 kn/m ²	110 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	60	110	130
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	30	85	120
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		32.99	28.28	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	662.80	1564.93	883.73
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		3111.46 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			3111.46 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	130 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= Ap*(1/2*D* γ *Nr+Pd*Nq)+(Ap*Nc*Cp)=		24097.57 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	27209.03 kN
Safe load carrying capacity	Qsafe=	10883.61 kN
The Safe load carrying capacity of pile=	1088 t	1088 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 888.99 kN = 88.90 t

The recommended uplift load carrying capacity is = 70 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-11 (P10)

Bored Cast in Situ Piles

Scour Depth below Ground Level 9.000 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 9.0m	9.0 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	7.000 m	6.0 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	60 kn/m ²	110 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	60	110	130
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	30	85	120
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		32.99	28.28	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	662.80	1564.93	883.73
(for Cohesive soils) $\alpha \times C_u \times A_s = \alpha \times C_u \times 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha \times C_u \times A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		3111.46 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha \times C_u \times A_s + K \times P_d \times \tan \delta \times A_s) =$			3111.46 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	130 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= Ap*(1/2*D* γ *Nr+Pd*Nq)+(Ap*Nc*Cp)=		24097.57 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	27209.03 kN
Safe load carrying capacity	Qsafe=	10883.61 kN
The Safe load carrying capacity of pile=	1088 t	1088 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 888.99 kN = 88.90 t

The recommended uplift load carrying capacity is = 70 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-12 (P11)

Bored Cast in Situ Piles

Scour Depth below Ground Level 9.000 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 9.0m	9.0 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	7.000 m	6.0 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	60 kn/m ²	110 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	60	110	130
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	30	85	120
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		32.99	28.28	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	662.80	1564.93	883.73
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		3111.46 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			3111.46 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	130 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= Ap*(1/2*D* γ *Nr+Pd*Nq)+(Ap*Nc*Cp)=		24097.57 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	27209.03 kN
Safe load carrying capacity	Qsafe=	10883.61 kN
The Safe load carrying capacity of pile=	1088 t	1088 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 888.99 kN = 88.90 t

The recommended uplift load carrying capacity is = 70 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-13 (P12)

Bored Cast in Situ Piles

Scour Depth below Ground Level 6.500 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 6.50m	6.50 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	4.500 m	8.5 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	85 kn/m ²	135 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	85	135	140
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	42.5	110	137.5
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		21.21	40.06	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	1330.19	2025.21	1012.60
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		4368.01 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			4368.01 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	140 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= $Ap \cdot (1/2 \cdot D \cdot \gamma \cdot Nr + Pd \cdot Nq) + (Ap \cdot Nc \cdot Cp)$ =		25864.72 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	30232.72 kN
Safe load carrying capacity	Qsafe=	12093.09 kN
The Safe load carrying capacity of pile=	1209 t	1209 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 1248.00 kN = 124.80 t

The recommended uplift load carrying capacity is = 100 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-14 (P13)

Bored Cast in Situ Piles

Scour Depth below Ground Level 6.500 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 6.50m	6.50 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	4.500 m	8.5 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	85 kn/m ²	135 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	85	135	140
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	42.5	110	137.5
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		21.21	40.06	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	1330.19	2025.21	1012.60
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers					
	$\Sigma(\alpha C_u A_s) =$	0.00 kN			
Skin friction resistance due to granular soil layers					
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$		4368.01 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			4368.01 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	140 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= Ap*(1/2*D*\gamma*Nr+Pd*Nq)+(Ap*Nc*Cp)=		25864.72 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	30232.72 kN
Safe load carrying capacity	Qsafe=	12093.09 kN
The Safe load carrying capacity of pile=	1209 t	1209 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 1248.00 kN = 124.80 t

The recommended uplift load carrying capacity is = 100 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-15 (P14)

Bored Cast in Situ Piles

Scour Depth below Ground Level 6.500 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV	Layer -V
Soil Strata : From To	0.0 - 2.0m	2.0 - 6.50m	6.50 - 15.00m	15.00 -20.0m	20.0 -22.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	20 m	20 m	20 m	20 m	20 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10	10
SPT Value (N)		0	50	50	50
Undrained shear strength (C_u)= $12 \cdot N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ) (Against Average SPT value, as per IS-6403)	0	0	38	38	38
Thickness of soil layer (h)	0.0 m	4.500 m	8.5 m	5.0 m	2.0 m
	Upto cut-off	upto Scour level			
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	85 kn/m ²	135 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	85	135	140
Adhesion (α)		0.5	0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1	1
Avg. Effective over burden pressure P_d =		0	42.5	110	137.5
Angle of wall friction $\delta = \phi$ (it is equal to angle of internal friction)		0	38	38	38
$A_s = 3.142 \cdot D \cdot h$		21.21	40.06	23.57	9.43
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	1330.19	2025.21	1012.60
(for Cohesive soils) $\alpha C_u A_s = \alpha \cdot C_u \cdot 3.142 \cdot D \cdot h$	No skin resistance is considered for this layer	0	0	0	0
Skin friction resistance due to cohesive soil layers		$\sum (\alpha C_u A_s) =$	0.00 kN		
Skin friction resistance due to granular soil layers		$\sum (K \times P_d \times \tan \delta \times A_s) =$	4368.01 kN		
Total Skin friction resistance of the pile, q_s					
$R_f = \sum (\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$			4368.01 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		20 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	140 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= Ap*(1/2*D* γ *Nr+Pd*Nq)+(Ap*Nc*Cp)=		25864.72 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	30232.72 kN
Safe load carrying capacity	Qsafe=	12093.09 kN
The Safe load carrying capacity of pile=	1209 t	1209 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 1248.00 kN = 124.80 t

The recommended uplift load carrying capacity is = 100 t

**Calculation of vertical safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project
No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.**

Pile Capacity Calculations (IS:2911/Part-1/Sec-2)-1979

LOCATION : BH-16 (A2)

Bored Cast in Situ Piles

Scour Depth below Ground Level 8.500 Say

Calculation of Skin friction Resistance

Item	Layer -I	Layer -II	Layer -III	Layer -IV
Soil Strata : From To	0.0 - 2.0m	2.0 - 8.50m	8.50 - 15.00m	15.00 -20.0m
Depth upto cut off level of pile	2 m	2 m	2 m	2 m
Diameter of Pile (D)	1.5 m	1.5 m	1.5 m	1.5 m
Length of Pile (L), below cut-off	18 m	18 m	18 m	18 m
Submerged Unit Weight (γ') (Minimum)	10	10	10	10
SPT Value (N)		0	50	50
Undrained shear strength (C_u)= $12 \times N/2$	0 kn/m ²	0 kn/m ²	0 kn/m ²	0 kn/m ²
Angle of internal friction of soil (ϕ)	0	0	38	38
(Against Average SPT value, as per IS-6403)				
Thickness of soil layer (h)	0.0 m	6.500 m	6.5 m	5.0 m
	Upto cut-off	upto Scour level		
Effective over burden pressure over the top of strata	0 kn/m ²	0 kn/m ²	0 kn/m ²	65 kn/m ²
Effective over burden pressure over the bottom of strata	0	0	65	115
Adhesion (α)		0.5	0.5	0.5
K= Coefficient of earth pressure in loose to medium sands = 1 - 3		1	1	1
Avg. Effective over burden pressure P_d =		0	32.5	90
Angle of wall friction $\delta = \phi$		0	38	38
(it is equal to angle of internal friction)				
$A_s = 3.142 \times D \times h$		30.63	30.63	23.57
(for Granular soils) $K \times P_d \times \tan \delta \times A_s =$		0.00	777.86	1656.99
(for Cohesive soils) $\alpha C_u A_s = \alpha \times C_u \times 3.142 \times D \times h$	No skin resistance is considered for this layer	0	0	0
Skin friction resistance due to cohesive soil layers				
	$\Sigma(\alpha C_u A_s) =$	0.00 kN		
Skin friction resistance due to granular soil layers				
	$\Sigma(K \times P_d \times \tan \delta \times A_s) =$	2434.85 kN		
Total Skin friction resistance of the pile, q_s				
$R_f = \Sigma(\alpha C_u A_s + K \times P_d \times \tan \delta \times A_s) =$		2434.85 kN		

Calculation of End bearing resistance

Type of bearing strata		0
C/S area of Pile		1.767 sqm
Length of Pile (L)		18 m
SPT value (N)		50
Angle of internal friction of soil (ϕ), at base		38 (Max. value)
Bearing capacity factor	Nc	0
	Nq	100
	N γ	84.858
Effective over burden pressure	Pd	115 KN/m ²

Total End bearing resistance of the pile (Qp)

Qp= Ap*(1/2*D* γ *Nr+Pd*Nq)+(Ap*Nc*Cp)=		21446.85 kN
Ultimate load carrying capacity	Qu= Qs+Qp=	23881.71 kN
Safe load carrying capacity	Qsafe=	9552.68 kN
The Safe load carrying capacity of pile=	955 t	955 t

The recommended vertical load carrying capacity is = 850 t

The uplift load carrying capacity of the pile = Total Skin resistance / 3.5 (Factor of Safety)

The uplift load carrying capacity of the pile = 695.67 kN = 69.57 t

The recommended uplift load carrying capacity is = 60 t

Appendix-B1

**Calculation of lateral safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project No.25 - Details
Design of the Sasec Sub Regional Connectivity - Reg.**

LOCATION BH-1 (A1)

Lateral safe load carrying capacity of pile have been calculated as under IS:2911- (Part1 Sec.2):2010:

Depth of Cut-off pile	=	2 m	
Maximum scour depth below GL	=	8.5 m	
Length of pile above GL L1	=	6.5 m	
Length of pile below cut-off level Le	=	18 m	
Dia of pile, D	=	1.5 m	
Coefficient of stiffness η_h	9×10^3	=	9000 kN/m ³ Table-3
Grade of concrete, f_{ck}	=	35 N/mm ²	
Modulus of Elasticity of Conc., E	=	5000 Sqrt f_{ck}	
	E	=	29580.39892 N/mm ²
		=	29580398.92 kN/m ³
Moment of Inertia of pile I	=	$\rho D^4 / 64$	
	I	=	0.248604911 m ⁴
Pile Stiffness T	=	$(EI / \eta_h)^{1/5}$	
		=	3.82 m
L_1 / T	=	0.361 m	
L_f / T	=	2.1 (From Fig.2)	
L_f	=	2.1 X T	
	=	8.03 m	

The Deflection Y is given as follows :

$$Y = \frac{Q(L_1 + L_f)^3}{12 EI}$$

$$= 0.015 \text{ m}$$

(Y = 1% of Pile Dia)

Where : Q is lateral safe load in Kg and Y is permissible deflection of Pile Head

$$Q = 12 EI * Y / (L_1 + L_f)^3$$

$$= 2241.033843 \text{ kN}$$

$$= 224.10 \text{ T}$$

Recommended Lateral Load Carrying Capacity is **150 T**

Appendix-B2

**Calculation of lateral safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project No.25 - Details
Design of the Sasec Sub Regional Connectivity - Reg.**

LOCATION BH-2 (P1)

Lateral safe load carrying capacity of pile have been calculated as under IS:2911- (Part1 Sec.2):2010:

Depth of Cut-off pile	=	2 m	
Maximum scour depth below GL	=	6.5 m	
Length of pile above GL L ₁	=	4.5 m	
Length of pile below cut-off level L _e	=	20 m	
Dia of pile, D	=	1.5 m	
Coefficient of stiffness η_h 9×10^3	=	9000 kN/m ³	Table-3
Grade of concrete, f_{ck}	=	35 N/mm ²	
Modulus of Elasticity of Conc., E	=	5000 Sqrt f_{ck}	
	E	=	29580.39892 N/mm ²
		=	29580398.92 kN/m ³
Moment of Inertia of pile I	=	$\rho D^4 / 64$	
	I	=	0.248604911 m ⁴
Pile Stiffness T	=	$(EI / \eta_h)^{1/5}$	
		=	3.82 m
L_1 / T	=	0.225 m	
L_f / T	=	2.05 (From Fig.2)	
L_f	=	2.05 X T	
	=	7.84 m	

The Deflection Y is given as follows :

$$Y = \frac{Q(L_1 + L_f)^3}{12 EI}$$

$$= 0.015 \text{ m}$$

(Y = 1% of Pile Dia)

Where : Q is lateral safe load in Kg and Y is permissible deflection of Pile Head

$$Q = 12 EI * Y / (L_1 + L_f)^3$$

$$= 2525.154502 \text{ kN}$$

$$= 252.52 \text{ T}$$

Recommended Lateral Load Carrying Capacity is **150 T**

Appendix-B3

**Calculation of lateral safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project No.25 - Details
Design of the Sasec Sub Regional Connectivity - Reg.**

LOCATION BH-3 (P2)

Lateral safe load carrying capacity of pile have been calculated as under IS:2911- (Part1 Sec.2):2010:

Depth of Cut-off pile	=	2 m	
Maximum scour depth below GL	=	6.5 m	
Length of pile above GL L ₁	=	4.5 m	
Length of pile below cut-off level L _e	=	20 m	
Dia of pile, D	=	1.5 m	
Coefficient of stiffness η_h	9×10^3	=	9000 kN/m ³ Table-3
Grade of concrete, f_{ck}	=	35 N/mm ²	
Modulus of Elasticity of Conc., E	=	5000 Sqrt f_{ck}	
	E	=	29580.39892 N/mm ²
		=	29580398.92 kN/m ³
Moment of Inertia of pile I	=	$\rho D^4 / 64$	
	I	=	0.248604911 m ⁴
Pile Stiffness T	=	$(EI / \eta_h)^{1/5}$	
		=	3.82 m
L_1 / T	=	0.225 m	
L_f / T	=	2.05 (From Fig.2)	
L_f	=	2.05 X T	
	=	7.84 m	

The Deflection Y is given as follows :

$$Y = \frac{Q(L_1 + L_f)^3}{12 EI}$$

$$= 0.015 \text{ m}$$

(Y = 1% of Pile Dia)

Where : Q is lateral safe load in Kg and Y is permissible deflection of Pile Head

$$Q = 12 EI * Y / (L_1 + L_f)^3$$

$$= 2525.154502 \text{ kN}$$

$$= 252.52 \text{ T}$$

Recommended Lateral Load Carrying Capacity is **150 T**

Appendix-B4

Calculation of lateral safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.

LOCATION BH-4 (P3)

Lateral safe load carrying capacity of pile have been calculated as under IS:2911- (Part1 Sec.2):2010:

Depth of Cut-off pile	=	2 m	
Maximum scour depth below GL	=	6.5 m	
Length of pile above GL L1	=	4.5 m	
Length of pile below cut-off level Le	=	20 m	
Dia of pile, D	=	1.5 m	
Coefficient of stiffness η_h	9×10^3	=	9000 kN/m ³ Table-3
Grade of concrete, f_{ck}	=	35 N/mm ²	
Modulus of Elasticity of Conc., E	=	5000 Sqrt f_{ck}	
	E	=	29580.39892 N/mm ²
		=	29580398.92 kN/m ³
Moment of Inertia of pile I	=	$\rho D^4 / 64$	
	I	=	0.248604911 m ⁴
Pile Stiffness T	=	$(EI / \eta_h)^{1/5}$	
		=	3.82 m
L_1 / T	=	0.225 m	
L_f / T	=	2.05 (From Fig.2)	
L_f	=	2.05 X T	
	=	7.84 m	

The Deflection Y is given as follows :

$$Y = \frac{Q(L_1 + L_f)^3}{12 EI}$$

$$= 0.015 \text{ m}$$

(Y = 1% of Pile Dia)

Where : Q is lateral safe load in Kg and Y is permissible deflection of Pile Head

$$Q = \frac{12 EI * Y}{(L_1 + L_f)^3}$$

$$= 2525.154502 \text{ kN}$$

$$= 252.52 \text{ T}$$

Recommended Lateral Load Carrying Capacity is **150 T**

Appendix-B5

Calculation of lateral safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project No.25 - Details Design of the Sasec Sub Regional Connectivity - Reg.

LOCATION BH-5 (P4)

Lateral safe load carrying capacity of pile have been calculated as under IS:2911- (Part1 Sec.2):2010:

Depth of Cut-off pile	=	2 m	
Maximum scour depth below GL	=	9 m	
Length of pile above GL L1	=	7 m	
Length of pile below cut-off level Le	=	20 m	
Dia of pile, D	=	1.5 m	
Coefficient of stiffness η_h	9×10^3	=	9000 kN/m ³ Table-3
Grade of concrete, f_{ck}	=	35 N/mm ²	
Modulus of Elasticity of Conc., E	=	5000 Sqrt f_{ck}	
	E	=	29580.39892 N/mm ²
		=	29580398.92 kN/m ³
Moment of Inertia of pile I	=	$\rho D^4 / 64$	
	I	=	0.248604911 m ⁴
Pile Stiffness T	=	$(EI / \eta_h)^{1/5}$	
		=	3.82 m
L_1 / T	=	0.350 m	
L_f / T	=	2.1 (From Fig.2)	
L_f	=	2.1 X T	
	=	8.03 m	

The Deflection Y is given as follows :

$$Y = \frac{Q(L_1 + L_f)^3}{12 EI}$$

$$= 0.015 \text{ m}$$

(Y = 1% of Pile Dia)

Where : Q is lateral safe load in Kg and Y is permissible deflection of Pile Head

$$Q = \frac{12 EI * Y}{(L_1 + L_f)^3}$$

$$= 2249.960712 \text{ kN}$$

$$= 225.00 \text{ T}$$

Recommended Lateral Load Carrying Capacity is **150 T**

Appendix-B9

**Calculation of lateral safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project No.25 - Details
Design of the Sasec Sub Regional Connectivity - Reg.**

LOCATION BH-9 (P8)

Lateral safe load carrying capacity of pile have been calculated as under IS:2911- (Part1 Sec.2):2010:

Depth of Cut-off pile	=	2 m	
Maximum scour depth below GL	=	9 m	
Length of pile above GL L1	=	7 m	
Length of pile below cut-off level Le	=	20 m	
Dia of pile, D	=	1.5 m	
Coefficient of stiffness η_h	9×10^3	=	9000 kN/m ³ Table-3
Grade of concrete, f_{ck}	=	35 N/mm ²	
Modulus of Elasticity of Conc., E	=	5000 Sqrt f_{ck}	
	E	=	29580.39892 N/mm ²
		=	29580398.92 kN/m ³
Moment of Inertia of pile I	=	$\rho D^4 / 64$	
	I	=	0.248604911 m ⁴
Pile Stiffness T	=	$(EI / \eta_h)^{1/5}$	
		=	3.82 m
L_1 / T	=	0.350 m	
L_f / T	=	2.1 (From Fig.2)	
L_f	=	2.1 X T	
	=	8.03 m	

The Deflection Y is given as follows :

$$Y = \frac{Q(L_1 + L_f)^3}{12 EI}$$

$$= 0.015 \text{ m}$$

(Y = 1% of Pile Dia)

Where : Q is lateral safe load in Kg and Y is permissible deflection of Pile Head

$$Q = \frac{12 EI * Y}{(L_1 + L_f)^3}$$

$$= 2249.960712 \text{ kN}$$

$$= 225.00 \text{ T}$$

Recommended Lateral Load Carrying Capacity is **150 T**

**Calculation of lateral safe load carrying capacity of piles for Major Bridge at Mechi River for Preparing DPR for ADB TA No.8116-IND: TA Sub Project No.25 - Details
Design of the Sasec Sub Regional Connectivity - Reg.**

LOCATION BH-14 (P13)

Lateral safe load carrying capacity of pile have been calculated as under IS:2911- (Part1 Sec.2):2010:

Depth of Cut-off pile	=	2 m	
Maximum scour depth below GL	=	6.5 m	
Length of pile above GL L ₁	=	4.5 m	
Length of pile below cut-off level L _e	=	20 m	
Dia of pile, D	=	1.5 m	
Coefficient of stiffness η_h	9×10^3	=	9000 kN/m ³ Table-3
Grade of concrete, f_{ck}	=	35 N/mm ²	
Modulus of Elasticity of Conc., E	=	5000 Sqrt f_{ck}	
	E	=	29580.39892 N/mm ²
		=	29580398.92 kN/m ³
Moment of Inertia of pile I	=	$\rho D^4 / 64$	
	I	=	0.248604911 m ⁴
Pile Stiffness T	=	$(EI / \eta_h)^{1/5}$	
		=	3.82 m
L_1 / T	=	0.225 m	
L_f / T	=	2.05 (From Fig.2)	
L_f	=	2.05 X T	
	=	7.84 m	

The Deflection Y is given as follows :

$$Y = \frac{Q(L_1 + L_f)^3}{12 EI}$$

$$= 0.015 \text{ m}$$

(Y = 1% of Pile Dia)

Where : Q is lateral safe load in Kg and Y is permissible deflection of Pile Head

$$Q = \frac{12 EI * Y}{(L_1 + L_f)^3}$$

$$= 2525.154502 \text{ kN}$$

$$= 252.52 \text{ T}$$

Recommended Lateral Load Carrying Capacity is **150 T**

TABLE-1: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-1/A1) (W.T. = 8.0M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 09.11.2015 Completion date : 14.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
1.0					SILTY SAND (SM) MIXED WITH GRAVELS	18.08	51.32	24.17	6.43	23.51	NP	-	-	-	-	-	0.0	-	
2.0	5	10	10	20		20.40	63.45	10.98	5.17	24.14	NP	-	-	-	-	-	0.0	-	
3.0	62	9/10	-	R	BOULDERS														
4.0					SANDY SILT	0.0	27.65	52.09	20.26	28.21	NP	-	-	-	-	-	0.0	-	
5.0	85	4/100	-	R															
6.0	17	40	10/100	R	GRAVELLY SAND														
7.0																			
8.0	40	12/100	-	R															
9.0	40	13/100	-	R															

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-1: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-1/ A1)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 09.11.2015 Completion date : 14.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	10.0					GRAVELLY SAND												
11.0																		
12.0	10/100	-	-															
13.0																		
14.0																		
15.0	11/100	-	-															
16.0																		
17.0																		
18.0	3/100																	

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-1: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-1/ A1)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 09.11.2015 Completion date : 14.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
	19.0					GRAVELLY SAND													
20.0																			
21.0	2/100	-	-																
22.0																			
23.0																			
24.0	5/100	-	-		SILTY SAND (SM)														
25.0																			
26.0																			
27.0	20	50	8/100				1.15	77.85	16.38	4.62	22.76	NP	-	-	-	-	-	0.0	-

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-1: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-1/ A1)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT

NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size

Type of Bit : TC / Diamond

Starting date : 09.11.2015

Completion date : 14.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
	28.0					GRAVELLY SAND / BOULDERS	20.65	71.50	6.20	1.65	22.3	NP	-	-	-	-	-	0.0	
29.0																			
30.0	13/100	-	-	R															
31.0																			
32.0																			
33.0	5/100	-	-	R															
34.0																			
35.0																			
36.0	5/100	-	-	R															

* = Consolidation Test,

c_c = Compression Index,

DFS = Differential Free Swell,

Δv = Water Table,

Sp = Swelling Pressure

TABLE-1: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-1/ A1)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 09.11.2015 Completion date : 14.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	37.0	5/100	-	-	R	GRAVELLY SAND / BOULDERS												
38.0																		
39.0	7/100	-	-	R														
40.0																		
41.0																		
42.0																		
42.3																		
43.0																		
44.0																		
45.0																		

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, Δv = Water Table, Sp = Swelling Pressure

TABLE-2: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-2/P1) (W.T. = 2.0M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 14.11.2015 Completion date : 20.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	φ deg.			
1.0	8/100	-	-	R	SILTY SAND (SM) MIXED WITH GRAVELS	23.49	53.27	18.36	4.88	20.18	NP	8.2	-	-	-	-	0.0	-	
2.0	— _v																		
3.0	50	7/100	-	R		17.90	59.25	15.54	7.31	-	-	-	-	-	-	-	-	0.0	-
4.0	45	11/100	-	R															
5.0																			
6.0	40	9/100	-	R															
7.0																			
8.0	12	40	12/100	R	22.60	53.75	17.03	6.62	19.20	NP	-	-	-	-	-	-	0.0	-	
9.0	14/100			R															

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, —_v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-2: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-2/P1)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 14.11.2015 Completion date : 20.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	10.0					SILTY SAND (SM) MIXED WITH GRAVELS												
11.0																		
12.0	14/100	-	-	-														
13.0																		
14.0																		
15.0	14/100																	
16.0																		
17.0																		
18.0																		

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-3: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-3/ P2)

(W.T. = 1.0M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 14.11.2015 Completion date : 20.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
1.0	68	12/100	-	R	SILTY SAND (SM) MIXED WITH GRAVELS	28.46	44.08	21.69	5.77	24.33	NP	-	-	-	-	-	0.0	-
2.0						17.90	75.50	4.49	2.11	21.52	NP	10.3	-	-	-	-	0.0	-
3.0	15	43	2/100	R	GRAVELLY SAND													
4.0	40	75	8/100	R		16.10	70.70	9.50	3.70	-	-	-	-	-	-	-	0.0	-
5.0					BOULDERS													
6.0	35	57	6/100	R														
7.0	40	64	8/100	R	GRAVELLY SAND													
8.0																		
9.0	57	9/100		R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-3: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-3/ P2)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 14.11.2015 Completion date : 20.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c													
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.															
	10.0					GRAVELLY SAND	21.10	68.45	8.15	2.30	23.34	NP	-	-	-	-	-	0.0	-												
11.0																															
12.0	13/100	-	-	R																											
13.0																															
14.0																															
15.0	48	52	75	-																											
16.0																															
17.0																															
18.0	14/100	-	-	-																											

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-3: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-3/ P2)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 14.11.2015 Completion date : 20.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	19.0					GRAVELLY SAND												
20.0																		
21.0	10/100	-	-	R														
22.0					SANDY SILT	0.00	25.45	50.69	23.86	25.04	NP	-	-	-	-	-	0.0	-
23.0																		
24.0	15	37	43	80														
25.0					GRAVELLY SAND	25.30	65.80	6.41	2.49	-	-	-	-	-	-	-	-	-
26.0																		
27.0	9	3/100	-	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-3: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-3/ P2)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 14.11.2015 Completion date : 20.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	28.0					GRAVELLY SAND												
29.0																		
30.0	14/100	-	-	R														
31.0																		
32.0																		
33.0	15	15	21	36		22.30	64.10	8.84	4.76	-	-	-	-	-	-	-	-	-
34.0																		
35.0																		
36.0	16	20	15	35														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, ∇ = Water Table, Sp = Swelling Pressure

TABLE-3: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-3/ P2)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 14.11.2015 Completion date : 20.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	37.0					GRAVELLY SAND												
38.0																		
39.0																		
40.0																		
41.0																		
42.0																		
43.0																		
44.0																		
45.0																		

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

TABLE-4: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-4/ P3) (W.T. = 0.60M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 05.12.2015 Completion date : 12.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	γ																	
1.0	28	11	12	23	SILTY SAND (SM) MIXED WITH GRAVELS	21.25	45.55	26.23	6.97	19.51	NP	8.91	-	-	-	-	0.0	-
2.0					SILTY SAND (SM)													
3.0	20	29	17	46		9.70	64.80	19.64	5.87	23.20	NP	11.2	-	-	-	-	0.0	-
4.0																		
5.0	17	17	16	33														
6.0	6	10	22	32		0.00	55.95	35.68	8.37	-	-	-	-	-	-	-	0.0	-
7.0																		
8.0	14	15	25	40	GRAVELLY SAND													
9.0	22	65	7/35	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, γ = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-4: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-4/ P3)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 05.12.2015 Completion date : 12.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	10.0					GRAVELLY SAND												
11.0																		
12.0	24	60	10/40	R														
13.0																		
14.0																		
15.0	23	24	50	74		24.40	66.15	7.28	2.17	20.27	NP	-	-	-	-	-	0.0	-
16.0																		
17.0																		
18.0	14	20	33	53														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-4: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-4/ P3)

Table Cont.

**PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.**

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 05.12.2015 Completion date : 12.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	19.0					FINE SAND												
20.0																		
21.0	16	14	17	31		0.95	98.30	0.59	0.16	22.09	NP	-	-	-	-	-	0.0	-
22.0																		
23.0																		
24.0	40	51	5/49	R	GRAVELLY SAND	30.05	64.55	4.27	1.13	-	-	-	-	-	-	-	0.0	
25.0																		
26.0																		
27.0	32	9/100	-	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-4: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-4/ P3)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 05.12.2015 Completion date : 12.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	28.0					GRAVELLY SAND												
29.0																		
30.0	9/100	-	-	R														
31.0																		
32.0																		
33.0																		
34.0																		
35.0																		
36.0																		

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

TABLE-5: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-5/ P4) (W.T. = 0.60M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TAsUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 08.12.2015 Completion date : 15.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	15	30	45	N	Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %	c t/m ²	ø deg.						
1.0	45	31	26	57	SILTY SAND (SM) MIXED WITH GRAVELS	26.95	35.18	29.92	7.95	25.17	NP	10.1	-	-	-	-	0.0	-
2.0	6	16	32	48	SANDY GRAVELS	48.50	29.45	16.98	5.07	23.66	NP	11.3	-	-	-	-	0.0	-
3.0	8	13	60	73	SANDY SILT	45.10	36.50	13.25	5.15	-	-	-	-	-	-	-	0.0	-
4.0	60	70	8/30	R	FINE SAND	0.60	36.75	46.36	16.29	-	-	-	-	-	-	-	0.0	-
5.0	28	40	60	100	SANDY SILT	5.10	84.80	7.88	2.22	22.69	NP	-	-	-	-	-	0.0	-
6.0	17	28	36	64	SILTY SAND (SM)	0.60	56.30	34.05	9.05	-	-	-	-	-	-	-	0.0	-

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-5: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-5/ P4)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 08.12.2015 Completion date : 15.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	10.0					FINE SAND												
11.0																		
12.0	41	93	3/7	R	3.10		94.65	1.73	0.52	25.11	NP	-	-	-	-	-	0.0	-
13.0																		
14.0																		
15.0	32	11/100	-	R														
16.0																		
17.0																		
18.0	56	80	5/20	R		3.95	94.05	1.50	0.50	-	-	-	-	-	-	-	0.0	-

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-5: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-5/ P4)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 08.12.2015 Completion date : 15.12.2015

Depth (m)	N - value				IS Classification	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Soil Description	Gravel %	sand %	Silt %	Clay %	Liquid Limit %				Plastic Limit %	c t/m ²		
19.0					FINE SAND													
20.0																		
21.0	12/10	-	-	R														
22.0					SANDY GRAVELS													
23.0																		
24.0	5/100	-	-	R		77.76	21.26	0.79	0.19	20.42	NP	-	-	-	-	-	0.0	
25.0																		
26.0																		
27.0	28	8/100	-	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-5: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-5/ P4)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 08.12.2015 Completion date : 15.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
	28.0					GRAVELLY SAND	15.95	83.35	0.55	0.15	21.1	NP	-	-	-	-	-	0.0	
29.0																			
30.0	12/100	-	-	R															
31.0																			
32.0																			
33.0																			
34.0																			
35.0																			
36.0																			

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

TABLE-6: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-6/ P5) (W.T. = 0.50M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 26.11.2015 Completion date : 30.11.2015

Depth (m)	N - value				IS Classification	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Soil Description	Gravel %	Sand %	Silt %	Clay %	Liquid Limit %				Plastic Limit %	c		
	t/m ²	deg.																
1.0	∇				SILTY SAND (SM) MIXED WITH GRAVELS	22.22	42.12	28.17	7.49	24.82	NP	10.3	-	-	-	-	0.0	-
2.0	14/100	-	-	R														
3.0	8/100	-	-	R	FINE SAND	0.45	94.25	4.08	1.22	21.25	NP	-	-	-	-	-	0.0	-
4.0	27	52	8/100	R														
5.0					SILTY SAND (SM)	0.00	84.00	11.52	4.48	-	-	-	-	-	-	-	0.0	-
6.0	25	50	10/100	R														
7.0	30	35	40	75														
8.0																		
9.0	20	40	60	100														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, ∇ = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-6: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-6/ P5)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 26.11.2015 Completion date : 30.11.2015

Depth (m)	N - value				IS Classification	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N	Soil Description	Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
10.0					SANDY SILT													
11.0																		
12.0	27	80	2/100	R														
13.0																		
14.0																		
15.0	20	70	2/100	R		4.95	38.40	44.19	12.46	-	-	-	-	-	-	-	0.0	-
16.0					GRAVELLY SAND/ BOULDERS													
17.0																		
18.0	14	80	3/100	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, ∇ = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-6: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-6/ P5)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 26.11.2015 Completion date : 30.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	19.0					GRAVELLY SAND/ BOULDERS												
20.0																		
21.0	30	70	7/100	R	37.25		58.40	3.39	0.96	-	-	-	-	-	-	-	0.0	
22.0																		
23.0																		
24.0	13/100	-	-	R														
25.0																		
26.0																		
27.0	50	3/100	-	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-6: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-6/ P5)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 26.11.2015 Completion date : 30.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
	28.0					GRAVELLY SAND/ BOULDERS													
29.0																			
30.0	14/100	-	-	R															
31.0																			
32.0																			
33.0	12/100	-	-	R															
34.0																			
35.0																			
36.0	7/100	-	-	R															

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, Δv = Water Table, Sp = Swelling Pressure

TABLE-7: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-7/ P6) (W.T. = 0.5M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 20.11.2015 Completion date : 25.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	10/100	7/100	20/100	30/100														
1.0	10/100	-	-	-	SILTY SAND (SM) MIXED WITH GRAVELS	18.70	45.50	28.28	7.52	24.21	NP	8.4	-	-	-	-	0.0	-
2.0																		
3.0	25	7/100	-	-	SILTY SAND (SM)	0.00	53.30	35.96	10.74	23.41	NP	-	-	-	-	-	0.0	-
4.0	7	12	16	28														
5.0																		
6.0	U	D	S									13.2	2.69	1.90	0.0	33.0	0.0	-
7.0																		
8.0	20	48	9/100		GRAVELLY SAND	0.00	59.80	28.94	11.26	-	-	-	-	-	-	-	0.0	-
9.0	50	85	1/100				16.25	72.00	8.70	3.06	-	-	-	-	-	-	-	0.0

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-7: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-7/ P6)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 20.11.2015 Completion date : 25.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	10.0					SANDY SILT												
11.0																		
12.0	22	55	5/100	-		0.00	18.00	63.96	18.04	23.62	NP	-	-	-	-	-	0.0	-
13.0					SILTY SAND (SM)													
14.0																		
15.0	30	59	3/100			0.00	80.90	15.09	4.01	-	-	-	-	-	-	-	0.0	-
16.0					SANDY SILT													
17.0																		
18.0	12	18	25			0.00	37.55	48.09	14.36	-	-	-	-	-	-	-	0.0	-

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-7: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-7/ P6)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 20.11.2015 Completion date : 25.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c																
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.																		
	19.0					SILTY SAND (SM)	0.00	75.05	17.96	6.99	20.4	-	-	-	-	-	-	0.0	-															
20.0																																		
21.0	7	10/100	-	R																														
22.0					GRAVELLY SAND MIXED BOULDERS																													
23.0																																		
24.0	69	9/100	-	R																														
25.0																																		
26.0																																		
27.0	55	11/100	-	R																														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-7: RESULT SHEET FOR MAJOR BRIDGE AT MECHI RIVER DES. CH.00+385 (BH-7/ P6)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT

NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size

Type of Bit : TC / Diamond

Starting date : 20.11.2015

Completion date : 25.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	28.0					GRAVELLY SAND MIXED BOULDERS												
29.0																		
30.0	60	9/100	-	R														
31.0																		
32.0																		
33.0	67	5/100	-	R														
34.0																		
35.0																		
36.0	8/100	-	-	R														

* = Consolidation Test,

c_c = Compression Index,

DFS = Differential Free Swell,

Δv = Water Table,

Sp = Swelling Pressure

TABLE-8: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-8/ P7) (W.T. = 0.50M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 13.12.2015 Completion date : 17.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
1.0	∇				SILTY SAND (SM) MIXED WITH GRAVELS	13.95	48.52	29.64	7.88	20.16	NP	9.3	-	-	-	-	0.0	-	
2.0	13	22	15	37		GRAVELLY SAND	39.52	59.96	0.40	0.12	19.66	NP	-	-	-	-	-	0.0	-
3.0	9	9	14	23	SILTY SAND (SM)		37.50	60.62	1.41	0.47	-	-	-	-	-	-	-	0.0	-
4.0	21	41	55	96			6.0	16	48	25	73	7.0	6	12	17	29	8.0	16	38
5.0																			
6.0																			
7.0																			
8.0																			
9.0																			

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, ∇ = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-8: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-8/ P7)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 13.12.2015 Completion date : 17.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
	10.0					SILTY SAND (SM)	0.00	51.05	39.65	9.30	-	-	-	-	-	-	-	0.0	-
11.0	15	31	5/69	R	0.00		58.65	32.25	9.10	24.39	NP	-	-	-	-	-	0.0	-	
12.0	16	50	47	97															
13.0																			
14.0																			
15.0	24	62	7/38	R		2.55	80.80	13.15	3.50	-	-	-	-	-	-	-	0.0	-	
16.0																			
17.0																			
18.0	26	57	9/43	R															

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-8: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-8/ P7)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 13.12.2015 Completion date : 17.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
	19.0					SILTY SAND (SM)													
20.0																			
21.0	3	8	14	22		0.00	50.40	38.19	11.41	20.22	NP	-	-	-	-	-	0.0	-	
22.0					FINE SAND														
23.0																			
24.0	50	8/100	-	R															
25.0																			
26.0																			
27.0	10/100	-	-	R															

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-8: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-8/ P7)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 13.12.2015 Completion date : 17.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	28.0					FINE SAND												
29.0					0.75		98.15	0.89	0.21	-	-	-	-	-	-	-	0.0	-
30.0	15	13/100	-	R														
31.0																		
32.0																		
33.0																		
34.0																		
35.0																		
36.0																		

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

TABLE-9: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-9/ P8) (W.T. = 0.00M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 19.12.2015 Completion date : 24.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15 v	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
1.0					SILTY SAND (SM) MIXED WITH GRAVELS	17.18	61.07	17.19	4.57	-	-	-	-	-	-	-	0.0	-
2.0	25	26	16	42														
3.0	36	7	11	18	GRAVELLY SAND	36.10	57.15	5.20	1.55	18.68	NP	-	-	-	-	-	0.0	-
4.0	26	44	12/56	-														
5.0	37	88	3/12	-														
6.0					SILTY SAND (SM)	0.85	59.85	29.48	9.83	-	-	-	-	-	-	-	0.0	-
7.0	22	36	29	65														
8.0																		
9.0	42	80	4/20	-														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-9: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-9/ P8)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 19.12.2015 Completion date : 24.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
	10.0					SANDY SILT													
11.0																			
12.0	42	80	4/20	-		0.00	40.65	49.85	9.50	27.31	NP	-	-	-	-	-	0.0	-	
13.0																			
14.0																			
15.0	11	34	13/66	-		0.0	21.60	68.99	9.41	-	-	-	-	-	-	-	0.0	-	
16.0					SILTY SAND (SM)														
17.0																			
18.0	47	11/100																	

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-9: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-9/ P8)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 19.12.2015 Completion date : 24.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	19.0 20.0 21.0 22.0 23.0	70	9/100	-	-	SILTY SAND (SM) SANDY SILT	0.00	76.70	18.41	4.89	21.33	NP	-	-	-	-	-	0.0
24.0 25.0 26.0 27.0	11	24	31	55	SILTY SAND (SM)	0.00	39.85	51.13	9.02	26.21	NP	-	-	-	-	-	0.0	-

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-9: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-9/ P8)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 19.12.2015 Completion date : 24.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	28.0					SILTY SAND (SM)	0.95	64.45	25.95	8.65	-	-	-	-	-	-	-	0.0
29.0																		
30.0	18	61	3/39	R														
31.0																		
32.0																		
33.0	3/100	-	-	R		0.00	65.55	28.94	5.51	-	-	-	-	-	-	-	0.0	-
34.0																		
35.0																		
36.0																		

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

TABLE-10: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-10/ P9) (W.T. = 1.50M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 13.12.2015 Completion date : 17.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
1.0	66	13/100	-	R	SILTY SAND (SM) MIXED WITH GRAVELS	19.76	61.51	14.79	3.93	23.67	NP	14.33	-	-	-	-	0.0	-
2.0					COARSER SAND	5.60	93.95	0.35	0.10	24.32	NP	-	-	-	-	-	-	0.0
3.0	3	2	1	3	GRAVELLY SAND	12.05	75.25	9.78	2.92	-	-	-	-	-	-	-	0.0	-
4.0	20	15	28	43														
5.0	30	12/100	-	R	FINE SAND	2.10	96.45	1.09	0.36	-	-	-	-	-	-	-	0.0	-
6.0																		
7.0	42	80	4/20	R														
8.0																		
9.0																		

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-10: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-10/ P9)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 13.12.2015 Completion date : 17.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
	10.0					SILTY SAND (SM)	0.00	55.65	35.92	8.43	19.37	NP	15.41	-	-	-	-	0.0	-
11.0																			
12.0	42	80	4/20	R															
13.0																			
14.0																			
15.0	11	34	13/66	R	SANDY SILT														
16.0																			
17.0																			
18.0	47	11/100	-	R															

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-10: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-10/ P9)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 13.12.2015 Completion date : 17.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	19.0					SANDY SILT	0.00	18.95	68.08	12.97	-	-	-	-	-	-	-	0.0
20.0																		
21.0	70	9/100	-	R														
22.0					SILTY SAND (SM)													
23.0																		
24.0	11	24	31	55		0.35	50.95	38.47	10.23	23.05	NP	-	-	-	-	-	0.0	-
25.0																		
26.0					SANDY SILT													
27.0	21	12/100	-	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-10: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-10/ P9)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 13.12.2015 Completion date : 17.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
	28.0					SANDY SILT	0.00	39.55	46.55	13.90	23.20	NP	-	-	-	-	-	0.0	-
29.0																			
30.0	18	61	3/39	R	GRAVELS/ BOULDERS														
31.0																			
32.0																			
33.0	3/100	-	-	R															
34.0																			
35.0																			
36.0																			

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

TABLE-11: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-11/ P10) (W.T. = 1.50M)
PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TANO.8116-IND: TAsUB PROJECT
NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 16.12.2015 Completion date : 21.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
1.0	15	30	50	80	SILTY SAND (SM) MIXED WITH GRAVELS	19.61	47.99	25.60	6.80	20.57	NP	-	-	-	-	-	0.0	-
2.0					SANDY GRAVELS	67.05	25.90	5.43	1.62	23.61	NP	-	-	-	-	-	0.0	-
3.0	45	50	50	100	BOULDERS													
4.0	7/100	-	-	428	SILTY GRAVELS (GM) MIXED WITH SAND	45.66	30.64	17.06	6.64	-	-	-	-	-	-	-	0.0	-
5.0					SANDY SILT	0.35	37.35	48.59	13.71	27.89	NP	-	-	-	-	-	0.0	-
6.0	12	50	150	200	GRAVELS/ BOULDERS													
7.0	5	12	18	30														
8.0																		
9.0	188	188	188	376														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, —v = Water Table, Sp = Swelling Pressure

TABLE-11: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-11/ P10)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TANO.8116-IND: TAsUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 16.12.2015 Completion date : 21.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	10.0					GRAVELS/ BOULDERS												
11.0																		
12.0	60	300	300	600														
13.0					FINE SAND													
14.0																		
15.0	25	65	375	440		0.00	97.80	0.48	1.72	21.62	NP	-	-	-	-	-	0.0	-
16.0					SILTY SAND (SM)													
17.0																		
18.0																		

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, ∇ = Water Table, Sp = Swelling Pressure

TABLE-11: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-11/ P10)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TANO.8116-IND: TAsUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 16.12.2015 Completion date : 21.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
19.0					SILTY SAND (SM)													
20.0																		
21.0	30	13/100	-	-		1.70	59.80	30.42	8.09	23.62	NP	-	-	-	-	-	0.0	-
22.0					GRAVELS/BOULDERS													
23.0																		
24.0	14/100	-	-															
25.0					SILTY SAND (SM)													
26.0																		
27.0	45	6/100				5.80	71.45	17.52	5.23	-	-	-	-	-	-	-	0.0	-

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, γ_w = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-11: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-11/ P10)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TANO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 16.12.2015 Completion date : 21.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	φ deg.			
28.0					SILTY SAND (SM)	8.40	71.25	14.65	5.70	-	-	-	-	-	-	-	0.0	-	
29.0																			
30.0	25	50	11/100		FINE SAND	1.40	95.05	2.77	0.78	23.34	NP	-	-	-	-	-	0.0	-	
31.0																			
32.0																			
33.0	14/100	-	-	R															
34.0																			
35.0																			
36.0	30	10/100	-	R															

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, —v = Water Table, Sp = Swelling Pressure

TABLE-12: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-12/ P11) (W.T. = 1.50M)
PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 16.12.2015 Completion date : 21.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
1.0	33	12	12	24	GRAVELLY SAND	23.42	40.99	28.12	7.48	24.92	NP	13.2	-	-	-	-	0.0	-	
2.0																			
3.0	26	36	29	65															
4.0																			
5.0	40	55	7/45	R		32.70	64.55	2.12	0.63	23.66	NP	-	-	-	-	-	0.0	-	
6.0	18	52	12/48	R	FINE SAND	0.00	97.55	1.84	0.61	-	-	-	-	-	-	-	0.0	-	
7.0																			
8.0	12/100	-	-	R															
9.0	54	8/100	-	R															

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-12: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-12/ P11)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 16.12.2015 Completion date : 21.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	10.0					FINE SAND	0.00	97.95	1.66	0.39	-	-	-	-	-	-	-	0.0
11.0																		
12.0	12/100	-	-	R														
13.0																		
14.0																		
15.0	32	7/100	-	R		0.00	92.25	6.05	1.71	20.68	NP	-	-	-	-	-	0.0	-
16.0																		
17.0																		
18.0	29	72	4/48	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, ∇ = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-12: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-12/ P11)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 16.12.2015 Completion date : 21.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	19.0					GRAVELLY SAND												
20.0																		
21.0	68	10/100	-	R	30.00		53.98	12.66	3.36	21.32	NP	-	-	-	-	-	0.0	-
22.0																		
23.0																		
24.0	13/100	-	-	R														
25.0																		
26.0																		
27.0	90	8/100	-	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-12: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-12/ P11)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 16.12.2015 Completion date : 21.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	28.0					SILTY SAND (SM)												
29.0																		
30.0	3/100	-	-	R														
31.0																		
32.0																		
33.0	48	9/100	-	R		3.15	54.30	37.44	5.11	24.8	NP	-	-	-	-	-	0.0	-
34.0																		
35.0																		
36.0	31	5/100	-	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, Δv = Water Table, Sp = Swelling Pressure

TABLE-12: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-12/ P11)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 16.12.2015 Completion date : 21.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	37.0 38.0 39.0 39.3 40.0 41.0 42.0 43.0 44.0 45.0					SILTY SAND (SM)												

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

TABLE-13: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-13/ P12) (W.T. = 1.50M)
PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 24.12.2015 Completion date : 29.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
1.0	10	14	13	27	SILTY SAND MIXED WITH GRAVELS	25.61	44.47	23.64	6.28	24.58	NP	-	-	-	-	-	0.0	-
2.0					FINE SAND													
3.0	60	25	24	49	GRAVELS/ BOULDERS	0.45	93.50	4.66	1.39	23.01	NP	-	-	-	-	-	0.0	-
4.0		U	D	S								15.37	2.72	1.95	0.0	38.0	0.0	-
5.0					SANDY GRAVELS													
6.0	7	48	5/52	R		50.60	40.20	6.90	2.30	-	-	-	-	-	-	-	0.0	-
7.0					FINE SAND													
8.0	40	7/100	-	R														
9.0	38	5/100				0.00	99.10	0.73	0.17	18.42	NP	-	-	-	-	-	0.0	-

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-13: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-13/ P12)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 24.12.2015 Completion date : 29.12.2015

Depth (m)	N - value				IS Classification	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N	Soil Description	Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
10.0					GRAVELLY SAND	17.25	73.15	7.49	2.11	19.81	NP	-	-	-	-	-	0.0	-
11.0																		
12.0	13/100	-	-	R	FINE SAND	24.60	63.55	9.36	2.49	20.31	NP	-	-	-	-	-	0.0	-
13.0																		
14.0																		
15.0	13/100	-	-	R		0.00	96.60	2.62	0.78	-	-	-	-	-	-	-	0.0	-
16.0																		
17.0																		
18.0	60	2/100	-	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, ∇ = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-13: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-13/ P12)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 24.12.2015 Completion date : 29.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	19.0					FINE SAND												
20.0																		
21.0	33	11/100	-	R														
22.0																		
23.0																		
24.0	89	7/100	-	R		4.95	88.95	4.76	1.34	-	-	-	-	-	-	-	0.0	-
25.0																		
26.0																		
27.0	93	3/100	-	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-13: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-13/ P12)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TA SUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 24.12.2015 Completion date : 29.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	28.0					FINE SAND												
29.0																		
30.0	83	13/100	-	R														
31.0																		
32.0																		
33.0	24	62	5/38	R		0.00	97.20	2.21	0.59	-	-	-	-	-	-	-	0.0	-
34.0																		
35.0																		
36.0	38	12/100	-	R														
36.3																		

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

TABLE-14: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-14/ P13)

(W.T. = 2.0M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 30.11.2015 Completion date : 03.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	φ deg.		
1.0	72	10/100	-	R	SILTY SAND MIXED WITH GRAVELS	18.51	43.68	29.87	7.94	21.57	NP	-	-	-	-	-	0.0	-
2.0					FINE SAND													
3.0	37	31	38	69	GRAVELS/ BOULDERS	0.00	94.35	4.35	1.30	23.14	NP	-	-	-	-	-	0.0	-
4.0					SANDY GRAVELS													
5.0																		
6.0	11	26	44	70	SANDY SILT	45.70	37.14	12.87	4.29	24.39	NP	-	-	-	-	-	0.0	-
7.0																		
8.0	38	14/100	-	R	FINE SAND	3.30	15.55	65.73	15.42	-	-	-	-	-	-	-	0.0	-
9.0	14/100			R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-14: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-14/ P13)

(W.T. = 2.0M)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 30.11.2015 Completion date : 03.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	10.0					FINE SAND	1.05	95.15	2.96	0.84	-	-	-	-	-	-	-	0.0
11.0																		
12.0	72	5/100	-	R														
13.0					SANDY GRAVEL													
14.0																		
15.0	42	90	2/100	R		64.05	28.90	5.57	1.48	18.31	NP	-	-	-	-	-	0.00	-
16.0																		
17.0					SANDY SILT													
18.0	44	13/100	-	R		10.40	38.25	39.54	11.81	26.33	NP	-	-	-	-	-	0.00	-

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, ∇ = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-14: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-14/ P13)

(W.T. = 2.0M)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 30.11.2015 Completion date : 03.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	19.0					GRAVELLY SAND												
20.0																		
21.0	60	13/100	-	R		27.30	59.90	9.60	3.20	20.51	NP	-	-	-	-	-	0.0	-
22.0					GRAVELS/ BOULDERS													
23.0																		
24.0	34	56	5/100	R														
25.0					FINE SAND													
26.0																		
27.0	66	8/100	-	R		0.00	91.65	6.76	1.59	-	-	-	-	-	-	-	0.0	-

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-14: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-14/ P13)

(W.T. = 2.0M)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT

NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size

Type of Bit : TC / Diamond

Starting date : 30.11.2015

Completion date : 03.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.			
	28.0					FINE SAND													
29.0																			
30.0	50	11/100	-	R															
31.0																			
32.0																			
33.0	13/100	-	-	R		0.00	92.35	5.97	1.68	23.4	NP	-	-	-	-	-	0.0		
34.0																			
35.0																			
36.0																			

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, γ_w = Water Table, Sp = Swelling Pressure

TABLE-15: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-15/ P14)

(W.T. = 2.0M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 05.12.2015 Completion date : 12.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c	
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	φ deg.			
1.0					SILTY SAND (SM) MIXED WITH GRAVELS	19.24	49.10	25.01	6.65	24.32	NP	-	-	-	-	-	0.0	-	
2.0	18	25	25	50															-v
3.0	35	87	3/100	R															
4.0					SANDY SILT	23.45	60.70	12.20	3.65	-	-	-	-	-	-	-	0.0	-	
5.0	26	25	13/100	R															
6.0	56	70	29	99															
7.0																			
8.0	73	8/100	-	R															
9.0	7	16	22	38		1.60	27.80	52.95	117.65	25.27	NP	-	-	-	-	-	0.0	-	

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-15: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-15/ P14)

(W.T. = 2.0M)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 05.12.2015 Completion date : 12.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	10.0					FINE SAND												
11.0																		
12.0	11/100	-	-	R		7.15	85.10	6.28	1.47	23.39	NP	-	-	-	-	-	0.0	-
13.0					GRAVELS/ BOULDERS													
14.0																		
15.0	12/100	-	-	R														
16.0					SANDY SILT MIXED WITH GRAVELS													
17.0																		
18.0	35	50	60	110		21.50	13.30	50.86	14.34	21.21	NP	-	-	-	-	-	0.0	-

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-15: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-15/ P14)

(W.T. = 2.0M)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size

Type of Bit : TC / Diamond

Starting date : 05.12.2015

Completion date : 12.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	19.0					SANDY SILT MIXED WITH GRAVELS												
20.0																		
21.0	U	D	S			22.20	27.85	38.96	10.99	-	-	-	-	-	-	-	0.0	-
22.0					GRAVELS/ BOULDERS													
23.0																		
24.0	11/100	-	-	R														
25.0					FINE SAND													
26.0																		
27.0	13/100	-	-	R														

* = Consolidation Test,

c_c = Compression Index,

DFS = Differential Free Swell,

W = Water Table,

Sp = Swelling Pressure

Table Cont.

TABLE-15: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-15/ P14)

(W.T. = 2.0M)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT

NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size

Type of Bit : TC / Diamond

Starting date : 05.12.2015

Completion date : 12.12.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	28.0					FINE SAND	2.90	88.80	6.56	1.74	24.39	NP	-	-	-	-	-	0.0
29.0																		
30.0	12/100	-	-	R														
31.0																		
32.0																		
33.0	10/100	-	-	R		6.10	82.80	8.55	2.55	18.30	NP	-	-	-	-	-	0.0	-
34.0																		
35.0																		
36.0																		

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, Δv = Water Table, Sp = Swelling Pressure

TABLE-16: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-16/A2) (W.T. = 2.5M)

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 26.11.2015 Completion date : 30.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
1.0					HIGHLY WEATHERED ROCK (GRAVELS/ BOULDERS)	Core Recovery = 28.0%						RQD = 0.0%						
2.0						Core Recovery = 24.0%						RQD = 0.0%						
3.0						Core Recovery = 0.0%						RQD = 0.0%						
4.0	12/100	-	-	R														
5.0																		
6.0	10/100	-	-	R														
7.0					SILTY SAND (SM) MIXED WITH GRAVELS													
8.0	72	11/100	-	R		27.20	44.30	21.95	6.56	20.38	NP	-	-	-	-	-	0.0	-
9.0	15	30	40	70														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-16: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-16/A2) (W.T. = 2.5M)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT

NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 26.11.2015 Completion date : 30.11.2015

Depth (m)	N - value				IS Classification	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Soil Description	Gravel %	Sand %	Silt %	Clay %	Liquid Limit %				Plastic Limit %	c t/m ²		
10.0					GRAVELS/ BOULDERS													
11.0																		
12.0	13/100	-	-	R														
13.0																		
14.0																		
15.0	13/100	-	-	R	GRAVELLY SAND													
16.0																		
17.0						16.85	71.55	8.70	2.90	19.80	NP	-	-	-	-	-	0.0	-
18.0	13/100	-	-	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, ∇ = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-16: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-16/A2) (W.T. = 2.5M)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 26.11.2015 Completion date : 30.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c		
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.				
	19.0					SILTY SAND (SM)	0.00	59.05	33.17	7.78	25.51	NP	-	-	-	-	-	0.0	-	
20.0																				
21.0	20	34	48	82																
22.0																				
23.0																				
24.0																				
25.0					GRAVELS/ BOULDERS															
26.0																				
27.0	74	9/100																		

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

Table Cont.

TABLE-16: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-16/A2) (W.T. = 2.5M)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT NO.25 - DETAILS DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 26.11.2015 Completion date : 30.11.2015

Depth (m)	N - value				IS Classification	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content, % (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Soil Description	Gravel %	Sand %	Silt %	Clay %	Liquid Limit %				Plastic Limit %	c t/m ²		
28.0					GRAVELS/ BOULDERS													
29.0																		
30.0	80	7/100	-	R														
31.0																		
32.0																		
33.0	10/100	-	-	R														
34.0																		
35.0																		
36.0	8/100	-	-	R														

* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, -v = Water Table, Sp = Swelling Pressure

TABLE-16: RESULT SHEET FOR MAJOR BRIDGE AT DES. CH.00+385 (BH-16/A2) (W.T. = 2.5M)

Table Cont.

PROJECT : GEOTECHNICAL INVESTIGATION FOR PREPARING DPR FOR ADB TA NO.8116-IND: TASUB PROJECT
 NO.25 - DETAILS DESIGN OF THE SASSEC SUB REGIONAL CONNECTIVITY - REG.

Size of Hole : Nx Size Type of Bit : TC / Diamond Starting date : 26.11.2015 Completion date : 30.11.2015

Depth (m)	N - value				IS Classification Soil Description	Sieve Size Analysis with hydrometer test				Atterberg Limits		Natural Moisture content,% (Sr, %)	Specific Gravity	Bulk Density (t/m ³)	Shear Parameter		DFS %	* C _c
	15	30	45	N		Gravel %	Sand %	Silt %	Clay %	Liquid Limit %	Plastic Limit %				c t/m ²	ø deg.		
	37.0					GRAVELS/ BOULDERS												
38.0																		
39.0	45	13/100		R														
40.0																		
41.0																		
42.0																		
43.0																		
44.0																		
45.0																		

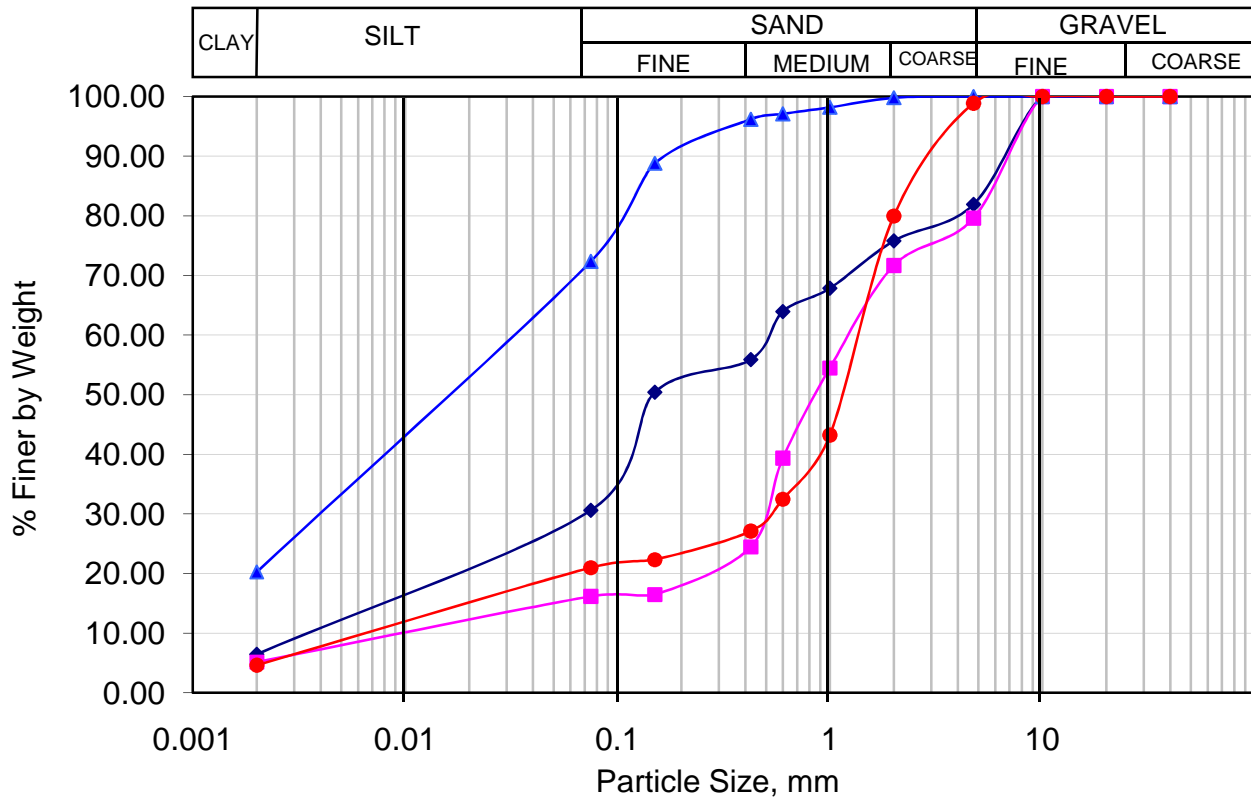
* = Consolidation Test, c_c = Compression Index, DFS = Differential Free Swell, Δv = Water Table, Sp = Swelling Pressure

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-1 (A-1)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-1 (A-1)	0.50	SM*	18.08	51.32	24.17	6.43
■	BH-1 (A-1)	1.50	SM*	20.40	63.45	10.98	5.17
▲	BH-1 (A-1)	6.00	SANDY SILT	0.00	27.65	52.09	20.26
●	BH-1 (A-1)	27.00	SM	1.15	77.85	16.38	4.62

SM* = SILTY SAND (SM) MIXED WITH GRAVELS
SM = SILTY SAND

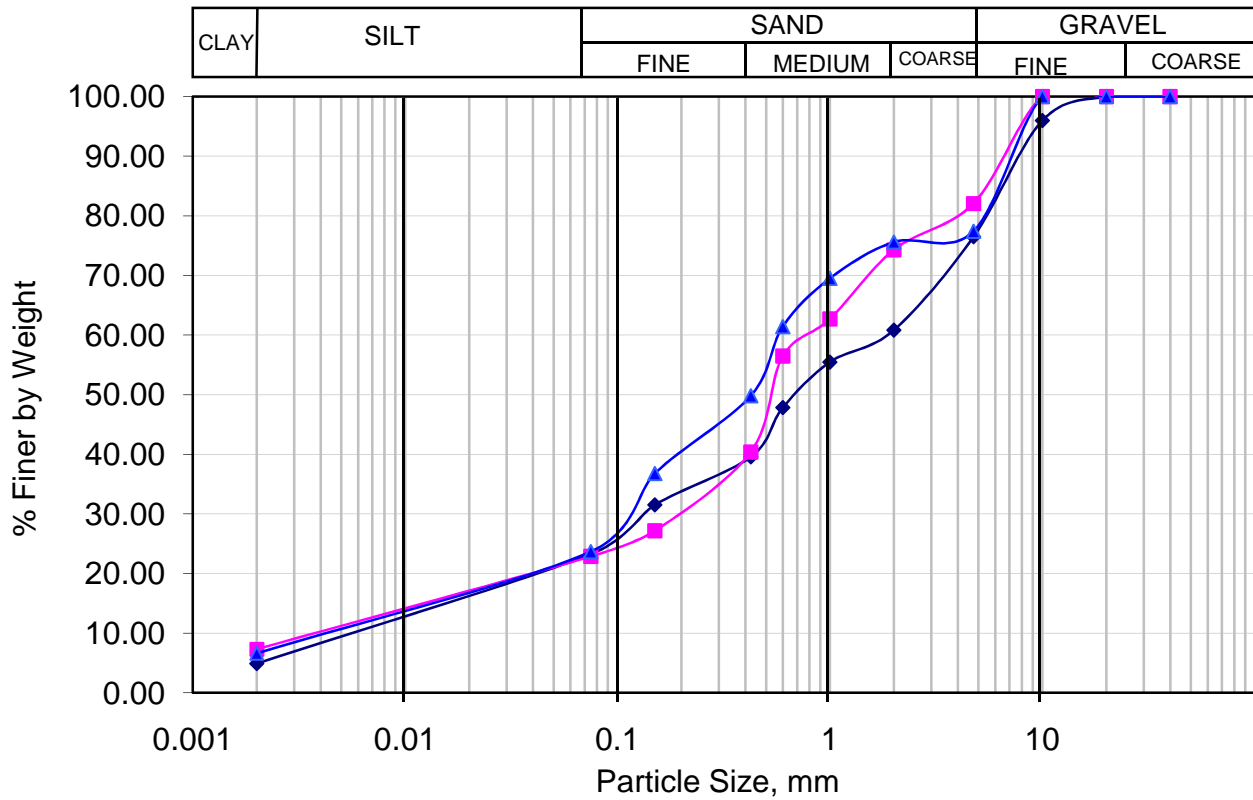
Depth =	0.50	Weighted Mean Dia, d_m	=	1.78	mm,	$f = 2.35$
Depth =	1.50	Weighted Mean Dia, d_m	=	2.26	mm,	$f = 2.64$
Depth =	6.00	Weighted Mean Dia, d_m	=	0.11	mm,	$f = 0.59$
Depth =	27.00	Weighted Mean Dia, d_m	=	1.41	mm,	$f = 2.09$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-2 (P-1)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-2 (P-1)	0.50	SM*	23.49	53.27	18.36	4.88
■	BH-2 (P-1)	3.00	SM*	17.90	59.25	15.54	7.31
▲	BH-2 (P-1)	7.50	SM*	22.60	53.75	17.03	6.62

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

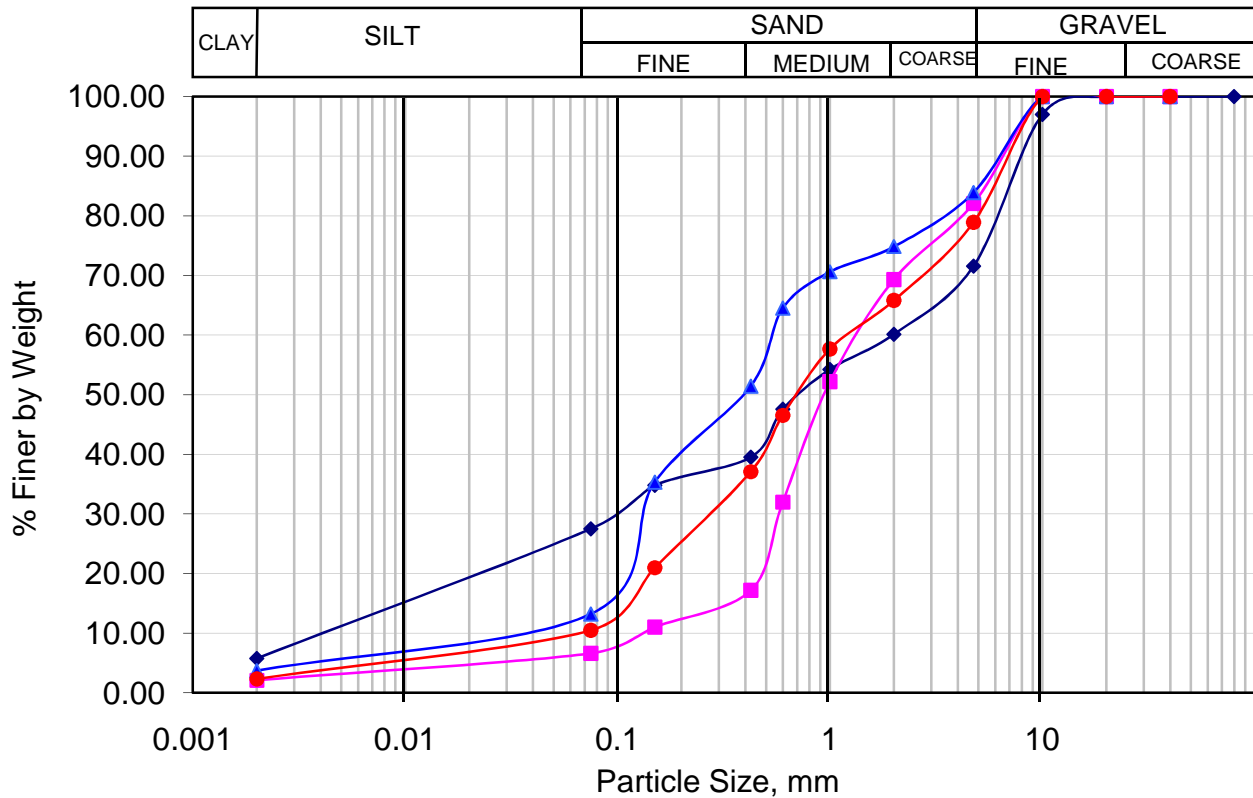
Depth =	0.50	Weighted Mean Dia, d_m	=	2.80	mm,	$f = 2.94$
Depth =	3.00	Weighted Mean Dia, d_m	=	1.94	mm,	$f = 2.45$
Depth =	7.50	Weighted Mean Dia, d_m	=	2.00	mm,	$f = 2.49$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-3 (P-2)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-3 (P-2)	0.50	SM*	28.46	44.08	21.69	5.77
■	BH-3 (P-2)	1.50	GRAVELLY SAND	17.90	75.50	4.49	2.11
▲	BH-3 (P-2)	4.50	GRAVELLY SAND	16.10	70.70	9.50	3.70
●	BH-3 (P-2)	12.00	GRAVELLY SAND	21.10	68.45	8.15	2.30

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

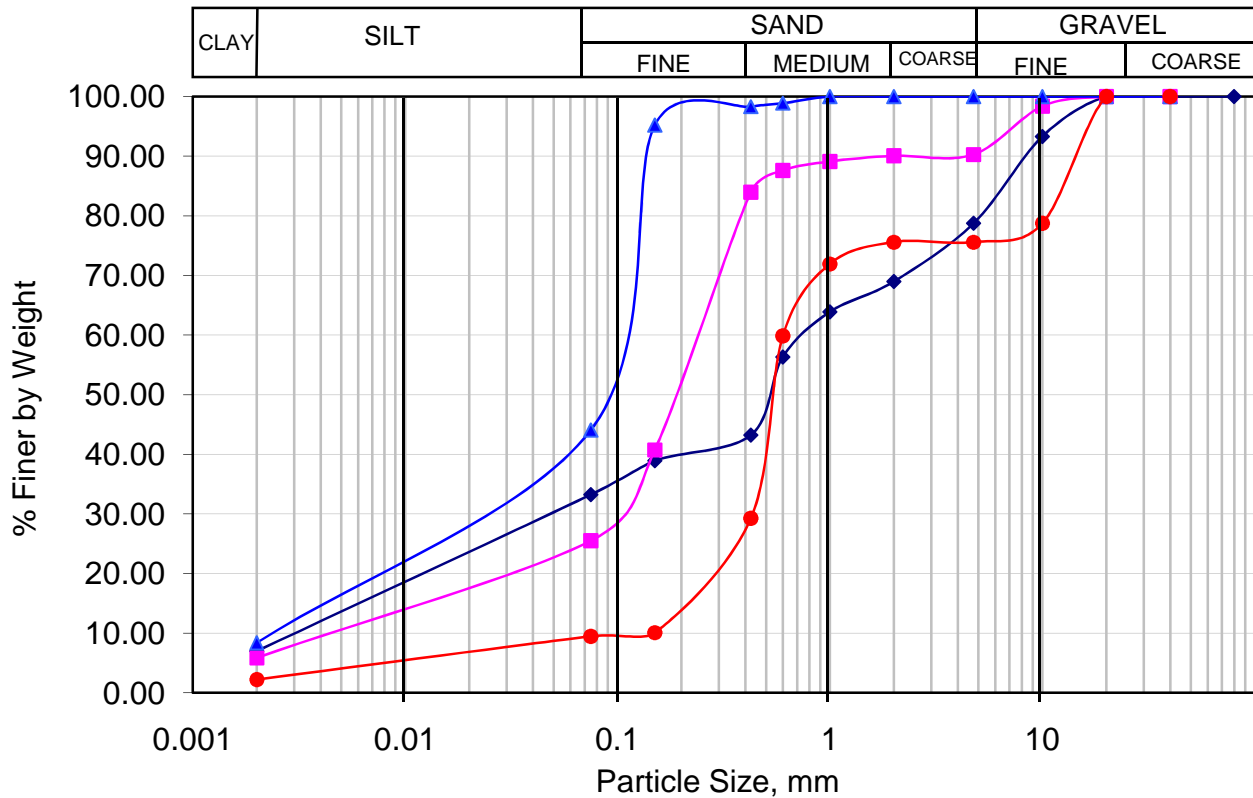
Depth =	0.50	Weighted Mean Dia, d_m	=	2.93	mm,	f = 3.01
Depth =	1.50	Weighted Mean Dia, d_m	=	2.27	mm,	f = 2.65
Depth =	4.50	Weighted Mean Dia, d_m	=	1.75	mm,	f = 2.33
Depth =	12.00	Weighted Mean Dia, d_m	=	2.32	mm,	f = 2.68

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-4 (P-3)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-4 (P-3)	0.50	SM*	21.25	45.55	26.23	6.97
■	BH-4 (P-3)	3.00	SM	9.70	64.80	19.64	5.87
▲	BH-4 (P-3)	6.00	SM	0.00	55.95	35.68	8.37
●	BH-4 (P-3)	15.00	GRAVELLY SAND	24.40	66.15	7.28	2.17

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

SM = SILTY SAND

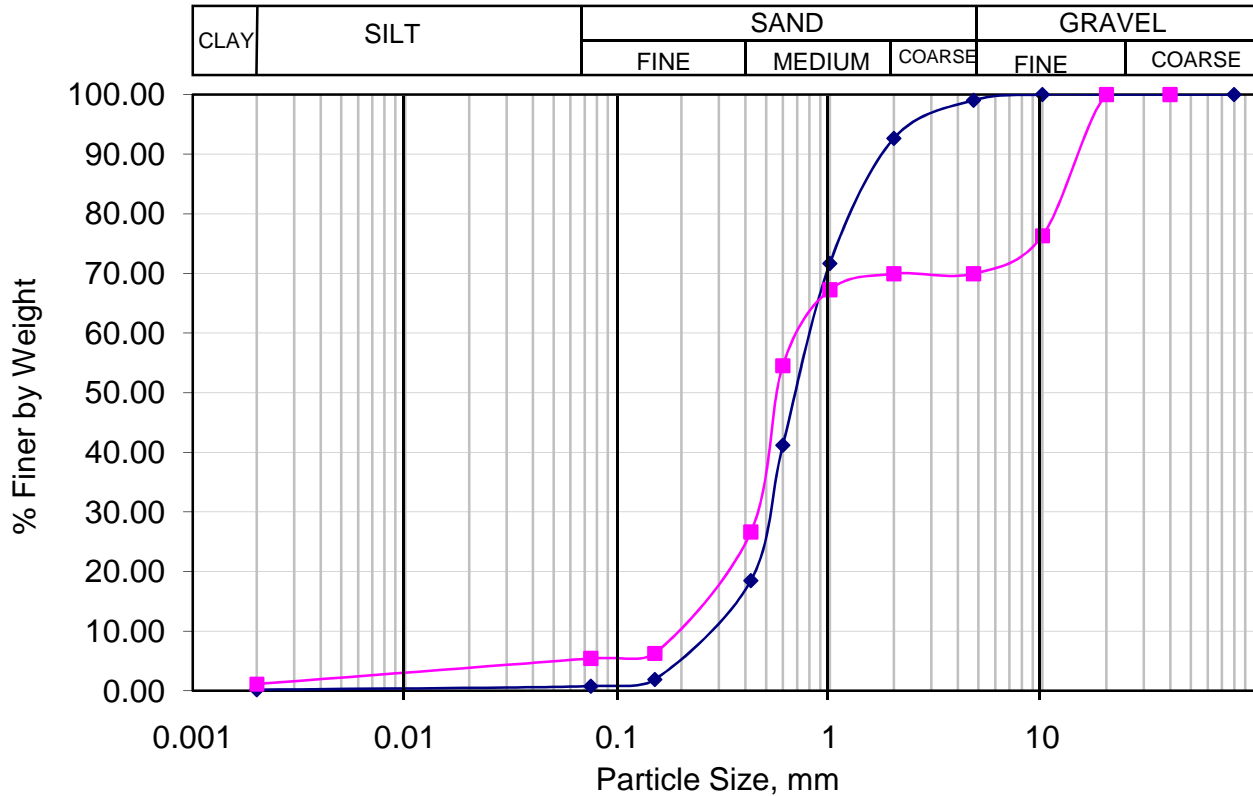
Depth =	0.50	Weighted Mean Dia, d_m	=	2.64	mm,	$f = 2.86$
Depth =	3.00	Weighted Mean Dia, d_m	=	1.04	mm,	$f = 1.80$
Depth =	6.00	Weighted Mean Dia, d_m	=	0.12	mm,	$f = 0.61$
Depth =	15.00	Weighted Mean Dia, d_m	=	3.79	mm,	$f = 3.43$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-4 (P-3)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
—◆—	BH-4 (P-3)	21.00	FINE SAND	0.95	98.30	0.59	0.16
—■—	BH-4 (P-3)	24.00	GRAVELLY SAND	30.05	64.55	4.27	1.13

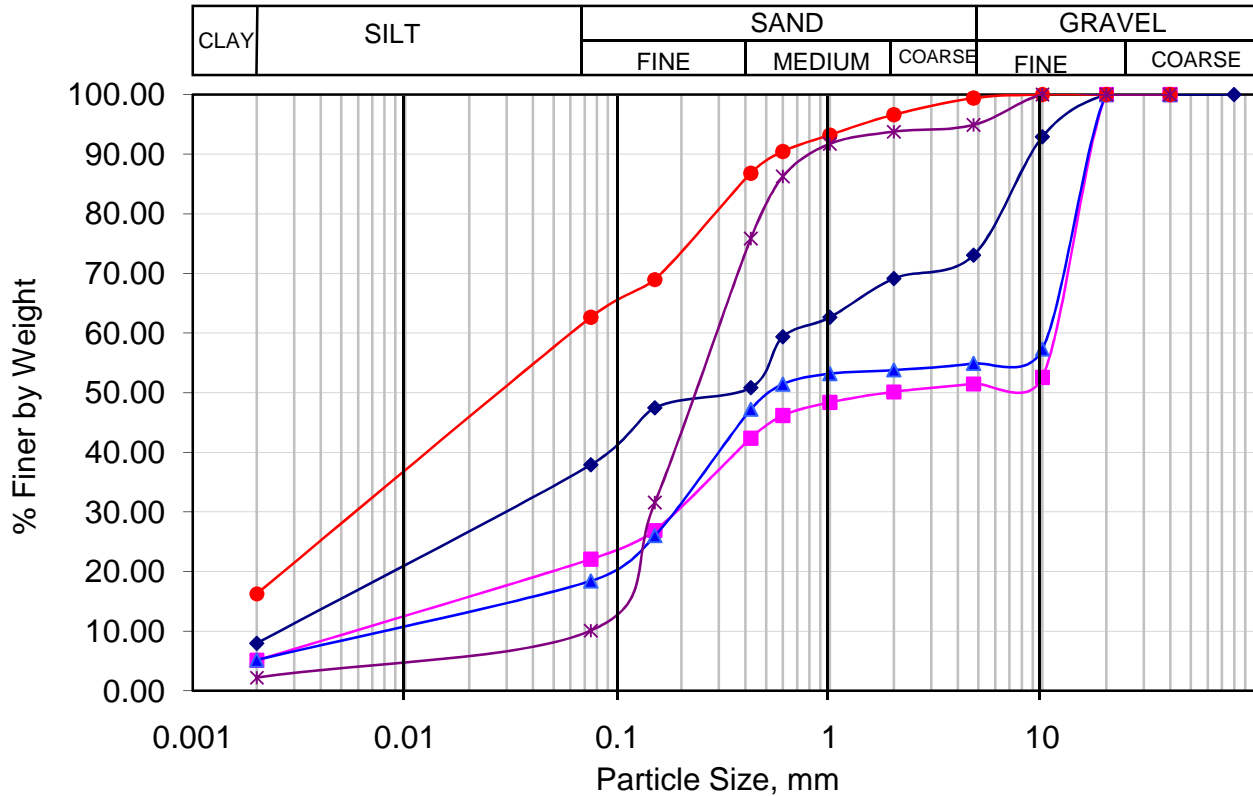
Depth = 21.00 Weighted Mean Dia, d_m = 1.01 mm, $f = 1.77$
 Depth = 24.00 Weighted Mean Dia, d_m = 4.37 mm, $f = 3.68$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-5 (P-4)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-5 (P-4)	0.50	SM*	26.95	35.18	29.92	7.95
■	BH-5 (P-4)	3.00	SANDY GRAVELS	48.50	29.45	16.98	5.07
▲	BH-5 (P-4)	4.50	SANDY GRAVELS	45.10	36.50	13.25	5.15
●	BH-5 (P-4)	6.00	SANDY SILT	0.60	36.75	46.36	16.29
✱	BH-5 (P-4)	7.50	FINE SAND	5.10	84.80	7.88	2.22

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

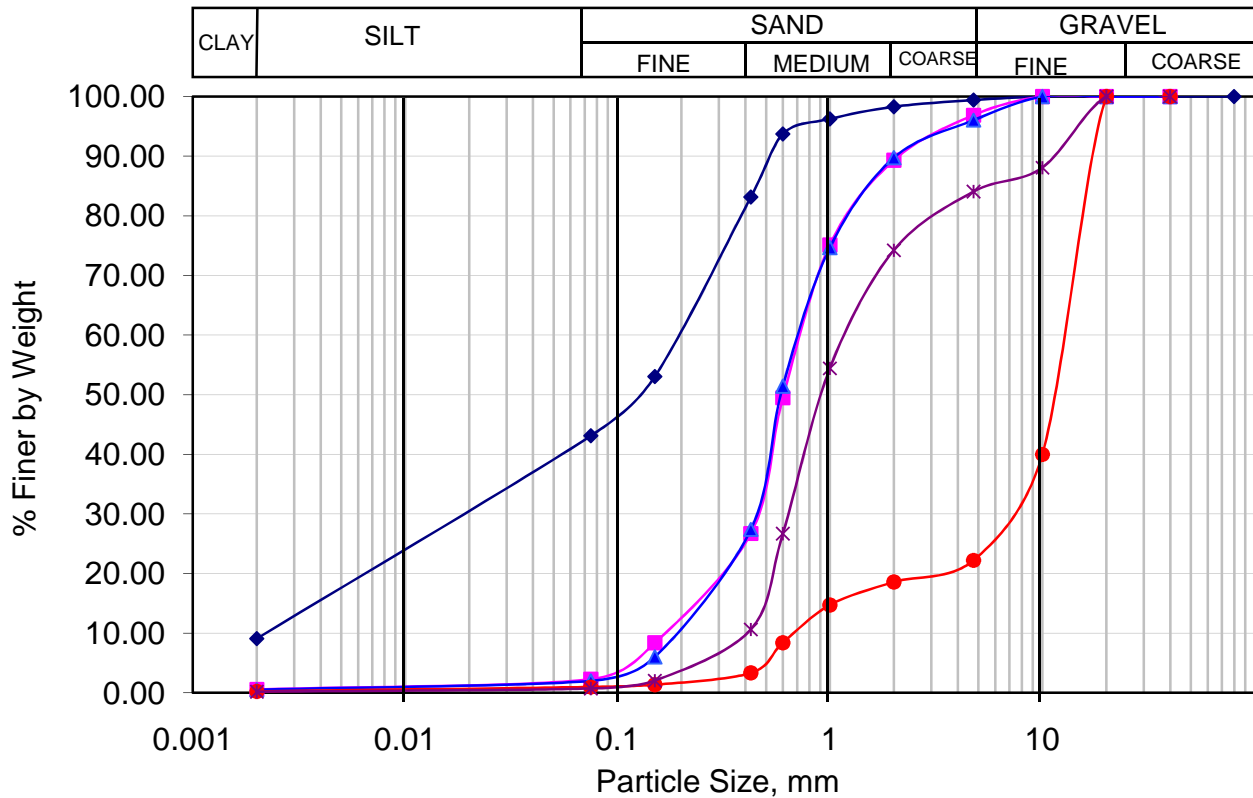
Depth =	0.50	Weighted Mean Dia, d_m	=	2.86	mm,	$f = 2.98$
Depth =	3.00	Weighted Mean Dia, d_m	=	7.36	mm,	$f = 4.78$
Depth =	4.50	Weighted Mean Dia, d_m	=	6.74	mm,	$f = 4.57$
Depth =	6.00	Weighted Mean Dia, d_m	=	0.31	mm,	$f = 0.98$
Depth =	7.50	Weighted Mean Dia, d_m	=	0.70	mm,	$f = 1.47$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-5 (P-4)

Grain Size Analysis



Symbol	BH No.	Depth, m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-5 (P-4)	9.00	SM	0.60	56.30	34.05	9.05
■	BH-5 (P-4)	12.00	FINE SAND	3.10	94.65	1.73	0.52
▲	BH-5 (P-4)	18.00	FINE SAND	3.95	94.05	1.50	0.50
●	BH-5 (P-4)	24.00	SANDY GRAVELS	77.76	21.26	0.79	0.19
✱	BH-5 (P-4)	27.00	GRAVELLY SAND	15.95	83.35	0.55	0.15

SM = SILTY SAND

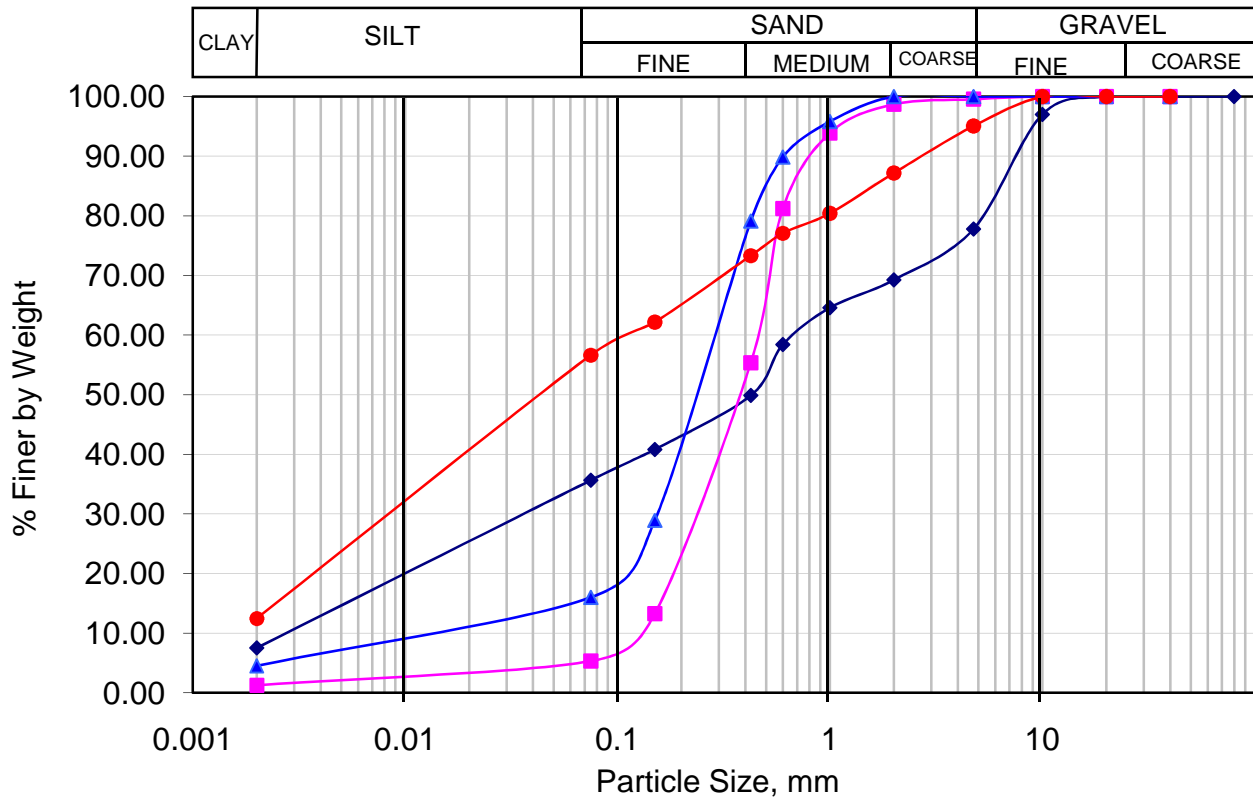
Depth =	9.00	Weighted Mean Dia, d_m	=	0.30	mm,	$f = 0.96$
Depth =	12.00	Weighted Mean Dia, d_m	=	1.08	mm,	$f = 1.83$
Depth =	18.00	Weighted Mean Dia, d_m	=	1.11	mm,	$f = 1.85$
Depth =	24.00	Weighted Mean Dia, d_m	=	10.58	mm,	$f = 5.72$
Depth =	27.00	Weighted Mean Dia, d_m	=	3.04	mm,	$f = 3.07$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-6 (P-5)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-6 (P-5)	0.50	SM*	22.22	42.12	28.17	7.49
■	BH-6 (P-5)	4.50	FINE SAND	0.45	94.25	4.08	1.22
▲	BH-6 (P-5)	7.50	SM	0.00	84.00	11.52	4.48
●	BH-6 (P-5)	15.00	SANDY SILT	4.95	38.40	44.19	12.46

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

SM = SILTY SAND

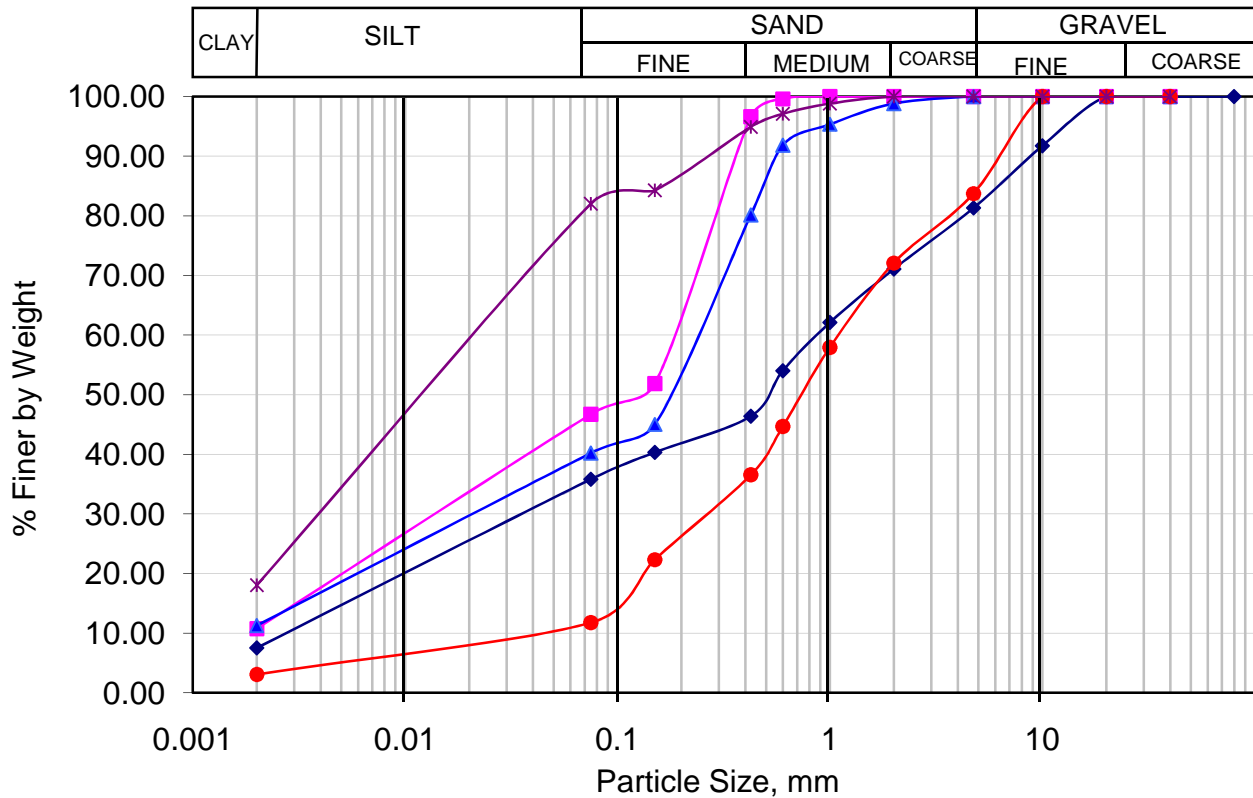
Depth =	0.50	Weighted Mean Dia, d_m	=	2.36	mm,	$f = 2.71$
Depth =	4.50	Weighted Mean Dia, d_m	=	0.50	mm,	$f = 1.24$
Depth =	7.50	Weighted Mean Dia, d_m	=	0.33	mm,	$f = 1.01$
Depth =	15.00	Weighted Mean Dia, d_m	=	0.84	mm,	$f = 1.61$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-7 (P-6)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-7 (P-6)	0.50	SM*	18.70	45.50	28.28	7.52
■	BH-7 (P-6)	4.50	SM	0.00	53.30	35.96	10.74
▲	BH-7 (P-6)	7.50	SM	0.00	59.80	28.94	11.26
●	BH-7 (P-6)	9.00	GRAVELLY SAND	16.25	72.00	8.70	3.06
✱	BH-7 (P-6)	12.00	SANDY SILT	0.00	18.00	63.96	18.04

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

SM = SILTY SAND

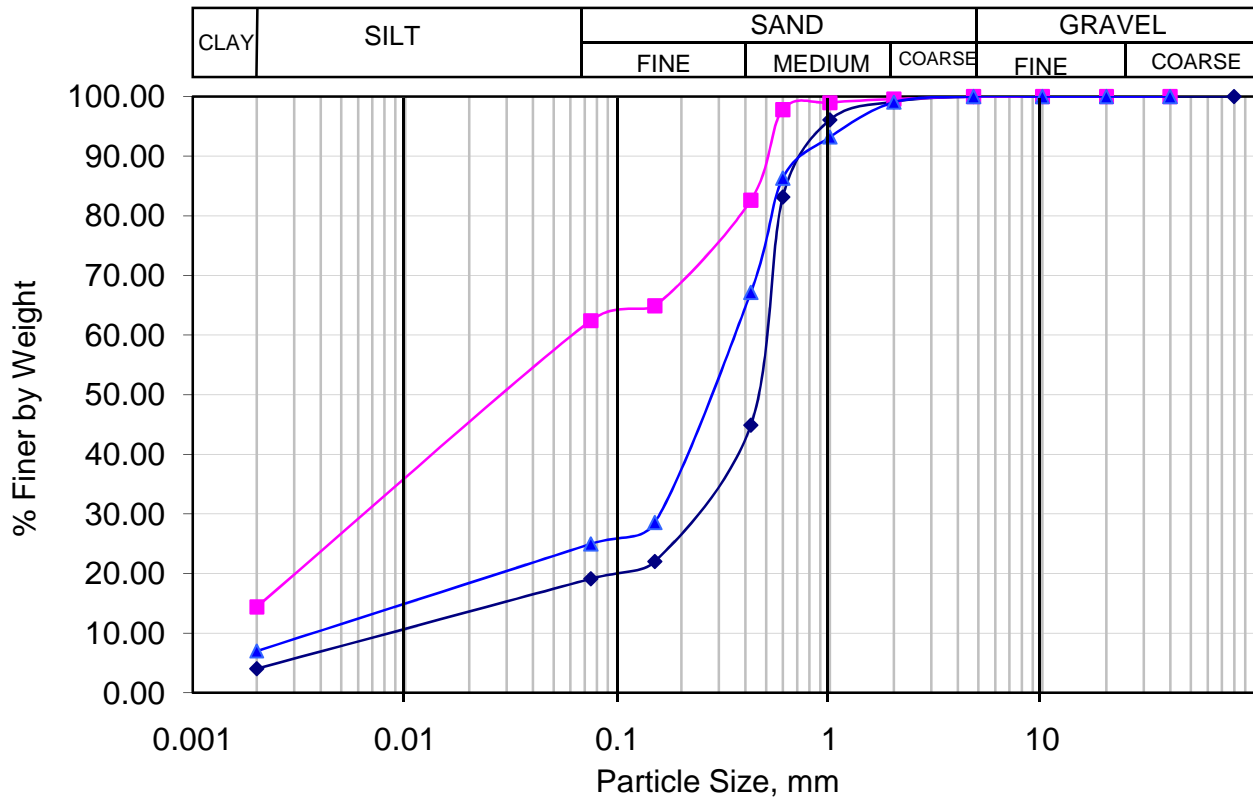
Depth =	0.50	Weighted Mean Dia, d_m	=	2.63	mm,	$f = 2.85$
Depth =	4.50	Weighted Mean Dia, d_m	=	0.17	mm,	$f = 0.73$
Depth =	7.50	Weighted Mean Dia, d_m	=	0.30	mm,	$f = 0.97$
Depth =	9.00	Weighted Mean Dia, d_m	=	2.01	mm,	$f = 2.49$
Depth =	12.00	Weighted Mean Dia, d_m	=	0.11	mm,	$f = 0.58$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-7 (P-6)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-7 (P-6)	15.00	SM	0.00	80.90	15.09	4.01
■	BH-7 (P-6)	18.00	SANDY SILT	0.00	37.55	48.09	14.36
▲	BH-7 (P-6)	21.00	SM	0.00	75.05	17.96	6.99

SM = SILTY SAND

GM* = SILTY GRAVELS (GM) MIXED WITH SAND

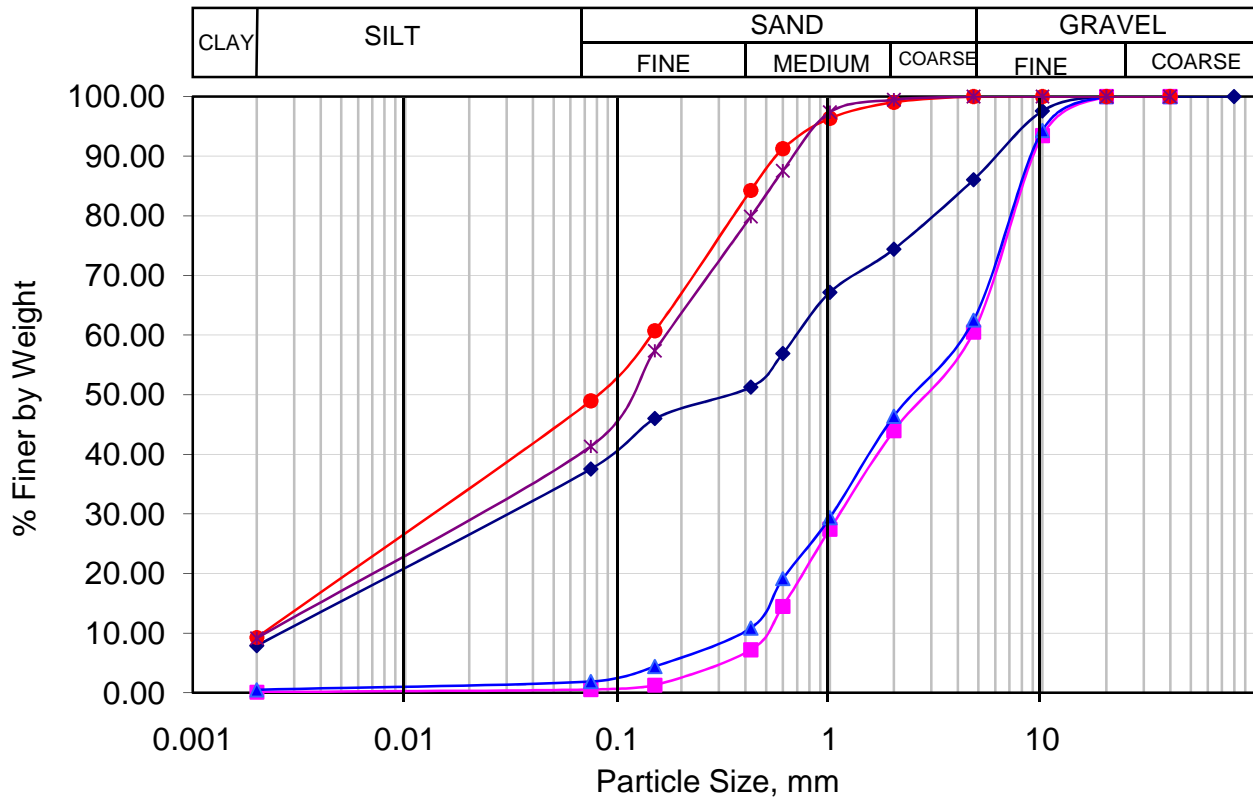
Depth =	15.00	Weighted Mean Dia, d_m	=	0.45	mm,	$f = 1.18$
Depth =	18.00	Weighted Mean Dia, d_m	=	0.19	mm,	$f = 0.76$
Depth =	21.00	Weighted Mean Dia, d_m	=	0.40	mm,	$f = 1.11$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-8 (P-7)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-8 (P-7)	0.50	SM*	13.95	48.52	29.64	7.88
■	BH-8 (P-7)	3.00	GRAVELLY SAND	39.52	59.96	0.40	0.12
▲	BH-8 (P-7)	6.00	GRAVELLY SAND	37.50	60.62	1.41	0.47
●	BH-8 (P-7)	9.00	SM	0.00	51.05	39.65	9.30
✱	BH-8 (P-7)	10.50	SM	0.00	58.65	32.25	9.10

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

SM = SILTY SAND

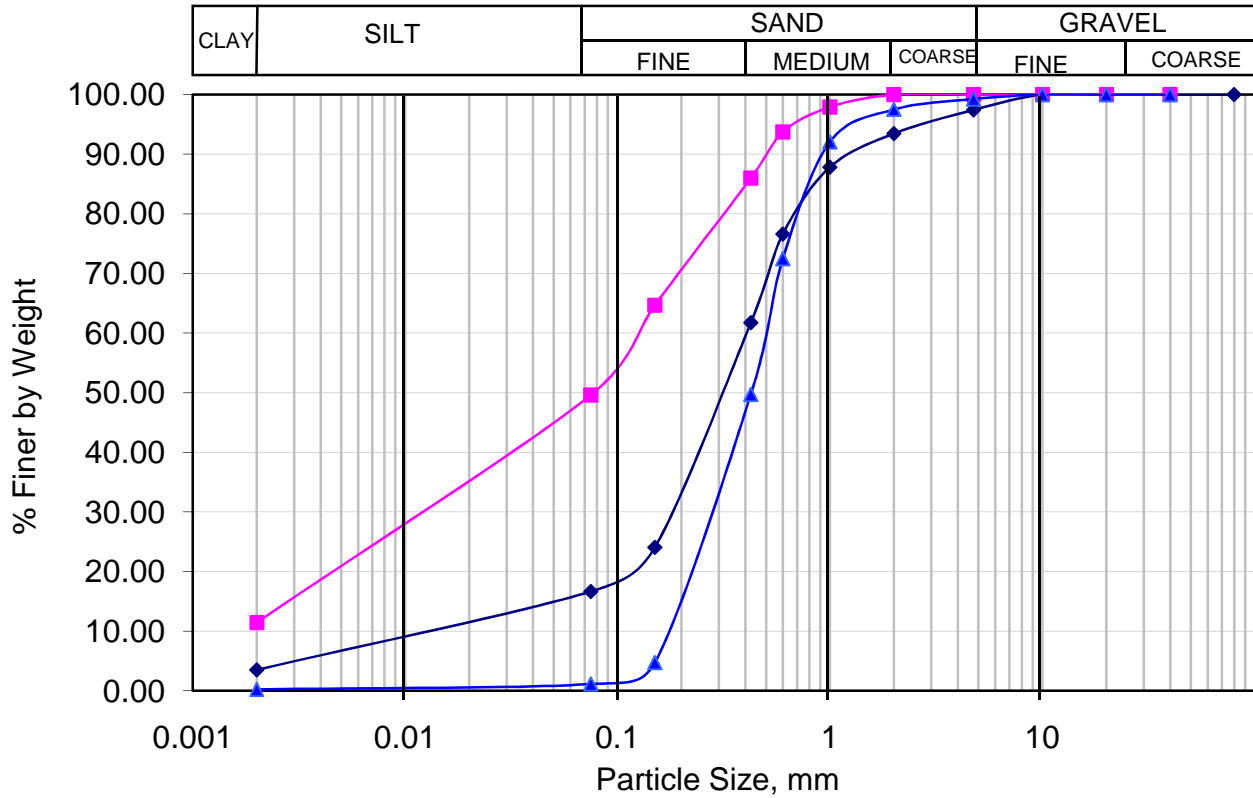
Depth =	0.50	Weighted Mean Dia, d_m	=	1.87	mm,	f = 2.40
Depth =	3.00	Weighted Mean Dia, d_m	=	4.38	mm,	f = 3.68
Depth =	6.00	Weighted Mean Dia, d_m	=	4.14	mm,	f = 3.58
Depth =	9.00	Weighted Mean Dia, d_m	=	0.25	mm,	f = 0.88
Depth =	10.50	Weighted Mean Dia, d_m	=	0.27	mm,	f = 0.91

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-8 (P-7)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-8 (P-7)	15.00	SM	2.55	80.80	13.15	3.50
■	BH-8 (P-7)	21.00	SM	0.00	50.40	38.19	11.41
▲	BH-8 (P-7)	30.00	FINE SAND	0.75	98.15	0.89	0.21

SM = SILTY SAND

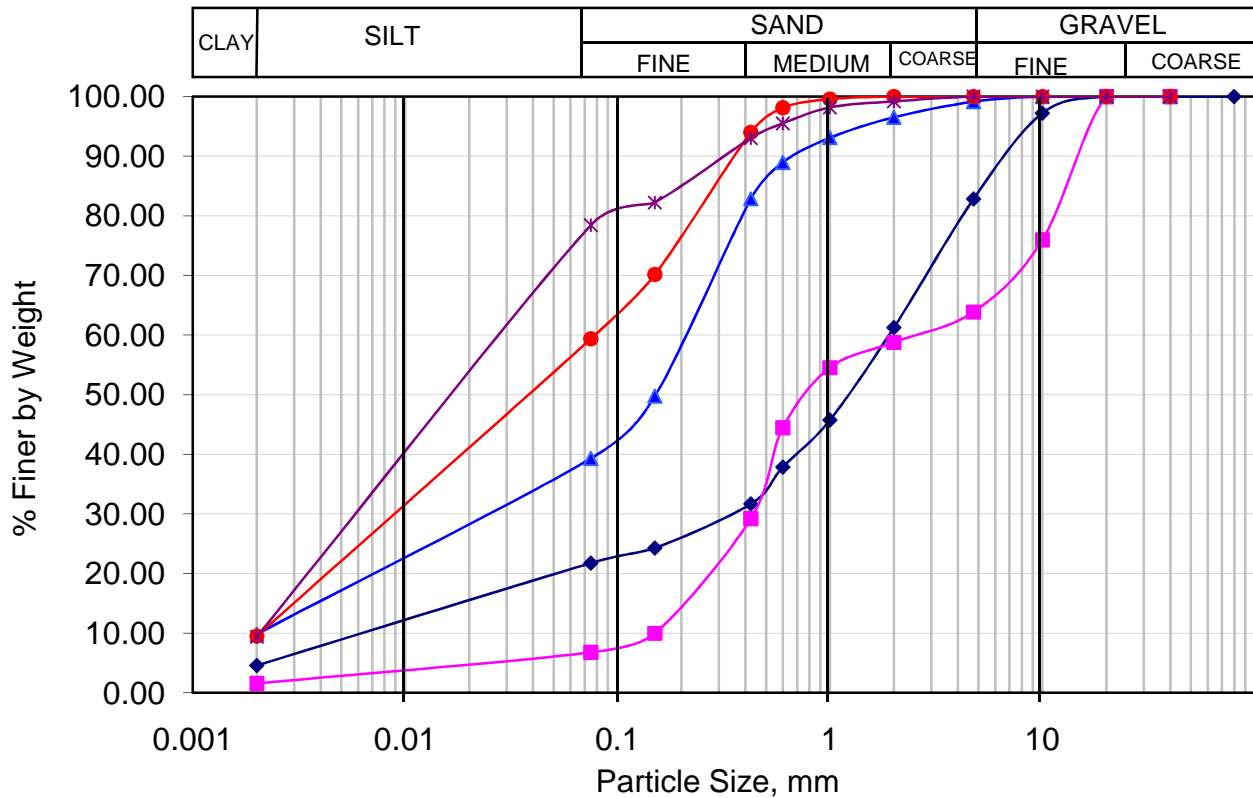
Depth =	15.00	Weighted Mean Dia, d_m	=	0.70	mm,	f = 1.47
Depth =	21.00	Weighted Mean Dia, d_m	=	0.20	mm,	f = 0.79
Depth =	30.00	Weighted Mean Dia, d_m	=	0.60	mm,	f = 1.37

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-9 (P-8)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-9 (P-8)	0.50	SM*	17.18	61.07	17.19	4.57
■	BH-9 (P-8)	4.50	GRAVELLY SAND	36.10	57.15	5.20	1.55
▲	BH-9 (P-8)	7.50	SM	0.85	59.85	29.48	9.83
●	BH-9 (P-8)	12.00	SANDY SILT	0.00	40.65	49.85	9.50
✱	BH-9 (P-8)	15.00	SANDY SILT	0.00	21.60	68.99	9.41

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

SM = SILTY SAND

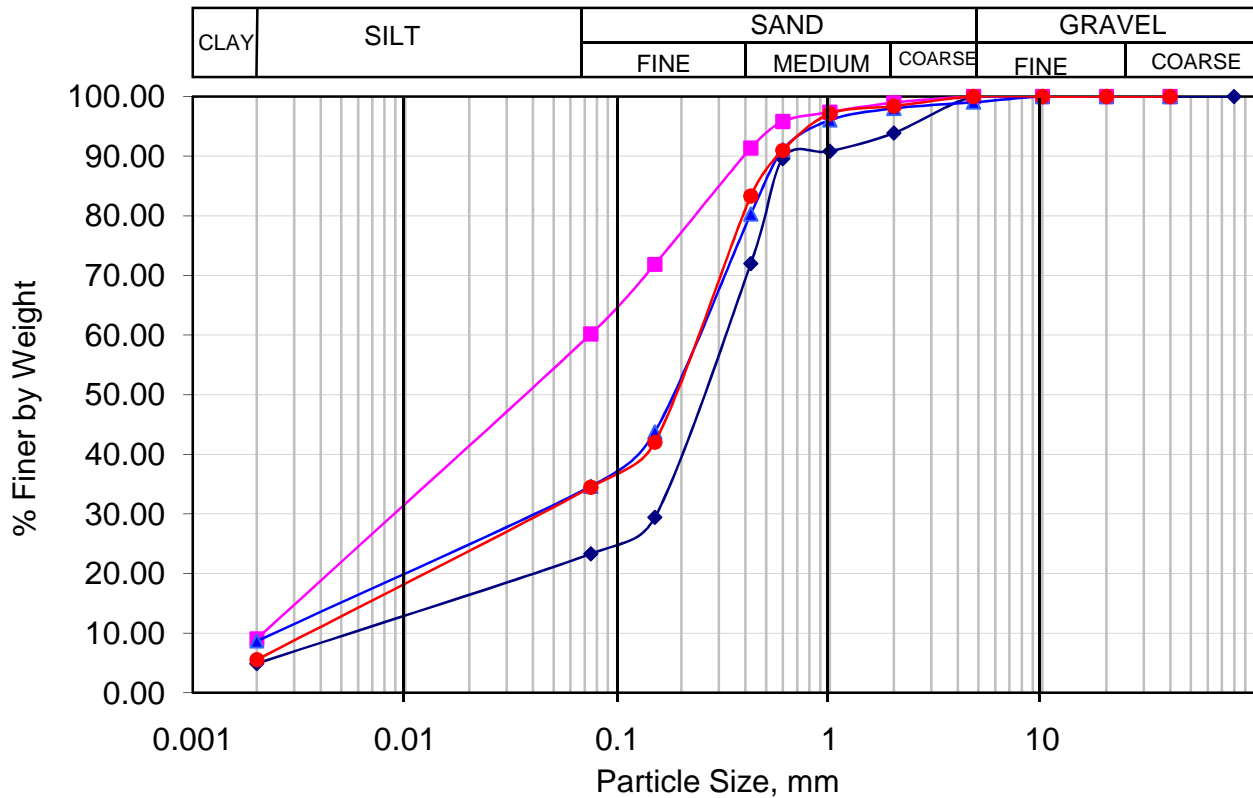
Depth =	0.50	Weighted Mean Dia, d_m	=	2.57	mm,	$f = 2.82$
Depth =	4.50	Weighted Mean Dia, d_m	=	4.95	mm,	$f = 3.92$
Depth =	7.50	Weighted Mean Dia, d_m	=	0.39	mm,	$f = 1.10$
Depth =	12.00	Weighted Mean Dia, d_m	=	0.14	mm,	$f = 0.66$
Depth =	15.00	Weighted Mean Dia, d_m	=	0.14	mm,	$f = 0.66$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-9 (P-8)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-9 (P-8)	21.00	SM	0.00	76.70	18.41	4.89
■	BH-9 (P-8)	24.00	SANDY SILT	0.00	39.85	51.13	9.02
▲	BH-9 (P-8)	27.00	SM	0.95	64.45	25.95	8.65
●	BH-9 (P-8)	33.00	SM	0.00	65.55	28.94	5.51

SM = SILTY SAND

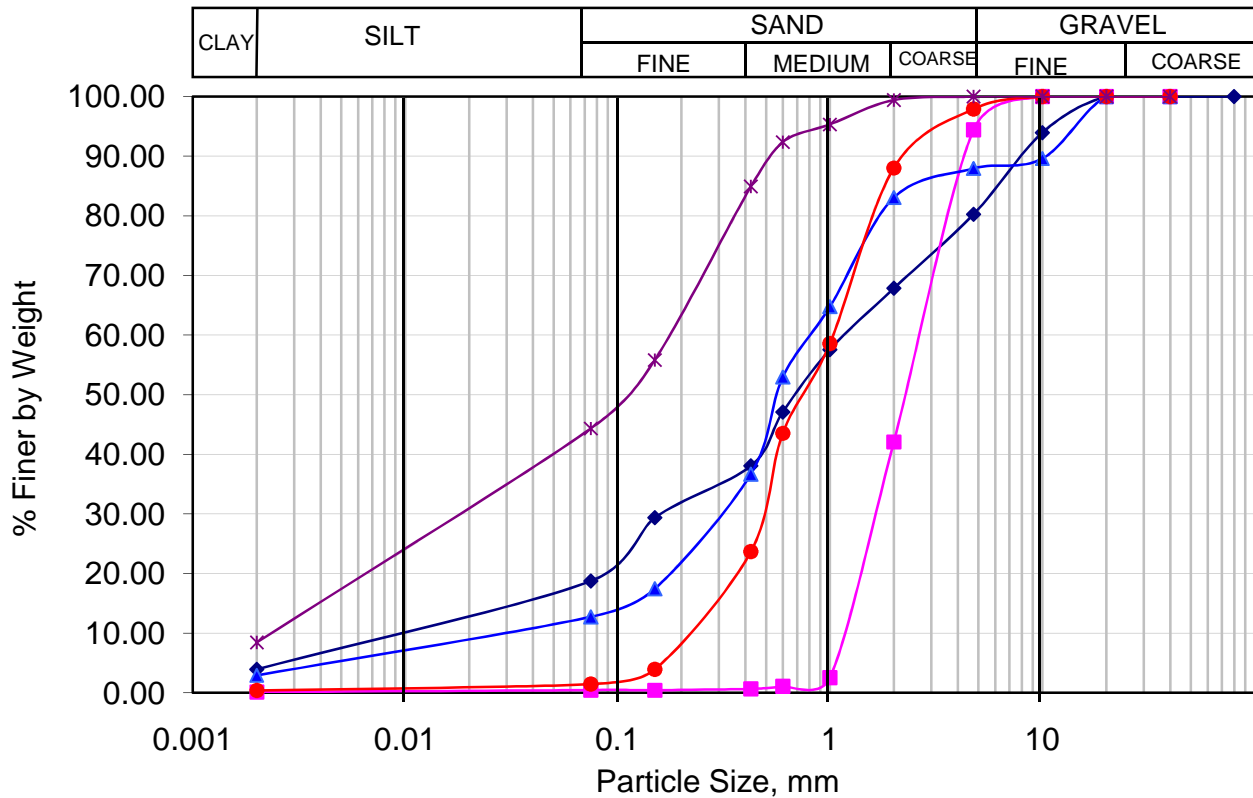
Depth =	21.00	Weighted Mean Dia, d_m	=	0.49	mm,	$f = 1.23$
Depth =	24.00	Weighted Mean Dia, d_m	=	0.19	mm,	$f = 0.76$
Depth =	27.00	Weighted Mean Dia, d_m	=	0.36	mm,	$f = 1.05$
Depth =	33.00	Weighted Mean Dia, d_m	=	0.30	mm,	$f = 0.97$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-10 (P-9)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-10 (P-9)	0.50	SM*	19.76	61.51	14.79	3.93
■	BH-10 (P-9)	3.00	COARSER SAND	5.60	93.95	0.35	0.10
▲	BH-10 (P-9)	6.00	GRAVELLY SAND	12.05	75.25	9.78	2.92
●	BH-10 (P-9)	9.00	FINE SAND	2.10	96.45	1.09	0.36
✱	BH-10 (P-9)	15.00	SM	0.00	55.65	35.92	8.43

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

SM = SILTY SAND

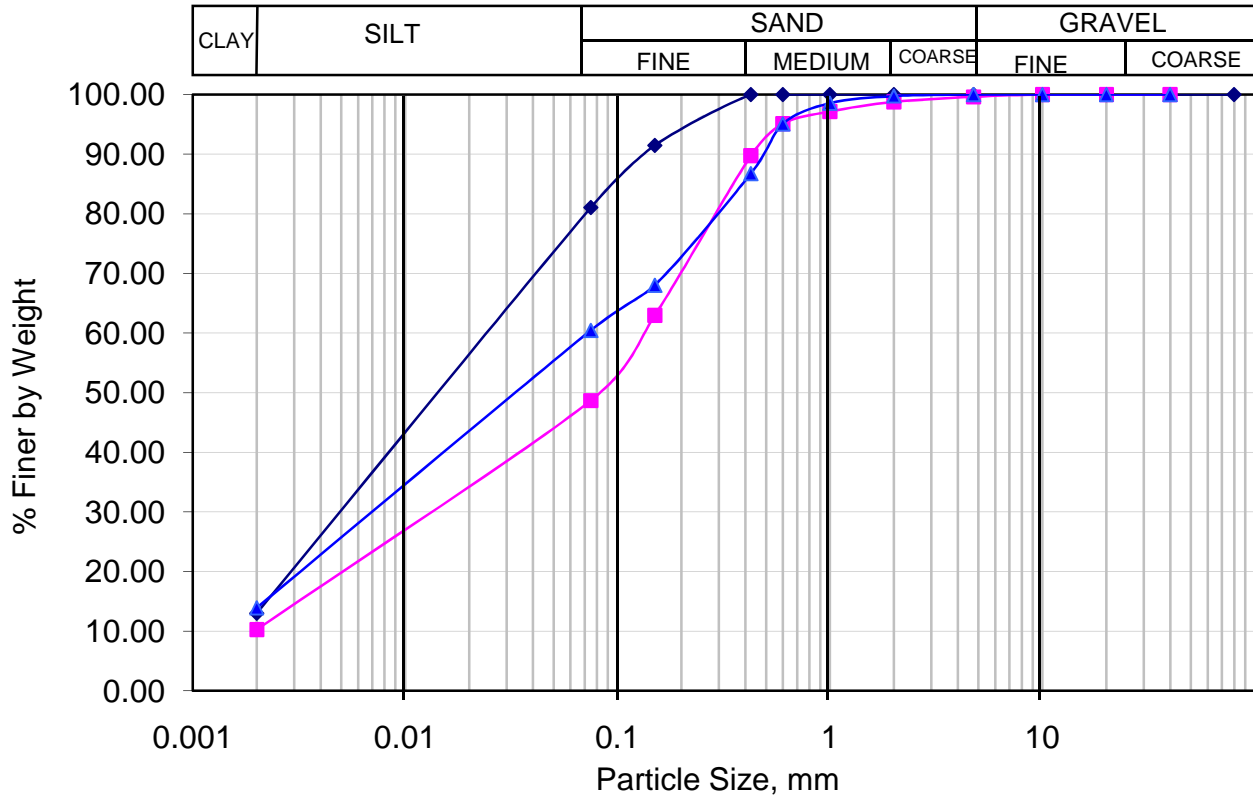
Depth =	0.50	Weighted Mean Dia, d_m	=	2.67	mm,	$f = 2.87$
Depth =	3.00	Weighted Mean Dia, d_m	=	2.79	mm,	$f = 2.94$
Depth =	6.00	Weighted Mean Dia, d_m	=	2.36	mm,	$f = 2.71$
Depth =	9.00	Weighted Mean Dia, d_m	=	1.21	mm,	$f = 1.94$
Depth =	15.00	Weighted Mean Dia, d_m	=	0.26	mm,	$f = 0.89$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-10 (P-9)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-10 (P-9)	18.00	SANDY SILT	0.00	18.95	68.08	12.97
■	BH-10 (P-9)	24.00	SM	0.35	50.95	38.47	10.23
▲	BH-10 (P-9)	27.00	SANDY SILT	0.00	39.55	46.55	13.90

SM = SILTY SAND

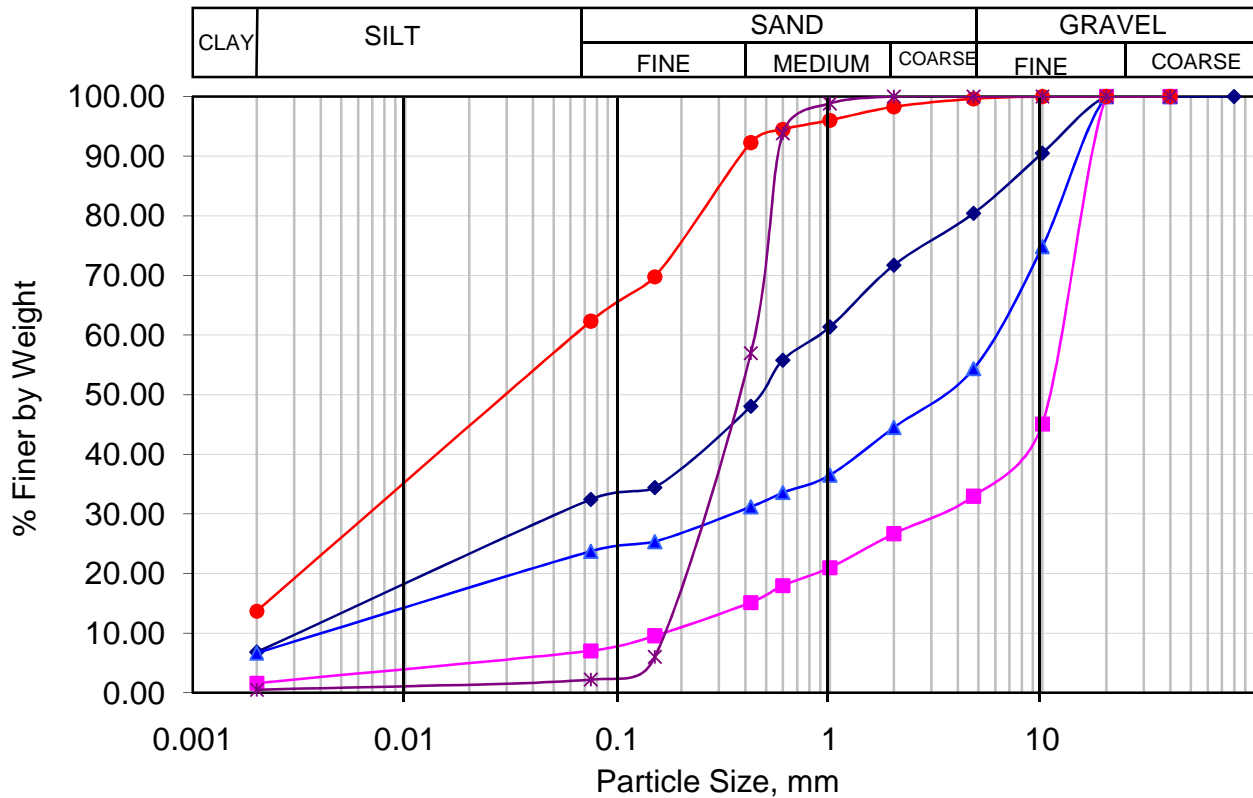
Depth =	18.00	Weighted Mean Dia, d_m	=	0.07	mm,	$f = 0.45$
Depth =	24.00	Weighted Mean Dia, d_m	=	0.24	mm,	$f = 0.85$
Depth =	27.00	Weighted Mean Dia, d_m	=	0.18	mm,	$f = 0.75$
Depth =	30.00	Weighted Mean Dia, d_m	=	0.25	mm,	$f = 0.87$
Depth =	15.00	Weighted Mean Dia, d_m	=	0.26	mm,	$f = 0.89$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-11 (P-10)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-11 (P-10)	0.50	SM*	19.61	47.99	25.60	6.80
■	BH-11 (P-10)	3.00	SANDY GRAVELS	67.05	25.90	5.43	1.62
▲	BH-11 (P-10)	6.00	GM*	45.66	30.64	17.06	6.64
●	BH-11 (P-10)	7.50	SANDY SILT	0.35	37.35	48.59	13.71
✱	BH-11 (P-10)	15.00	FINE SAND	0.00	97.80	1.72	0.48

SM* = SILTY SAND (SM) MIXED WITH GRAVELS
GM* = SILTY GRAVELS (GM) MIXED WITH SAND

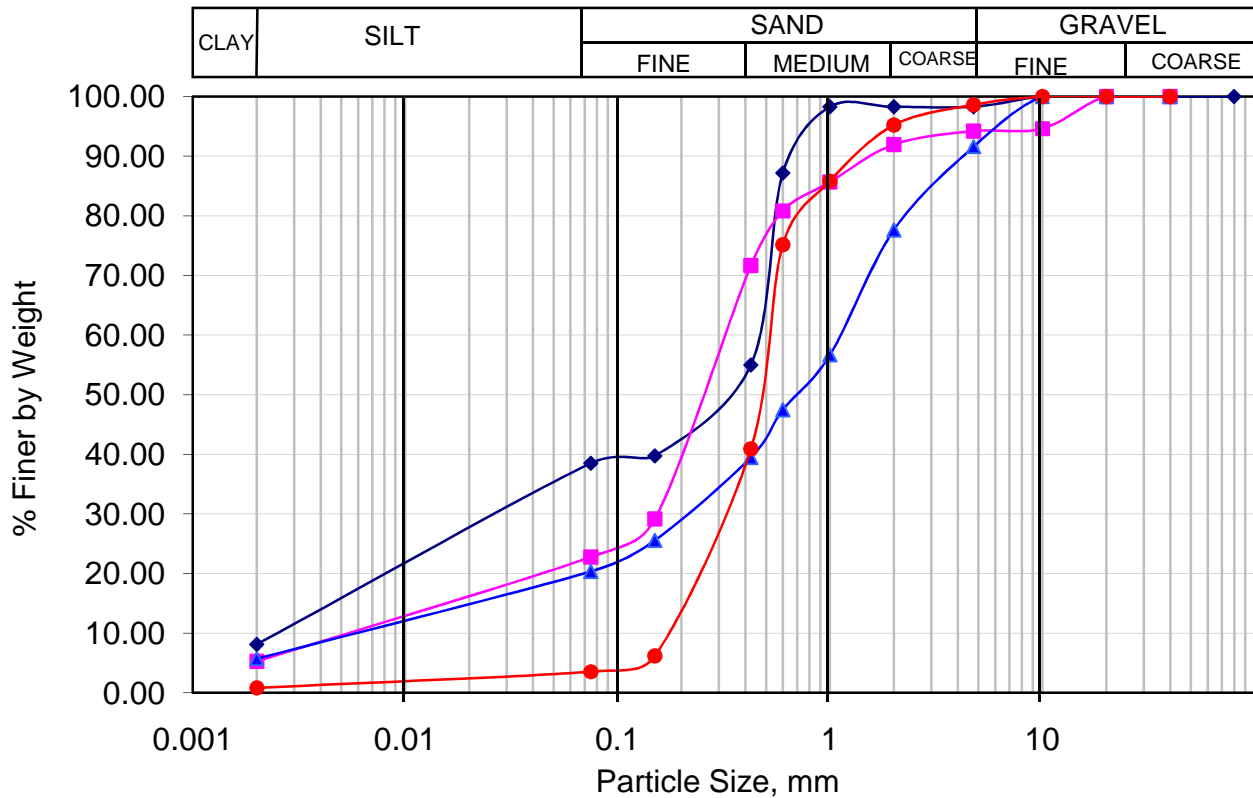
Depth =	0.50	Weighted Mean Dia, d_m	=	2.76	mm,	$f = 2.92$
Depth =	3.00	Weighted Mean Dia, d_m	=	9.49	mm,	$f = 5.42$
Depth =	6.00	Weighted Mean Dia, d_m	=	5.80	mm,	$f = 4.24$
Depth =	7.50	Weighted Mean Dia, d_m	=	0.23	mm,	$f = 0.84$
Depth =	15.00	Weighted Mean Dia, d_m	=	0.40	mm,	$f = 1.11$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-11 (P-10)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-11 (P-10)	21.00	SM	1.70	59.80	30.42	8.09
■	BH-11 (P-10)	27.00	SM	5.80	71.45	17.52	5.23
▲	BH-11 (P-10)	30.00	SM	8.40	71.25	14.65	5.70
●	BH-11 (P-10)	33.00	FINE SAND	1.40	95.05	2.77	0.78

SM = SILTY SAND

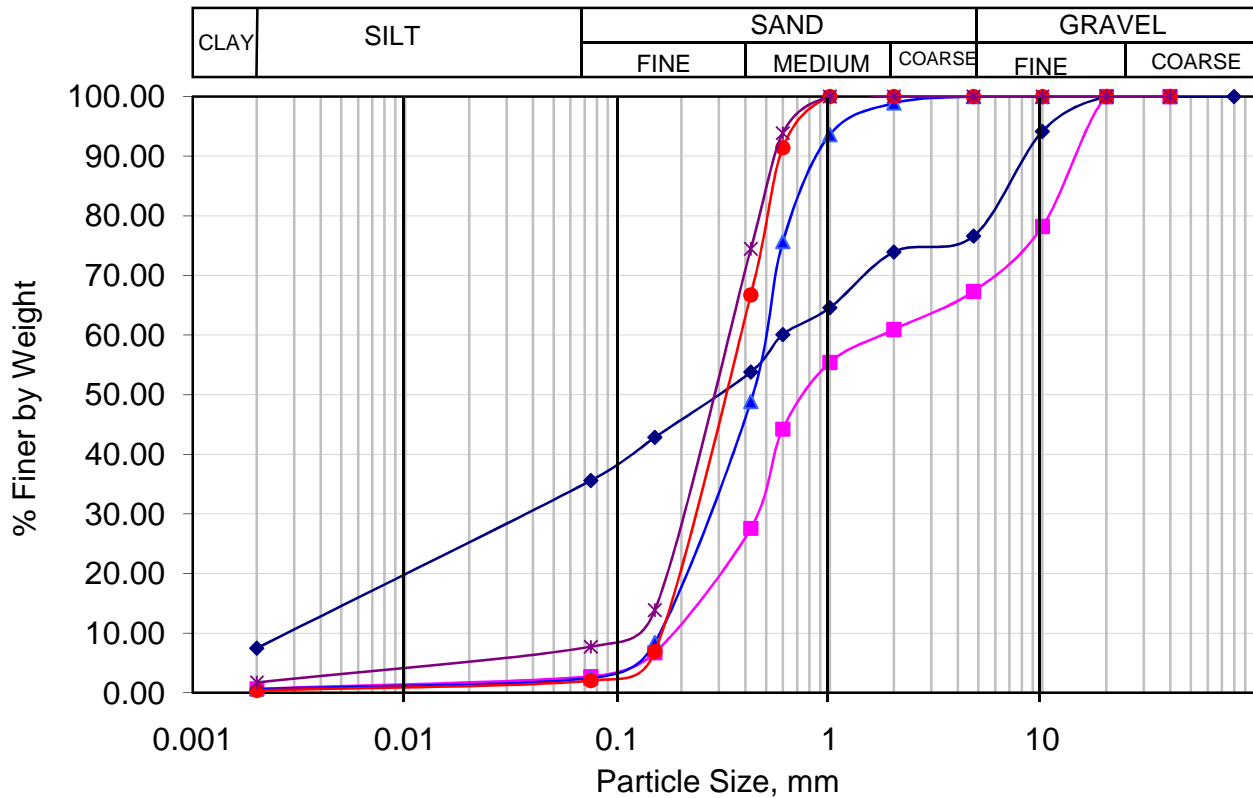
Depth =	21.00	Weighted Mean Dia, d_m	=	0.44	mm,	$f = 1.17$
Depth =	27.00	Weighted Mean Dia, d_m	=	1.23	mm,	$f = 1.95$
Depth =	30.00	Weighted Mean Dia, d_m	=	1.57	mm,	$f = 2.21$
Depth =	33.00	Weighted Mean Dia, d_m	=	0.72	mm,	$f = 1.50$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-12 (P-11)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-12 (P-11)	0.50	SM*	23.42	40.99	28.12	7.48
■	BH-12 (P-11)	4.50	GRAVELLY SAND	32.70	64.55	2.12	0.63
▲	BH-12 (P-11)	6.00	FINE SAND	0.00	97.55	1.84	0.61
●	BH-12 (P-11)	9.00	FINE SAND	0.00	97.95	1.66	0.39
✱	BH-12 (P-11)	15.00	FINE SAND	0.00	92.25	6.05	1.71

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

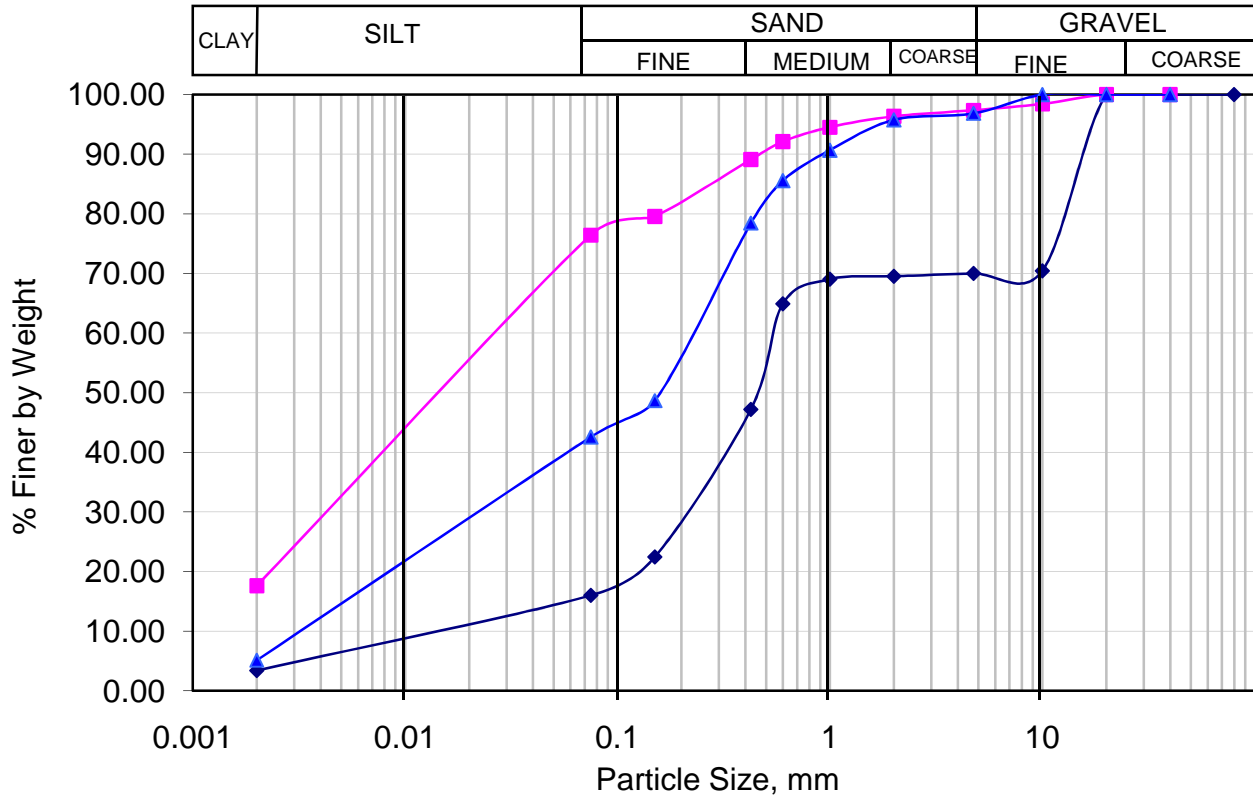
Depth =	0.50	Weighted Mean Dia, d_m	=	2.52	mm,	$f = 2.80$
Depth =	4.50	Weighted Mean Dia, d_m	=	4.61	mm,	$f = 3.78$
Depth =	6.00	Weighted Mean Dia, d_m	=	0.52	mm,	$f = 1.27$
Depth =	9.00	Weighted Mean Dia, d_m	=	0.37	mm,	$f = 1.08$
Depth =	15.00	Weighted Mean Dia, d_m	=	0.33	mm,	$f = 1.01$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-12 (P-11)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-12 (P-11)	21.00	GRAVELLY SAND	30.00	53.98	12.66	3.36
▲	BH-12 (P-11)	33.00	SM	3.15	54.30	37.44	5.11

SM = SILTY SAND

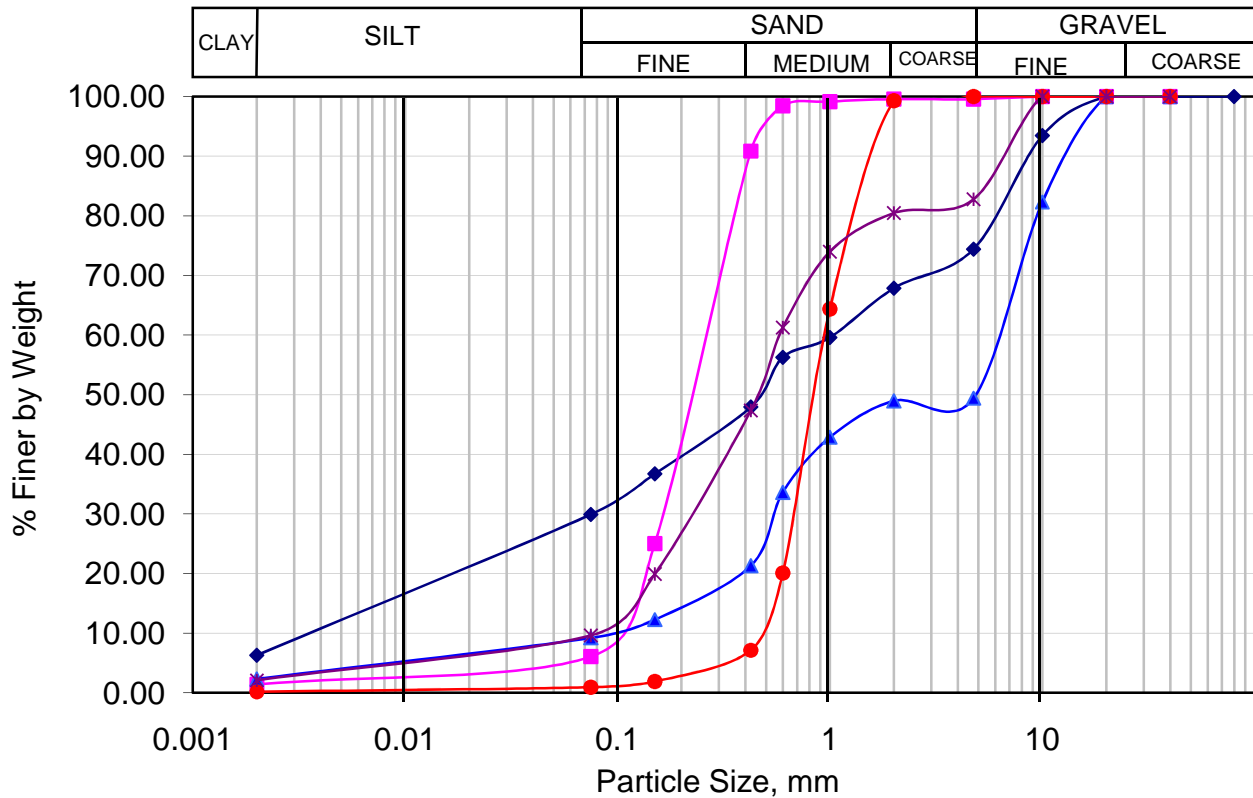
Depth = 21.00 Weighted Mean Dia, d_m = 4.70 mm, $f = 3.81$
 Depth = 33.00 Weighted Mean Dia, d_m = 0.53 mm, $f = 1.28$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-13 (P-12)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-13 (P-12)	0.50	SM*	25.61	44.47	23.64	6.28
■	BH-13 (P-12)	3.00	FINE SAND	0.45	93.50	4.66	1.39
▲	BH-13 (P-12)	6.00	SANDY GRAVELS	50.60	40.20	6.90	2.30
●	BH-13 (P-12)	9.00	FINE SAND	0.00	99.10	0.73	0.17
✱	BH-13 (P-12)	10.50	GRAVELLY SAND	17.25	73.15	7.49	2.11

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

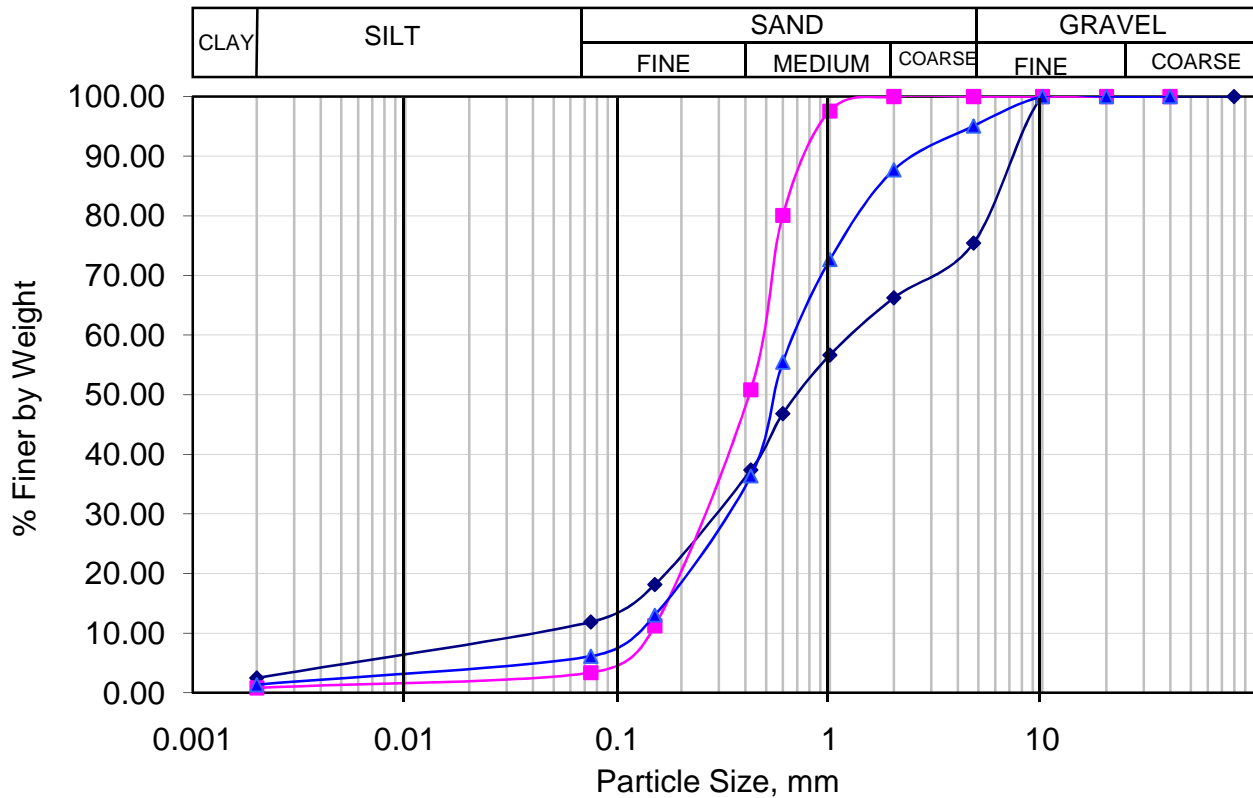
Depth =	0.50	Weighted Mean Dia, d_m	=	2.85	mm,	$f = 2.97$
Depth =	3.00	Weighted Mean Dia, d_m	=	0.30	mm,	$f = 0.96$
Depth =	6.00	Weighted Mean Dia, d_m	=	5.36	mm,	$f = 4.07$
Depth =	9.00	Weighted Mean Dia, d_m	=	0.99	mm,	$f = 1.75$
Depth =	10.50	Weighted Mean Dia, d_m	=	1.71	mm,	$f = 2.30$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-13 (P-12)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-13 (P-12)	12.00	GRAVELLY SAND	24.60	63.55	9.36	2.49
■	BH-13 (P-12)	15.00	FINE SAND	0.00	96.60	2.62	0.78
▲	BH-13 (P-12)	24.00	FINE SAND	4.95	88.95	4.76	1.34

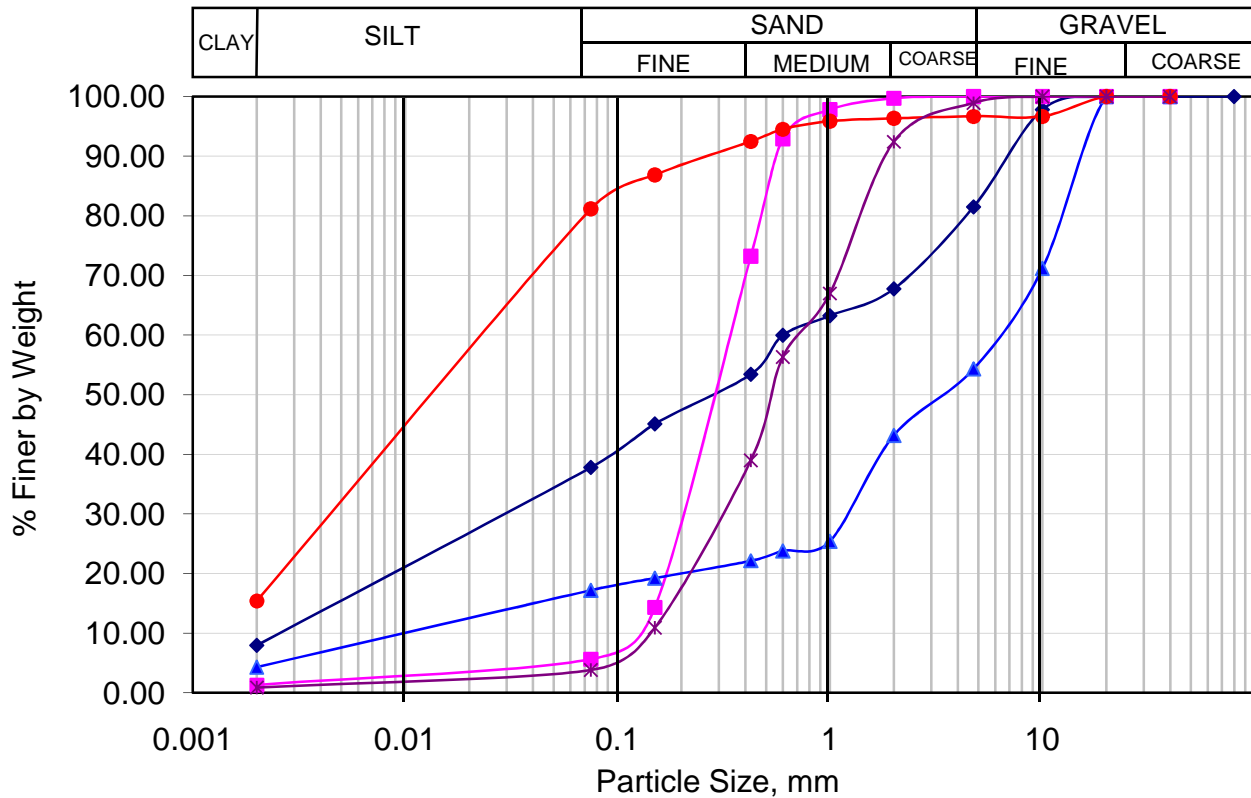
Depth = 12.00 Weighted Mean Dia, d_m = 2.46 mm, $f = 2.76$
 Depth = 15.00 Weighted Mean Dia, d_m = 0.45 mm, $f = 1.18$
 Depth = 24.00 Weighted Mean Dia, d_m = 1.15 mm, $f = 1.89$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-14 (P-13)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-14 (P-13)	0.50	SM*	18.51	43.68	29.87	7.94
■	BH-14 (P-13)	3.00	FINE SAND	0.00	94.35	4.35	1.30
▲	BH-14 (P-13)	6.00	SANDY GRAVELS	45.70	37.14	12.87	4.29
●	BH-14 (P-13)	7.50	SANDY SILT	3.30	15.55	65.73	15.42
✱	BH-14 (P-13)	9.00	FINE SAND	1.05	95.15	2.96	0.84

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

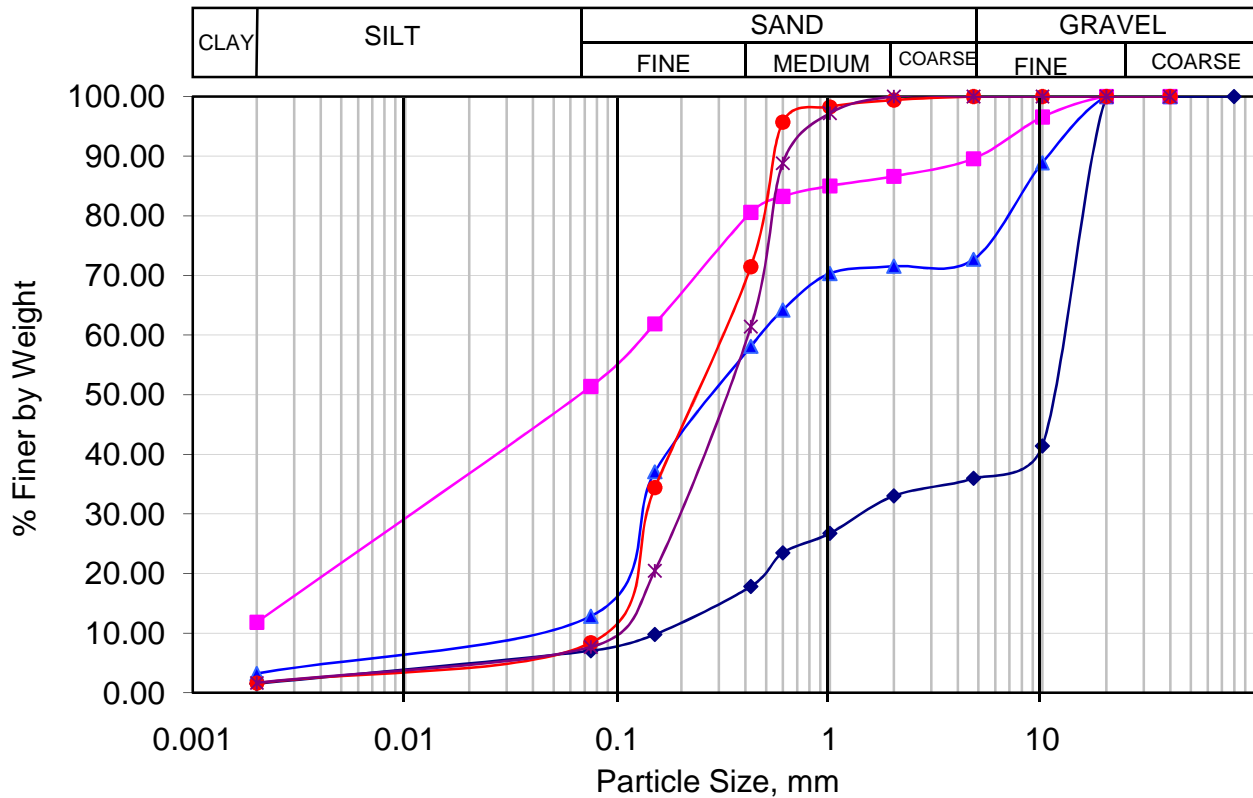
Depth =	0.50	Weighted Mean Dia, d_m	=	2.17	mm,	$f = 2.59$
Depth =	3.00	Weighted Mean Dia, d_m	=	0.36	mm,	$f = 1.05$
Depth =	6.00	Weighted Mean Dia, d_m	=	6.25	mm,	$f = 4.40$
Depth =	7.50	Weighted Mean Dia, d_m	=	0.59	mm,	$f = 1.35$
Depth =	9.00	Weighted Mean Dia, d_m	=	0.94	mm,	$f = 1.71$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-14 (P-13)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-14 (P-13)	15.00	SANDY GRAVELS	64.05	28.90	5.57	1.48
■	BH-14 (P-13)	18.00	SANDY SILT	10.40	38.25	39.54	11.81
▲	BH-14 (P-13)	21.00	GRAVELLY SAND	27.30	59.90	9.60	3.20
●	BH-14 (P-13)	27.00	FINE SAND	0.00	91.65	6.76	1.59
✱	BH-14 (P-13)	33.00	FINE SAND	0.00	92.35	5.97	1.68

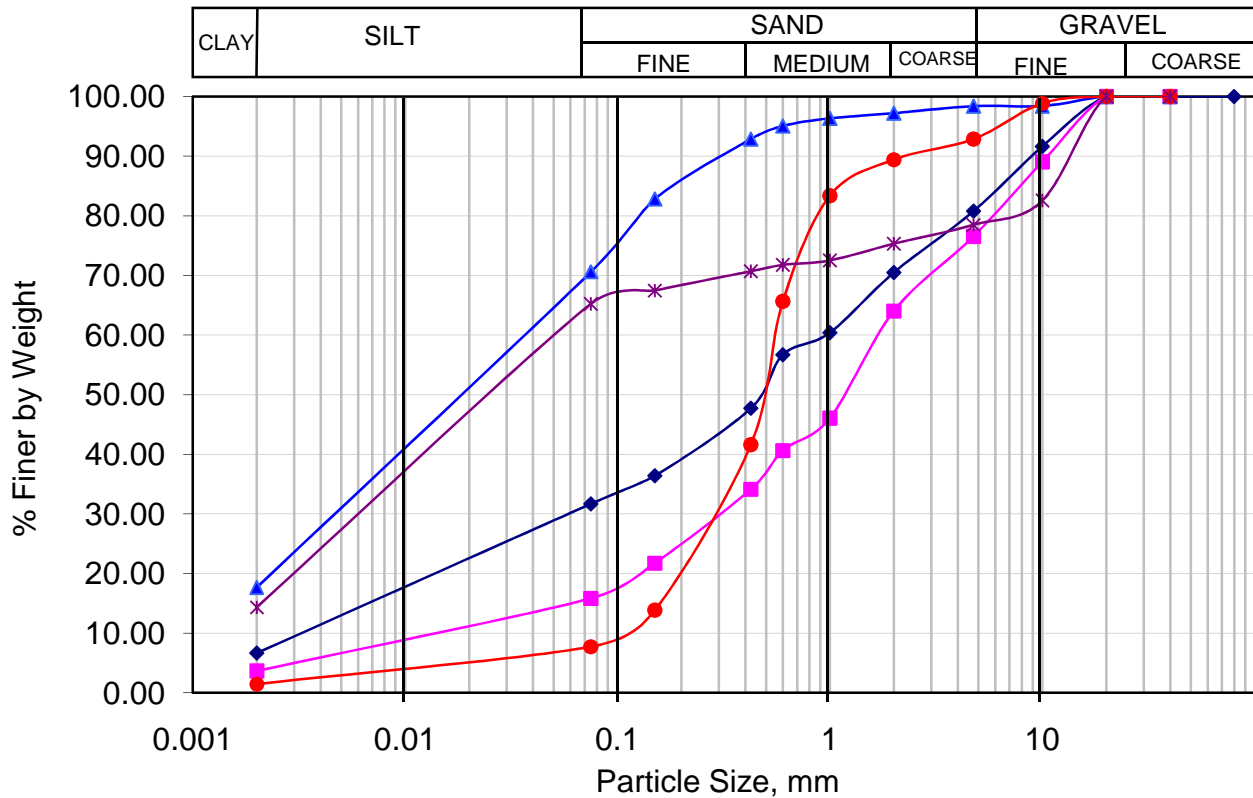
Depth =	15.00	Weighted Mean Dia, d_m	=	9.47	mm,	$f = 5.42$
Depth =	18.00	Weighted Mean Dia, d_m	=	1.27	mm,	$f = 1.98$
Depth =	21.00	Weighted Mean Dia, d_m	=	3.09	mm,	$f = 3.09$
Depth =	27.00	Weighted Mean Dia, d_m	=	0.32	mm,	$f = 1.00$
Depth =	33.00	Weighted Mean Dia, d_m	=	0.38	mm,	$f = 1.09$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-15 (P-14)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-15 (P-14)	0.50	SM*	19.24	49.10	25.01	6.65
■	BH-15 (P-14)	6.00	SM*	23.45	60.70	12.20	3.65
▲	BH-15 (P-14)	9.00	SANDY SILT	1.60	27.80	52.95	17.65
●	BH-15 (P-14)	12.00	FINE SAND	7.15	85.10	6.28	1.47
✱	BH-15 (P-14)	18.00	SANDY SILT MIXED WITH GRAVELS	21.50	13.30	50.86	14.34

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

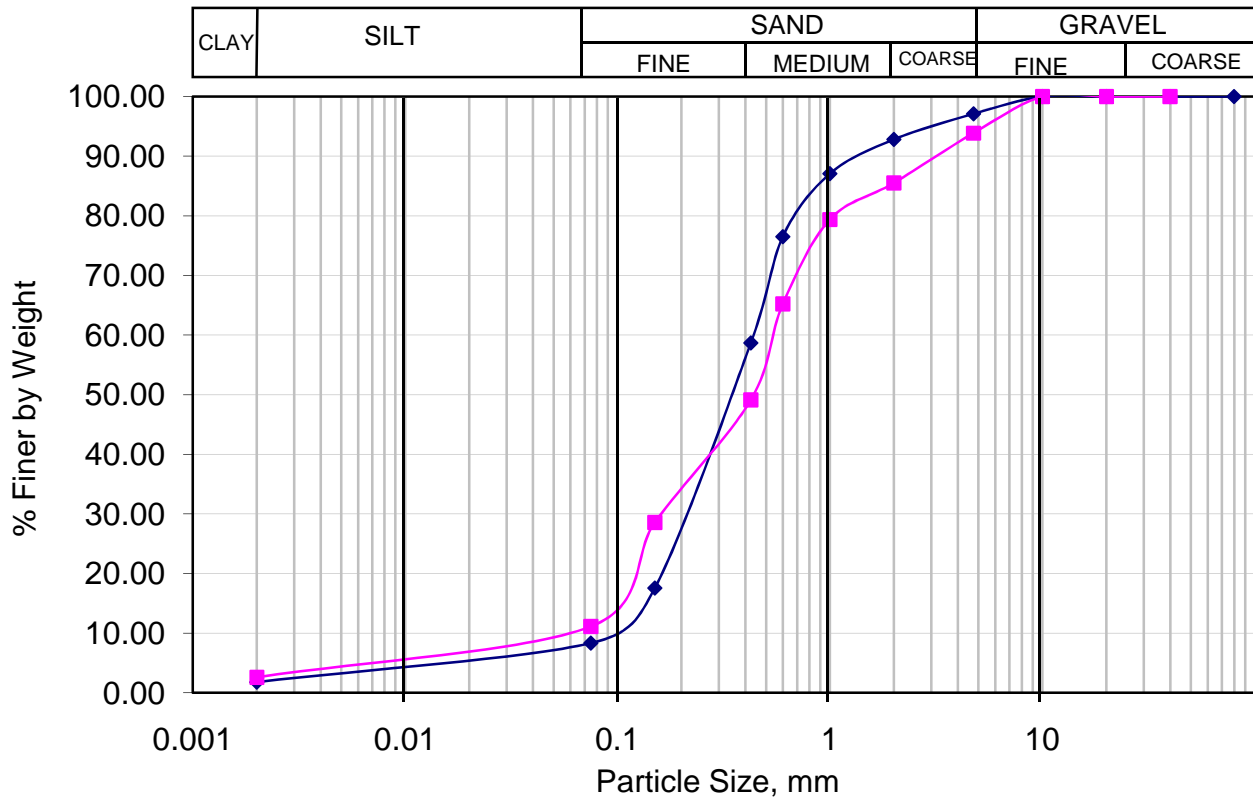
Depth =	0.50	Weighted Mean Dia, d_m	=	2.68	mm,	$f = 2.88$
Depth =	6.00	Weighted Mean Dia, d_m	=	3.38	mm,	$f = 3.24$
Depth =	9.00	Weighted Mean Dia, d_m	=	0.38	mm,	$f = 1.09$
Depth =	12.00	Weighted Mean Dia, d_m	=	1.17	mm,	$f = 1.91$
Depth =	18.00	Weighted Mean Dia, d_m	=	3.11	mm,	$f = 3.11$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG.

BH-15 (P-14)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-15 (P-14)	27.00	FINE SAND	2.90	88.80	6.56	1.74
■	BH-15 (P-14)	33.00	FINE SAND	6.10	82.80	8.55	2.55

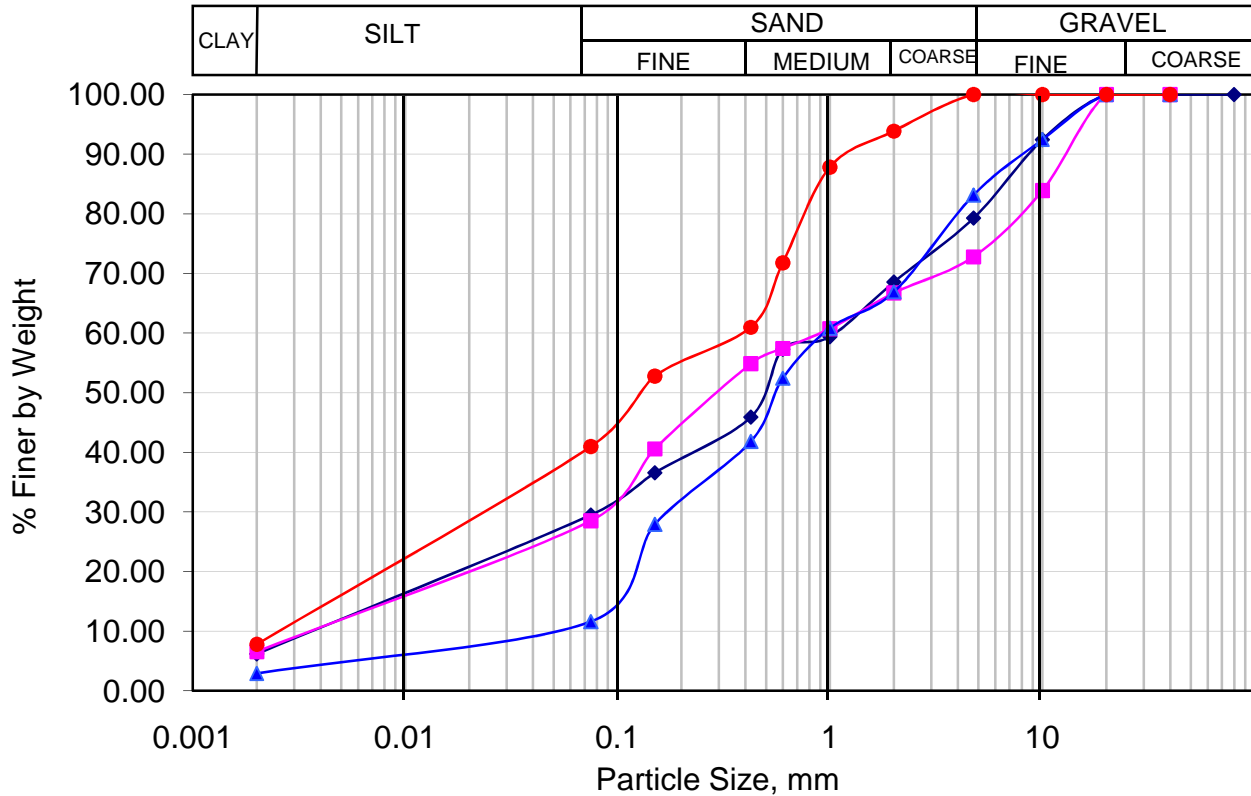
Depth = 27.00 Weighted Mean Dia, d_m = 0.75 mm, $f = 1.53$
 Depth = 33.00 Weighted Mean Dia, d_m = 1.10 mm, $f = 1.85$

PNT DESIGNS PVT. LTD., KOTA

PROJECT : GEOTECHNICAL INVESTIGATION FOR TWO PREPARING DPR FOR ADB TA No. 8116-IND: TA SUB PROJECT No.25 - DETAILED DESIGN OF THE SASEC SUB REGIONAL CONNECTIVITY - RFG

BH-16 (A-2)

Grain Size Analysis



Symbol	BH No.	Depth,m	Soil description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
◆	BH-16 (A-2)	0.50	SM*	20.71	49.84	23.26	6.18
■	BH-16 (A-2)	7.50	SM*	27.20	44.30	21.95	6.56
▲	BH-16 (A-2)	18.00	GRAVELLY SAND	16.85	71.55	8.70	2.90
●	BH-16 (A-2)	24.00	SM	0.00	59.05	33.17	7.78

SM = SILTY SAND

SM* = SILTY SAND (SM) MIXED WITH GRAVELS

Depth =	0.50	Weighted Mean Dia, d_m	=	2.73	mm,	$f = 2.91$
Depth =	7.50	Weighted Mean Dia, d_m	=	3.63	mm,	$f = 3.36$
Depth =	18.00	Weighted Mean Dia, d_m	=	2.64	mm,	$f = 2.86$
Depth =	24.00	Weighted Mean Dia, d_m	=	0.53	mm,	$f = 1.29$