

Government of the People's Republic of Bangladesh Ministry of Housing and Public Works Urban Development Directorate (UDD)

> Preparation of Development Plan for Fourteen Upazilas Package 03

Draft Survey Report

Geological Survey of Bagmara Upazila

September 2016

Submitted By

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LETTER OF TRANSMITTAL

EXECUTIVE SUMMARY

Development plan of Bagmara Upazila, District Dhaka has been taken under package-3 and the project titled 'Preparation of Development Plan for Fourteen Upazilas' a initiative of Urban Development Directorate (UDD). In this development plan, subsurface geological and geotechnical information's has been considered for a durable and sustainable urban environment. This is basically done to determine the state of the soil below the surface of the project area and natural, such as earthquakes, landslides and soil erosion as a result of the design of the infrastructure development such as geological and hydro-meteorological hazards are evaluated.

To know the subsurface environment of the study area, surveys has been carried out up to 30 meter below the earth surface in the field. Investigations and surveys are geo-morphological survey; drilling of boreholes and preparation of borehole logs; collection of undisturbed and disturbed soil sample as per standard guide line; conducting standard penetration tests (SPTs); drilling of boreholes and casing by PVC pipe for conducting Down-hole seismic test; conducting Down-hole seismic test and conducting Multi-Channel Analysis of Surface Wave (MASW). Laboratory testing of soil samples such as Grain Size analysis, Natural moisture Content, Atterberg Limits, Specific Gravity, Direct Shear Test, Unconfined Compression strength, etc has been performing in the laboratory which will give more qualitative and quantitative information about the subsurface materials. To meet the above geological, geotechnical and geophysical task, 36 boreholes with SPT program, Five MASW and seven Down-hole seismic survey programs have been conducted into the field at Bagmara Upazila.

From geotechnical and geological data base would give a clear idea about the geohazard status of particular landscape where newly urban developing activities or any other mega infrastructure project is going on and this mentioned investigation also gives idea about the vulnerability of existing build up infrastructure of a particular area. Based on these results, proper management techniques as well as other necessary adaptation process could be addressed before or after the development activities in the studied area. On the other hand, if the infrastructures are built according to this risk informed physical land-use plan, the long-term maintenance cost will be reduced and the developed structure will withstand against the potential natural hazards.

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	ABBREVIAT	IONS
ASTM	American Society for Testing	and Materials
AVS30	Average Shear Wave velocit	y of 30 meter depth
BH	Borehole	
MASW	Multi-Channel Analysis of Su	rface Wave
N value	Soil resistance or compactne	SS
PGA	Peak Ground Acceleration	
PGV	Peak Ground Velocity	
PS logging	Primary and Shear wave log	ging (Down-hole seismic test)
SA	Spectral Acceleration	
SPAC	Spatial Autocorrelation	
SPT	Standard Penetration Tests	
UDD	Urban Development Director	ate
EGL	Existing Ground Level	
GWL	Ground Water Level	

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CHAPTER-01: INTRODUCTION

1.1. BACKGROUND:

Horizontal expansion of urban area is rapidly increasing in Bangladesh with respect to their rapid population growth and increasing life expectance of the peoples. But present trend of planning practice is mostly oriented towards planning of major cities and towns, not in all other towns or growth centers because huge amount of financial allocation/grants involvement. Recent policy of government, the upazila has been recognized as the most significant tier of administration. So that these areas are need to be planned and developed to accommodate all social, economic, administrative, infrastructure services and service facilities. The government's intention is to reflect the national policy of bringing development administrative and service facilities to the door step of rural masses and to ensure better delivery of government services to the people. Realizing the fact and importance of formulating development plans for upazilas, Urban Development Directorate has come up with a great initiative to plan those areas. At the first phase of this initiative UDD has decided to prepare development plan for 14 Upazilas all over Bangladesh into five different packages. For each package separate consultancy team has been appointed to carry out that job more fruitfully. Desh Upodesh Ltd. in Association with AAIMA International BD Ltd. and Tech-SUS Ltd has been selected for package-3 (covering Bagmara Upazila, Dist: Meherpur; Bagmara Sadar Upazila, Dist: Bagmara; and Baghmara Upazila, Dist: Rajshahi) by project evaluation committee of UDD.

Subsurface geological and geotechnical information's has been considered for a durable and sustainable urban environment. Primarily this work is to determine subsurface soil condition of the project area and evaluating of natural geological and hydro-meterological hazards such as earthquake, landslide and ground failure which integrate the consequence into the design of the infrastructure.

Regarding this study, following investigations and surveys has been carried out in the field which are geo-morphological survey; drilling of boreholes and preparation of borehole logs; collection of undisturbed and disturbed soil sample as per standard guide line; conducting standard penetration tests (SPTs); drilling of boreholes and casing by PVC pipe for conducting Down-hole seismic test; conducting Down-hole seismic test and conducting Multi-Channel Analysis of Surface Wave (MASW). Geologically and structurally the area is not much complex, that's why geotechnical and geophysical investigations are covered whole floodplain area except low or marshy land up to 30 meter depth from ground level and almost everywhere soil sediments are fluvial type of deposit which are much soft and thicker.

Following laboratory testing of soil samples such as Grain size analysis, Natural moisture content, Atterberg limits, Specific Gravity, Direct Shear Test, Unconfined Compression strength, etc has been performing in the laboratory which will give more qualitative and quantitative information about the subsurface materials. These field and laboratory test data will be analyzed and integrated into a module to produce risk sensitive micro-zonation maps.

1.2. SCOPE OF WORK:

The aim of this work is to determine subsurface soil condition of the project area and evaluating of natural geological and hydro-meterological hazards such as earthquake, liquefaction, ground failure and integrate the consequence into the design of the infrastructure. The main objective will be achieved through accomplishment of the following sub-objectives:

- a) Preparation of Geological map of the study area.
- b) Preparation of sub-surface lithological 3D model of different layers through geotechnical investigation
- c) Preparation of engineering geological mapping based on AVS30
- d) Determination of soil type in the project area
- e) Foundation layer identification
- f) Preparation of Seismic Hazard Map
- g) Finally intensity map is prepared for high rise and low rise building

CHAPTER-02: METHODOLOGY

The methods and materials used to carry out of these activities have been described below-

2.1. TEST DETAILS AND PROCEDURE OF DOWN-HOLE SEISMIC TEST (PS LOGGING)

Main objectives of downhole seismic test to measure the travelling time of elastic wave from the ground surface to some arbitrary depths beneath the ground. The seismic wave was generated by striking a wooden plank by a sledge hammer. The plank was placed on the ground surface at around 1 m in horizontal direction from the top of borehole. The plank was hit separately on both ends to generate shear wave energy in opposite directions and is polarized in the direction parallel to the plank.

The shear wave emanated from the plank is detected by a tri-axial geophone. The geophone was lowered to 1 m below ground surface and attached to the borehole wall by inflating an air bladder. Then, the measurements were taken at every 1 m interval until the geophone was lowered to 30 m below ground surface. For each elevation, 3 records were taken and then used to calculate the shear wave velocity.



Plate 1: Downhole Seismic Test data logger

2.2.1. Procedure of Field Work and Analysis

 a) A wooden plank with an approximate dimension of 2 ft x 1 ft x 2 ft is fixed to the ground. The wooden plank is placed about 1m from the borehole as shown in Plate 2.



Plate 2: Wooden Plank as the Vibration Source

b) Cables are wired from the geophone Plate 3 and the trigger to the data acquisition unit Plate 4. Signals in the vertical, radial and transverse directions are recorded by the data acquisition unit.



Plate 3: Geophone



Plate 4: Data Acquisition Unit

c) The geophone is lowered into the borehole as shown in Plate 5 Then, air is pumped into the air bag to fix the geophone to the casing (PVC pipe) at 1 m interval in depth basically.



Plate 5: Geophone Lowering In the Borehole

d) Excitations are generated by hitting the wooden plank in three directions by the hammer.



Plate 6: Direction of Excitations

e) Data is recorded in the data acquisition unit. Figure 1 illustrates a typical dataset in obtaining the arrival time of S-wave. Hitting the wooden plank in opposite directions generates signals as shown in the figure. The time that two curves begin to separate is the arrival time of shear wave. By doing the same analysis for every depth, S-wave profiles are obtained throughout the depth of the borehole.

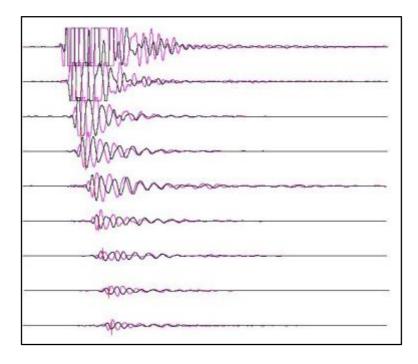
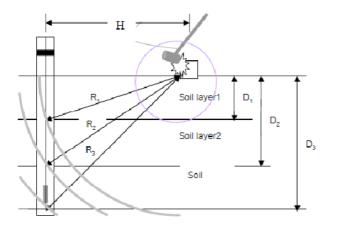


Figure 1: Determination of the Arrival Time of S-Wave

f) Using the raw data of the test depth (D), the shortest pass (R) and the recorded arrival time of S-wave (t) in the inclined path is calculated to the travel time, t_c , in the vertical path as shown in Figure 2.



$$t_c = D \frac{t}{R}$$

Where

t_c is the corrected travel time

D is the testing depth from ground surface,

t is the first arrival time from test *R* is the distance between the source an receiver

[Auld 1977]



g) By plotting the corrected travel time versus depth, the velocity of every 1 m interval is calculated from (Auld 1977)

$$V_{d} = \frac{\Delta D}{\Delta t_{c}} [Auld \ 1977]$$

Where, ΔD is depth interval showing similar slope and Δt_c is the corrected travel time difference of ΔD .

2.2. TEST DETAILS AND PROCEDURE OF MULTI-CHANNEL ANALYSIS OF SURFACE WAVE (MASW)

Multichannel Analysis of Surface Wave (MASW) is recent and very popular method for computation of shear wave velocity. This method is widely used for seismic microzonation. A MASW is a seismic surface method, widely used for subsurface characterization and is increasingly being applied for seismic microzonation and site response studies (Anbazhagan and Sitharam, 2008). It is also used for the geotechnical characterization of near surface materials (Park and Miller, 1999; Xia et al., 1999; Miller et al., 1999; Anbazhagan and Sitharam, 2008). MASW is used to identify the subsurface material boundaries, spatial and depth variations of weathered and engineering rocks (Anbazhagan and Sitharam, 2009). We have used the MASW system consisting of 12 channels Geode seismograph with 12 vertical geophones of 10 Hz capacity.

The measuring procedure in this project is shown as follows:

- I. To decide the measuring line
- II. To set receivers along the line at the ground surface. The intervals of each geophone are 3m.
- III. To set an acrylic board at a half interval outside the line
- IV. To shoot it vertically. Then generated elastic waves are recorded by receivers.
- V. To shift the acrylic board between second receiver and the third receiver, and shoot it vertically. Then generated elastic waves are recorded at receivers.
- VI. To iterate this procedure up to setting the acrylic boards at a half interval outside the other side of the line.

The data acquisition parameters are given in table 1.

Seismic refraction		
Number of channels	12	
Geophone spacing	3m	
Array length	33m	
Sampling rate	1ms	
Record length	2 sec	
Natural frequency of Geophone	10 Hz	
Source	8 kg hammer	
Shot number	13 points, 11 between	
	geophones and 2 outside of	
	measuring line	

Table 1: MASW Data Acquisition Parameters

Source: Park and Miller, 1999; Xia et al. 1999; Miller et al. 1999; Anbazhagan and Sitharam, 2008

2.2.1. Analysis of MASW

Data processing consists of two main steps: (i) Obtaining the dispersion curves of Rayleigh wave phase velocity from the records; (ii) Determining the V s profiles from which the Vs30 values are calculated (see figure 3). In the phase velocity analysis, SPAC (Spatial Autocorrelation) method (Okada, 2003) is employed. Okada (2003) shows Spatial Autocorrelation function ρ (ω , r) is expressed by Bessel function.

$$\rho(\omega, r) = J_0(\omega r / c(\omega))$$
 [Okada, 2003]

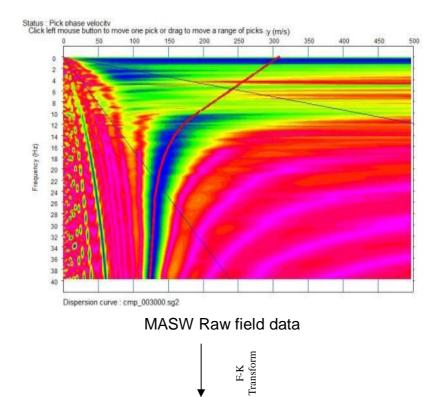
Where, r is the distance between receivers, $\dot{\omega}$ is the angular frequency, c ($\dot{\omega}$) is phase velocity of waves, J₀ is the first kind of Bessel function. The phase velocity was obtained at each frequency using equation (2). A one dimensional inversion using a non-linear least square method has been applied to the phase velocity curves. In the inversion, the following relationship between P-wave velocity (Vp) and Vs (Kitsunezaki et. al., 1990):

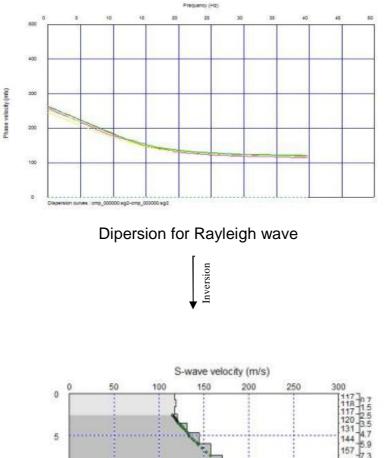
$$Vp = 1.29 + 1.11Vs$$
 [Kitsunezaki et. al., 1990]

Where, Vs is S-wave velocity (km/s), Vp is P-wave velocity (km/s). In order to assume density ρ (g/cm3) from S-wave velocity, the relationship of Ludwig et al. (1970) is used.

$$\rho = 1.2475 + 0.399Vp - 0.026Vp^{2}$$
 [Ludwig et al. (1970)]

These calculations are carried out along the measuring line, and the S-wave velocity distribution section was analyzed.





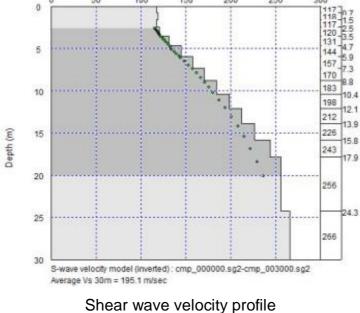


Figure 3: Main Step of the MASW Processing Technique

2.3. TEST DETAILS AND PROCEDURE OF STANDARD PENETRATION TEST

The geotechnical boreholes have been constructed using wash boring method. In this investigation, 36 numbers of boreholes have been prepared at Bagmara Upazila. The borehole logs are enclosed in the Appendix A. The boring method has been described in the following section.

2.3.1. Drilling

The bore holes are being drilled through mechanical percussion wash boring method at the locations previously decided. As 30 m boring is so complicated and time consuming moreover it has done continuously to the end to prevent the possibility of caving of the boring wall, is will been decided to send two sets of worker who will work in 8 hrs until desired depths will be achieved. In this manner the estimated time for boring execution will 13- shifts and 12- shifts are considered for mobilization, assemble and disassemble of the equipment, site cleanup and backfill the bore holes to their pre-existing condition.

2.3.2. Data Collection

The field data are being collected according to the respective standard methods. First of all the location, areal coverage, topography, geomorphology of the test site are note down. The soil sample collection procedure is mentioned in the section 2.3.4. While SPT soil samples are collected. At the same time, the ground water table is note down.

2.3.3. SPT Execution

As it mentioned earlier, the geotechnical boreholes will be constructed using mechanical boring method. The depth of those boreholes is to 30m. In this method N values (standard Penetration Test) is counted and soil sample also be taken in every 1.5m depth interval. The subsequent procedure which has been followed during the field work is furnished as follows:

- I. Drill a 100-200 mm (2.5-8 in) diameter exploratory boring to the depth of the first test.
- II. Insert the SPT sampler (also known as a Split-spoon Sampler) into the boring. The shape and dimensions of this sampler are shown in Figure 4. It is connected via steel rods to a 63.5 kg (140 lb) hammer, as shown in Figure 5.
- III. An automatic tripping mechanism (in case of rotary drilling used this technique in this investigation), raise the hammer a distance of 760 mm (30 in) and allow it to fall. This energy drives the sampler into the bottom of the boring. Repeat this process until the sampler has penetrated a distance of 450 mm (18 in), recording the number of hammer blows required for each 150 mm (6 in) interval.
- IV. Compute the N-value by summing the blow counts for the last 300 mm (12 in) of penetration. The blow count for the first 150 mm (6 in) is retained for reference purposes, but not used to compute N because the bottom of the boring is likely to be disturbed by the drilling process and may be covered with loose soil that fell from the sides of the boring.
- V. Extract the SPT sampler, then remove and save the soil sample (disturbed sample).
- VI. Drill the boring to the depth of the next test and repeat steps 2 through 6 as required.

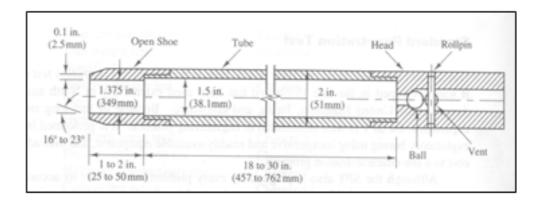


Figure 4: Split-spoon sampler.

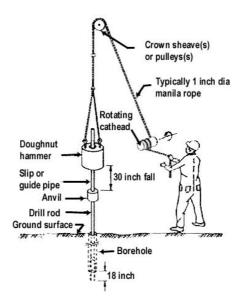


Figure 5: The SPT sampler in place in the boring with hammer

2.3.4. SOIL SAMPLING

Two main categories of soil samples are collected, undisturbed and disturbed. Undisturbed samples, which are required mainly for shear strength and consolidation tests, are obtained by techniques which aim at preserving the in-situ structure and water content of the soil. In boreholes, undisturbed samples can be obtained by withdrawing the boring tools (except when hollow-stem continuous-flight augers are used) and driving or pushing a sample tube into the soil at the bottom of the hole. The sampler is normally attached to a length of boring rod which can be lowered and raised by the cable of the percussion rig. When the tube is brought to the surface, some soil is removed from each end and molten wax is applied, in thin layers, to form a seal approximately 25mm thick: the ends of the tube are then covered by protective caps. Undisturbed block samples can be cut by hand from the bottom or sides of a trial pit. During cutting, the samples must be protected from water, wind and sun to avoid any change in water content: the samples should be covered with molten wax immediately they have been brought to the surface. It is impossible to obtain a sample that is completely undisturbed, no matter how elaborate or careful the ground investigation and sampling technique might be. In the case of clays, for example,

swelling will take place adjacent to the bottom of a borehole due to the reduction in total stresses when soil is removed and structural disturbance may be caused by the action of the boring tools; subsequently, when a sample is removed from the ground the total stresses are reduced to zero.

Soft clays are extremely sensitive to sampling disturbance, the effects being more pronounced in clays of low plasticity than in those of high plasticity. The central core of a soft clay sample will be relatively less disturbed than the outer zone adjacent to the sampling tube. Immediately after sampling, the pore water pressure in the relatively undisturbed core will be negative due to the release of the in-situ total stresses. Swelling of the relatively undisturbed core will gradually take place due to water being drawn from the more disturbed outer zone and resulting in the dissipation of the negative excess pore water pressure: the outer zone of soil will consolidate due to the redistribution of water within the sample. The dissipation of the negative excess pore water pressure is accompanied by a corresponding reduction in effective stresses. The soil structure of the sample will thus offer less resistance to shear and will be less rigid than the in-situ soil.

A disturbed sample is one having the same particle size distribution as the in-situ soil but in which the soil structure has been significantly damaged or completely destroyed; in addition, the water content may be different from that of the in-situ soil. Disturbed samples, which are used mainly for soil classification tests, visual classification and compaction tests, can be excavated from trial pits or obtained from the tools used to advance boreholes (e.g. from augers and the clay cutter). The soil recovered from the shell in percussion boring will be deficient in fines and will be unsuitable for use as a disturbed sample. Samples in which the natural water content has been preserved should be placed in airtight, non-corrosive containers: all containers should be completely filled so that there is negligible air space above the sample. All samples should be clearly labeled to show the project name, date, location, borehole number, depth and method of sampling; in addition, each sample should be given a serial number. Special care is required in the handling, transportation and storage of samples (particularly undisturbed samples) prior to testing. The types of tube samplers used in this study are described below.

Thin-walled Sampler

Thin-walled samplers (Figure 6) have been used to collected undisturbed samples from boreholes. These samplers are used in soils which are sensitive to disturbance such as soft to firm clays and plastic silts. The sampler does not employ a separate cutting shoe, the lower end of the tube itself being machined to form a cutting edge. The internal diameter may range from 35 to 100 mm. The area ratio is approximately 10% and samples of first-class quality can be obtained provided the soil has not been disturbed in advancing the borehole. In trial pits and shallow boreholes the tube can often be driven manually

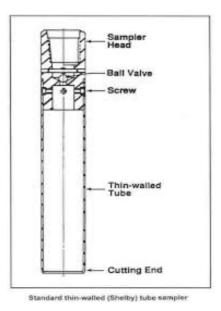


Figure 6: Thin-Walled (Shelby Tube) Sampler

Split-spoon sampler

Split-spoon samplers (Figure 7) have been to collect disturb samples. It consists of a tube which is split longitudinally into two halves: a shoe and a sampler head incorporating air-release holes are screwed onto the ends. The two halves of the tube can be separated when the shoe and head are detached to allow the sample to be removed. The internal and external diameters are 35 and 50 mm, respectively, the area ratio being approximately 100%, with the result that there is considerable disturbance of the sample. This sampler is used mainly in sands, being the tool specified in the standard penetration test (SPT).

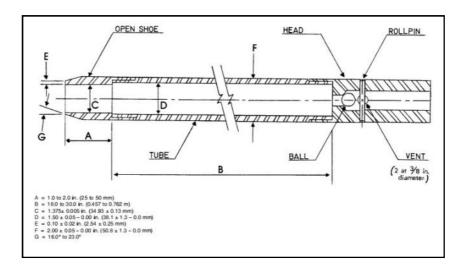


Figure 7: Undisturbed (Split-Spoon) Sampler

2.3.5. CARRYING OUT DIFFERENT ENGINEERING TESTS ON SOIL SAMPLE

A wide variety of laboratory tests is performing on soils to measure number of soil parameters. Some soil properties are intrinsic to the composition of the soil matrix and are not affected by sample disturbance, while other properties depend on the structure of the soil as well as its composition, and can only be effectively tested on relatively undisturbed samples. Some soil tests measure the direct properties of the soil, while others measure "index properties" which provide useful information about the soil without directly measuring the property desired.

The test types and standard which have been following given in the following section. Before explaining each of the engineering tests, the standard followed in each test is mentioned here:

- ➢ Grain size analysis
 - o Sieve Analysis
 - o Hydrometer Analysis
- Natural Moisture Content Tests
- > Attarbarge Limit Test
- Unconfined Compressional Test
- Traxial Test

All laboratory test result are given in Appendix D.

CHAPTER-03: SURVEY RESULT AT BAGMARA UPAZILA

3.1. GEOPHYSICAL INVESTIGATIONS

The main objectives of these investigation to estimate local site effects against earthquakes and the task has been segregated by three-fold: 1) To determine shear wave velocity profile at various sites, 2) To classify soil conditions according to seismic design specifications and 3) To analyze soil amplifications in the area. Field measurements of shear wave velocities were conducted in Bagmara Upazila and described in below.

Shear wave velocity profile (Vs profile) in the field were carried out by two geophysical exploration methods namely 1) seismic downhole test and 2) Multichannel Analysis of Surface Wave (MASW).

Seismic downhole test is a direct measurement method for obtaining the shear wave velocity profile of soil stratum. However, the test requires borehole which is not time and cost effective for the project. Multichannel analysis of surface waves (MASW) is a non-invasive technique which can be used to determine the Vs profile at sites. In this project, the seismic downhole and MASW tests were performed at 6 and 5 locations respectively. Locations of seismic downhole test and MASW tests are shown in Map 2. The GPS coordinate of the test locations are showing in Table 2.

Survey					
type	BH ID	Location Name	Lat	Long	Union Name
	BH-06	Ganggopara Girls School, Hat Ganggopara, Auch Para Union	24.61902	88.73029	Auch Para Union
(bu	BH-24	Ganipur Union Complex office, Hasnipur Bazar, Ganipur Union	24.52932	88.74364	Ganipur Union
Downhole Seismic Test (PS Logging)	BH-26	Sahid Sakandar Memorial Adarsho High School, Godaoun Mor, Bhabanigong Pourashava	24.58064	88.82589	Bhabanigong Pourashava
mic Tes	BH-29	Jhikra High School, Jhikra Bazar, Jhikra Union	24.616	88.89302	Jhikra Union
le Seist	BH-32	Sajura Mirzapur, Goalkandi Union	24.54549	88.84274	Goalkandi Union
Downhol	BH-37	Tahirpur University (Birshobidalay) college, Tahirpur Bazar, Tahirpur Pourashava	24.51805	88.84495	Tahirpur Pourashava
	BH-09	Mirpur Dimukki Primary and High School, jolapara Hat, Dwippur Union	24.64339	88.803	Dwippur Union
Irface	MASW-1	Jamgram Govt. Primary School, Jamgram, Tahirpur Pourashava	24.52896	88.82662	Tahirpur Pourashava
Multi-channel Analysis of Surface Wave (MASW)	MASW-2	Shreepur govt. primary school, Bagmara	24.55312	88.79897	
	MASW-3	Binorthpur govt. primary school,Subhadanga Union	24.57543	88.75258	Subhadanga Union
-channel , Wave	MASW-4	Uttar akdala Govt. Primary School, Uttar akdala Bazar, Bhabanigong Pourashava	24.59876	88.82558	Bhabanigong Pourashava
Multi	MASW-5	Hamir kutsha Union complex office, Hamir Kutsha Union	24.5582	88.87315	Hamir Kutsha Union

Source: Field Survey, 2016

3.1.1. Down-Hole Seismic (PS Logging) Test Results

As a fundamental parameter, shear wave velocity is required to define the dynamic properties of soils. If the soil velocity is less then 180m/s, it can be say as loose or soft soil. Estimation of shear wave velocity (Vs) / average shear wave velocity (AVS) and mapping is a way to characterize varying site conditions, and it can also be used to model earthquake-related ground shaking. Estimation of AVS aims to generate a map of estimated shear wave velocities for the upper 30m of the subsurface. Further this map can be used for seismic site response analysis i.e., to determine peak ground acceleration (PGA) and spectral acceleration (SA) values of both bedrock and ground surface. In this context, Downhole seismic test data acquisition has been completed at Bagmara Upazilla in Seven different locations on date 5th to 8th January, 2016.

The average shear wave velocity (AVS) of each PS logging test are tabulated in Table 3. Work plan of the test depth was 30m, however, in some locations did not reach the geophone to the 30 m in depth due to adverse conditions of PVC. The shear wave velocities at every 1m interval of each site are given in Appendix A at tabular and also graphical format.

3.1.2. MASW Survey Result

To predict subsurface shear-wave interval velocities, multi-spectral analyses of surface waves (MASW) are popularly used. Shear wave velocities can also extract additional velocity-related information such as mechanical properties of soils and rocks. In general, MASW data compare favorably to other geophysical methods for predicting interval velocities. Furthermore, comparisons to vertical seismic profiles correlate well with MASW predicted shear wave interval velocities. In this perspective, MASW test has been completed at Five different locations at Bagmara Upazilla by 30th November,2016 and field raw data has been processed and also interpreted.

The results of the MASW test are enclosed in Appendix B at tabular and also graphical format.

3.2. GEOTECHNICAL INVESTIGATIONS

To ensure safety of human beings and materials, geotechnical investigations have become an essential component of every construction, it includes a detailed investigation of soil strength, composition, water content, and other important soil characteristics. Investigation borings with standard penetration test were conducted in order to know vertical geological conditions. The borings with SPT were carried out at 36 points at Bagmara Upazila.

3.2.1. Standard Penetration Test (SPT) Log Analysis and Interpretation

SPT is a common in-situ testing method used to determine the geotechnical engineering properties of subsurface soils. It was developed in the late 1920s and has been used extremely in North and South America, the United Kingdom, Japan, and elsewhere. Because of this long record of experience, the SPT is well-established in engineering practice. It is performed inside exploratory boring using inexpensive and readily available equipment, and thus adds little cost to a site characterization program. Although the SPT also is plagued by many problems that affect its accuracy and reproducibility, it probably will continue to be used for the foreseeable future, primarily because of its low cost. However, it is partially being replaced by other test methods, especially on larger and more critical projects.

All the borings has to be conducted and preparation of field bore log by visual classification has to be done in the presence of the experienced technical personnel. The borehole records have to be taken that include soil type, nature of sample, soil moisture content and consistency, SPT blow counts (N Value), ground water observation and apparent origin (fill, alluvium, recent sediments, etc.) and daily field logs have been prepared. The bore locations are given in following table 5 and the geotechnical borehole log are enclosed in the below section.

BH ID	Location Name	Lat	Long	Union Name
BH-01	Near Gobinda Para Union Complex, Gobinda Para Union	24.65849	88.73728	Gobinda Para Union
BH-02	Hatkhugipur High School, Hatkhugipur Bazar, Near Auch Para union complex	24.62386	88.70332	Auch Para Union
BH-03	Rokittepara Govt. primary school, Palopara, Auch Para Union	24.61088	88.68531	Auch Para Union
BH-04	Sharcol Shimla High School, beside Nasir Bazar, Sondanga Union	24.66983	88.77749	Sondanga Union
BH-05	Village Name- Madila, Boidar Mor, Nardas Union	24.65351	88.76144	Nardas Union, Near Sonadanga union
BH-06	Ganggopara Girls School, Hat Ganggopara, Auch Para Union	24.61902	88.73029	Auch Para Union
BH-07	Shehali Eid gha mat, Auch Para Union	24.61034	88.71178	Auch Para Union
BH-08	Uttar Jamalpur Govt. primary school, Uttar Jamalpur Fatepur, Sondanga Union	24.67196	88.81125	Sondanga Union
BH-09	Mirpur Dimukki Primary and High School, jolapara Hat, Dwippur Union	24.64339	88.803	Dwippur Union
BH-10	Byegacha Govt. primary and high School, Byegacha Bazar, Subhadanga Union	24.61254	88.76151	Subhadanga Union
BH-11	Machmail High School, Machmail Bazar, Subhadanga Union	24.57887	88.73202	Subhadanga Union
BH-12	Mugaipara High School, Mugaipara Bazar, Auch Para Union	24.57418	88.70657	Auch Para Union
BH-13	Baganna Govt. Primary School, Bihanali Bazar, Bara Bihanali Union	24.65396	88.8504	Bara Bihanali Union
BH-14	Dwippur Govt. primary and high School, Village name-Char Horinarayan Kundhu, Dwippur Union	24.62888	88.82063	Dwippur Union
BH-17	Doulatpur Madhomik School, Madha Doulatpur, Subhadanga Union	24.57765	88.76096	Subhadanga Union
BH-19	Gonganarayanpur Namajgram Govt. Primary School, Kumanitola, Ganipur Union	24.5365	88.72177	Ganipur Union
BH-20	21 nos. Bara Bihanali govt. School, Bara Bihanali Union	24.62606	88.85274	Bara Bihanali Union
BH-21	Uttar akdala Govt. Primary School, Uttar akdala Bazar, Bhabanigong Pourashava	24.59941	88.82528	Bhabanigong Pourashava

Table 3: Bore Hole Information Summary at Bagmara Upazila

	Nandanpur(Chekamara) Bazar, Mohila			
BH-22	Dakhil Madrasha, Basu Para Union	24.57737	88.79211	Basu Para Union
BH-24	Ganipur Union Complex office, Hasnipur Bazar, Ganipur Union	24.52932	88.74364	Ganipur Union
BH-25	Boiloshingho Govt. Primary School, Maria Union	24.59821	88.84588	Maria Union
BH-26	Sahid Sakandar Memorial Adarsho High School, Godaoun Mor, Bhabanigong Pourashava	24.58064	88.82589	Bhabanigong Pourashava
BH-27	Bagmara Degree College, Ganipur Union	24.55881	88.80555	Ganipur Union
BH-28	Shadhopara Madrasha, Near post office, Sreepur Union	24.53365	88.78897	Sreepur Union
BH-29	Jhikra High School, Jhikra Bazar, Jhikra Union	24.616	88.89302	Jhikra Union
BH-30	Sakoa Bohumuki High School, Sikdar Bazar, Maria Union	24.58401	88.87783	Maria Union
BH-31	Gangopara Govt. Primary school, Maria Union	24.56969	88.84544	Maria Union
BH-32	Sajura Mirzapur, Goalkandi Union	24.54549	88.84274	Goalkandi Union
BH-33	Jamgram Govt. Primary School, Jamgram, Tahirpur Pourashava	24.52897	88.82679	Tahirpur Pourashava
BH-34	Koyamajampur Govt. Prtimary School, Durgapur, Near Tahirpur Pourashava	24.52245	88.81128	Near Tahirpur Pourashava
BH-35	Nak para, Jogi para Union	24.59607	88.90939	Jogi Para Union
BH-36	Hamir kutsha Union complex office, Hamir Kutsha Union	24.55917	88.87413	Hamir Kutsha Union
BH-37	Tahirpur University (Birshobidalay) college, Tahirpur Bazar, Tahirpur Pourashava	24.51805	88.84495	Tahirpur Pourashava
BH-38	Jogi Para Union	24.568401	88.9318	Jogi Para Union
BH-39	Talghoria Govt. Primary School, Hamir Kutsha Union	24.55199	88.90859	Hamir Kutsha Union
BH-40	Choukali Govt. Primary School, Choukali Bazar, Goalkandi Union	24.53553	88.87837	Goalkandi Union

Source: Field data, 2015

While boring and SPT testing, soil samples are being visually classified in the following way:

Sieve	Soils	Designations
+No 4 (4.76mm)	Gravel	
No.4 to No 10(2.00mm)	Coarse	Sand
No. 10 to No 40 (0.42mm)	Medium	Sand
No. 40 to No 200 (0.07mm)	Fine	Sand
No.200	Silt or Clay	

Some soil has one dominant lithology with minuscule amount of other soil type. In such cases, minor soil sample are written in the following manner with along with dominant soil type.

1. Trace	1 to 10%
2. Little	10 to 25%
3. With	25 to 35%

SPT- N value is also note down while SPT Testing. Then the collected soil samples are being cross checked with SPT-N values to ensure quality data collection.

Based on N-values, other very useful soil parameters may be obtained from the corelation charts given by different research workers. Two such useful co-relations for cohesive and non-cohesive soils after K. Terzaghi are given below:

Table 4: Values of Relative Density (Dr.), Friction Angle and Unit Weight of Non-

CO	hesiv	ve soi	l basec	l on l	N-val	ues

N-	Condition	Relative	Angle of Internal	Moist Unit	
values		Density	friction (Degree)	Weight (Pcf)	
0-4	Very Loose	0-15%	28 ⁰	70-100	
4-10	Loose	15-35%	28 ⁰ -30 ⁰	95-125	
10-30	Medium dense	35-65%	30 ⁰ -36 ⁰	110-130	
30-50	Dense	65-85%	36 ⁰ -41 ⁰	110-140	
Over 50	Very dense	85-100%	Over 41 ⁰	> 130	

 Table 5: Values of Unconfined Compressive Strength based on N-values for

 Cohesive Soil (Approximate):

N-values	Condition	Unconfined Compressive Strength		
		(Tsf)		
Below 2	Very soft	Below 0.25		
2-4	Soft	0.25-0.50		
4-8	Medium stiff	0.50-1.00		
8-16	Stiff	1.00-2.00		
16-32	very stiff	2.00-4.00		
Over 32	Hard	over 4.00		

In the above table the shear strength of cohesive soil is equal to ½ of unconfined compressive strength and the angle of shearing resistance is equal to zero. It should be remembered that the co-relation for cohesive soil is not always much reliable. *The litholog are already written down in a standard format and has been attached in the appendix C.*

CHAPTER-04: CONCLUSION

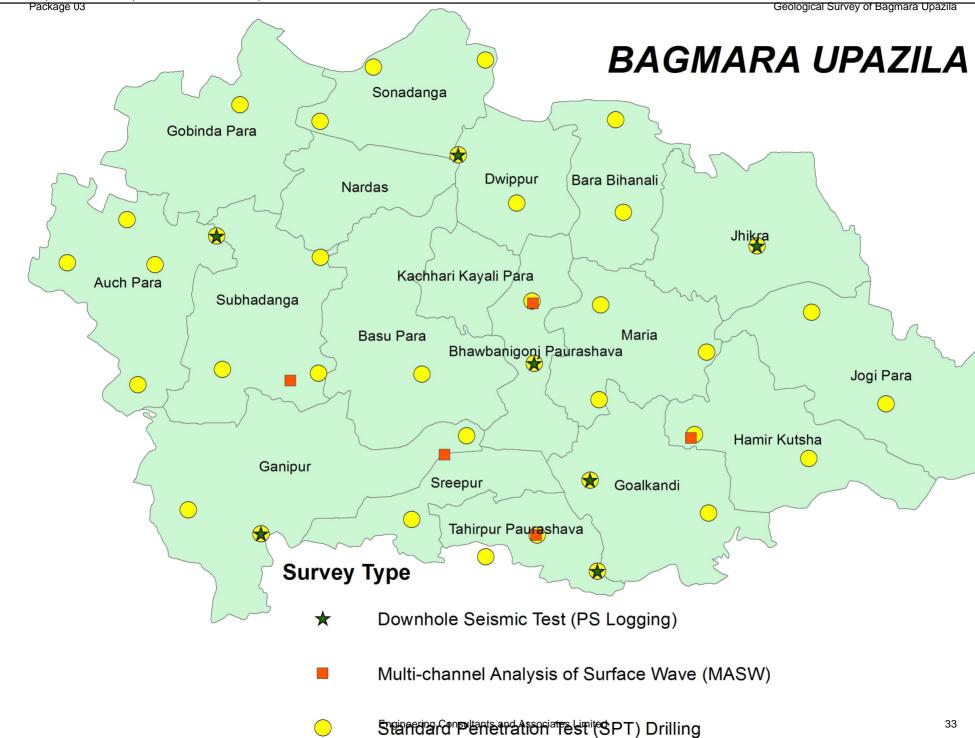
Bagmara Upazila and its adjoining areas is mostly comprises by monotonous flood plain area except few depression. Soil quality of the project area is varying as morphological difference, that's why geological, geotechnical and geophysical investigations has been carried out such a pattern to cover all morphological unit. In this consequences, 36 boreholes with SPT, 7 downhole seismic tests and 5 MASW program has been completed in the field as a part of this survey investigation. During this survey, soil samples (disturbed and undisturbed) are also collected for further laboratory test which will give idea about the soil engineering properties. This investigation data will be analyzed and integrated in a module from which it can possible to generate geomorphologic map, sub-surface litho-logical 3D model of different layers, engineering geological mapping based on AVS30, Seismic Hazard Assessment Map, soil type map, seismic intensity map, Peak Ground Acceleration (PGA) and recommended building height maps for both high rise building and low rise building etc

Above investigation and outcomes would give a clear idea about the geo-hazard status of particular landscape where newly urban developing activities or any other mega infrastructure project is going on and this mentioned investigation also gives idea about the vulnerability of existing build up infrastructure of a particular area. Based on these results, proper management techniques as well as other necessary adaptation process could be addressed before or after the development activities in the studied area. It is to be mentioned that the long-term maintenance cost will be reduced and the developed structure will withstand against the potential natural hazards if the infrastructures are built following the risk informed physical land-use plan.

CHAPTER 5: REFERENCES

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Preparation of Development Plan for Fourteen Upazilas



Appendix B

Multi-channel Analysis of Surface Wave (MASW) Results and Graphs

Preparation of Development Plan for Fourteen Upazilas Package 03

Geological Survey of Bagmara Upazila

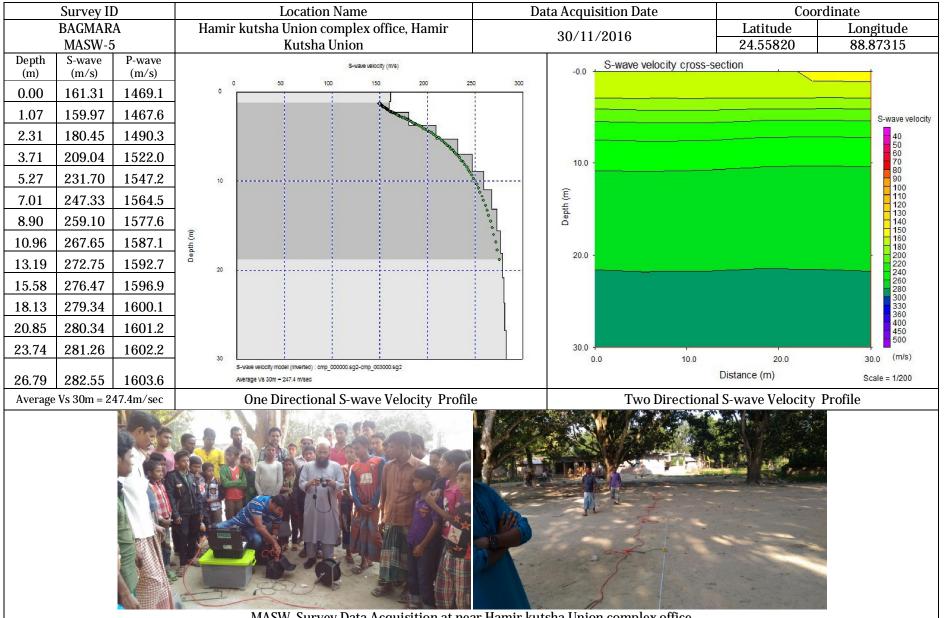
Survey ID			Location Name			Da	Data Acquisition Date		Coordinate		
BAGMARA		Jamgram Govt. Primary School, Jamgram,				30/11/2016		Latitude	Longitude		
	MASW-1				Tahirpur Pour	ashava		30/11/2010		24.52896	88.82662
Depth (m)	S-wave (m/s)	P-wave (m/s)	_		0 50 100 15	S-wave velocity (m/s) i0 200 250 300 3	400	-0.0 S-wave	velocity cross-se	ection	
0.00	147.60	1453.8		0							
1.07	149.57	1456.0							<u></u>		S-wave velocity
2.31	160.58	1468.2	_								40
3.71	187.31	1497.9	_			Dear and		10.0 -			40 50 60 70 80 90
5.27	221.92	1536.3		10							90 100
7.01	250.46	1568.0	_			×.		Depth (m)			110
8.90	271.01	1590.8	Ē			i i i		Dep			- 130 - 140 - 150
10.96	287.36	1608.9	Depth (m)					20.0 -			160
13.19	304.48	1627.9	ă	20				20.0			220
15.58	321.55	1646.9									260
18.13	339.86	1667.2									- 330 - 360
20.85	357.85	1687.2	_				• 4				110 120 130 140 150 160 180 200 220 240 260 280 300 330 360 400 450 500
23.74	373.31	1704.3	_	30			•	30.0 - 0.0	10.0	20.0	30.0 (m/s)
26.79	385.16	1717.5			S-wave velocity model (Inverted) : cmp_ Average Vs 30m = 268.6 m/sec	_000000.sg2-cmp_003000.sg2				Distance (m)	Scale = 1/200
Average V	/s 30m = 20	68.6m/sec		(One Directional S	-wave Velocity Profil	е	T\	wo Directional	S-wave Velocity	Profile
		6		at the	MASW Surve	y Data Acquisition at	Jamgram Gov	rt. Primary Scho	olfield		

Engineering Consultants and Associates Limited

	Survey II)			Location Name	Da	ta Acquisition Date	Cool	rdinate
	BAGMAR MASW-2	A	S	Shree	epur govt. primary school, Bagmara		30/11/2016	Latitude 24.55312	Longitude 88.79897
Depth (m)	S-wave (m/s)	P-wave (m/s)		0	S-wave velocity (m/s) 50 100 150 200 2	250 300	S-wave velocity cross-section	'n	
0.00	158.20	1465.6		0					
1.39	151.61	1458.3							
3.13	190.59	1501.6							S-wave velocity
5.21	221.81	1536.2							50
7.64	238.61	1554.9		10			10.0 -		
10.42	251.20	1568.8					Depth (m)		110
13.54	258.49	1576.9	Sec. 1			Ť.			130 140 150
17.01	275.49	1595.8	Depth (m)				20.0 -		
20.83	278.27	1598.9	Del	20		•			220 240 260
			-		S-wate velocity model (Inverted) : cmp_000000 sg2-cmp_003000 sg2 Average Ve 30m - 237.3 m/sec			20.0 ance (m)	380 400 450 500 30.0 (m/s) Scale = 1/200
Average	Vs 30m = 23	37.3m/sec			One Directional S-wave Velocity Profil	e	Two Directiona	l S-wave Velocity	Profile
					MASW Survey Data Acquisition at	sureepur gov	L. primary school field		

	Survey II)		Location Name	Da	ta Acquisition D	ate	Coor	rdinate
	BAGMAR		Binorth	pur govt. primary school, Subhadanga		30/11/2016		Latitude	Longitude
Death	MASW-3			Union		1		24.57543	88.75258
Depth (m)	S-wave (m/s)	P-wave (m/s)		S-wave velocity (m/s)		-0.0 S-wave	velocity cross-se	ection	
0.00	152.58	1459.4	0	0 50 100 150 200 2	300				
1.07	150.07	1456.6							S-wave velocity
2.31	163.81	1471.8							
3.71	179.19	1488.9				10.0 -			40 50 60 70 80 90
5.27	193.34	1504.6	10			10.0			80
7.01	207.49	1520.3				Depth (m)			100 110 120
8.90	221.51	1535.9	0		2	Dept			- 120 - 130 - 140 - 150
10.96	235.33	1551.2	Depth (m)						160
13.19	244.37	1561.2	е С 20			20.0 -			200
15.58	253.36	1571.2							240 260 280
18.13	254.79	1572.8							300 330 260
20.85	255.72	1573.9			1				- 180 - 200 - 220 - 240 - 260 - 280 - 300 - 330 - 360 - 400 - 450 - 500
23.74	256.37	1574.6	30			30.0 <mark>-</mark> 0.0	10.0	20.0	30.0 (m/s)
26.79	257.17	1575.5		8-wave velocity model (Inverted) : cmp_000000.sg2-cmp_003000.sg2 Average Vs 30m - 221.2 m/sec				Distance (m)	Scale = 1/200
Average	Vs 30m = 22	21.2m/sec		One Directional S-wave Velocity Profile	e	Tv	vo Directiona	l S-wave Velocity	Profile
				MASW Survey Data Acquisition at B	inorthpur go	ovt. primary scho	ool field		

	Survey II)			Location Name	Da	ta Acquisition Date	Coor	dinate			
	BAGMAR		Uttar		dala Govt. Primary School, Uttar akdala	kdala 20/11/2016 Latitude Long						
	MASW-4			В	azar, Bhabanigong Pourashava		30/11/2010	24.59876	88.82558			
Depth (m)	S-wave (m/s)	P-wave (m/s)			S-wave velocity (m/s)							
0.00	164.48	1472.6		0	50 100 150 200 25	0 300						
1.07	162.21	1470.1					-0.0 S-wave velocity cross-section	· · · ·				
2.31	177.92	1470.1	-									
3.71	198.70	1510.6							S-wave velocity			
5.27	215.24	1528.9		10			10.0 -					
7.01	229.37	1520.0		10			Ē		90			
8.90	242.45	1559.1					Depth (m)		120 130 140			
10.96	255.10	1573.2	Depth (m)				20.0 -		150 160 180			
13.19	265.77	1585.0				•	20.0		40 50 60 70 90 100 110 120 130 140 140 150 100 220 280 280 300 300 300 300 300 300 300 500 5			
15.58	272.46	1592.4	- 23	20					280 300 330			
18.13	276.36	1596.8							360 400 450			
20.85	277.92	1598.5					30.0 + 0.0 10.0	20.0 30.0	40.0 (m/s)			
23.74	279.31	1600.0						Distance (m)	Scale = 1/200			
26.79	281.02	1601.9	3		S-wave velocity model (inverted) : cmp_000000.sg2-cmp_003000.sg2	<u> </u>						
	281.02 Vs 30m = 24			1	Average Vis 30m - 2412 mises One Directional S-wave Velocity Profile	<u> </u>	Two Directions	S-wave Velocity	Drofilo			
					MASW Survey Data Acquisition at Ut	tar akdala G	ovt. Primary School field					



MASW Survey Data Acquisition at near Hamir kutsha Union complex office

Appendix C

Geotechnical Borehole Logs and Graphs

	GEOTECHNICAL	BOR								
Meth Borin Borin	hole No: BH-01 od of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m		Exixting ground level: Ground water level: 2.44m below EGL Started on: 06.02.2016 Completed on: 06.02.2016							
Clien Proje	•			urte	en U	lpazila	as(Pa	ckage	÷-3)	Legend:
Loca	tion: Near Gobinda Para Union (Complex	، Go	bind	da Pa	ara Ui	nion			Clay Silt Sand Coordinate:- Lat-24.65849 Long-88.73728
				ation Test	SPT blows per 0.3 m penetration					
Depth (m)	Visual Description	sloc	ple	Layer Number	Thickness(m)		vs on S		N-Values	-
Dept		Symbols	Sample	Laye	Thick	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
					Γ					$1 \overline{\mathbf{n}} + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$
- 1.5	Brownish Grey soft to medium stiff					1	1	1	2	$ \mathbf{k} + \mathbf{k} $
	SILT with very fine sand			1	4.5	2	3	5	8	
3.0						۷	5	5	U	
- 4.5					\vdash	3	4	6	10	│┝ ╶╋ ╶┼╌┼╴┼╶┼╶┤│
- 6.0						3	5	7	12	
- 7.5						1	1	2	3	
- 9.0						4	5	10	15	$ - \uparrow \downarrow + + + + + $
- 10.5						5	7	10	17	
- 12.0						2	2	4	6	
- 13.5						2	4	5	9	
- 15.0						1	1	1	2	
- 16.5	Light Grey soft to stiff SILT with clay			3	25.5	1	1	2	3	$\left \left \frac{1}{2}\right + \left \frac{1}{2}\right $
- 18.0	č					2	2	2	4	
- 19.5						2	2	2	4	│ │╉┼╶┼╶┼╶┤ │
- 21.0						2	2	3	5	
- 22.5						2	3	2	5	
- 24.0						3	4	5	9	$ \cdot \langle \cdot \rangle + \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot $
- 25.5						3	5	7	12	
- 27.0						4	6	8	14	
- 28.5						6	8	10	18	
- 30.0	End of Boring				┞	7	10	12	22	
	Disturbed Sample(Split Spoon)		Layer	.r 1			Layer 4	1		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	r 2			Layer 5	5		
			Layer	r 3			Layer 6	3		

	GEOTECHNICAL	. BOR	EH	OL	.E	LOC)			
	hole No: BH-02			Exixting ground level:						
	od of Boring: Percussion			Ground water level: 4.47m below EGL						
	ng Dia.:100(mm) ng Depth: 30.0m	Started on: 07.02.2016								
Clien		rate (LIC	וחנ							Completed on: 07.02.2016 Legend:
Proje	•	•		urtee	en U	pazila	as(Pa	ckage	9-3)	
-	tion: Hatkhugipur High School, H							-		Clay Silt Sand
comp		-								Coordinate:- Lat-24.62356 Long-88.70332
				ber	Ê				tion Test	SPT blows per 0.3 m penetration
Ê.	Visual Description	sl	e	Num	ess(Blow	s on S	poon	N-Values	-
Depth (m)		Symbols	Sample	Layer Number	Thickness(m)	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
De		ŝ	ŝ	La	È	15	15	15	30	
1.5	Brownish Grey soft to medium stiff					1	2	3	5	
	SILT with very fine sand			1	4.5					
3.0	-					2	2	2	4	
							0	4	2	
- 4.5						1	2	1	3	
- 60						1	2	2	4	
6.0						'	2	2	-	
7.5						1	2	1	3	
9.0						2	2	2	4	
10.5						2	2	3	5	
12.0						2	2	4	6	
13.5						2	3	4	7	
						1	2	2	4	
15.0							2	2	4	
16.5						2	2	3	5	
10.0	Light Grey soft to stiff SILT with clay			3	25.5				-	
- 18.0						2	2	4	6	
- 19.5						2	3	5	8	
21.0						2	3	3	6	
							0	0	-	
22.5						2	2	3	5	
						1	2	2	4	
24.0							2	2	4	
- 25.5						2	2	4	6	
20.0									-	
- 27.0						2	3	3	6	
- 28.5						3	3	4	7	
- 30.0	End of Boring					3	4	6	10	
			 	I				L		
	Disturbed Sample(Split Spoon)		Layer	1			Layer 4	ļ		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	2			Layer 5	;		
			1				1			
			Layer	3			Layer 6	5		

	GEOTECHNICAL	BOR								
Meth Borir	hole No: BH-03 od of Boring: Percussion ng Dia.:100(mm)	Exixting ground level: Ground water level: 4.88m below EGL Started on: 08.02.2016								
Clien	t : Urban Development Directo	orate (LIC	וחנ							Completed on: 08.02.2016 Legend:
Proje	•			urtee	en U	pazila	as(Pa	ckage	:-3)	
Loca	tion : Rokittepara Govt. primary s	Clay Silt Sand Coordinate:- Lat-24.61088 Long-88.68531								
				ber	(u)				tion Test	SPT blows per 0.3 m penetration
(m) (Visual Description	ols	e	Num	ness		/s on S		N-Values	
Depth (m)		Symbols	Sample	Layer Number	Thickness(m)	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
- 1.5	Brownish Grey medium stiff to stiff		_			2	3	3	6	
	SILT with very fine SAND			1	4.5				40	
3.0						4	4	6	10	
- 4.5						3	4	5	9	│ ├── ┫── │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │
								0	•	
6.0						1	1	2	3	
- 7.5						1	2	2	4	
- 9.0						2	2	2	4	
- 10.5						2	2	3	5	
- 12.0						2	3	4	7	
- 13.5						2	3	5	8	
- 15.0						2	2	3	5	
						2				
- 16.5	Grey soft to medium stiff SILT with clay			3	25.5		3	5	8	
- 18.0						2	2	3	5	
- 19.5						2	3	5	8	
- 21.0						2	3	3	6	
- 22.5						2	2	2	4	
- 24.0						2	2	3	5	
25.5						2	3	3	6	
- 27.0						3	3	4	7	
- 28.5						2	3	4	7	
- 30.0						3	4	5	9	
	End of Boring						<u> </u>			
	Disturbed Sample(Split Spoon)		Laye	r 1			Layer 4	ļ		Layer 7
	Undisturbed Sample(Shelby Tube)		Laye				Layer 5			
1			Laye	r 3			Layer 6	6		

	GEOTECHNICAL	. BOR	EH	OL	.E I	LOC	•			
	hole No: BH-04 od of Boring: Percussion		Exixting ground level:							
Borin	ng Dia. :100(mm)		Ground water level: 4.57m below EGL Started on: 05.02.2016							
	ng Depth: 30.0m		Completed on: 05.02.2016							
Clien Proje	•			urtee	en U	pazila	as(Par	ckage	e-3)	Legend:
-	tion : Sharcol Shimla High School	Clay Silt Sand								
	5		<u>т</u>	r		1			tion Test	Coordinate:- Lat-24.66983 Long-88.77749 SPT blows per 0.3 m penetration
(F	Vieuel Description	ŝ		nmbe	ss(m		/s on Sp		N-Values	
Depth (m)	Visual Description	Symbols	Sample	Layer Number	Thickness(m)	5cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
Ď	Light Brown loose very fine to fine	Ś	ů			15	15	15	30	
- 1.5	SAND with silt			2	1.5	1	2	3	5	
1.5							_	Ŭ	Ũ	
- 3.0						1	1	2	3	
- 4.5						1	1	1	2	
	Light Grey soft to medium stiff SILT									
6.0	with clay			3	9.0	1	2	1	3	
7.5						1	2	2	4	
							0	0		
9.0						2	2	2	4	
10.5						2	2	3	5	
	Redish Brown medium stiff SILT with			4	3.0	2	2	4	6	
- 12.0	clay				3.0	2	2	4	0	
13.5						2	3	4	7	
- 15.0						4	6	8	14	
10.0							-	-		
16.5						5	7	10	17	
- 18.0	Light Brown medium dense fine SAND with silt			5	9.0	6	10	10	20	
	SAND WIT SIT					_	10			
19.5						7	10	14	24	
21.0			-			8	12	13	25	
- 00 F						10	13	15	28	
- 22.5							10	15	20	
- 24.0			_			12	16	18	34	
- 25.5						14	20	24	44	
20.0	Light Grey dense to very dense medium to fine SAND little silt			7	7.5					
- 27.0						16	24	26	50	
28.5						17	21	29	50	
						10	07	05	00	
- 30.0	End of Boring					18	27	35	62	
	Disturbed Sample(Split Spoon)		Layer	r 1			Layer 4	Ļ		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	r 2			Layer 5	5		
			Layer	3			Layer 6	,		

	GEOTECHNICAL	. BOR	EH	OL	-E I	LOC	3			
Meth Borir	hole No: BH-06 nod of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m		Exixting ground level: Ground water level: 2.13m below EGL Started on: 04.02.2016 Completed on: 04.02.2016							
Clien	t :Urban Development Director		,	urto		nozile		okogo	. 2)	Legend:
Proje	tion : Ganggopara Girls School, H							-	-3)	Clay Silt Sand
			ation Test	Coordinate:- Lat-24.61902 Long-88.73029 SPT blows per 0.3 m penetration						
Ê	Visual Description	S		Jumbe	m)sse		/s on S		N-Values	
Depth (m)		Symbols	Sample	Layer Number	Thickness(m)	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
- 1.5	Brownish Grey medium stiff SILT with					1	2	3	5	
- 3.0	very fine sand			1	4.5	2	3	4	7	
- 4.5					-	3	3	4	7	
6.0						1	1	1	2	
7.5						1	1	1	2	
9.0						1	1	2	3	
10.5						2	2	3	5	
- 12.0	Grey soft to medium stiff SILT little clay			3	15.0	2	2	2	4	
- 13.5						2	2	2	4	
- 15.0						2	2	2	4	
- 16.5						2	2	4	6	
- 18.0						2	2	2	4	
- 19.5						1	2	3	5	
21.0	Light Grey medium dense fine SAND with silt			5	4.5	5	5	9	14	
- 22.5						6	8	9	17	
24.0						6	6	15	21	
- 25.5	Light Grey very dense medium to fine					30	50	0	50	
- 27.0	SAND little silt			7	6.0	25	50	0	50	
- 28.5						27	50	0	50	
- 30.0	End of Boring					20	35	19	54	
	Disturbed Sample(Split Spoon)		Laye	r 1			Layer 4	ţ		Layer 7
	Undisturbed Sample(Shelby Tube)		Layei	r 2			Layer 5	5		
			Layer	r 3			Layer 6	\$		

	GEOTECHNICAL	BOR	EH	OL	.E I	LOC	•			
	hole No: BH-08									Exixting ground level:
	od of Boring: Percussion			Ground water level: 3.05m below EGL						
	ng Dia.: 100(mm) ng Depth: 30.0m			Started on: 04.02.2016						
Clien		rato (LIC	וחנ							Completed on: 04.02.2016 Legend:
Proje	•			urtee	en U	pazila	as(Pa	ckade	-3)	
-	tion : Uttar Jamalpur Govt. primar							-		Clay Silt Sand
Unior		Coordinate:- Lat-24.67196 Long-88.81125								
				ber	۲ ب	Stan	dard F	enetra	tion Test	SPT blows per 0.3 m penetration
Ê	Visual Description	s		Layer Number	Thickness(m)	Blow	s on S	poon	N-Values	
Depth (m)	visual Description	Symbols	Sample	er ⊳	ckne	E	E	E	ε	0 40 20 20 40 50 50 70 00
Del		Syr	Sar	Lay	Thi	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
	Brownish Grey medium stiff SILT with			1	1.5					
1.5	very fine sand					1	2	3	5	
3.0	Light Brown loose to medium dense very fine SAND with silt					3	3	5	8	
- 4.5	·			2	6.0	3	4	7	11	
	Light Grey loose very fine SAND with					-				
6.0	silt					2	2	2	4	
						2	2	3	5	
7.5						2	2	5	5	
9.0						1	1	1	2	
	Light Grey soft to medium stiff SILT little clay			3	4.5					
10.5	inthe clay					1	1	2	3	│
- 12.0						2	3	3	6	
						-			-	
13.5						3	4	5	9	
45.0						3	5	6	11	
15.0						5	5	0		
16.5	Light Brown medium dense fine			5	9.0	4	6	8	14	
	SAND little clay									
18.0						6	9	13	22	
- 19.5						7	10	15	25	
						~	10	40	00	
21.0						9	12	16	28	
- 00 F						10	15	18	33	
22.5						10	10	10	00	
24.0						12	16	16	32	
25.5	Light Brown dense to very dense medium to fine SAND with silt			6	9.0	14	15	20	35	
	medium to fine OAND with sit									
- 27.0						16	18	24	42	
28.5						17	20	27	47	
						18	24	26	50	
- 30.0	End of Boring					10	27	20	50	
	Disturbed Sample(Split Spoon)		Layer	r 1			Layer 4	ł		Layer 7
							.,			1 ´
	Undisturbed Sample(Shelby Tube)		Layer	2			Layer 5	5		
			Layer	3			Layer 6	6		
1			,51	-						

	GEOTECHNICAL	. BOR	EH	OL	.E I	LOC)					
Meth Borir	hole No: BH-09 od of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m		Exixting ground level: Ground water level: 4.27m below EGL Started on: 03.02.2016									
Clien		rate (UD	D)							Completed on: 03.02.2016 Legend:		
Proje	ect : Preparation of Development	t Plan fo	r Fou	urtee	en U	pazila	as(Pa	ckage	-3)	Clay Silt Sand		
Loca	tion : Mirpur Dimukki Primary and	High So	chool	l, jol	apar	a Hat	i, Dwip	ppur l	Jnion	Coordinate:- Lat-24.64339 Long-88.803		
				nber	(m)				tion Test	SPT blows per 0.3 m penetration		
Depth (m)	Visual Description	pols	ple	Layer Number	Thickness(m)		s on S		N-Values			
Dept		Symbols	Sample	Laye	Thick	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80		
- 1.5	Brownish Grey medium stiff SILT with very fine SAND			1	3.0	1	2	2	4			
- 3.0						2	2	3	5			
- 4.5	Light Brown to Grey loose very fine to fine SAND with silt		┝	2	3.0	2	4	4	8			
6.0						2	1	2	3			
- 7.5				1		1	2	2	4			
- 9.0	Redish brown medium stiff to stiff			4	7.5	2	3	4	7			
- 10.5	SILT with clay					3	4	6	10			
- 12.0						2	3	3	6			
- 13.5						2	3	5	8			
- 15.0						6	10	12	22			
- 16.5						7	12	14	26			
- 18.0	Light Brown medium dense to very dense fine to medium SAND little silt			6	10.5	10.5	10.5	9	13	15	28	
- 19.5						10	14	17	31			
- 21.0						12	16	18	34			
- 22.5						14	20	22	42			
- 24.0						16	23	27	50			
- 25.5	Light Grey dense to very dense					14	18	23	41			
- 27.0	medium to fine SAND little silt			7	6.0	16	23	26	49			
- 28.5						18	24	26	50			
- 30.0	End of Boring					20	27	30	57			
	Disturbed Sample(Split Spoon)		Layer	:1			Layer 4	ţ		Layer 7		
	Undisturbed Sample(Shelby Tube)		Layer				Layer 5					
			Layer	3			Layer 6	\$				

	GEOTECHNICAL	. BOF	REH	OL	.E	LOC	•			
	hole No: BH-10		Exixting ground level:							
	od of Boring: Percussion	Ground water level: 3.66m below EGL								
	ng Dia.:100(mm) ng Depth: 30.0m		Started on: 03.02.2016							
Clien		rate (LIC	וחנ							Completed on: 03.02.2016 Legend:
Proje				urtee	en U	pazila	as(Pa	ckade	-3)	
-	tion : Byegacha Govt. primary and							-		Clay Silt Sand
Unior		Coordinate:- Lat-24.61254 Long-88.76151								
				ber	Ê				tion Test	SPT blows per 0.3 m penetration
(L)	Visual Description	<u>s</u>	Θ	Num	less(Blow	rs on S	poon	N-Values	-
Depth (m)		Symbols	Sample	Layer Number	Thickness(m)	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
Ď		Ś	ő	Ľ	È	15	15	15	30	
1.5						2	3	4	7	
	Brown loose very fine SAND with silt			2	5.0	~		•	_	
3.0						2	2	3	5	
- 4.5						3	3	4	7	
4.5						Ŭ	Ŭ	-	,	
- 6.0						1	1	1	2	
7.5						1	1	1	2	
9.0	Dark Grey soft to medium stiff SILT					2	2	2	4	
	with clay			3	9.0	2	2	2	F	
10.5						2	2	3	5	
- 12.0						2	1	2	3	
12.0						_		_	Ū	
13.5						2	2	2	4	
15.0						5	6	9	15	
						_				
16.5	Light Brown medium dense to dense					6	8	12	20	
40.0	fine to medium SAND			6	6.0	8	12	18	30	
18.0						0	12	10	50	
- 19.5						8	14	21	35	
- 21.0						12	24	32	56	
22.5						14	27	33	60	
						24	50	0	50	
24.0	Lisht Oracia and Isaac and Isaac to					24	50	0	50	
- 25.5	Light Grey very dense medium to coarse SAND			7	10.0	23	50	0	50	
20.0						_0		Ũ		
- 27.0						30	50	0	50	
28.5						40	50	0	50	
- 30.0	End of Boring					20	50	0	50	
							I			I
	Disturbed Sample(Split Spoon)		Layer	1			Layer 4	•		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	2			Layer 5	5		
1	-		- 1.				- 1.			
1			Layer	3			Layer 6	6		

	GEOTECHNICAL	. BOR	REH	OL	.E I	LOC	•			
	hole No: BH-11 od of Boring: Percussion		Exixting ground level:							
Borir	ng Dia. :100(mm)		Ground water level: 3.53m below EGL Started on: 09.02.2016							
_	ng Depth: 30.0m									Completed on: 09.02.2016
Clien Proje	•		,	urtee	ən U	pazila	as(Pa	ckage	e-3)	Legend:
Loca	tion : Machmail High School, Mac	Clay Silt Sand								
			Т	er	Ê	Stan	idard P	enetra	tion Test	Coordinate:- Lat-24.57887 Long-88.73202 SPT blows per 0.3 m penetration
(m	Visual Description	<u>0</u>	0	dmb	u)sse	Blow	/s on S	poon	N-Values	
Depth (m)	violai 2000 pieri	Symbols	Sample	Layer Number	Thickness(m)	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
								-	0	
- 1.5	Light Brown loose to medium dense		-			1	3	4	7	
	very fine SAND with silt			2	4.5	3	4	6	10	
3.0						J	-	0	10	
- 4.5						4	5	7	12	
- 6.0			_			2	3	4	7	
- 7.5	Dark Grey medium stiff SILT with clay	,		3	6.0	2	3	5	8	
- 9.0						2	3	3	6	
3.0								Ũ	Ũ	
10.5						2	2	2	4	
- 12.0	Brown medium stiff to stiff SILT with clay			4	3.0	2	3	4	7	
- 13.5						3	4	6	10	
- 15.0						6	9	10	19	
- 16.5						7	10	14	24	
18.0			_			6	10	13	23	
- 19.5			_			6	12	10	22	
21.0	Liekt Dreum medium dense te dense					8	12	14	26	
- 22.5	Light Brown medium dense to dense fine to medium SAND			6	16.5	7	10	16	26	
- 24.0			_			10	11	15	26	
- 25.5			_			10	13	16	29	
- 27.0						12	14	18	32	
- 28.5						13	16	20	36	
						14	20	24	44	
- 30.0	End of Boring					14	20	24	44	
🗖	Disturbed Sample(Split Spoon)		Layer	: 1			Layer 4	Ļ		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	: 2			Layer 5	5		
			Layer	r 3			Layer 6	6		

	GEOTECHNICAL	. BOR	ξΕΗ	OL	.E	LOC)			
Meth Borir	hole No: BH-12 nod of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m			Exixting ground level: Ground water level: 2.74m below EGL Started on: 08.02.2016 Completed on: 08.02.2016						
Clien								-		Legend:
Proje	ect : Preparation of Development tion : Mugaipara High School, Mu							-	:-3)	Clay Silt Sand
LUCA		yaipara	tion Test	Coordinate:- Lat-24.57418 Long-88.70657 SPT blows per 0.3 m penetration						
Ê	Visual Description	S		umbe	(m)ss		s on S		N-Values	
Depth (m)	Visual Description	Symbols	Sample	Layer Number	Thickness(m)	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
- 1.5	Light Brown to Grey loose very fine SAND with silt			2	3.0	2	2	3	5	
- 3.0	 					3	2	3	5	│├ ∳╎ ╎ ╎ ╎ ╎ ╎ │ │
- 4.5						1	1	2	3	
- 6.0						1	1	2	3	│
- 7.5	Light Grey soft to medium stiff SILT with clay			3	9.0	1	2	2	4	
- 9.0						2	1	2	3	$ \bullet + + + + + + + + + + + + + + + + + +$
- 10.5						2	2	3	5	$ \mathbf{A} \mathbf{A}$
- 12.0	 					2	3	3	6	4 + + + +
- 13.5						4	5	5	10	
- 15.0						5	8	11	19	
- 16.5	Light Brown medium dense to dense			6	10.5	6	10	14	24	
- 18.0	fine to medium SAND					7	8	15	23	
- 19.5						7	10	16	26	
- 21.0						10	15	20	35	
- 22.5						15	19	24	43	
- 24.0						18	22	29	51	
- 25.5	Light Grey very dense medium to			7	7.5	18	24	30	54	
- 27.0	coarse SAND				1.5	22	27	30	57	
- 28.5						22	30	32	62	
- 30.0	End of Boring				-	27	40	12	52	
	Disturbed Sample(Split Spoon)		Layer	r 1			Layer 4	t I		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	2			Layer 5	5		-
			Layer	3			Layer 6	5		

	GEOTECHNICAL	. BOR	EH	OL	.E	LOC	•			
Meth Borir	hole No: BH-17 od of Boring: Percussion ng Dia.:100(mm)									Exixting ground level: Ground water level: 2.59m below EGL Started on: 05.02.2016
	ng Depth: 30.0m									Completed on: 05.02.2016
Clien Proje	•	•		urtee	ən U	pazila	as(Pa	ckage	e-1)	Legend:
Loca	tion: Doulatpur Madhomik Schoo	I, Madha	a Doi	ulatp	our, s	Subha	adang	ja Uni	ion	Clay Silt Sand Coordinate:- Lat-24.57765 Long-88.76096
			Γ	ber	Ê				tion Test	SPT blows per 0.3 m penetration
E)	Visual Description	slo	e	Num	ness(s on S		N-Values	
Depth (m)		Symbols	Sample	Layer Number	Thickness(m)	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
- 1.5	Light Brown loose to medium dense very fine SAND with silt			2	3.0	2	3	3	6	
- 3.0						3	4	6	10	
4.5						3	5	6	11	
- 6.0	Light Grey soft to medium stiff SILT with clay			3	6.0	1	1	2	3	
- 7.5						1	1	1	2	
- 9.0						1	2	2	4	
10.5						1	2	3	5	
- 12.0	Brown medium stiff SILT with clay			4	5.0	3	3	4	7	
- 13.5						3	4	4	8	
- 15.0						7	11	21	32	
- 16.5			_			8	13	19	32	
- 18.0			_			8	14	20	34	
- 19.5	Light Brown dense fine to medium SAND little silt		-	6	11.5	9	14	21	35	
- 21.0	SAND Inte Sit		_			7	13	18	31	
- 22.5				l		7	11	16	27	
24.0						7	13	16	29	
- 25.5			_	-	┢─┘	8	14	17	31	
- 27.0	Light Crowyon, donce medium SAND			7	4.5	20	50	0	50	
- 28.5	Light Grey very dense medium SAND		-	7	4.5	30	50	0	50	
- 30.0	End of Boring					30	50	0	50	
	Disturbed Sample(Split Spoon)		Layer	ـــــــــــــــــــــــــــــــــــــ			Layer 4	. I		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer				Layer 5			а ⁻
			Layer	r 3			Layer 6	;		

	GEOTECHNICAL	. BOR	۲E	OL	E I	LOG	•			
	hole No: BH-19									Exixting ground level:
	od of Boring: Percussion ng Dia.:100(mm)									Ground water level: 2.74m below EGL
	1g Depth: 30.0m									Started on: 07.02.2016 Completed on: 07.02.2016
Clien		rate (UI	DD)							Legend:
Proje								-		
	tion : Gonganarayanpur Namajgra	am Gov	t. Prii	mary	/ Scł	nool, l	Kuma	nitola	l ,	Clay Silt Sand
Gamp	pur Union	T	Т	5		Stan	dard P	Ponetra	tion Test	Coordinate:- Lat-24.5365 Long-88.72177 SPT blows per 0.3 m penetration
,				Layer Number	Thickness(m)		s on Sp		N-Values	
Depth (m)	Visual Description	Symbols	ple	er Nt	knes					
Depi		Sym	Sample	Laye	Thic	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
- 1.5						1	1	1	2	$ \mathbf{A} + \mathbf{A} $
								1		
- 3.0						1	2	3	5	│
	Brown to Light Grey loose to medium			2	8.0	2			40	N _ _
4.5	dense very fine to fine SAND with silt					3	4	6	10	
6.0						5	8	12	20	
0.0									-	/
7.5						3	6	8	14	
					┢─┦				_	
9.0						2	3	5	8	
10.5	Grey medium stiff to stiff SILT with					3	3	4	7	│ ┝─┫┤──┤╴┤╴┤╴┤╴┤ │ │
10.0	clay			3	5.5	-			-	
- 12.0						3	4	5	9	$ \cdot \cdot$
13.5	/+					4	5	7	12	
- 15.0						4	5	7	12	
10.0										
16.5	Brown medium dense fine SAND little clay			5	6.0	4	5	6	11	
	0.07						_	_		
18.0						5	6	6	12	
- 19.5						7	9	11	20	
19.5							Ŭ		20	
21.0						8	15	18	33	
22.5						8	15	20	35	
24.0						21	30	20	50	
24.0	Light Grey dense to very dense		[7	10.5		00	20	00	
25.5	medium to coarse SAND					23	40	10	50	│
- 27.0	1					26	35	15	50	
						22	34	16	50	
28.5						22	34	10	50	
- 30.0						23	41	9	50	
	End of Boring		<u> </u>							
	Disturbed Sample(Split Spoon)		Layer	71			Layer 4	†		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	r 2			Layer 5	5		
							1			
			Layer	3			Layer 6	i		

	GEOTECHNICAL	. BOF	₹EH	OL	-E I	LOC	3			
Meth Borir	hole No: BH-20 nod of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m			Exixting ground level: Ground water level: 3.66m below EGL Started on: 02.02.2016 Completed on: 02.02.2016						
Clien Proje	•			urtee	en U	pazila	as(Pa	ckade	e-3)	Legend:
-	tion: 21 nos. Bara Bihanali govt.							onago	()	Clay Silt Sand
				ber	Ê				tion Test	Coordinate:- Lat-24.62606 Long-88.85274 SPT blows per 0.3 m penetration
Depth (m)	Visual Description	sols	ole	Layer Number	Thickness(m)		vs on S	i I	N-Values	
Dept		Symbols	Sample	Laye	Thick	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
- 1.5	Light Brown loose to medium dense very fine SAND			1	4.5	1	2	2	4	
- 3.0	very line SAND					3	4	6	10	
- 4.5						4	5	7	12	
- 6.0	Light Grey soft to medium stiff SILT with clay			3	3.0	5	2	2	4	
7.5				_	\vdash	2	3	4	7	
- 9.0	Brown stiff SILT with clay			4	3.0	3	5	5	10	
- 10.5					-	4	6	9	15	
- 12.0						7	10	16	26	
- 13.5						8	12	18	30	
- 15.0						8	10	16	26	
- 16.5	Light Brown medium dense to dense fine to medium SAND			6	12.0	12	15	18	33	
- 18.0						12	17	20	37	
- 19.5						15	18	24	42	
21.0						16	20	22	42	
- 22.5						17	22	24	46	
- 24.0						18	24	27	51	
- 25.5	Light Grey dense to very dense			7	7.5	16	20	26	46	
- 27.0	medium to fine SAND					18	24	30	54	
- 28.5						20	26	33	59	
- 30.0	End of Boring					18	27	35	62	
	Disturbed Sample(Split Spoon)		Layer	r 1			Layer 4	1		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	r 2			Layer 5	5		
			Layer	r 3			Layer 6	3		

	GEOTECHNICAL	. BOF	¢ΕΗ	OL	.E I	-06	3			
	hole No: BH-21									Exixting ground level:
	od of Boring: Percussion									Ground water level: 4.27m below EGL
	ng Dia.: 100(mm) ng Depth: 30.0m									Started on: 01.02.2016
Clien		rate (I II	וחס							Completed on: 01.02.2016 Legend:
Proje	•			urtee	ən U	pazila	as(Pa	ckade	-3)	
-	tion : Uttar akdala Govt. Primary S							-		Clay Silt Sand
	ashava								-	Coordinate:- Lat-24.59941 Long-88.82528
				ber	Ê				tion Test	SPT blows per 0.3 m penetration
(E	Visual Description	<u>s</u>	đ	Layer Number	Thickness(m)	Blow	/s on Sp	poon	N-Values	
Depth (m)		Symbols	Sample	yer I	ickn	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
Ď		ŝ	s	La	É	15	15	15	30	
1.5	Light Brown loose to medium dense					2	3	3	6	
	very fine to fine SAND with silt			2	4.5					
3.0	-					3	3	5	8	
								0	10	
- 4.5						3	4	6	10	
						1	1	2	3	
6.0								2	5	
7.5	Grey soft to stiff SILT with clay			3	6.0	1	2	2	4	
-										
9.0						2	4	6	10	
10.5						3	5	8	13	
12.0						6	10	14	24	
						8	12	16	28	
13.5						0	12	10	20	
- 15.0						10	15	18	33	
10.0	Light Brown medium dense to dense			6	10.5				00	
16.5	fine to medium SAND					12	16	20	36	
18.0						14	18	23	41	
19.5						16	20	24	44	
						45	22	200	40	
21.0						15	22	26	48	
- 22.5						17	24	26	50	
22.5							27	20	00	
- 24.0						12	15	22	37	
25.5	Light Grey very dense to dense fine to medium SAND			7	9.0	14	17	23	40	
- 27.0						16	20	22	42	
									- 0	
28.5						17	24	26	50	
						18	27	23	50	
- 30.0	End of Boring					10	21	25	50	
	Disturbed Sample(Split Spoon)		Layer	1			Layer 4			Layer 7
			Layer	•			Layer			
	Undisturbed Sample(Shelby Tube)		Layer	2			Layer 5	5		
1			Layer	5			Layer 6	,		

	GEOTECHNICAL	BOR	REH	OL	.E	LOC	3			
	hole No: BH-22									Exixting ground level:
	od of Boring: Percussion ng Dia.:100(mm)									Ground water level: 3.35m below EGL
	ng Depth: 30.0m			Started on: 02.02.2016 Completed on: 02.02.2016						
Clien		rate (UI	DD)							Legend:
Proje				urtee	ən U	pazila	as(Pa	ckage	e-1)	
	tion: Nandanpur(Chekamara) Ba	azar, Mo	ohila	Dak	hil M	ladras	sha, E	Basu F	Para	Clay Silt Sand
Unior	ו ר	1	1	<u> </u>	<u> </u>	Ctor	dord D) o n o tro	tion Toot	Coordinate:- Lat-24.57737 Long-88.79211 SPT blows per 0.3 m penetration
				Layer Number	Thickness(m)		idard P /s on S		tion Test N-Values	GFT blows per 0.5 m penetration
h (m	Visual Description	pols	ple	r Nu	cnes					-
Depth (m)		Symbols	Sample	-aye	Thick	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
							~~~			
- 1.5						1	1	1	2	
1.5	Light Brown very loose to loose very			2	4.5				-	
- 3.0	fine SAND with silt					2	2	2	4	
- 4.5						2	2	3	5	
						~	2	2	0	
6.0						2	3	3	6	
7.5						1	2	3	5	
	Dark Grey medium stiff to stiff SILT with clay			3	7.5					
9.0	with Clay			1		3	5	8	13	
10.5						3	7	8	15	
12.0						5	8	10	18	
- 12.0							Ŭ	10	10	
13.5						7	10	16	26	
15.0						9	15	22	37	
						10	10	25	4.4	
16.5	Light Brown medium dense to dense					10	19	25	44	
- 18.0	medium to fine SAND			6	11.0	10	20	25	45	
10.0										
- 19.5						11	23	27	50	
21.0						8	10	15	25	
- 22.5						8	10	13	23	
22.5							10	10	20	
- 24.0						15	20	26	46	
25.5						15	21	28	49	
	Light Grey dense to very dense medium to coares SAND			7	7.0	47			- 0	
- 27.0	medium to coales OAND					17	22	28	50	
28.5						19	27	30	57	
20.5								00	01	
- 30.0	End of Doring					22	30	35	65	
	End of Boring									
	Disturbed Sample(Split Spoon)		Layer	71			Layer 4	Ļ		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	r 2			Layer 5	5		
	[,									
1			Layer	r <b>3</b>			Layer 6	6		

	GEOTECHNICAL	. BOF	¢ΕΗ	OL	-E /	LOC	3			
Meth Borir Borir	hole No: BH-24 hod of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m				Exixting ground level: Ground water level: 4.88m below EGL Started on: 06.02.2016 Completed on: 06.02.2016					
Clien Proje	•			urtee	ən U	pazila	as(Pa	ckage	9-3)	Legend:
Loca	tion: Ganipur Union Complex office	ce, Has	nipur	Baz	zar, (	Ganip	our Un	ion		Clay Silt Sand Coordinate:- Lat-24.52932 Long-88.74364
			Τ	lber	٦ آ				tion Test	SPT blows per 0.3 m penetration
(m) c	Visual Description	sloc	ele	Layer Number	Thickness(m)		/s on Sp		N-Values	-
Depth (m)		Symbols	Sample	Layer	Thick	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
- 1.5						1	2	3	5	
- 3.0	Brown loose to medium dense very fine SAND with silt			2	7.5	2	3	4	7	
- 4.5						3	4	5	9	
- 6.0						5	7	7	14	
7.5						5	7	10	17	
9.0	Grey stiff SILT with clay			3	4.5	5	6	8	14	
- 10.5						5	6	9	15	
- 12.0						3	5	6	11	
- 13.5	Brown medium stiff SILT with clay			4	3.0	2	3	4	7	
15.0						2	3	4	7	
- 16.5						7	16	26	42	
- 18.0	Light Brown dense to very dense medium to fine SAND			6	7.5		14	29	43	
- 19.5						16	27	23	50	
21.0						14	14	27	41	
- 22.5						16	32	18	50	
- 24.0						20	34	16	50	
- 25.5	Light Grey very dense medium to fine SAND			7	7.5	16	32	18	50	
- 27.0						12	23	29	52	
- 28.5						17	33	17	50	
- 30.0	End of Boring		0			20	50	0	50	
	Disturbed Sample(Split Spoon)		Layer	: 1			Layer 4	)		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	2			Layer 5	i		
			Layer	3			Layer 6	i		

	GEOTECHNICAL	. BOF	۲Η	OL	E I	-06	6			
	hole No: BH-26									Exixting ground level:
	od of Boring: Percussion									Ground water level: 2.29m below EGL
	ng Dia.:100(mm) ng Depth: 30.0m		Started on: 27.01.2016 Completed on: 27.01.2016							
Clien		rate (UI	(חכ							Legend:
Proje	•			urtee	ən U	pazila	as(Pa	ckage	e-1)	
Loca	tion : Sahid Sakandar Memorial A	darsho	High	Sch	100l,	Goda	aoun I	Mor,		Clay Silt Sand
Bhab	anigong Pourashava	1		—	<b></b>					Coordinate:- Lat-24.58064 Long-88.82589
				Layer Number	ε				tion Test	SPT blows per 0.3 m penetration
(m)	Visual Description	ols	e	Nun	ress		s on S		N-Values	-
Depth (m)		Symbols	Sample	ayer	Thickness(m)	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
		S	S		+	¥	16	1:	эс	
									-	
1.5						2	3	3	6	
	Light Brown loose to medium dense fine to very fine SAND with silt			2	4.8	4	8	10	18	
3.0						4	0	10	10	
- 4.5						3	6	8	14	
- 6.0						1	1	2	3	
7.5	Grey soft to stiff SILT with clay			3	5.7	1	2	2	4	
						2	5	F	10	
9.0						2	Э	5	10	
- 10.5						3	5	6	11	
10.5						Ŭ	Ũ	Ũ		
- 12.0						4	6	9	15	
13.5				5	6.5	4	7	10	17	
	fine to medium SAND							47	04	
15.0						8	14	17	31	
- 16.5						8	15	20	35	
10.5						Ŭ	10	20	00	
18.0						14	21	29	50	
- 19.5	Light Brown very dense to dense					17	26	24	50	
	medium SAND			6	6.0					
21.0						13	20	23	43	
- 00 F						10	17	21	38	
22.5			_			10	.,	21	50	
- 24.0						17	28	40	68	
- 25.5						14	24	32	56	
	Light Grey very dense to dense			7	7.0					
- 27.0	medium SAND					14	21	28	49	
							10	0.5	10	
28.5						11	18	25	43	
- 30.0						11	18	23	41	
30.0	End of Boring						10	20		
	Disturbed Sample(Split Spoon)		Layer	r 1			Layer 4			Layer 7
					_					
	Undisturbed Sample(Shelby Tube)		Layer	2			Layer 5	5		
			Layer	r 3			Layer 6	5		
1			<b>a</b> '''							

	GEOTECHNICAL	. BOR	EH	OL	.E	LOC	3			
Meth Borir	hole No: BH-27 nod of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m			Exixting ground level: Ground water level: 3.05m below EGL Started on: 31.01.2016 Completed on: 31.01.2016						
Clien	• •	rate (UE	D)							Legend:
Proje	ect : Preparation of Development	t Plan fo	r Foi	urtee	ən U	pazila	as(Pa	ckage	-3)	
Loca	tion: Bagmara Degree College, G	3anipur I	Clay Silt Sand Coordinate:- Lat-24.55881 Long-88.80555							
<u> </u>		Ι	Γ	er	Ê	Stan	idard P	enetra	tion Test	SPT blows per 0.3 m penetration
Ê	Visual Description	<u>0</u>	0	Layer Number	Thickness(m)	Blow	/s on S	poon	N-Values	
Depth (m)		Symbols	Sample	yer N	ickne	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
Ď		ŝ	Se	La	Ĕ	15	15	15	30	
- 1.5	Brown soft to medium stiff SILT with very fine sand			1	4.5	1	2	2	4	
- 3.0	very line salid					2	3	4	7	
						2	3	5	8	
- 4.5						2	3	5	0	
- 6.0	Light Brown medium dense very fine SAND with silt			2	3.0	4	4	5	9	
7.5						4	5	6	11	
- 9.0						2	4	4	8	
- 10.5	Grey medium stiff to stiff SILT with clay			3	6.0	3	4	6	10	
- 12.0						4	6	8	14	
- 13.5						4	7	9	16	
- 15.0						7	12	14	26	
<del>-</del> 16.5	Light Brown medium dense to very					10	14	17	31	
- 18.0	dense medium to fine SAND			6	9.0	12	20	25	45	
- 19.5						15 17	17 23	23 27	40 50	
21.0						17	23	21	50	
- 22.5						12	15	20	35	
- 24.0						14	17	24	41	
- 25.5	Light Grey dense to very dense medium SAND			7	7.5	17	24	26	50	
- 27.0						22	32	18	50	
- 28.5						32	22	28	50	
- 30.0	End of Boring	1				30	35	15	50	
	Disturbed Sample(Split Spoon)		Layer	r 1			Layer 4	Ļ		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	r 2			Layer 5	5		
			Layer	r 3			Layer 6	6		

	GEOTECHNICAL	BOR	EH	OL	EI	_00	6			
	hole No: BH-28 od of Boring: Percussion									Exixting ground level: Ground water level: 3.66m below EGL
Borir	ng Dia.:100(mm)				Started on: 01.02.2016					
Borin	ng Depth: 30.0m nt : Urban Development Directo	roto (LIF	וחנ							Completed on: 01.02.2016 Legend:
Proje	•	•		urtee	en U	pazila	as(Pa	ckage	9-3)	
Loca	tion: Shadhopara Madrasha, Nea	ar post o	office	, Sre	epu	r Unio	on			Clay Silt Sand Coordinate:- Lat-24.53365 Long-88.78897
				nber	(m)				tion Test	SPT blows per 0.3 m penetration
(m) r	Visual Description	sloc	ole	' Nur	ness		s on S		N-Values	
Depth (m)		Symbols	Sample	Layer Number	Thickness(m)	15cm	15cm	15cm	30cm	0 20 40 60 80 100
- 1.5	Light Brown loose very fine to fine SAND with silt		_	2	2.0	2	3	4	7	
- 3.0						1	1	1	2	
- 4.5						1	1	1	2	
						1	1	1	2	
6.0	Grey very soft to stiff SILT with very fine sand			3	10.0					
7.5						1	1	2	3	
9.0						3	4	6	10	
- 10.5						4	5	7	12	
- 12.0						4	7	9	16	
- 13.5						5	7	10	17	
- 15.0	Light Brown medium dense to dense				7.5	6	8	10	18	
- 16.5	very fine to medium SAND			6	7.5	7	10	15	25	
18.0						8	13	16	29	
- 19.5						12	17	19	36	
- 21.0						14	20	25	45	
- 22.5						14	20	27	47	
- 24.0	Light Grey dense to very dense					22	50	45	95	
25.5	medium to coarse SAND			7	10.5	20	38	41	79	
- 27.0						23	42	50	92	
- 28.5						19	33	40	73	
- 30.0	End of Boring					21	35	42	77	
			1 1.							l
	Disturbed Sample(Split Spoon)		Layer				Layer 4			Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	1			Layer 5			
1			Layer	3			Layer 6	)		

	GEOTECHNICAL	. BOR	(EH	OL	.E I	LOG	6			
	hole No: BH-29 od of Boring: Percussion			Exixting ground level: Ground water level: 3.66m below EGL						
Borir	<b>ng Dia.</b> :100(mm)				Started on: 28.01.2016					
Borir Clien	ng Depth: 30.0m It : Urban Development Directo	roto (LI	וחר							Completed on: 28.01.2016
Proje	•			urtee	ən U	pazila	as(Pa	ckage	e-3)	Legend:
Loca	tion: Jhikra High School, Jhikra B	Bazar, Jł	nikra	Unic	on					Clay Silt Sand Coordinate:- Lat-24.616 Long-88.89302
		<u> </u>	tion Test	SPT blows per 0.3 m penetration						
(m)	Visual Description	<u>s</u>	Φ	Numl	iess(r	Blow	s on S	poon	N-Values	
Depth (m)		Symbols	Sample	Layer Number	Thickness(m)	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
					Ľ.		~			
- 1.5	Brown loose to medium dense very					1	1	2	3	
- 3.0	fine SAND with silt			2	4.5	3	4	5	9	
5.0								Ũ	Ū	
- 4.5						3	4	6	10	
- 6.0				I		2	2	4	6	
7.5	Grey medium stiff to stiff SILT with clay			3	6.0	2	3	4	7	
- 9.0						3	5	7	12	
- 10.5				-		4	6	8	14	
- 12.0			_			6	10	12	22	
- 13.5			_			7	12	13	25	
- 15.0						8	11	15	26	
- 16.5			_			10	13	17	30	
- 18.0			_			10	14	18	32	
- 19.5	Light brown medium dense to dense		-	6	19.5	12	16	20	36	
- 21.0	fine to medium SAND		-			10	15	18	33	
- 22.5				I		12	14	16	30	
- 24.0						13	15	18	33	
- 25.5						14	16	19	35	
- 27.0			-	I		12	18	20	38	
- 28.5			-	I		14	20	20	40	
- 30.0	End of Boring			-		15	18	24	42	
	Disturbed Sample(Split Spoon)		Layer	r 1			Layer 4	Ļ		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	r 2			Layer 5	5		
			Layer	r 3			Layer 6	6		

	GEOTECHNICAL	BOR	REH	OL	.E I	L00	•			
Meth Borir	hole No: BH-30 od of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m			Exixting ground level: Ground water level: 3.05m below EGL Started on: 29.01.2016 Completed on: 29.01.2016						
Clien Proje	•			urtee	en U	pazila	as(Pa	ckage	e-1)	Legend:
Loca	tion: Sakoa Bohumuki High Scho	ool, Sikd	ar Ba	azar,	, Ma	ria Ur	nion			Clay Silt Sand Coordinate:- Lat-24.58401 Long-88.87783
				ber	(m)				tion Test	SPT blows per 0.3 m penetration
Depth (m)	Visual Description	bols	ple	Layer Number	Thickness(m)		s on S		N-Values	
Dept		Symbols	Sample	Laye	Thic	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
<b>—</b> 1.5	Light Brown loose to medium dense very fine SAND with silt			2	4.5	2	2	3	5	
- 3.0						3	3	4	7	
- 4.5						3	4	5	9	
6.0						2	2	2	4	
- 7.5	Grey soft to medium stiff SILT with clay			3	6.0	2	2	3	5	
- 9.0						2	3	3	6	
- 10.5						2	3	4	7	
- 12.0	Brown medium stiff SILT with clay			4	3.0	2	2	4	6	
- 13.5						2	2	3	5	
- 15.0	Light brown dense medium to fine SAND			6	3.0	10	16	22	38	
- 16.5						10	18	24	42	
- 18.0						17	22	28	50	
- 19.5						16	18	24	42	
- 21.0						12	14	25	39	
- 22.5	Light Grey very dense to dense fine			7	13.5	14	24	26	50	
- 24.0	to medium SAND				13.5	14	22	24	46	
- 25.5						16	23	25	48	
- 27.0						17	26	24	50	
28.5						14	16	22	38	
- 30.0	End of Boring					16	20	25	45	
	Disturbed Sample(Split Spoon)		Layer	1			Layer 4			Layer 7
	Undisturbed Sample(Shelby Tube)		Layer				Layer 5			1
			Layer				Layer 6			

	GEOTECHNICAL									
Meth Borir	hole No: BH-31 od of Boring: Percussion ng Dia.:100(mm)	Exixting ground level: Ground water level: 2.44m below EGL Started on: 10.02.2016								
_	<b>1g Depth:</b> 30.0m									Completed on: 10.02.2016
Clien Proje	•			urtee	en U	pazila	as(Pa	ckage	e-3)	Legend:
Loca	tion : Gangopara Govt. Primary se	Clay Silt Sand Coordinate:- Lat-24.56969 Long-88.84544								
				ber	Ê.				tion Test	SPT blows per 0.3 m penetration
(m) c	Visual Description	slo	ele	Num	ness		s on S		N-Values	
Depth (m)		Symbols	Sample	Layer Number	Thickness(m)	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
										$ \mathbf{N} $ $ $
<b>—</b> 1.5	Brownish Grey medium stiff to stiff				4.5	1	2	2	4	
- 3.0	SILT			1	4.5	3	4	5	9	
						_				
- 4.5						3	4	7	11	
- 6.0						1	1	2	3	
7.5	Light Grey soft to medium stiff SILT with clay			3	6.0	1	2	2	4	
9.0						2	2	4	6	
- 10.5						2	3	4	7	
- 12.0						7	10	13	23	
- 13.5						7	15	20	35	
- 15.0	Light Brown medium dense to dense fine to medium SAND			6	9.0	8	14	18	32	
- 16.5						10	16	18	34	
- 18.0						10	15	20	35	
- 19.5						12	16	20	36	
- 21.0			_			14	20	20	40	
- 22.5						15	22	24	46	
- 24.0	Light Grey dense to very dense					12	16	20	36	
- 25.5	medium to fine SAND			7	10.5	14	20	23	43	
- 27.0						16	22	24	46	
- 28.5						17	25	27	52	
- 30.0	End of Boring					18	27	30	57	
	-			<u>ا</u>						L
	Disturbed Sample(Split Spoon) Undisturbed Sample(Shelby Tube)		Laye				Layer 4			Layer 7
	Characterined Sample(Shelpy Tube)		Laye				Layer 5			
I			.,,,,,				,			

	GEOTECHNICAL									
Meth Borir	hole No: BH-32 nod of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m	Exixting ground level: Ground water level: 3.66m below EGL Started on: 30.01.2016 Completed on: 30.01.2016								
Clien	t : Urban Development Director									Legend:
Proje			or Foi	urtee	ən U	pazila	as(Pa	ckage	9-3)	Clay Silt Sand
Loca	tion : Sajura Mirzapur, Goalkandi	Coordinate:- Lat-24.54549 Long-88.84274								
				mber	s(m)				tion Test N-Values	SPT blows per 0.3 m penetration
Depth (m)	Visual Description	Symbols	Sample	Layer Number	Thickness(m)		1			
Dep		Syr	San	Lay	Thic	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
- 1.5						2	3	3	6	
- 3.0	Light Brown to Grey loose to medium					2	2	3	5	
- 4.5	dense very fine SAND with silt		_	2	7.5	2	2	3	5	
- 6.0						3	4	5	9	
- 7.5						3	4	6	10	
- 9.0						2	4	6	10	
10.5	Light Grey medium stiff SILT with clay	,		3	6.0	3	5	6	11	
- 12.0						2	4	6	10	
- 13.5						4	6	10	16	
- 15.0						12	14	21	35	
- 16.5						14	17	24	41	
- 18.0						15	18	25	43	
- 19.5						16	22	26	48	
21.0	Light grey dense to very dense			7	16.5	18	24	26	50	
- 22.5	medium to coarse SAND					13	17	23	40	
- 24.0						14	16	24	40	
- 25.5			_			15	18	25	43	
- 27.0			-			16	18	24	42	
- 28.5			-			16	20	25	45	
- 30.0	End of Boring	-		-		18	22	26	48	
	Disturbed Sample(Split Spoon)		Layer	r 1			Layer 4	t I		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	r 2			Layer 5	5		•
			Layer	r 3			Layer 6	3		

	GEOTECHNICAL									
Meth Borir Borir	hole No: BH-33 od of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m	Exixting ground level: Ground water level: 2.59m below EGL Started on: 31.01.2016 Completed on: 31.01.2016								
Clien Proje	•			urtee	en U	pazila	as(Pa	ckage	e-3)	Legend:
Loca	tion : Jamgram Govt. Primary Sch	Clay Silt Sand Coordinate:- Lat-24.52897 Long-88.82679								
				her	(u)				tion Test	SPT blows per 0.3 m penetration
Depth (m)	Visual Description	Symbols	Sample	Layer Number	Thickness(m)	15cm 80	15cm o S	15cm u000	N-Values E S O E	0 10 20 30 40 50 60 70 80 90
- 1.5	Light Brown loose fine to very fine		_	2	4.7	2	3	4	7	
- 3.0	SAND with silt				4.7	2	2	3	5	
- 4.5						2	3	3	6	
6.0						2	3	4	7	
7.5						2	4	4	8	
- 9.0				3	8.0	3	4	5	9	
- 10.5						4	5	6	11	
- 12.0						5	7	7	14	
- 13.5						5	7	8	15	
- 15.0	Light Brown medium dense fine to medium SAND			5	4.3	5	6	13	19	
16.5						7	10	14	24	
- 18.0						13	18	25	43	
- 19.5						13	18	24	42	
21.0						14	21	27	48	
- 22.5	Light Grey dense to very dense					14	23	32	55	
- 24.0	medium to fine SAND			7		20	39	45	84	
- 25.5						20	31	40	71	
- 27.0						21	36	42	78	
- 28.5						21	36	45	81	
- 30.0	End of Boring					18	29	39	68	
	Disturbed Sample(Split Spoon)		Layer	1			Layer 4			Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	2			Layer 5	;		
			Layer	3			Layer 6	5		

	GEOTECHNICAL									
	hole No: BH-34									Exixting ground level:
	od of Boring: Percussion									Ground water level: 2.44m below EGL
	<b>ng Dia.:</b> 100(mm) <b>ng Depth:</b> 30.0m									Started on: 09.02.2016
Clien		rato (LIC	וחנ							Completed on: 09.02.2016
Proje	•			irtee	n U	pazila	s(Pa	ckage	-3)	Legend:
-	tion : Koyamajampur Govt. Prtima							-	,	Clay Silt Sand
	ashava	Coordinate:- Lat-24.52245 Long-88.81128								
				oer	n)	Stan	dard P	enetra	tion Test	SPT blows per 0.3 m penetration
Ê	Visual Description	<u>0</u>		Layer Number	Thickness(m)	Blow	s on S	poon	N-Values	
Depth (m)		Symbols	Sample	/er ľ	ickne	15cm	15cm	Ę	Ę	0 10 20 30 40 50 60 70 80
De		Syl	Sa	La	Thi	150	150	15cm	30cm	
	Light Brown soft SILT with very fine sand			1	1.5					
1.5	Sanu					2	2	2	4	
3.0						2	2	3	5	
							-		-	
4.5						2	3	3	6	7
						1	1	4	2	
6.0						1	1	1	2	
- 7.5	Grey to Light Grey very soft to					1	1	2	3	
1.0	medium stiff SILT with clay			3	12.5				-	
- 9.0						1	2	2	4	<b>4</b>
10.5						2	3	4	7	
								_	-	
- 12.0						3	4	5	9	
						4	4	5	9	
13.5						4	4	5	9	
- 15.0						8	9	16	25	
16.5						8	11	17	28	
- 18.0	Light Brown medium dense to dense			6	8.5	8	13	19	32	
	fine to medium SAND little silt					10	10	01	07	
19.5						10	16	21	37	
- 21.0						10	17	21	38	
21.0						10	.,	21	00	
22.5						10	19	23	42	
- 24.0						10	15	20	35	
25.5	Light Grey dense to very dense					15	25	30	55	
	medium to fine SAND			7	7.5	45	05	05	00	
- 27.0						15	25	35	60	
00.5						21	38	12	50	
28.5							00		00	
- 30.0						27	40	10	50	
$\vdash$	End of Boring		<u> </u>							
	Disturbed Sample(Split Spoon)		Layer	1			Layer 4	L I		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	2			Layer 5	;		
				-						
			Layer	3			Layer 6	5		

	GEOTECHNICAL									
Meth Borir	hole No: BH-36 od of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m	Exixting ground level: Ground water level: 3.35m below EGL Started on: 10.02.2016 Completed on: 10.02.2016								
Clien	t : Urban Development Directo									Legend:
Proje								ckage	e-1)	Clay Silt Sand
Loca	tion : Hamir kutsha Union complex	Coordinate:- Lat-24.55917 Long-88.87413								
				nber	Ê				tion Test	SPT blows per 0.3 m penetration
Depth (m)	Visual Description	pols	ple	Layer Number	Thickness(m)		s on S		N-Values	-
Dept		Symbols	Sample	Laye	Thicl	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
<b>—</b> 1.5	Light Brown loose fine to very fine SAND with silt			1	4.0	1	2	2	4	
- 3.0						2	2	2	4	
- 4.5						2	2	3	5	
6.0	Light Grey medium stiff to stiff SILT			3	7.5	1	2	2	4	
7.5	with clay				7.5	2	3	6	9	
- 9.0						3	5	5	10	
- 10.5						3	5	7	12	
- 12.0			_			8	10	13	23	
- 13.5	Light Brown medium dense to dense		_		7.5	10	12	18	30	
- 15.0	fine to medium SAND	_	6	7.5	10	14	18	32		
- 16.5			_			9	16	22	38	
18.0			-		┢─┦	10	16	20	36	
- 19.5			_			8	13	16	29	
- 21.0						8	15	18	33	
- 22.5						20	32	18	50	
- 24.0	Light Grey dense to very dense medium to fine SAND			7	12.0	20	32	18	50	
- 25.5				l		25	40	10	50	
- 27.0				l		30	50	0	50	
- 28.5				l		32	50	0	50	
- 30.0	End of Boring	1				30	50	0	50	
	Disturbed Sample(Split Spoon)		Layer	r 1			Layer 4	1		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	r 2			Layer 5	5		
			Layer	3			Layer 6	3		

	GEOTECHNICAL									
	hole No: BH-37									Exixting ground level:
	od of Boring: Percussion									Ground water level: 2.44m below EGL
	ng Dia.:100(mm) ng Depth: 30.0m									Started on: 30.01.2016
Clien		rate (LI	וחר							Completed on: 30.01.2016 Legend:
Proje				urtee	en U	pazila	as(Pa	ckade	-3)	
-	tion : Tahirpur University (Birshob							-		Clay Silt Sand
	ashava	• •				•	-		•	Coordinate:- Lat-24.51805 Long-88.84495
				ber	m)				tion Test	SPT blows per 0.3 m penetration
(E	Visual Description	<u>v</u>	⁽¹⁾	Mum	ess(	Blow	s on S	poon	N-Values	
Depth (m)		Symbols	Sample	Layer Number	Thickness(m)	5cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
De		sy	Sa	La	ЧТ	150	15(	15(	300	
- 1.5						1	1	1	2	
	Light Brown very loose to medium			2	5.0					
3.0	dense very fine to fine SAND with silt					3	4	5	9	
						4	F	c	11	
4.5						4	5	6	11	
6.0						2	3	4	7	
0.0						-	Ũ			
7.5						3	4	5	9	
9.0	Light Gery medium stiff to stiff SILT					3	5	7	12	
	with clay			3	9.0					
10.5						4	6	8	14	
						~	7	0	45	
- 12.0						5	7	8	15	
13.5						6	8	10	18	
15.5						0	Ũ		10	
15.0			_			8	15	25	40	
16.5						8	17	27	44	
18.0						11	18	28	46	
						12	20	30	50	
- 19.5						12	20	30	50	
21.0						14	22	33	55	
2	Light Brown dense to very dense			6	10.0					
22.5	medium to fine SAND			0	16.0	16	23	33	56	
- 24.0						13	19	30	49	
25.5						15	22	30	52	
						15	20	20	50	
- 27.0						15	20	30	50	
- 28.5						18	30	35	65	
20.0									00	
- 30.0						18	25	35	60	
	End of Boring									
	Disturbed Sample(Split Spoon)		Layer	1			Layer 4	Ļ		Layer 7
	Undisturbed Sample(Shelby Tube)		1 01 10	2			l aver f			
	onaistainea sauthie(sueinà i nne)		Layer	2			Layer 5	,		
			Layer	3			Layer 6	;		

	GEOTECHNICAL									
Meth Borir	hole No: BH-39 hod of Boring: Percussion ng Dia.:100(mm)	Exixting ground level: Ground water level: 2.13m below EGL Started on: 28.01.2016								
Borin	ng Depth: 30.0m It : Urban Development Director	vrato (LIC	חר							Completed on: 28.01.2016 Legend:
Proje	•			urtee	ən U	pazila	as(Pa	ckage	e-1)	Clay Silt Sand
Loca	tion: Talghoria Govt. Primary Sch	Coordinate:- Lat-24.55199 Long-88.90859								
				her	(E				tion Test	SPT blows per 0.3 m penetration
(m) (	Visual Description	ols	e	Num	ness(		/s on S		N-Values	
Depth (m)		Symbols	Sample	Layer Number	Thickness(m)	15cm	15cm	15cm	30cm	0 10 20 30 40 50 60 70 80
- 1.5	Light Brown loose to medium dense very fine SAND with silt			2	4.0	3	5	7	12	
- 3.0						3	3	3	6	
- 4.5						2	2	3	5	
6.0	Light Grey medium stiff to stiff SILT					2	3	5	8	
- 7.5	with clay			3	8.0	2	3	6	9	
9.0						5	7	10	17	
- 10.5						6	8	11	19	
- 12.0						10	14	20	34	
- 13.5			-			10	17	20	37	
- 15.0			-			9	20	27	47	
- 16.5		-				13	23	27	50	
- 18.0			-			20	50	0	50	
- 19.5	Light Brown dense to very dense fine		_			18	40	10	50	
- 21.0	to medium SAND			6	19.0	18	38	12	50	
- 22.5				4		15	30	21	51	
- 24.0	5			4		11	22	28	50	
- 25.5				1		11	22	26	48	
- 27.0				1		15	27	23	50	
- 28.5						18	23	28	51	
- 30.0	End of Boring			-		21	31	19	50	
	Disturbed Sample(Split Spoon)		Layer	r 1			Layer 4	ı I		Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	r 2			Layer 5	5		
			Layer	r 3			Layer 6	\$		

	GEOTECHNICAL									
Meth Borir	hole No: BH-40 od of Boring: Percussion ng Dia.:100(mm) ng Depth: 30.0m	Exixting ground level: Ground water level: 2.13m below EGL Started on: 29.01.2016 Completed on: 29.01.2016								
Clien Proje	•			urtee	en U	pazila	as(Pa	ckage	-1)	Legend:
-	tion : Choukali Govt. Primary Sch	Clay Silt Sand Coordinate:- Lat-24.53553 Long-88.87837								
				ber	Ê				tion Test	SPT blows per 0.3 m penetration
Depth (m)	Visual Description	Symbols	Sample	Layer Number	Thickness(m)	15cm B	15cm o 0	15cm uood	N-Values E OC	0 10 20 30 40 50 60 70 80 90
- 1.5	Brownish Grey soft SILT with very fine sand			1	3.0	1	1	1	2	
- 3.0						1	1	1	2	
- 4.5						1	1	1	2	
- 6.0						1	1	2	3	$\left  \left  \frac{1}{2} \right  + \left  \frac{1}{2$
7.5	Light Grey soft to stiff SILT with clay			3	8.0	2	2	3	5	
- 9.0						3	5	6	11	
- 10.5						3	6	6	12	
- 12.0						12	14	18	32	
- 13.5						10	12	15	27	
- 15.0			_			6	4	9	13	
- 16.5						6	8	10	18	
- 18.0						14	21	30	51	
- 19.5	Light Crow donoo to yory donoo		_			14	20	28	48	
21.0	Light Grey dense to very dense medium to fine SAND trace silt			7	19.0	17	34	42	76	
- 22.5						17	40	42	82	
- 24.0						15	28	31	59	
- 25.5			_			15	24	30	54	
- 27.0						16	27	31	58	
- 28.5						17	33	39	72	
- 30.0	End of Boring					18	32	37	69	
	Disturbed Sample(Split Spoon)		Layer	• 1			Layer 4			Layer 7
	Undisturbed Sample(Shelby Tube)		Layer	2			Layer 5	;		
			Layer	3			Layer 6	;		

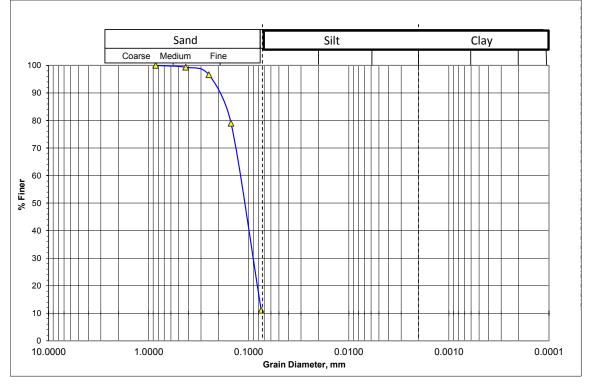
## Appendix D

## Geotechnical Laboratory Test Results and Graphs

#### GRAIN SIZE ANALYSIS (Mechanical) OF FINE AGGREGATE, SOIL ETC.

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Sharcol Shimla High School, beside Nasir Bazar, Sondanga UnionBore Hole No: BH-04Sampled Date: 05/02/2016Sample No :D-11Depth (m) :16.5

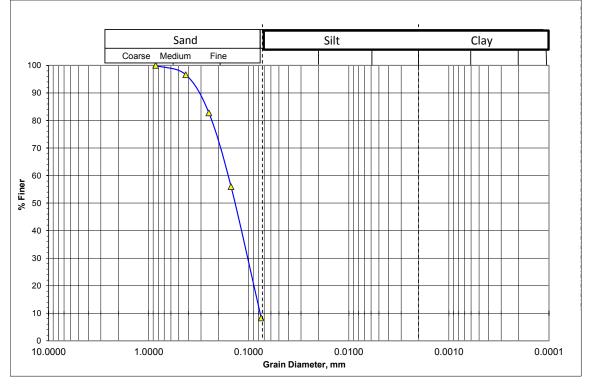
#### **Graphical Representation:**



Fines or % of silt and clay = 10 Mean Diameter,  $D_{50} = 0.115$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.60 % Particles (from the grain -size analysis graph (0.075mm size) = 90 (0.005mm size) & (0.001mm size) = 10

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Sharcol Shimla High School, beside Nasir Bazar, Sondanga UnionBore Hole No: BH-04Sampled Date: 05/02/2016Sample No :D-17Depth (m) :25.5

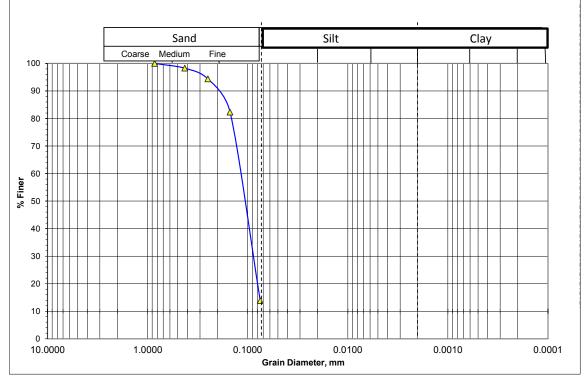
## **Graphical Representation:**



Fines or % of silt and clay = 8 Mean Diameter,  $D_{50} = 0.15$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.68 % Particles (from the grain -size analysis graph (0.075mm size) = 92 (0.005mm size) & (0.001mm size) = 8

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Ganggopara Girls School, Hat Ganggopara, Auch Para UnionBore Hole No: BH-Bg06Sampled Date: 04/02/2016Sample No :D-14Depth (m) :21.0

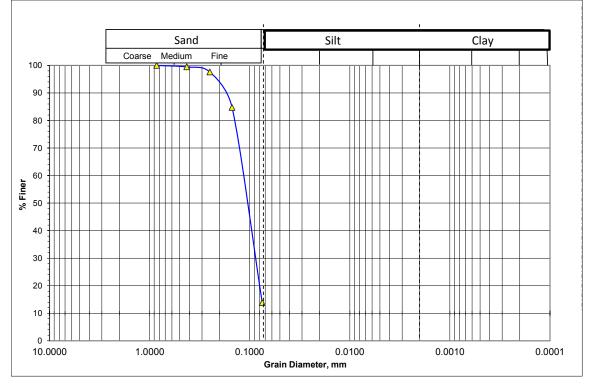
## **Graphical Representation:**



Fines or % of silt and clay = 14 Mean Diameter,  $D_{50} = 0.105$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.57 % Particles (from the grain -size analysis graph (0.075mm size) = 86 (0.005mm size) & (0.001mm size) = 14

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Uttar Jamalpur Govt. primary school, Uttar Jamalpur Fatepur, SondangaBore Hole No: BH-08Sampled Date: 04/02/2016Sample No :D-03Test Date :08/04/2016Depth (m) :9.0

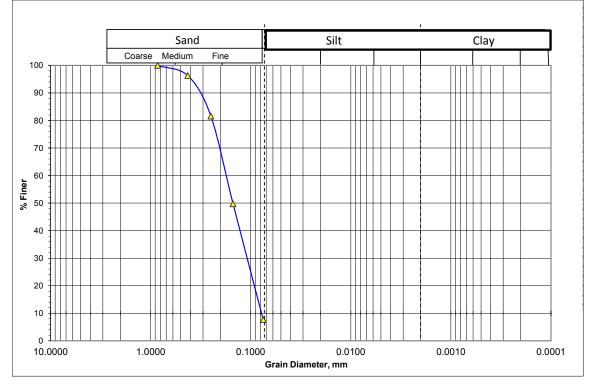
#### **Graphical Representation:**



Fines or % of silt and clay = 14 Mean Diameter,  $D_{50} = 0.105$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.57 % Particles (from the grain -size analysis graph (0.075mm size) = 86 (0.005mm size) & (0.001mm size) = 14

Client : Urban Development Directorate (UDD)Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Uttar Jamalpur Govt. primary school, Uttar Jamalpur Fatepur, SondangaBore Hole No: BH-08Sampled Date: 04/02/2016Sample No :D-16Test Date :08/04/2016Depth (m) :24.0

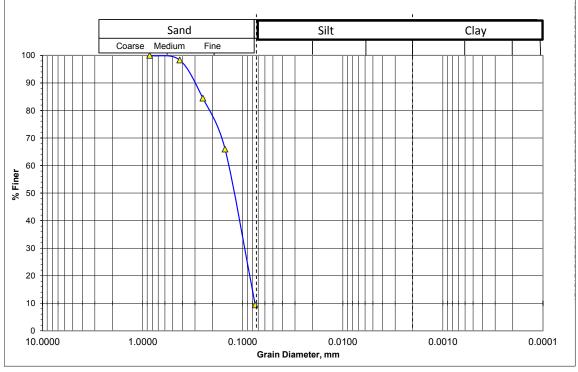
#### **Graphical Representation:**



Fines or % of silt and clay = 7 Mean Diameter,  $D_{50} = 0.165$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.71 % Particles (from the grain -size analysis graph (0.075mm size) = 93 (0.005mm size) & (0.001mm size) = 7

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Mirpur Dimukki Primary and High School, jolapara Hat, Dwippur UnionBore Hole No: BH-Bg09Sampled Date: 03/02/2016Sample No :D-11Test Date :Depth (m) :16.5

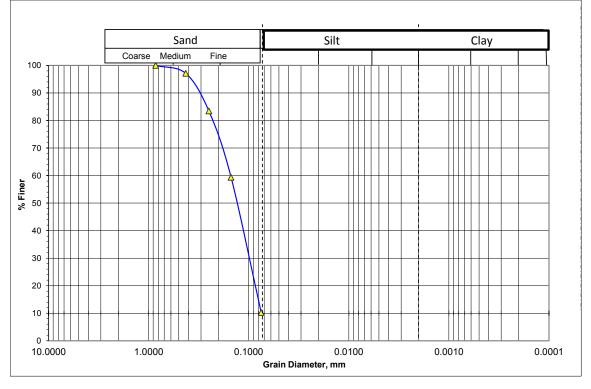
# Graphical Representation:



Fines or % of silt and clay = 10 Mean Diameter,  $D_{50} = 0.13$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.63 % Particles (from the grain -size analysis graph (0.075mm size) = 90 (0.005mm size) & (0.001mm size) = 10

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Mirpur Dimukki Primary and High School, jolapara Hat, Dwippur UnionBore Hole No: BH-Bg09Sampled Date: 03/02/2016Sample No :D-17Test Date :Depth (m) :25.5

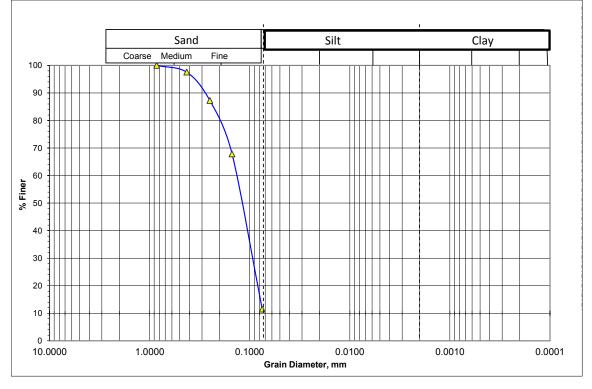
#### **Graphical Representation:**



Fines or % of silt and clay = 10 Mean Diameter,  $D_{50} = 0.135$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.65 % Particles (from the grain -size analysis graph (0.075mm size) = 90 (0.005mm size) & (0.001mm size) = 10

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Byegacha Govt. primary and high School, Byegacha Bazar, SubhadangaBore Hole No: BH-Bg10Sampled Date: 03/02/2016Sample No :D-11Depth (m) :16.5

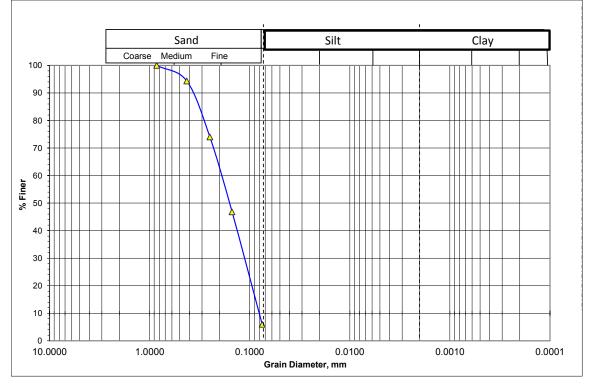
#### **Graphical Representation:**



Fines or % of silt and clay = 11 Mean Diameter,  $D_{50} = 0.125$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.62 % Particles (from the grain -size analysis graph (0.075mm size) = 89 (0.005mm size) & (0.001mm size) = 11

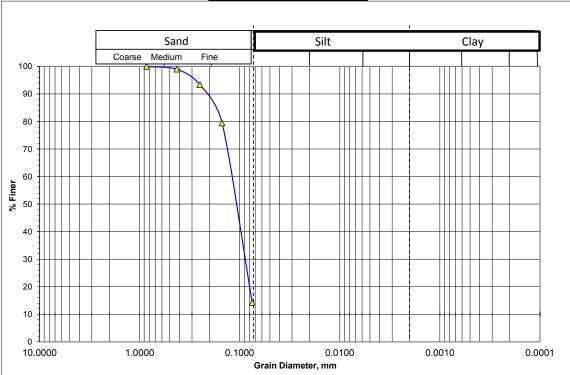
Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Byegacha Govt. primary and high School, Byegacha Bazar, SubhadangaBore Hole No: BH-Bg10Sampled Date: 03/02/2016Sample No :D-15Test Date :Depth (m) :22.5

#### **Graphical Representation:**



Fines or % of silt and clay = 6 Mean Diameter,  $D_{50} = 0.17$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.73 % Particles (from the grain -size analysis graph (0.075mm size) = 94 (0.005mm size) & (0.001mm size) = 6

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Machmail High School, Machmail Bazar, SubhadangaBore Hole No: BH-Bg11Sampled Date: 09/02/2016Sample No :D-02Test Date :08/04/2016Depth (m) :3.0



Fines or % of silt and clay = 14 Mean Diameter,  $D_{50} = 0.11$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.58 % Particles (from the grain -size analysis graph (0.075mm size) = 86 (0.005mm size) & (0.001mm size) = 14

#### **Graphical Representation:**

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Machmail High School, Machmail Bazar, SubhadangaBore Hole No: BH-Bg11Sampled Date: 09/02/2016Sample No :D-11Test Date :08/04/2016Depth (m) :16.5

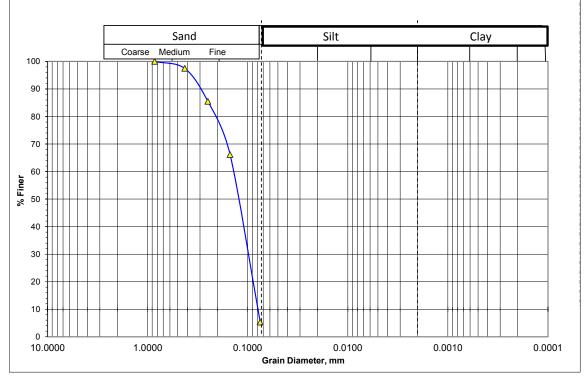
#### Sand Silt Clay Coarse Medium Fine 100 90 1 80 70 60 % Finer 50 40 i 30 20 10 0 10.0000 1.0000 0.1000 0.0100 0.0010 0.0001 Grain Diameter, mm

Fines or % of silt and clay = 11 Mean Diameter,  $D_{50} = 0.13$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.63 % Particles (from the grain -size analysis graph (0.075mm size) = 89 (0.005mm size) & (0.001mm size) = 11

#### **Graphical Representation:**

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Mugaipara High School, Mugaipara Bazar, Auch Para UnionBore Hole No: BH-Bg12Sampled Date: 08/02/2016Sample No :D-10Test Date :Depth (m) :15.0

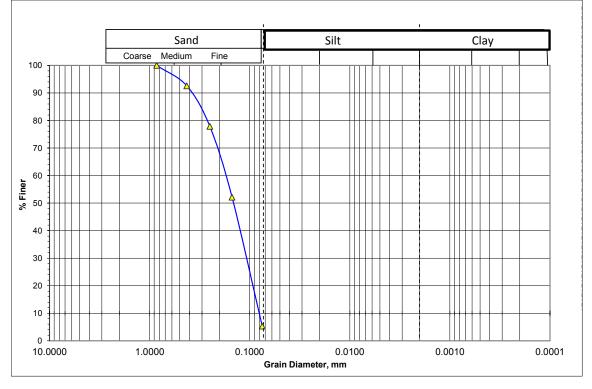
## Graphical Representation:



Fines or % of silt and clay = 5 Mean Diameter,  $D_{50} = 0.14$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.66 % Particles (from the grain -size analysis graph (0.075mm size) = 95 (0.005mm size) & (0.001mm size) = 5

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Mugaipara High School, Mugaipara Bazar, Auch Para UnionBore Hole No: BH-Bg12Sampled Date: 08/02/2016Sample No :D-17Test Date :Depth (m) :25.5

#### **Graphical Representation:**



Fines or % of silt and clay = 5 Mean Diameter,  $D_{50} = 0.155$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.69 % Particles (from the grain -size analysis graph (0.075mm size) = 95 (0.005mm size) & (0.001mm size) = 5

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Doulatpur Madhomik School, Madha Doulatpur, Subhadanga UnionBore Hole No: BH-Bg17Sampled Date: 05/02/2016Sample No :D-11Depth (m) :16.5

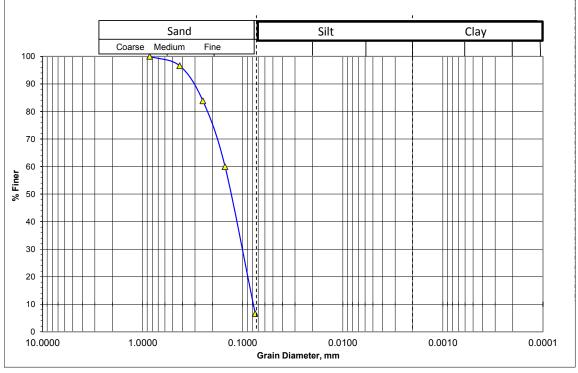
#### **Graphical Representation:** Silt Sand Clay Coarse Medium Fine 100 90 1 80 70 1 60 % Finer 50 40 i 30 20 10 0 10.0000 1.0000 0.1000 0.0100 0.0010 0.0001 Grain Diameter, mm

Fines or % of silt and clay = 10 Mean Diameter,  $D_{50} = 0.125$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.62 % Particles (from the grain -size analysis graph (0.075mm size) = 90 (0.005mm size) & (0.001mm size) = 10

graph

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Doulatpur Madhomik School, Madha Doulatpur, Subhadanga UnionBore Hole No: BH-Bg17Sample No :D-19Test Date :06/04/2016Depth (m) :28.5

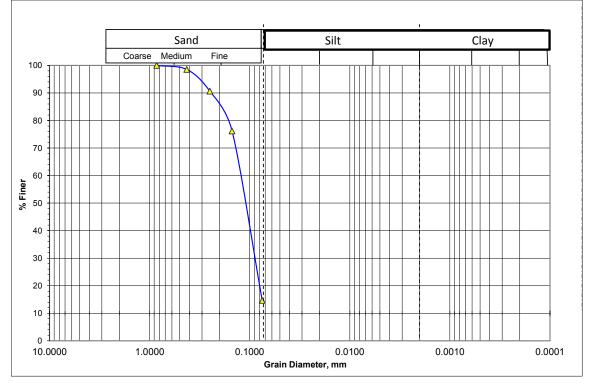
# Graphical Representation:



Fines or % of silt and clay = 6 Mean Diameter,  $D_{50} = 0.135$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.65 % Particles (from the grain -size analysis graph (0.075mm size) = 94 (0.005mm size) & (0.001mm size) = 6

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Gonganarayanpur Namajgram Govt. Primary School, Kumanitola, GanipurBore Hole No: BH-Bg19Sampled Date: 07/02/2016Sample No :D-02Test Date :Depth (m) :3.0

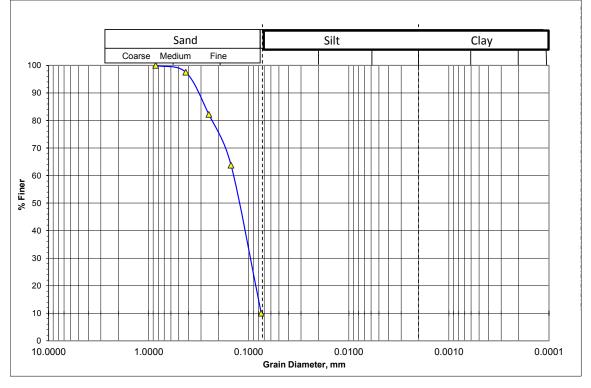
#### **Graphical Representation:**



Fines or % of silt and clay = 14 Mean Diameter,  $D_{50} = 0.115$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.60 % Particles (from the grain -size analysis graph (0.075mm size) = 86 (0.005mm size) & (0.001mm size) = 14

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Gonganarayanpur Namajgram Govt. Primary School, Kumanitola, GanipurBore Hole No: BH-Bg19Sampled Date: 07/02/2016Sample No :D-11Test Date :Depth (m) :16.5

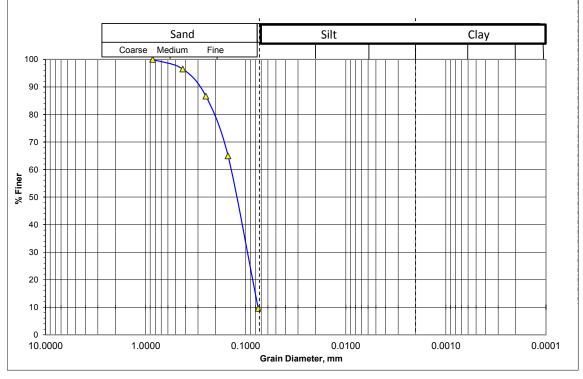
#### **Graphical Representation:**



Fines or % of silt and clay = 10 Mean Diameter,  $D_{50} = 0.13$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.63 % Particles (from the grain -size analysis graph (0.075mm size) = 90 (0.005mm size) & (0.001mm size) = 10

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : 21 nos. Bara Bihanali govt. School, Bara Bihanali UnionBore Hole No: BH-Bg20Sampled Date: 02/02/2016Sample No :D-09Test Date :11/04/2016Depth (m) :13.5

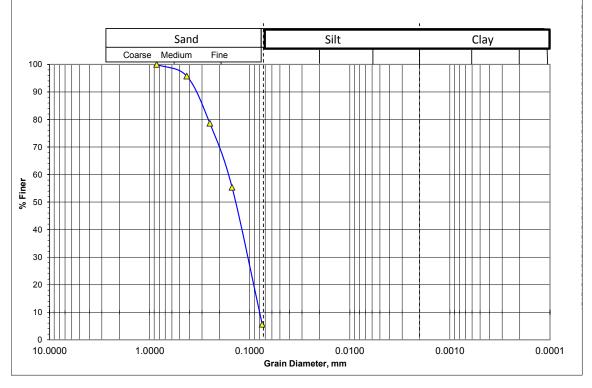
## Graphical Representation:



Fines or % of silt and clay = 9 Mean Diameter,  $D_{50} = 0.125$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.62 % Particles (from the grain -size analysis graph (0.075mm size) = 91 (0.005mm size) & (0.001mm size) = 9

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : 21 nos. Bara Bihanali govt. School, Bara Bihanali UnionBore Hole No: BH-Bg20Sampled Date: 02/02/2016Sample No :D-16Test Date :11/04/2016Depth (m) :24.0

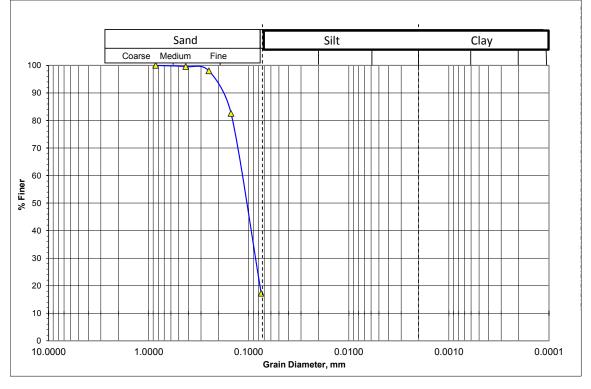
## Graphical Representation:



Fines or % of silt and clay = 5 Mean Diameter,  $D_{50} = 0.15$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.68 % Particles (from the grain -size analysis graph (0.075mm size) = 95 (0.005mm size) & (0.001mm size) = 5

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Uttar akdala Govt. Primary School, Uttar akdala Bazar, Bhabanigong PourashavaBore Hole No: BH-Bg21Sampled Date: 01/02/2016Sample No :D-02Test Date :Depth (m) :3.0

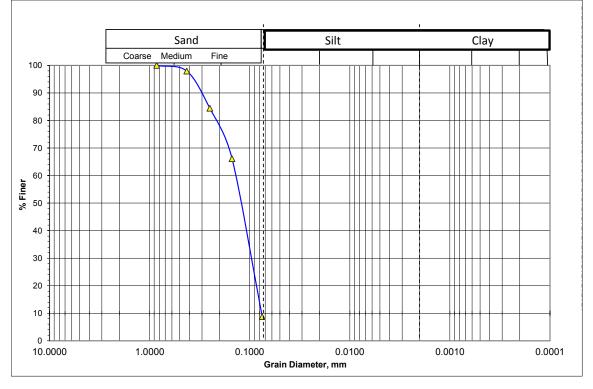
#### **Graphical Representation:**



Fines or % of silt and clay = 17 Mean Diameter,  $D_{50} = 0.1$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.56 % Particles (from the grain -size analysis graph (0.075mm size) = 83 (0.005mm size) & (0.001mm size) = 17

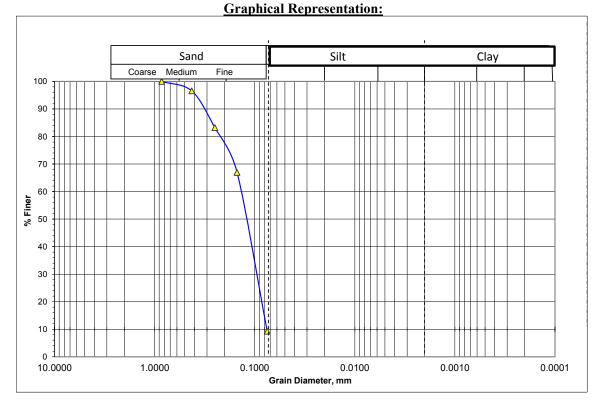
Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Uttar akdala Govt. Primary School, Uttar akdala Bazar, Bhabanigong PourashavaBore Hole No: BH-Bg21Sampled Date: 01/02/2016Sample No :D-09Test Date :Depth (m) :13.5

#### **Graphical Representation:**



Fines or % of silt and clay = 9 Mean Diameter,  $D_{50} = 0.13$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.63 % Particles (from the grain -size analysis graph (0.075mm size) = 91 (0.005mm size) & (0.001mm size) = 9

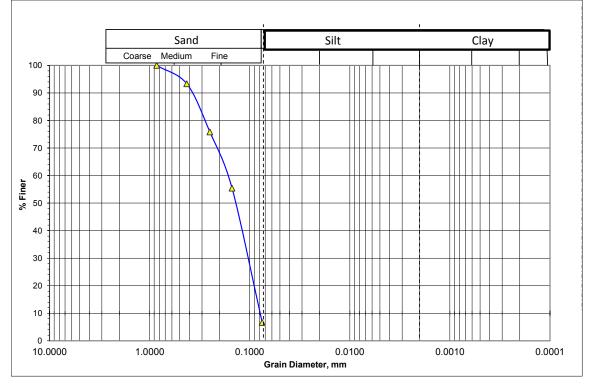
Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Nandanpur( Chekamara) Bazar, Mohila Dakhil Madrasha, Basu Para UnionBore Hole No: BH-Bg22Sampled Date: 02/02/2016Sample No :D-10Test Date :11/04/2016Depth (m) :15.0



Fines or % of silt and clay = 9 Mean Diameter,  $D_{50} = 0.125$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.62 % Particles (from the grain -size analysis graph (0.075mm size) = 91 (0.005mm size) & (0.001mm size) = 9

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Nandanpur( Chekamara) Bazar, Mohila Dakhil Madrasha, Basu Para UnionBore Hole No: BH-Bg22Sampled Date: 02/02/2016Sample No : D-17Test Date : 11/04/2016Depth (m) : 25.5

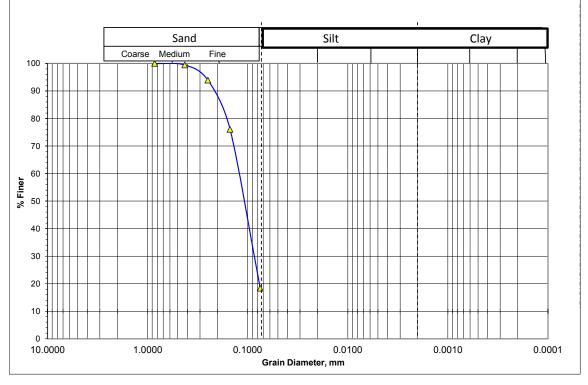
#### **Graphical Representation:**



Fines or % of silt and clay = 6 Mean Diameter,  $D_{50} = 0.15$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.68 % Particles (from the grain -size analysis graph (0.075mm size) = 94 (0.005mm size) & (0.001mm size) = 6

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Ganipur Union Complex office, Hasnipur Bazar, Ganipur UnionBore Hole No: BH-Bg24Sampled Date: 06/02/2016Sample No :D-02Depth (m) :3.0

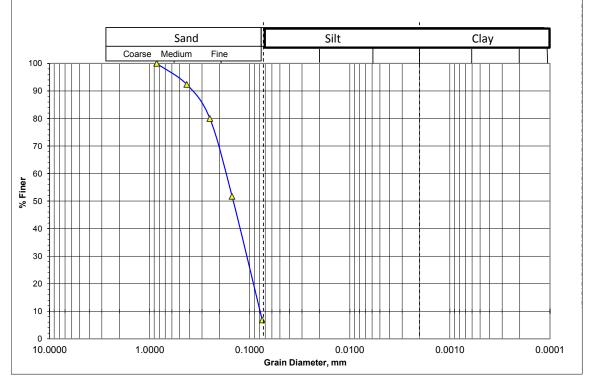
## **Graphical Representation:**



Fines or % of silt and clay = 18 Mean Diameter,  $D_{50} = 0.11$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.58 % Particles (from the grain -size analysis graph (0.075mm size) = 82 (0.005mm size) & (0.001mm size) = 18

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Ganipur Union Complex office, Hasnipur Bazar, Ganipur UnionBore Hole No: BH-Bg24Sampled Date: 06/02/2016Sample No :D-17Depth (m) :25.5

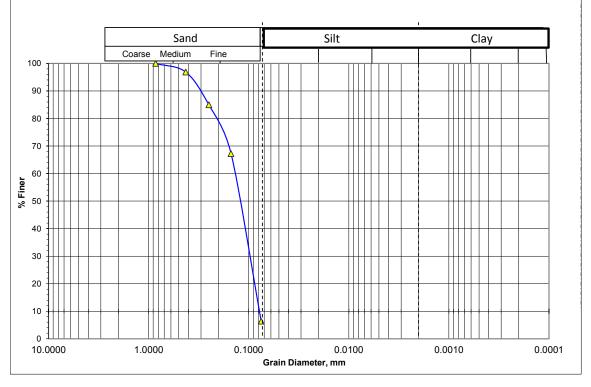




Fines or % of silt and clay = 7 Mean Diameter,  $D_{50} = 0.165$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.71 % Particles (from the grain -size analysis graph (0.075mm size) = 93 (0.005mm size) & (0.001mm size) = 7

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Sahid Sakandar Memorial Adarsho High School, Godaoun Mor, BhabanigongBore Hole No: BH-Bg26Sampled Date: 27/01/2016Sample No :D-08Test Date :Depth (m) :12.0

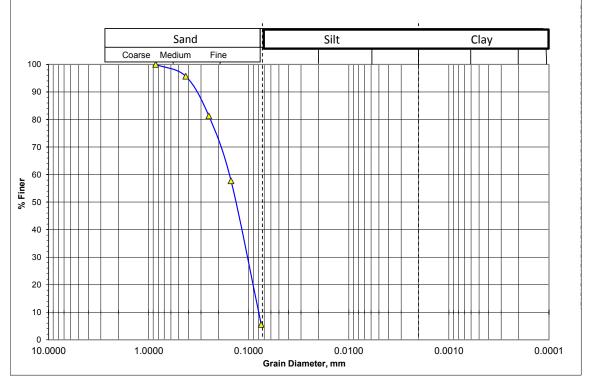




Fines or % of silt and clay = 6 Mean Diameter,  $D_{50} = 0.13$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.63 % Particles (from the grain -size analysis graph (0.075mm size) = 94 (0.005mm size) & (0.001mm size) = 6

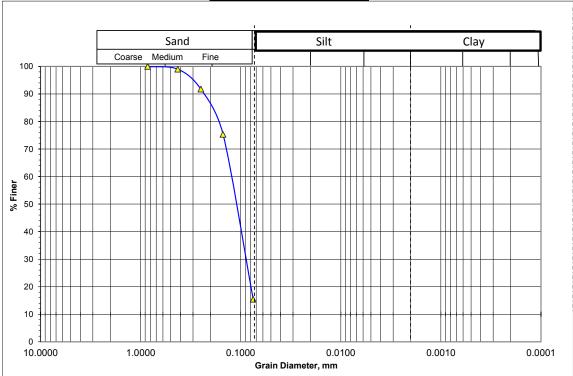
Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Sahid Sakandar Memorial Adarsho High School, Godaoun Mor, BhabanigongBore Hole No: BH-Bg26Sampled Date: 27/01/2016Sample No :D-12Test Date :Depth (m) :18.0

#### **Graphical Representation:**



Fines or % of silt and clay = 5 Mean Diameter,  $D_{50} = 0.145$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.67 % Particles (from the grain -size analysis graph (0.075mm size) = 95 (0.005mm size) & (0.001mm size) = 5

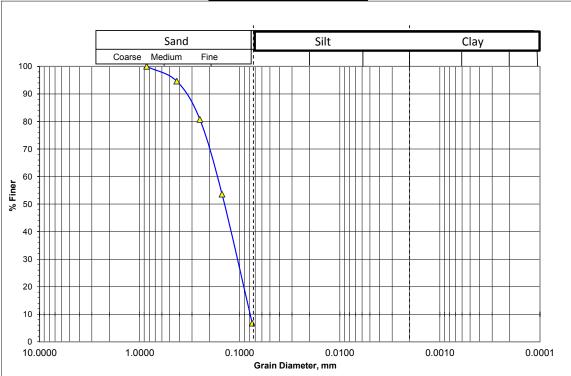
Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Bagmara Degree College, Ganipur UnionBore Hole No: BH-Bg27Sampled Date: 31/01/2016Sample No : D-04Test Date : 09/04/2016Depth (m) : 6.06.0



Fines or % of silt and clay = 15 Mean Diameter,  $D_{50} = 0.115$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.60 % Particles (from the grain -size analysis graph (0.075mm size) = 85 (0.005mm size) & (0.001mm size) = 15

#### **Graphical Representation:**

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Bagmara Degree College, Ganipur UnionBore Hole No: BH-Bg27Sampled Date: 31/01/2016Sample No : D-16Test Date : 09/04/2016Depth (m) : 24.024.0



Fines or % of silt and clay = 6 Mean Diameter,  $D_{50} = 0.15$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.68 % Particles (from the grain -size analysis graph (0.075mm size) = 94 (0.005mm size) & (0.001mm size) = 6

#### **Graphical Representation:**

99

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Shadhopara Madrasha, Near post office, Sreepur UnionBore Hole No: BH-Bg28Sampled Date: 01/02/2016Sample No :D-09Test Date :08/04/2016Depth (m) :13.5

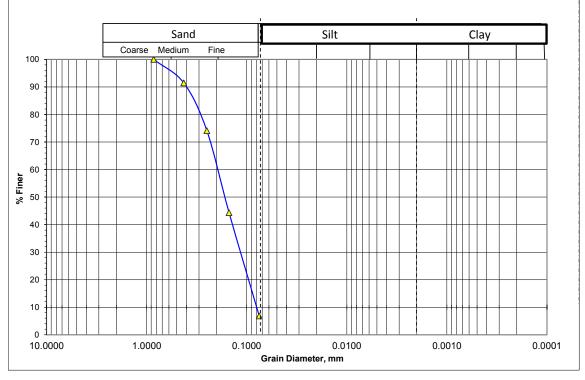
#### Sand Silt Clay Coarse Medium Fine 100 90 1 80 70 60 % Finer 50 40 į 30 20 10 Å 0 10.0000 1.0000 0.1000 0.0100 0.0010 0.0001 Grain Diameter, mm

Fines or % of silt and clay = 4 Mean Diameter,  $D_{50} = 0.13$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.63 % Particles (from the grain -size analysis graph (0.075mm size) = 96 (0.005mm size) & (0.001mm size) = 4

#### **Graphical Representation:**

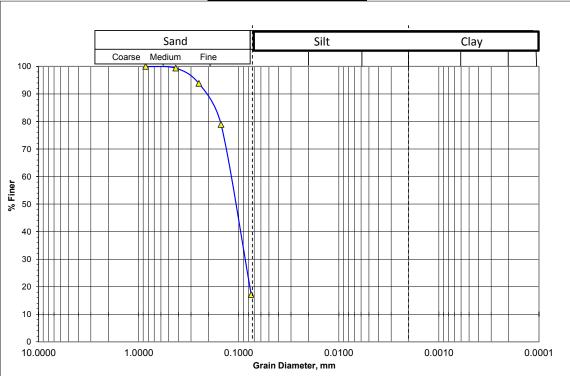
Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Shadhopara Madrasha, Near post office, Sreepur UnionBore Hole No: BH-Bg28Sampled Date: 01/02/2016Sample No :D-14Depth (m) :21.0

## Graphical Representation:



Fines or % of silt and clay = 7 Mean Diameter,  $D_{50} = 0.17$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.73 % Particles (from the grain -size analysis graph (0.075mm size) = 93 (0.005mm size) & (0.001mm size) = 7

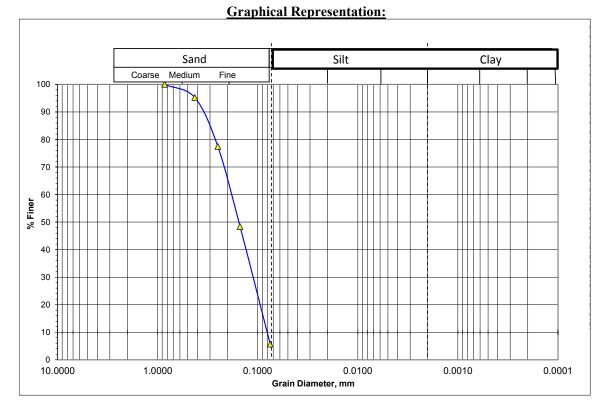
Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Jhikra High School, Jhikra Bazar, Jhikra UnionBore Hole No: BH-Bg29Sampled Date: 28/01/2016Sample No : D-02Test Date : 09/04/2016Depth (m) : 3.0



Fines or % of silt and clay = 17 Mean Diameter,  $D_{50} = 0.11$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.58 % Particles (from the grain -size analysis graph (0.075mm size) = 83 (0.005mm size) & (0.001mm size) = 17

## **Graphical Representation:**

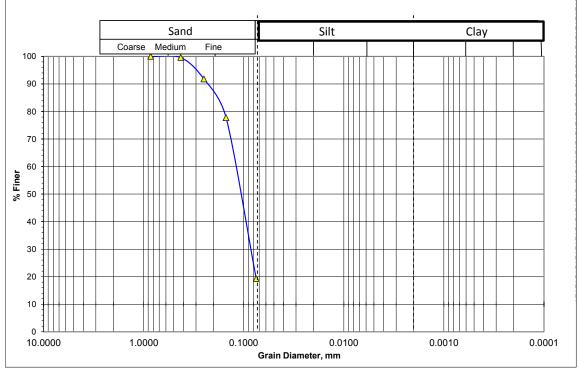
Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Jhikra High School, Jhikra Bazar, Jhikra UnionBore Hole No: BH-Bg29Sampled Date: 28/01/2016Sample No : D-09Test Date : 09/04/2016Depth (m) : 13.5



Fines or % of silt and clay = 5 Mean Diameter,  $D_{50} = 0.16$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.70 % Particles (from the grain -size analysis graph (0.075mm size) = 95 (0.005mm size) & (0.001mm size) = 5

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Sakoa Bohumuki High School, Sikdar Bazar, Maria UnionBore Hole No: BH-Bg30Sampled Date: 29/01/2016Sample No :D-02Test Date :09/04/2016Depth (m) :3.0

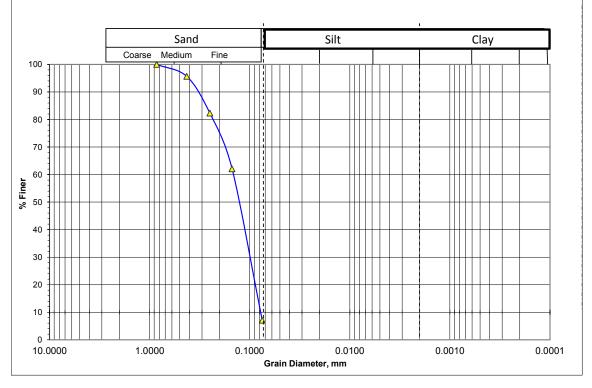
# Graphical Representation:



Fines or % of silt and clay = 19 Mean Diameter,  $D_{50} = 0.11$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.58 % Particles (from the grain -size analysis graph (0.075mm size) = 81 (0.005mm size) & (0.001mm size) = 19

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Sakoa Bohumuki High School, Sikdar Bazar, Maria UnionBore Hole No: BH-Bg30Sampled Date: 29/01/2016Sample No :D-13Test Date :09/04/2016Depth (m) :19.5

## Graphical Representation:



Fines or % of silt and clay = 6 Mean Diameter,  $D_{50} = 0.14$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.66 % Particles (from the grain -size analysis graph (0.075mm size) = 94 (0.005mm size) & (0.001mm size) = 6

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Gangopara Govt. Primary school, Maria UnionBore Hole No: BH-Bg31Sampled Date: 10/02/2016Sample No :D-09Test Date :Depth (m) :13.5

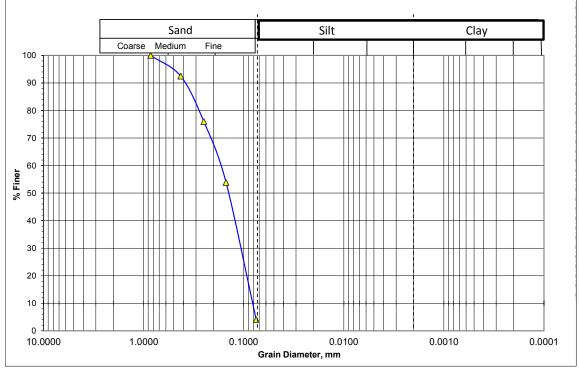
#### Sand Silt Clay Coarse Medium Fine 100 90 1 80 70 60 % Finer 50 40 į 30 20 10 Å 0 10.0000 1.0000 0.1000 0.0100 0.0010 0.0001 Grain Diameter, mm

Fines or % of silt and clay = 5 Mean Diameter,  $D_{50} = 0.13$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.63 % Particles (from the grain -size analysis graph (0.075mm size) = 95 (0.005mm size) & (0.001mm size) = 5

#### **Graphical Representation:**

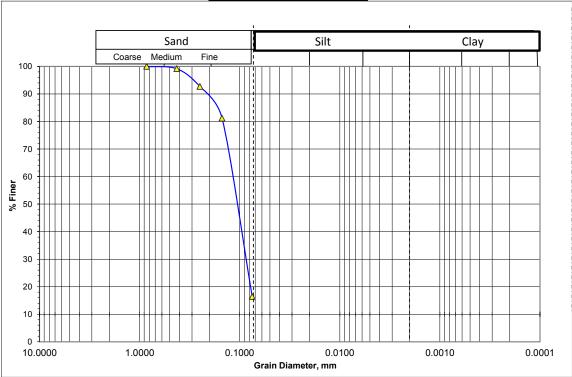
Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Gangopara Govt. Primary school, Maria UnionBore Hole No: BH-Bg31Sampled Date: 10/02/2016Sample No :D-14Test Date :07/04/2016Depth (m) :21.0

# Graphical Representation:



Fines or % of silt and clay = 4 Mean Diameter,  $D_{50} = 0.15$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.68 % Particles (from the grain -size analysis graph (0.075mm size) = 96 (0.005mm size) & (0.001mm size) = 4

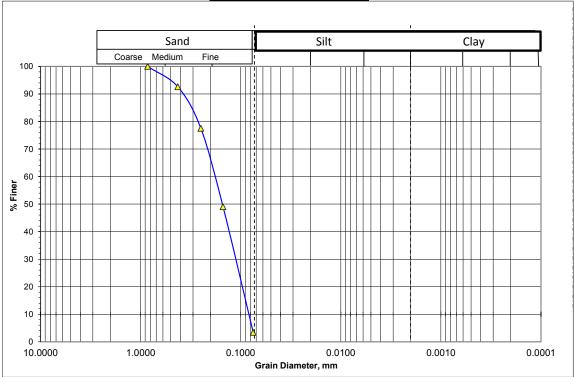
Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Sajura Mirzapur, Goalkandi UnionBore Hole No: BH-Bg32Sampled Date: 30/01/2016Sample No : D-02Test Date : 09/04/2016Depth (m) : 3.0



## **Graphical Representation:**

Fines or % of silt and clay = 16 Mean Diameter,  $D_{50} = 0.105$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.57 % Particles (from the grain -size analysis graph (0.075mm size) = 84 (0.005mm size) & (0.001mm size) = 16

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Sajura Mirzapur, Goalkandi UnionBore Hole No: BH-Bg32Sampled Date: 30/01/2016Sample No : D-12Test Date : 09/04/2016Depth (m) : 18.0

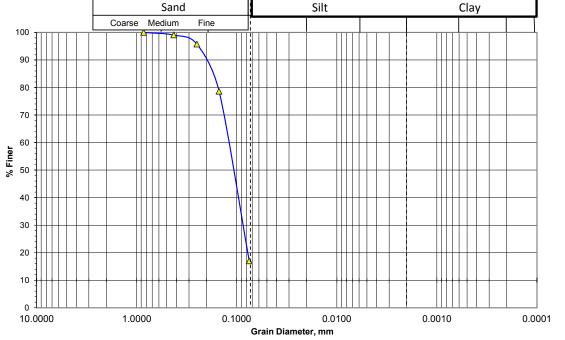


Fines or % of silt and clay = 3 Mean Diameter,  $D_{50} = 0.165$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.71 % Particles (from the grain -size analysis graph (0.075mm size) = 97 (0.005mm size) & (0.001mm size) = 3

## **Graphical Representation:**

Client : Urban Development Directorate (UDD) Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location : Jamgram Govt. Primary School, Jamgram, Tahirpur Pourashava Bore Hole No: BH-Bg33 Sampled Date: 31/01/2016 Sample No : D-02 Test Date : 10/04/2016 Depth (m) : 3.0

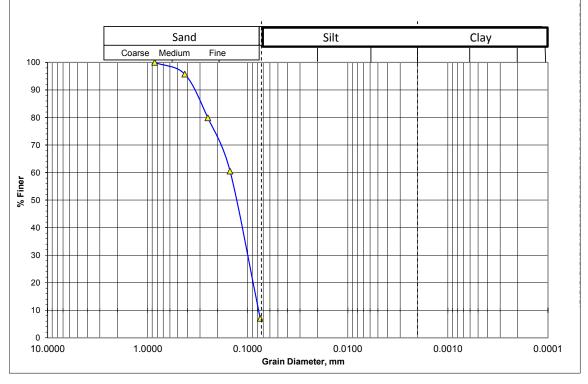
# **Graphical Representation:** Silt Sand Clay Coarse Medium Fine 1



Fines or % of silt and clay = 17Mean Diameter,  $D_{50} = 0.11$  mm Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.58$ % Particles (from the grain -size analysis graph (0.075 mm size) =83 (0.005 mm size) & (0.001 mm size) = 17

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Jamgram Govt. Primary School, Jamgram, Tahirpur PourashavaBore Hole No: BH-Bg33Sampled Date: 31/01/2016Sample No :D-10Depth (m) :15.0

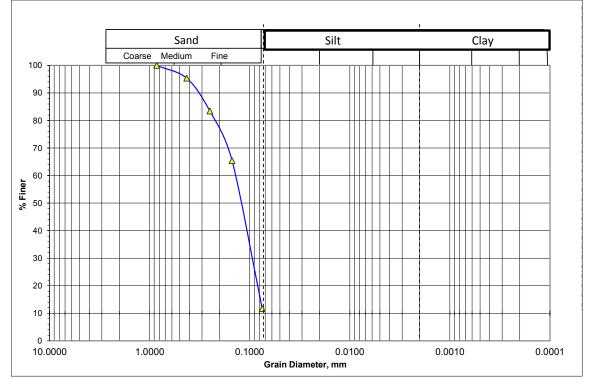
# Graphical Representation:



Fines or % of silt and clay = 6 Mean Diameter,  $D_{50} = 0.14$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.66 % Particles (from the grain -size analysis graph (0.075mm size) = 94 (0.005mm size) & (0.001mm size) = 6

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Koyamajampur Govt. Prtimary School, Durgapur, Near Tahirpur PourashavaBore Hole No: BH-Bg34Sampled Date: 09/02/2016Sample No :D-11Test Date :Depth (m) :16.5

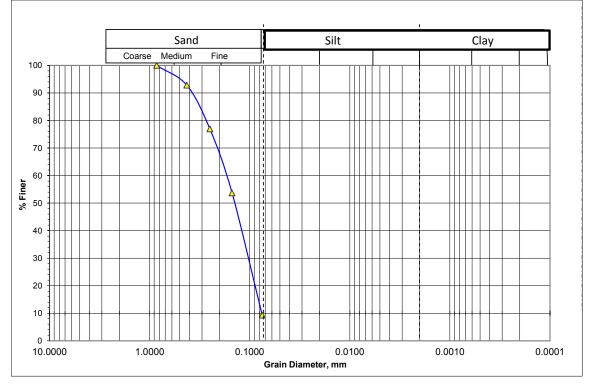
## **Graphical Representation:**



Fines or % of silt and clay = 11 Mean Diameter,  $D_{50} = 0.13$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.63 % Particles (from the grain -size analysis graph (0.075mm size) = 89 (0.005mm size) & (0.001mm size) = 11

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Koyamajampur Govt. Prtimary School, Durgapur, Near Tahirpur PourashavaBore Hole No: BH-Bg34Sampled Date: 09/02/2016Sample No :D-17Test Date :Depth (m) :25.5

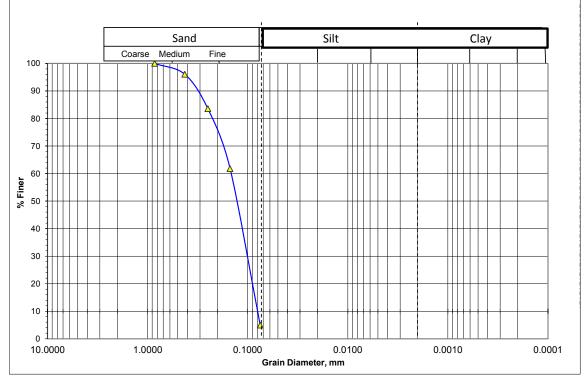
## **Graphical Representation:**



Fines or % of silt and clay = 9 Mean Diameter,  $D_{50} = 0.15$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.68 % Particles (from the grain -size analysis graph (0.075mm size) = 91 (0.005mm size) & (0.001mm size) = 9

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Hamir kutsha Union complex office, Hamir Kutsha UnionBore Hole No: BH-Bg36Sampled Date: 10/02/2016Sample No :D-09Test Date :05/04/2016Depth (m) :13.5

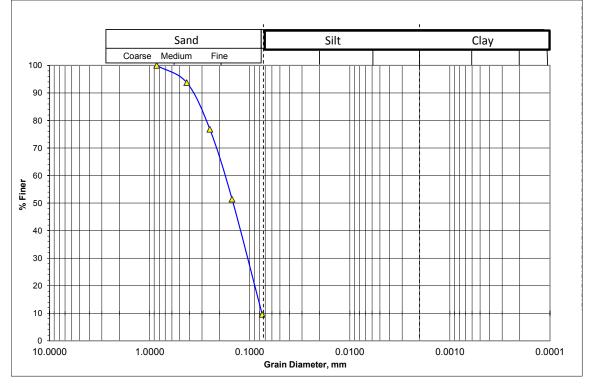
## **Graphical Representation:**



Fines or % of silt and clay = 5 Mean Diameter,  $D_{50} = 0.135$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.65 % Particles (from the grain -size analysis graph (0.075mm size) = 95 (0.005mm size) & (0.001mm size) = 5

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Hamir kutsha Union complex office, Hamir Kutsha UnionBore Hole No: BH-Bg36Sampled Date: 10/02/2016Sample No :D-14Test Date :05/04/2016Depth (m) :21.0

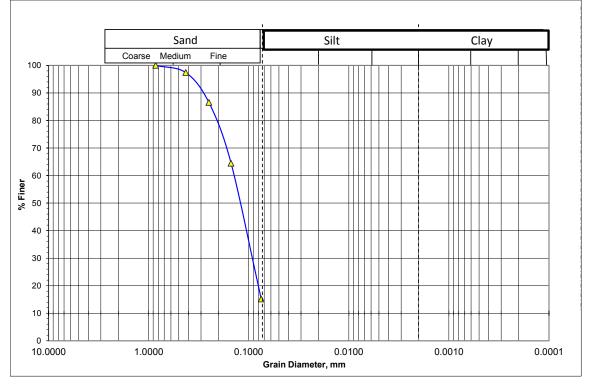
## **Graphical Representation:**



Fines or % of silt and clay = 9 Mean Diameter,  $D_{50} = 0.16$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.70 % Particles (from the grain -size analysis graph (0.075mm size) = 91 (0.005mm size) & (0.001mm size) = 9

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Tahirpur University (Birshobidalay) college, Tahirpur Bazar, Tahirpur PourashavaBore Hole No: BH-Bg37Sampled Date: 30/01/2016Sample No :D-2Test Date :Depth (m) :3.0

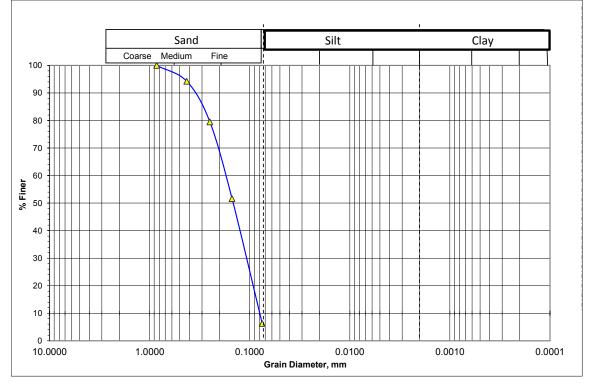
## **Graphical Representation:**



Fines or % of silt and clay = 15 Mean Diameter,  $D_{50} = 0.125$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.62 % Particles (from the grain -size analysis graph (0.075mm size) = 85 (0.005mm size) & (0.001mm size) = 15

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Tahirpur University (Birshobidalay) college, Tahirpur Bazar, Tahirpur PourashavaBore Hole No: BH-Bg37Sampled Date: 30/01/2016Sample No :D-12Test Date :Depth (m) :18.0

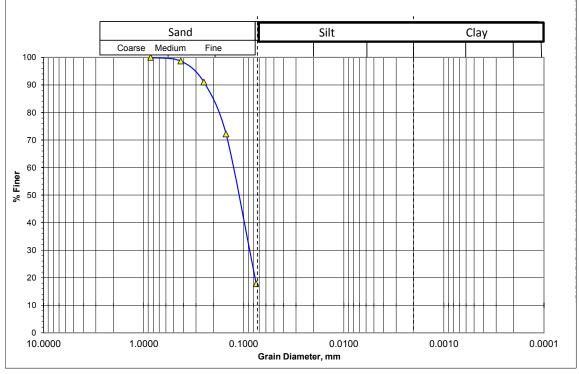
## **Graphical Representation:**



Fines or % of silt and clay = 6 Mean Diameter,  $D_{50} = 0.16$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.70 % Particles (from the grain -size analysis graph (0.075mm size) = 94 (0.005mm size) & (0.001mm size) = 6

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Talghoria Govt. Primary School, Hamir Kutsha UnionBore Hole No: BH-Bg39Sampled Date: 28/01/2016Sample No : D-02Test Date : 11/04/2016Depth (m) : 3.0

# Graphical Representation:



Fines or % of silt and clay = 17 Mean Diameter,  $D_{50} = 0.115$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.60 % Particles (from the grain -size analysis graph (0.075mm size) = 83 (0.005mm size) & (0.001mm size) = 17

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Talghoria Govt. Primary School, Hamir Kutsha UnionBore Hole No: BH-Bg39Sampled Date: 28/01/2016Sample No : D-10Test Date : 11/04/2016Depth (m) : 15.0

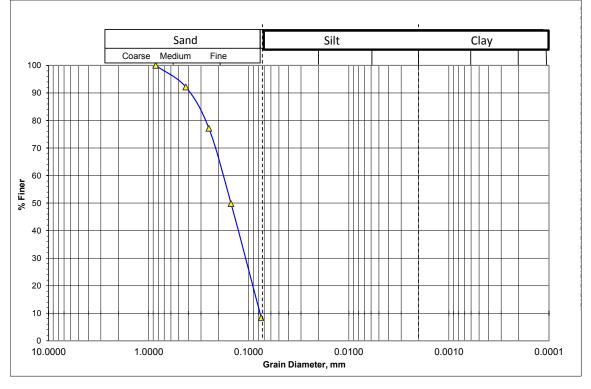
#### Sand Silt Clay Coarse Medium Fine 100 90 1 80 70 1 60 % Finer 50 40 i 30 20 10 0 10.0000 1.0000 0.1000 0.0100 0.0010 0.0001 Grain Diameter, mm

Fines or % of silt and clay = 7 Mean Diameter,  $D_{50} = 0.15$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.68 % Particles (from the grain -size analysis graph (0.075mm size) = 93 (0.005mm size) & (0.001mm size) = 7

## **Graphical Representation:**

Client : Urban Development Directorate (UDD)Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)Project Location : Choukali Govt. Primary School, Choukali Bazar, Goalkandi UnionBore Hole No: BH-Bg40Sampled Date: 29/01/2016Sample No :D-09Test Date :08/04/2016Depth (m) :13.5

## **Graphical Representation:**



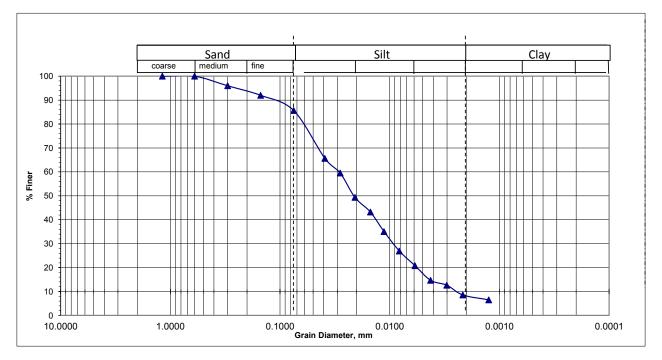
Fines or % of silt and clay = 8 Mean Diameter,  $D_{50} = 0.16$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.70 % Particles (from the grain -size analysis graph (0.075mm size) = 92 (0.005mm size) & (0.001mm size) = 8

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Gobinda Para Union Complex, Gobinda Para Union

Bore Hole No :	BH Bg01	Sample No.	D2	Sampled Date:	06/02/2016
Depth (m) :	3.0			Test Date :	22/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.022 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.26$ 

% Particles ( from the grain -size analysis graph).

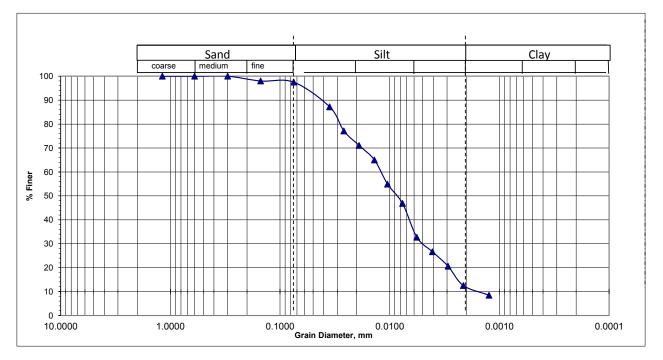
Sand (0.075mm size) =15%, Silt (0.005mm size) = 77% & Clay (0.001mm size) = 8%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Gobinda Para Union Complex, Gobinda Para Union

Bore Hole No :	BH Bg01	Sample No.	D5	Sampled Date:	06/02/2016
Depth (m) :	7.5			Test Date :	22/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.009 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.16$ 

% Particles ( from the grain -size analysis graph).

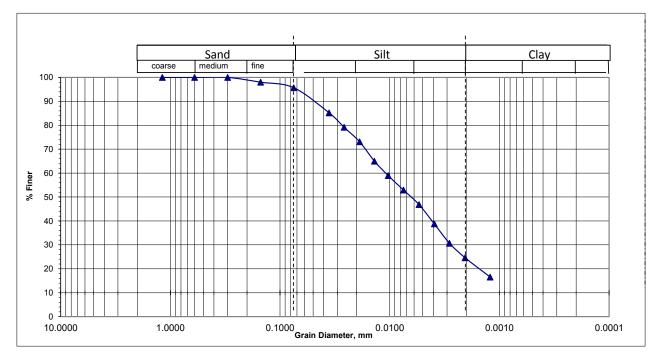
Sand (0.075mm size) = 3%, Silt (0.005mm size) = 84% & Clay (0.001mm size) = 13%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Near Gobinda Para Union Complex, Gobinda Para Union

Bore Hole No :	BH Bg01	Sample No.	D15	Sampled Date:	06/02/2016
Depth (m) :	22.5			Test Date :	22/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.007 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.14$ 

% Particles ( from the grain -size analysis graph).

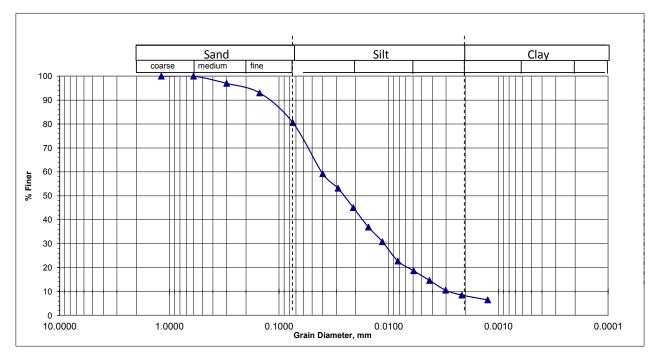
Sand (0.075mm size) =5%, Silt (0.005mm size) = 72% & Clay (0.001mm size) = 23%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Hatkhugipur High School, Hatkhugipur Bazar, Near Auch Para union complex

Bore Hole No :	BH Bg02	Sample No.	D2	Sampled Date:	07/02/2016
Depth (m) :	3.0			Test Date :	22/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.026 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.28$ 

% Particles ( from the grain -size analysis graph).

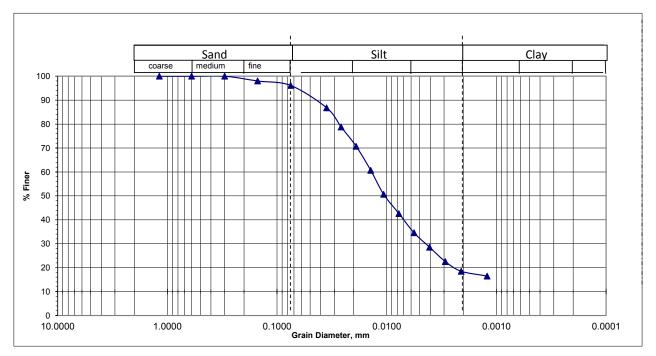
Sand (0.075mm size) =20%, Silt (0.005mm size) = 72% & Clay (0.001mm size) = 8%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Hatkhugipur High School, Hatkhugipur Bazar, Near Auch Para union complex

Bore Hole No :	BH Bg02	Sample No.	D6	Sampled Date:	07/02/2016
Depth (m) :	9.0			Test Date :	22/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.012$  mm Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.19$ 

% Particles ( from the grain -size analysis graph).

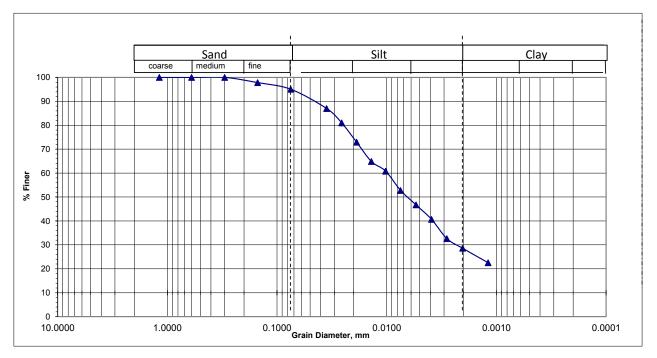
Sand (0.075mm size) =4%, Silt (0.005mm size) = 78% & Clay (0.001mm size) = 18%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Hatkhugipur High School, Hatkhugipur Bazar, Near Auch Para union complex

Bore Hole No :	BH Bg02	Sample No.	D14	Sampled Date:	07/02/2016
Depth (m) :	21.0			Test Date :	22/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.007 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.14$ 

% Particles ( from the grain -size analysis graph).

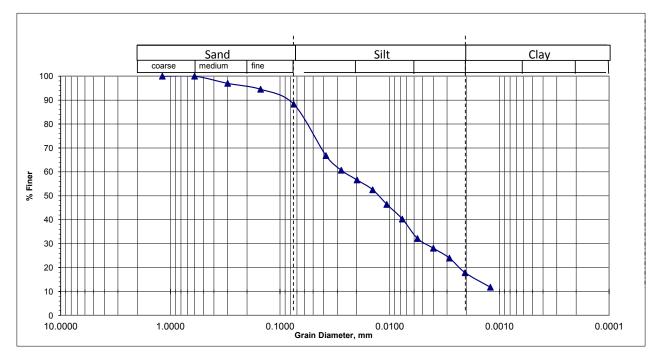
Sand (0.075mm size) =5%, Silt (0.005mm size) = 67% & Clay (0.001mm size) = 28%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Rokittepara Govt. primary school, Palopara, Auch Para Union

Bore Hole No :	BH 03	Sample No.	D2	Sampled Date:	08/02/2016
Depth (m) :	3.0			Test Date :	22/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.013 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.20$ 

% Particles ( from the grain -size analysis graph).

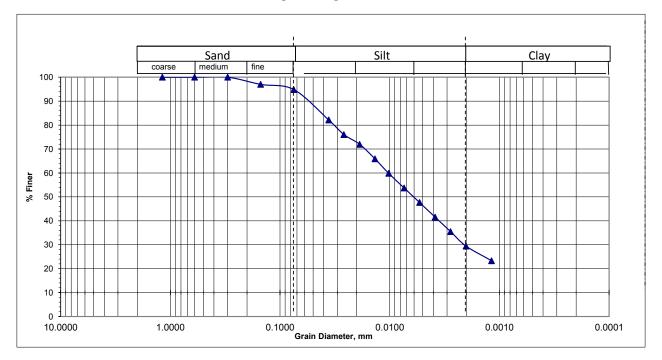
Sand (0.075mm size) =13%, Silt (0.005mm size) = 70% & Clay (0.001mm size) = 17%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Rokittepara Govt. primary school, Palopara, Auch Para Union

Bore Hole No :	BH 03	Sample No.	D5	Sampled Date:	08/02/2016
Depth (m) :	7.5			Test Date :	22/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.006 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.14$ 

% Particles ( from the grain -size analysis graph).

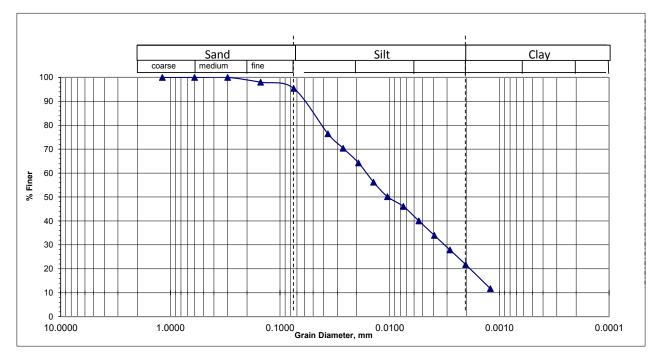
Sand (0.075mm size) =5%, Silt (0.005mm size) = 66% & Clay (0.001mm size) = 29%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Rokittepara Govt. primary school, Palopara, Auch Para Union

Bore Hole No :	BH 03	Sample No.	D12	Sampled Date:	08/02/2016
Depth (m) :	18.0			Test Date :	22/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.01 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.18$ 

% Particles ( from the grain -size analysis graph).

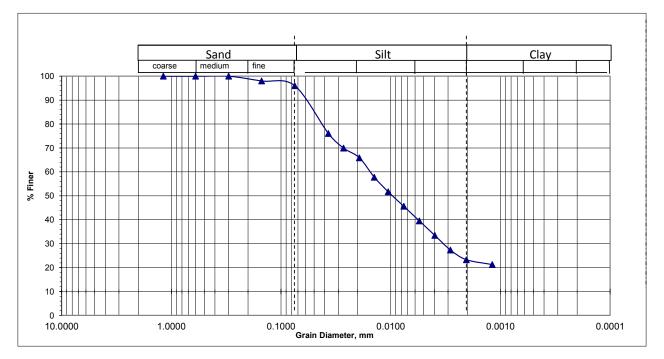
Sand (0.075mm size) =5%, Silt (0.005mm size) = 74% & Clay (0.001mm size) = 21%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Sharcol Shimla High School, beside Nasir Bazar, Sondanga Union

Bore Hole No :	BH Bg04	Sample No.	D3	Sampled Date:	05/02/2016
Depth (m) :	4.5			Test Date :	23/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.01 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.18$ 

% Particles ( from the grain -size analysis graph).

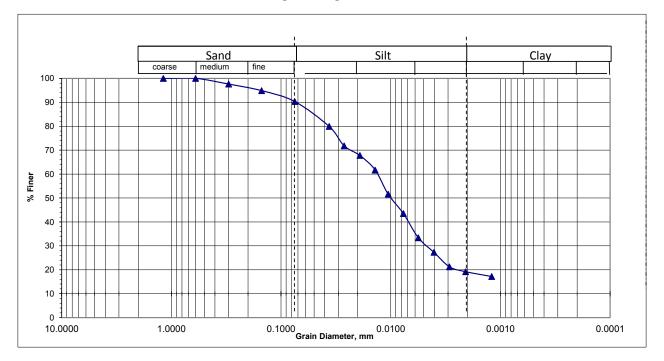
Sand (0.075mm size) =4%, Silt (0.005mm size) = 73% & Clay (0.001mm size) = 23%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Ganggopara Girls School, Hat Ganggopara, Auch Para Union

Bore Hole No :	BH Bg06	Sample No.	D2	Sampled Date:	04/02/2016
Depth (m) :	3.0			Test Date :	23/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.01 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.18$ 

% Particles ( from the grain -size analysis graph).

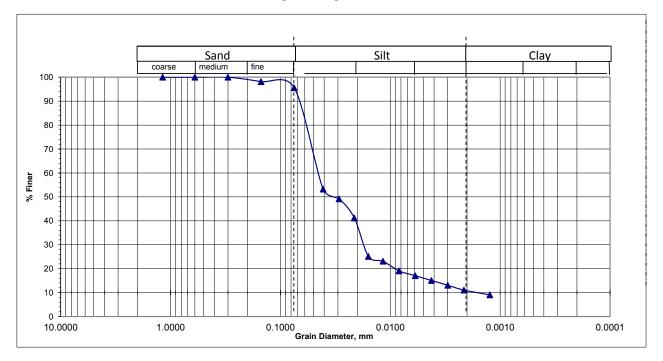
Sand (0.075mm size) =10%, Silt (0.005mm size) = 72% & Clay (0.001mm size) = 18%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Ganggopara Girls School, Hat Ganggopara, Auch Para Union

Bore Hole No :	BH Bg06	Sample No.	D5	Sampled Date:	04/02/2016
Depth (m) :	7.5			Test Date :	23/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.033 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.32$ 

% Particles ( from the grain -size analysis graph).

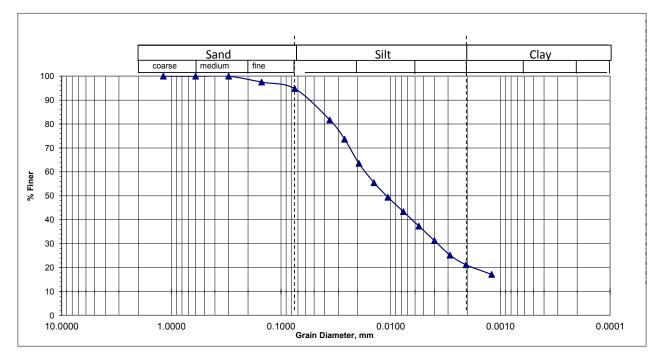
Sand (0.075mm size) =4%, Silt (0.005mm size) = 84% & Clay (0.001mm size) = 12%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Uttar Jamalpur Govt. primary school, Uttar Jamalpur Fatepur, Sondanga

Bore Hole No :	BH Bg08	Sample No.	D6	Sampled Date:	04/02/2016
Depth (m) :	9.0			Test Date :	13/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.012$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.19

% Particles ( from the grain -size analysis graph).

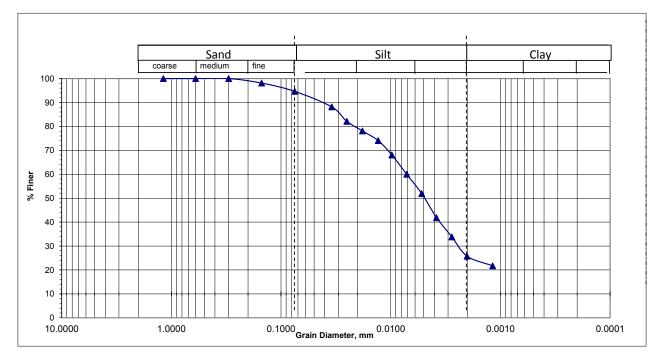
Sand (0.075mm size) =6%, Silt (0.005mm size) = 73% & Clay (0.001mm size) = 21%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Mirpur Dimukki Primary and High School, jolapara Hat, Dwippur Union

Bore Hole No :	BH Bg09	Sample No.	D6	Sampled Date:	03/02/2016
Depth (m) :	9.0			Test Date :	13/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.005 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.12$ 

% Particles ( from the grain -size analysis graph).

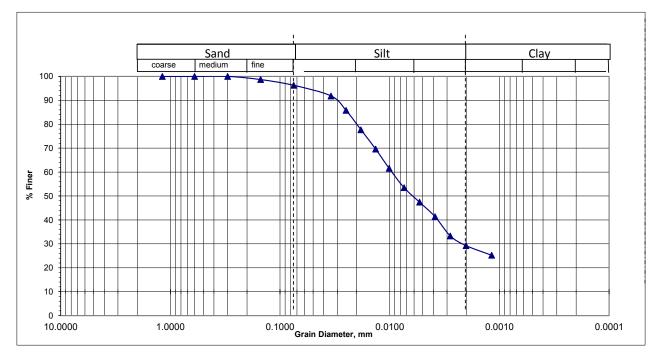
Sand (0.075mm size) =6%, Silt (0.005mm size) = 68% & Clay (0.001mm size) = 26%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Byegacha Govt. primary and high School, Byegacha Bazar, Subhadanga

Bore Hole No :	BH Bg10	Sample No.	D5	Sampled Date:	03/02/2016
Depth (m) :	7.5			Test Date :	15/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.006 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.14$ 

% Particles ( from the grain -size analysis graph).

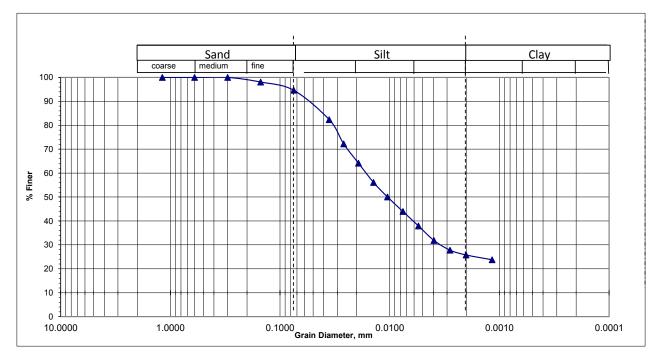
Sand (0.075mm size) =4%, Silt (0.005mm size) = 68% & Clay (0.001mm size) = 28%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Machmail High School, Machmail Bazar, Subhadanga Union

Bore Hole No :	BH 11	Sample No.	D8	Sampled Date:	09/02/2016
Depth (m) :	12.0			Test Date :	16/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.01 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.18$ 

% Particles ( from the grain -size analysis graph).

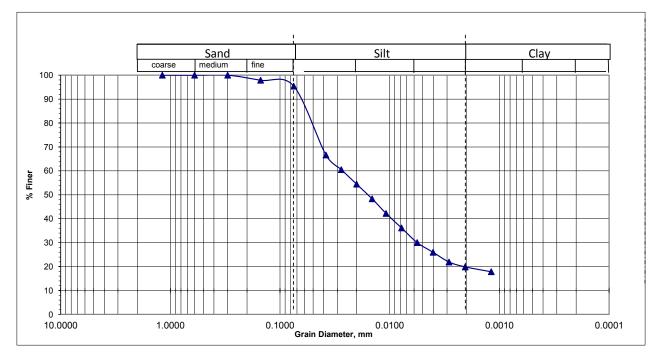
Sand (0.075mm size) =6%, Silt (0.005mm size) = 69% & Clay (0.001mm size) = 25%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Mugaipara High School, Mugaipara Bazar, Auch Para Union

Bore Hole No :	BH 12	Sample No.	D3	Sampled Date:	08/02/2016
Depth (m) :	4.5			Test Date :	16/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.017$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.23

Sint Factor, F 1.7 onsert(D 50) 0.25

% Particles ( from the grain -size analysis graph).

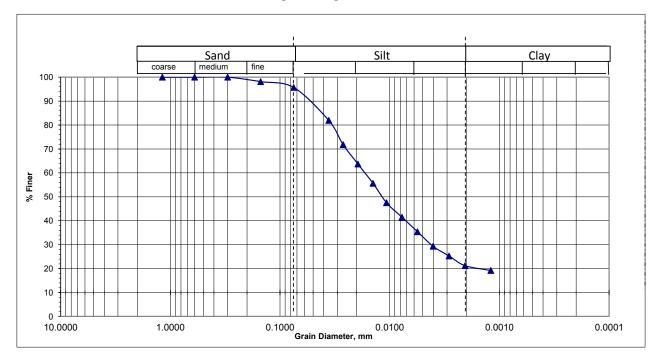
Sand (0.075mm size) =5%, Silt (0.005mm size) = 75% & Clay (0.001mm size) = 20%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Doulatpur Madhomik School, Madha Doulatpur, Subhadanga Union

Bore Hole No :	BH Bg17	Sample No.	D8	Sampled Date:	05/02/2016
Depth (m) :	12.0			Test Date :	16/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.013 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.20$ 

% Particles ( from the grain -size analysis graph).

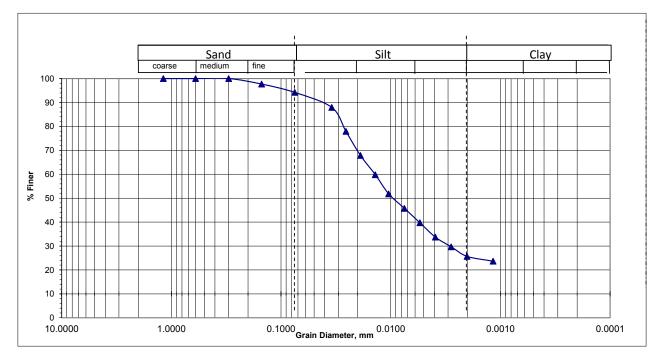
Sand (0.075mm size) =4%, Silt (0.005mm size) = 74% & Clay (0.001mm size) = 22%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Gonganarayanpur Namajgram Govt. Primary School, Kumanitola, Ganipur

Bore Hole No :	BH Bg19	Sample No.	D7	Sampled Date:	07/02/2016
Depth (m) :	10.5			Test Date :	16/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.01 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.17$ 

% Particles ( from the grain -size analysis graph).

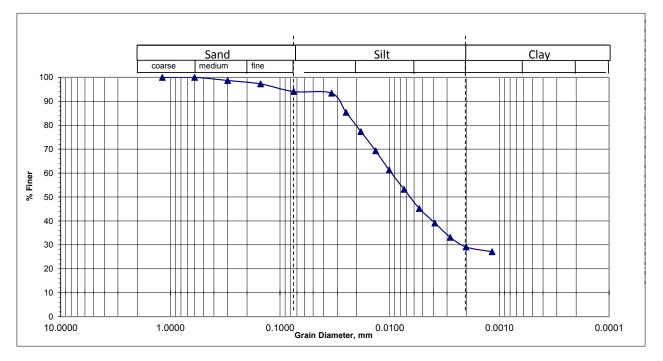
Sand (0.075mm size) =6%, Silt (0.005mm size) = 69% & Clay (0.001mm size) = 25%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : 21 nos. Bara Bihanali govt. School, Bara Bihanali Union

Bore Hole No :	BH Bg20	Sample No.	D6	Sampled Date:	02/02/2016
Depth (m) :	9.0			Test Date :	16/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.007 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.14$ 

% Particles ( from the grain -size analysis graph).

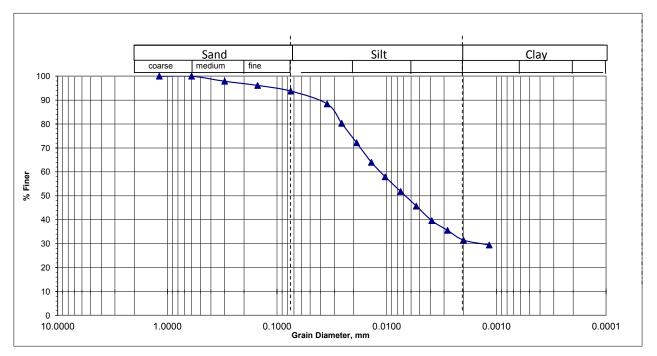
Sand (0.075mm size) =6%, Silt (0.005mm size) = 66% & Clay (0.001mm size) = 28%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Uttar akdala Govt. Primary School, Uttar akdala Bazar, Bhabanigong Pourashava

Bore Hole No :	BH Bg21	Sample No.	D5	Sampled Date:	01/02/2016
Depth (m) :	7.5			Test Date :	16/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.007 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.15$ 

% Particles ( from the grain -size analysis graph).

Sand (0.075mm size) =7%, Silt (0.005mm size) = 61% & Clay (0.001mm size) = 32%

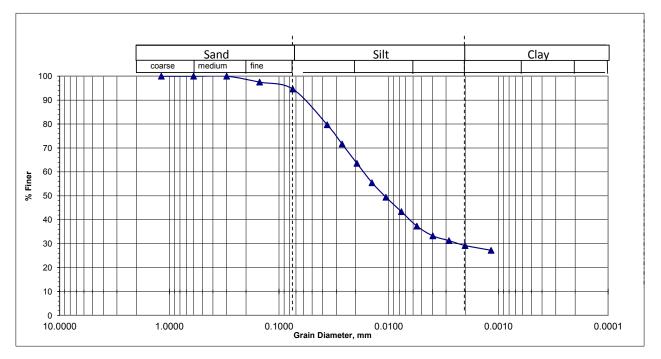
Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Nandanpur( Chekamara) Bazar, Mohila Dakhil Madrasha, Basu Para Union

 Bore Hole No :
 BH Bg22
 Sample No.
 D6
 Sampled Date:
 02/02/2016

 Depth (m) :
 9.0
 Test Date :
 16/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.012 \text{ mm}$ Silt-Factor,  $f = 1.76 \text{xsgrt}(D_{50}) = 0.19$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.19$ 

% Particles ( from the grain -size analysis graph).

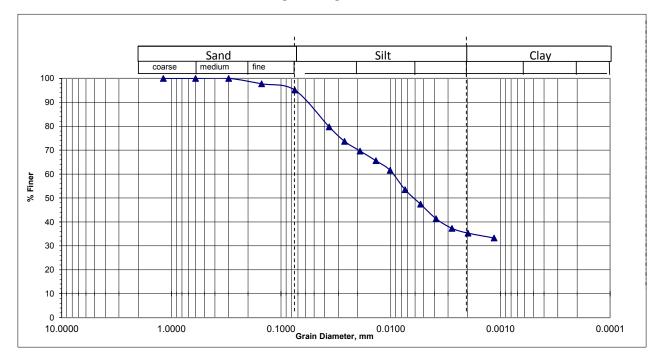
Sand (0.075mm size) =6%, Silt (0.005mm size) = 65% & Clay (0.001mm size) = 29%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Ganipur Union Complex office, Hasnipur Bazar, Ganipur Union

Bore Hole No :	BH Bg24	Sample No.	D9	Sampled Date:	06/02/2016
Depth (m) :	13.5			Test Date :	16/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.006 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.14$ 

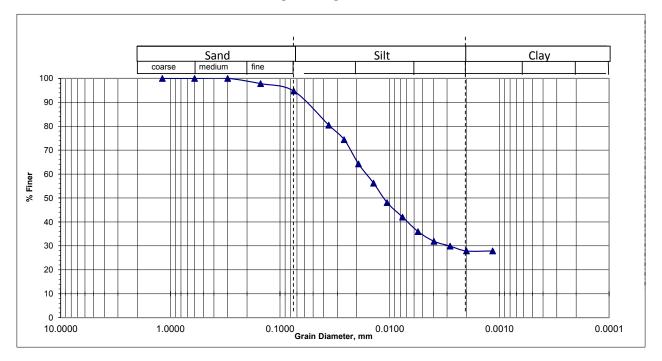
% Particles ( from the grain -size analysis graph).

Sand (0.075mm size) =5%, Silt (0.005mm size) = 60% & Clay (0.001mm size) = 35%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Sahid Sakandar Memorial Adarsho High School, Godaoun Mor, Bhabanigong Pourashava							
Bore Hole No :	BH Bg26	Sample No.	D5	Sampled Date:	27/01/2016		
Depth (m) :	7.5			Test Date :	15/04/2016		



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.012$  mm Silt-Factor, f = 1.76xsqrt( $D_{50}$ ) = 0.19

% Particles ( from the grain -size analysis graph).

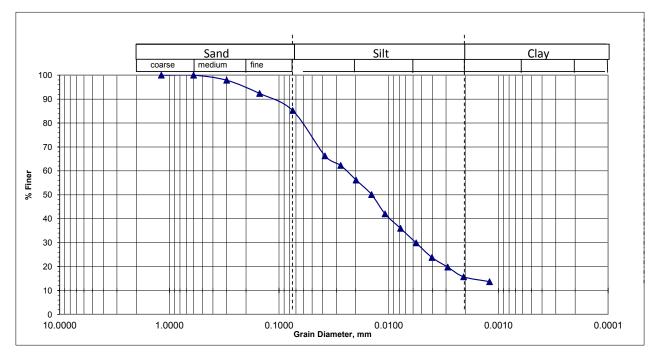
Sand (0.075mm size) =5%, Silt (0.005mm size) = 67% & Clay (0.001mm size) = 28%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Bagmara Degree College, Ganipur Union

Bore Hole No :	BH Bg27	Sample No.	D2	Sampled Date:	31/01/2016
Depth (m) :	3.0			Test Date :	15/04/2016



### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.016 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.22$ 

% Particles ( from the grain -size analysis graph).

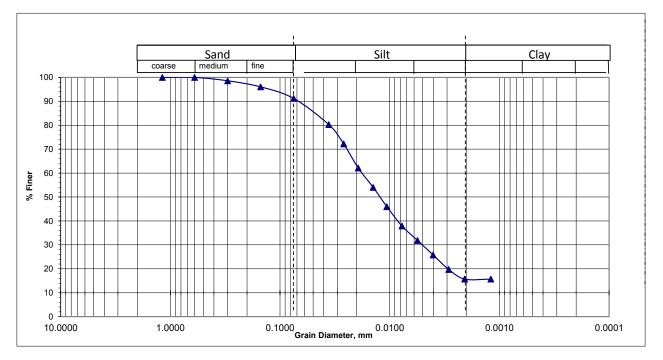
Sand (0.075mm size) =15%, Silt (0.005mm size) = 70% & Clay (0.001mm size) = 15%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Shadhopara Madrasha, Near post office, Sreepur Union

Bore Hole No :	BH Bg28	Sample No.	D3	Sampled Date:	01/02/2016
Depth (m) :	4.5			Test Date :	13/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.013 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.20$ 

% Particles ( from the grain -size analysis graph).

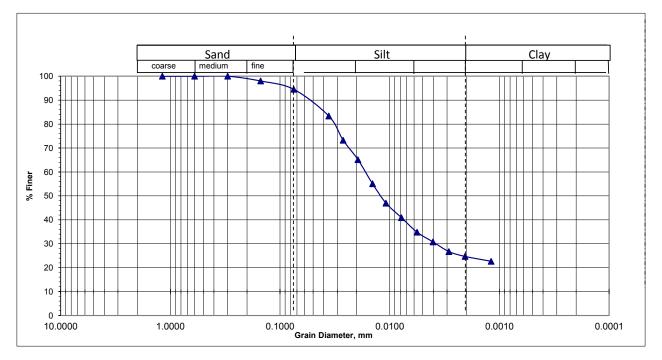
Sand (0.075mm size) =9%, Silt (0.005mm size) = 75% & Clay (0.001mm size) = 16%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Jhikra High School, Jhikra Bazar, Jhikra Union

Bore Hole No :	BH Bg29	Sample No.	D5	Sampled Date:	28/01/2016
Depth (m) :	7.5			Test Date :	13/04/2016



### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.013 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.20$ 

% Particles ( from the grain -size analysis graph).

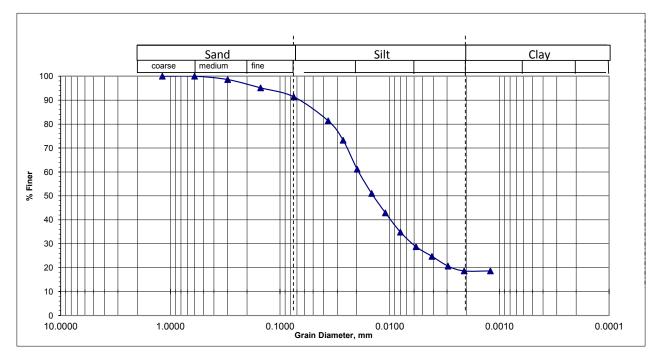
Sand (0.075mm size) =6%, Silt (0.005mm size) = 69% & Clay (0.001mm size) = 25%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Sakoa Bohumuki High School, Sikdar Bazar, Maria Union

Bore Hole No :	BH Bg30	Sample No.	D5	Sampled Date:	29/01/2016
Depth (m) :	7.5			Test Date :	15/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.015 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.22$ 

% Particles ( from the grain -size analysis graph).

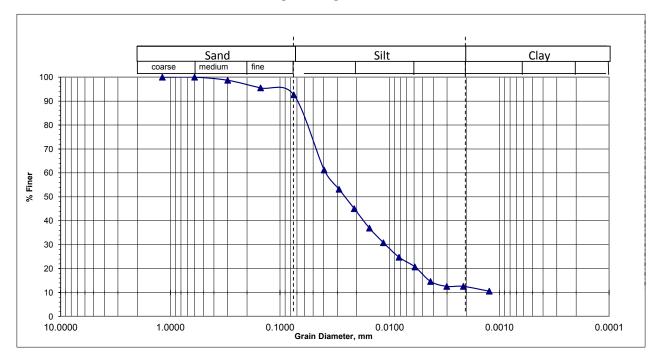
Sand (0.075mm size) =9%, Silt (0.005mm size) = 73% & Clay (0.001mm size) = 18%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Gangopara Govt. Primary school, Maria Union

Bore Hole No :	BH Bg31	Sample No.	D2	Sampled Date:	10/02/2016
Depth (m) :	3.0			Test Date :	13/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.026 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.28$ 

% Particles ( from the grain -size analysis graph).

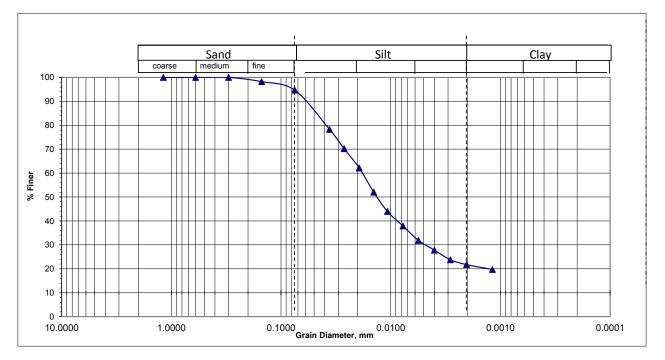
Sand (0.075mm size) =8%, Silt (0.005mm size) = 79% & Clay (0.001mm size) = 13%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Sajura Mirzapur, Goalkandi Union

Bore Hole No :	BH Bg32	Sample No.	D7	Sampled Date:	30/01/2016
Depth (m) :	10.5			Test Date :	16/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.015 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.21$ 

% Particles ( from the grain -size analysis graph).

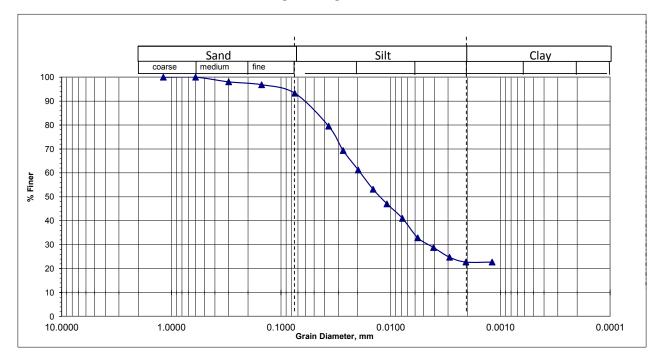
Sand (0.075mm size) =6%, Silt (0.005mm size) = 72% & Clay (0.001mm size) = 22%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Jamgram Govt. Primary School, Jamgram, Tahirpur Pourashava

Bore Hole No :	BH Bg33	Sample No.	D5	Sampled Date:	31/01/2016
Depth (m) :	7.5			Test Date :	16/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.014 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.20$ 

% Particles ( from the grain -size analysis graph).

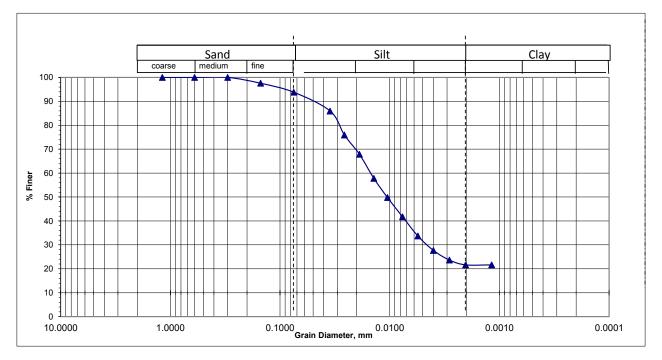
Sand (0.075mm size) =7%, Silt (0.005mm size) = 70% & Clay (0.001mm size) = 23%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Koyamajampur Govt. Prtimary School, Durgapur, Near Tahirpur Pourashava

Bore Hole No :	BH Bg34	Sample No.	D3	Sampled Date:	09/02/2016
Depth (m) :	4.5			Test Date :	13/04/2016



### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.01 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.18$ 

% Particles ( from the grain -size analysis graph).

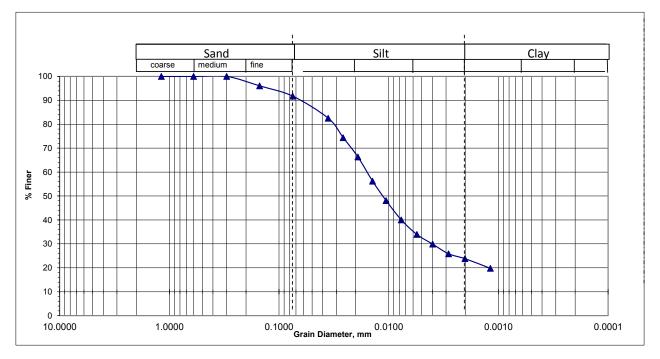
Sand (0.075mm size) =6%, Silt (0.005mm size) = 72% & Clay (0.001mm size) = 22%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Hamir kutsha Union complex office, Hamir Kutsha Union

Bore Hole No :	BH Bg36	Sample No.	D4	Sampled Date:	10/02/2016
Depth (m) :	6.0			Test Date :	17/04/2016



### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.012 \text{ mm}$ Silt-Factor,  $f = 1.76 \text{xsgrt}(D_{50}) = 0.19$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.19$ 

% Particles ( from the grain -size analysis graph).

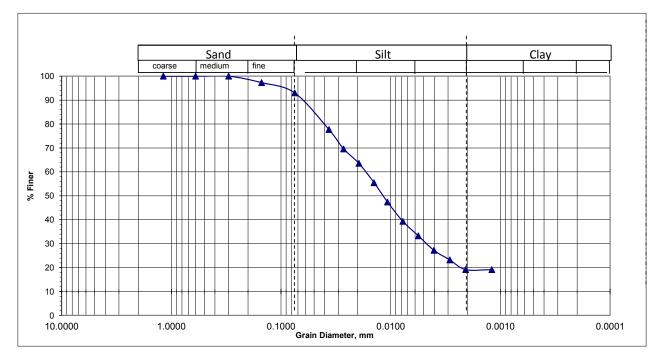
Sand (0.075mm size) =8%, Silt (0.005mm size) = 68% & Clay (0.001mm size) = 24%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Tahirpur University (Birshobidalay) college, Tahirpur Bazar, Tahirpur Pourashava

Bore Hole No :	BH Bg37	Sample No.	D6	Sampled Date:	30/01/2016
Depth (m) :	9.0			Test Date :	16/04/2016



#### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.012 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.19$ 

% Particles ( from the grain -size analysis graph).

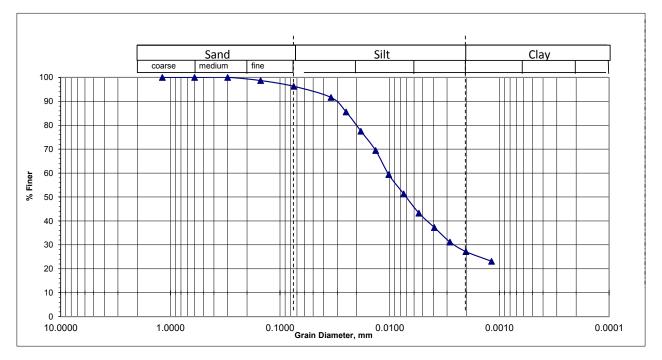
Sand (0.075mm size) =7%, Silt (0.005mm size) = 73% & Clay (0.001mm size) = 18%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Talghoria Govt. Primary School, Hamir Kutsha Union

Bore Hole No :	BH Bg39	Sample No.	D4	Sampled Date:	28/01/2016
Depth (m) :	6.0			Test Date :	17/04/2016



### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.007 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.15$ 

% Particles ( from the grain -size analysis graph).

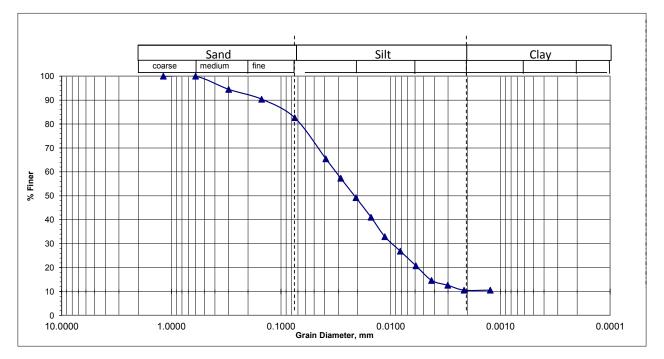
Sand (0.075mm size) =4%, Silt (0.005mm size) = 70% & Clay (0.001mm size) = 26%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Choukali Govt. Primary School, Choukali Bazar, Goalkandi Union

Bore Hole No :	BH Bg40	Sample No.	D2	Sampled Date:	29/01/2016
Depth (m) :	3.0			Test Date :	17/04/2016



### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.022 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.26$ 

% Particles ( from the grain -size analysis graph).

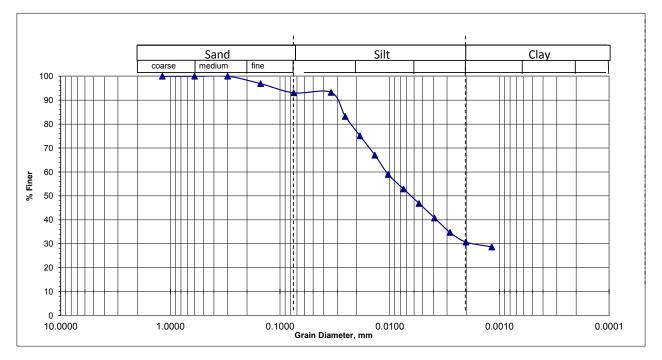
Sand (0.075mm size) =18%, Silt (0.005mm size) = 72% & Clay (0.001mm size) = 10%

Client : Urban Development Directorate (UDD)

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : Choukali Govt. Primary School, Choukali Bazar, Goalkandi Union

Bore Hole No :	BH Bg40	Sample No.	D4	Sampled Date:	29/01/2016
Depth (m) :	6.0			Test Date :	17/04/2016



### **Graphical Representation:**

Mean Diameter,  $D_{50} = 0.006 \text{ mm}$ 

Silt-Factor,  $f = 1.76xsqrt(D_{50}) = 0.14$ 

% Particles ( from the grain -size analysis graph).

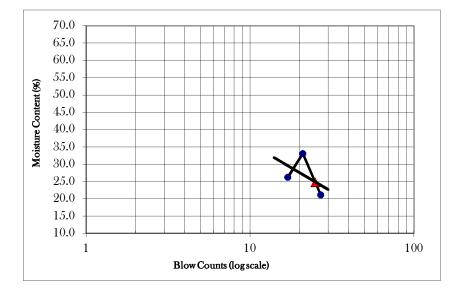
Sand (0.075mm size) =8%, Silt (0.005mm size) = 61% & Clay (0.001mm size) = 31%

### **Client : Urban Development Directorate (UDD)**

<b>Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)</b>
Project Location : Near Gobinda Para Union Complex, Gobinda Para Union
Sample Information:

Sample Information:	
Sample Date:	6/2/2016
Test Date:	20/9/2016
Boring Number	<u>BH-01</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Determination of Liquid Limit			Determination of Plastic Limit		
C55	C66	C77	Cup Number	Ct103	Ct103
42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
95.09	67.89	70.6	Weight of Wet Soil and Cup (g)	21.26	21.65
84.09	62.02	65.5	Weight of Dry Soil and Cup (g)	21.09	21.39
26.2	33.1	21.1	Moisure Content (%)	11.0	14.1
17	21	27			
	C55 42.13 95.09 84.09 26.2	C55C6642.1344.2795.0967.8984.0962.0226.233.1	C55C66C7742.1344.2741.3595.0967.8970.684.0962.0265.526.233.121.1	C55         C66         C77         Cup Number           42.13         44.27         41.35         Weight of Cup (g)           95.09         67.89         70.6         Weight of Wet Soil and Cup (g)           84.09         62.02         65.5         Weight of Dry Soil and Cup (g)           26.2         33.1         21.1         Moisure Content (%)	C55         C66         C77         Cup Number         Ct103           42.13         44.27         41.35         Weight of Cup (g)         19.55           95.09         67.89         70.6         Weight of Wet Soil and Cup (g)         21.26           84.09         62.02         65.5         Weight of Dry Soil and Cup (g)         21.09           26.2         33.1         21.1         Moisure Content (%)         11.0



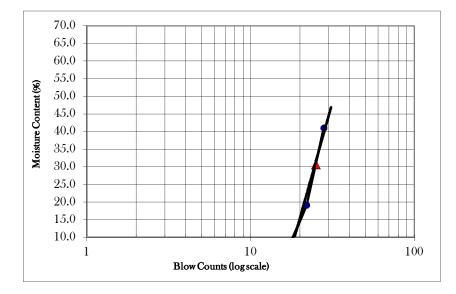
Liquid Limit	25
Plastic Limit	13
Plasticity Index	12

### **Client : Urban Development Directorate (UDD)**

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
Project Location : Rokittepara Govt. primary school, Palopara, Auch Para Union
Sample Information:

Sample Information:	
Sample Date:	8/2/2016
Test Date:	20/9/2016
Boring Number	<u>BH-03</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Limit			Determination of Plastic Li	mit	
C44	C33	C88	Cup Number	Ct104	Ct104
42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
95.89	75.53	79.63	Weight of Wet Soil and Cup (g)	21.96	21.76
91.19	70.52	68.5	Weight of Dry Soil and Cup (g)	21.39	21.33
9.6	19.1	41.0	Moisure Content (%)	31.0	24.2
18	22	28			
	C44 42.13 95.89 91.19 9.6	C44C3342.1344.2795.8975.5391.1970.529.619.1	C44C33C8842.1344.2741.3595.8975.5379.6391.1970.5268.59.619.141.0	C44         C33         C88         Cup Number           42.13         44.27         41.35         Weight of Cup (g)           95.89         75.53         79.63         Weight of Wet Soil and Cup (g)           91.19         70.52         68.5         Weight of Dry Soil and Cup (g)           9.6         19.1         41.0         Moisure Content (%)	C44C33C88Cup NumberCt10442.1344.2741.35Weight of Cup (g)19.5595.8975.5379.63Weight of Wet Soil and Cup (g)21.9691.1970.5268.5Weight of Dry Soil and Cup (g)21.399.619.141.0Moisure Content (%)31.0



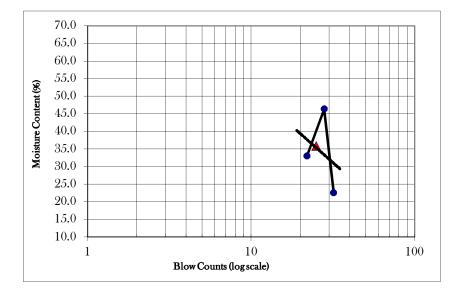
Liquid Limit	31
Plastic Limit	28
Plasticity Index	3

### **Client : Urban Development Directorate (UDD)**

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
Project Location : Sharcol Shimla High School, beside Nasir Bazar, Sondanga Union
Sample Information:

Sample Information:	
Sample Date:	5/2/2016
Test Date:	20/9/2016
Boring Number	<u>BH-04</u>
Sample Number	<u>D4</u>
Depth of Sample(m)	<u>6.0</u>

Determination of Liquid	Limit			Determination of Plastic Li	mit	
Cup Number	C10	C14	C220	Cup Number	Ct302	Ct302
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	115.08	64.13	53.28	Weight of Wet Soil and Cup (g)	13.87	14.18
Weight of Dry Soil and Cup (g)	95.68	55.36	50.22	Weight of Dry Soil and Cup (g)	13.39	13.76
Moisure Content (%)	33.0	46.4	22.6	Moisure Content (%)	38.7	26.1
Blow Counts	22	28	32			



Liquid Limit	36
Plastic Limit	32
Plasticity Index	3

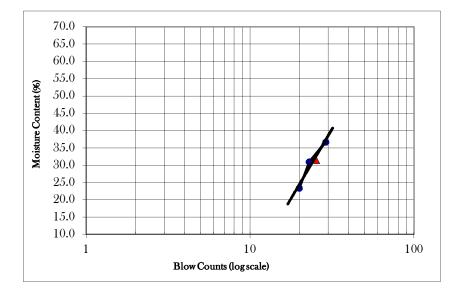
### **Client : Urban Development Directorate (UDD)**

### **Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)**

**Project Location : Nilkhi Union Porishod Bhovon, Shibchor, Madaripur Mirpur Dimukki Primary and** Sample Information:

Sumpte miermanom	
Sample Date:	3/2/2016
Test Date:	20/9/2016
Boring Number	<u>BH-09</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Limit			Determination of Plastic Li	mit	
C03	C08	C09	Cup Number	Ct111	Ct111
42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
95.95	65.52	71.61	Weight of Wet Soil and Cup (g)	21.96	21.85
85.77	60.5	63.49	Weight of Dry Soil and Cup (g)	21.53	21.26
23.3	30.9	36.7	Moisure Content (%)	21.7	34.5
20	23	29			
	C03 42.13 95.95 85.77 23.3	C03C0842.1344.2795.9565.5285.7760.523.330.9	C03C08C0942.1344.2741.3595.9565.5271.6185.7760.563.4923.330.936.7	C03         C08         C09         Cup Number           42.13         44.27         41.35         Weight of Cup (g)           95.95         65.52         71.61         Weight of Wet Soil and Cup (g)           85.77         60.5         63.49         Weight of Dry Soil and Cup (g)           23.3         30.9         36.7         Moisure Content (%)	C03C08C09Cup NumberCt11142.1344.2741.35Weight of Cup (g)19.5595.9565.5271.61Weight of Wet Soil and Cup (g)21.9685.7760.563.49Weight of Dry Soil and Cup (g)21.5323.330.936.7Moisure Content (%)21.7



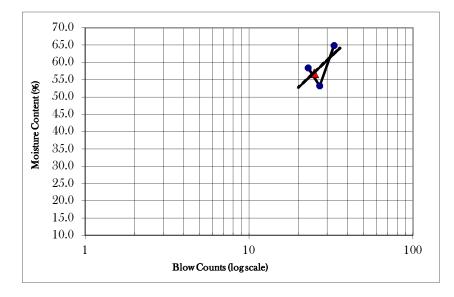
Liquid Limit	32
Plastic Limit	28
Plasticity Index	4

### **Client : Urban Development Directorate (UDD)**

### **Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project**

Sample Information:	
Sample Date:	3/2/2016
Test Date:	20/9/2016
Boring Number	<u>BH-10</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Determination of Liquid	Limit			Determination of Plastic L	imit	
Cup Number	C01	C07	C11	Cup Number	Ct102	Ct102
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	125.18	65.43	56.37	Weight of Wet Soil and Cup (g)	14.75	14.38
Weight of Dry Soil and Cup (g)	92.65	55.37	48.62	Weight of Dry Soil and Cup (g)	13.85	13.66
Moisure Content (%)	58.4	53.2	64.9	Moisure Content (%)	52.9	47.7
Blow Counts	23	27	33			
		-	-	-		



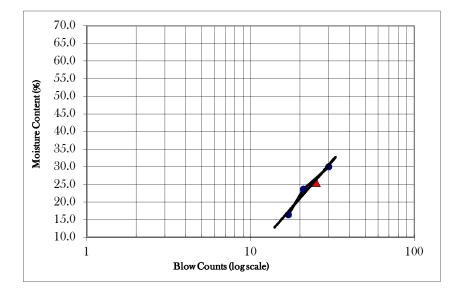
Liquid Limit	57
Plastic Limit	50
Plasticity Index	7

### **Client : Urban Development Directorate (UDD)**

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
Project Location : Machmail High School, Machmail Bazar, Subhadanga Union
Sample Information:

Sample Information:	
Sample Date:	9/2/2016
Test Date:	21/9/2016
Boring Number	<u>BH-11</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Determination of Liquid	Limit			Determination of Plastic Li	imit	
Cup Number	C44	C33	C88	Cup Number	Ct104	Ct104
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	103.89	70.53	76.63	Weight of Wet Soil and Cup (g)	21.76	21.35
Weight of Dry Soil and Cup (g)	95.19	65.52	68.5	Weight of Dry Soil and Cup (g)	21.33	21.13
Moisure Content (%)	16.4	23.6	29.9	Moisure Content (%)	24.2	13.9
Blow Counts	17	21	30			
		•		•		



Liquid Limit	26
Plastic Limit	19
Plasticity Index	7

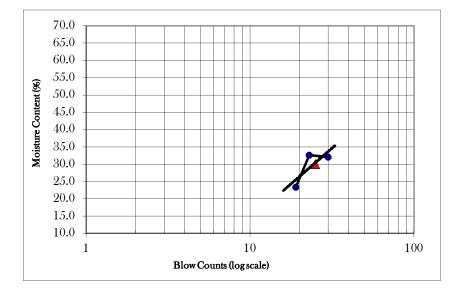
### **Client : Urban Development Directorate (UDD)**

**Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)** 

**Project Location : Machmail High School, Machmail Bazar, Subhadanga UnionMugaipara High Schoo** Sample Information:

Sample Date:	8/2/2016
Test Date:	21/9/2016
Boring Number	<u>BH-12</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Determination of Liquid Limit			Determination of Plastic Limit			
C55	C66	C77	Cup Number	Ct103	Ct103	
42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55	
95.09	63.03	70.6	Weight of Wet Soil and Cup (g)	21.66	21.55	
85.09	58.42	63.5	Weight of Dry Soil and Cup (g)	21.34	21.13	
23.3	32.6	32.1	Moisure Content (%)	17.9	26.6	
19	23	30		-		
	C55 42.13 95.09 85.09 23.3	C55C6642.1344.2795.0963.0385.0958.4223.332.6	C55C66C7742.1344.2741.3595.0963.0370.685.0958.4263.523.332.632.1	C55         C66         C77         Cup Number           42.13         44.27         41.35         Weight of Cup (g)           95.09         63.03         70.6         Weight of Wet Soil and Cup (g)           85.09         58.42         63.5         Weight of Dry Soil and Cup (g)           23.3         32.6         32.1         Moisure Content (%)	C55C66C77Cup NumberCt10342.1344.2741.35Weight of Cup (g)19.5595.0963.0370.6Weight of Wet Soil and Cup (g)21.6685.0958.4263.5Weight of Dry Soil and Cup (g)21.3423.332.632.1Moisure Content (%)17.9	



Liquid Limit	30
Plastic Limit	22
Plasticity Index	8

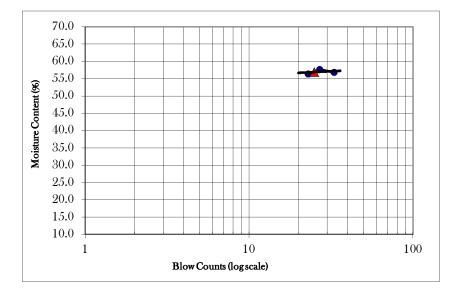
### **Client : Urban Development Directorate (UDD)**

**Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)** 

**Project Location : Chor kasi kata Adarsha Sorkari Prothomic Bidhaloy, Sibchor, MadaripurDoulatpur** Sample Information:

1	
Sample Date:	5/2/2016
Test Date:	21/9/2016
Boring Number	<u>BH-17</u>
Sample Number	<u>D4</u>
Depth of Sample(m)	<u>6.0</u>

Determination of Liquid Limit			Determination of Plastic Limit		
C01	C07	C11	Cup Number	Ct102	Ct102
36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
127.18	69.43	56.98	Weight of Wet Soil and Cup (g)	14.79	14.68
94.65	57.37	49.62	Weight of Dry Soil and Cup (g)	13.95	13.78
56.4	57.6	56.8	Moisure Content (%)	46.7	55.2
23	27	33			
	C01 36.96 127.18 94.65 56.4	C01C0736.9636.45127.1869.4394.6557.3756.457.6	C01C07C1136.9636.4536.67127.1869.4356.9894.6557.3749.6256.457.656.8	C01         C07         C11         Cup Number           36.96         36.45         36.67         Weight of Cup (g)           127.18         69.43         56.98         Weight of Wet Soil and Cup (g)           94.65         57.37         49.62         Weight of Dry Soil and Cup (g)           56.4         57.6         56.8         Moisure Content (%)	C01C07C11Cup NumberCt10236.9636.4536.67Weight of Cup (g)12.15127.1869.4356.98Weight of Wet Soil and Cup (g)14.7994.6557.3749.62Weight of Dry Soil and Cup (g)13.9556.457.656.8Moisure Content (%)46.7



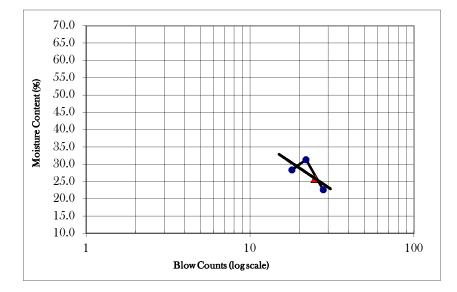
Liquid Limit	57	
Plastic Limit	51	_
Plasticity Index	6	-

### **Client : Urban Development Directorate (UDD)**

### **Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project**

Sample Information:	
Sample Date:	7/2/2016
Test Date:	21/9/2016
Boring Number	<u>BH-19</u>
Sample Number	<u>D8</u>
Depth of Sample(m)	<u>12.0</u>

Determination of Liquid Limit				Determination of Plastic Limit		
Cup Number	nber C03 C08 C09		Cup Number	Ct111	Ct111	
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	110.95	69.52	74.61	Weight of Wet Soil and Cup (g)	21.86	21.95
Weight of Dry Soil and Cup (g)	95.77	63.5	68.49	Weight of Dry Soil and Cup (g)	21.53	21.36
Moisure Content (%)	28.3	31.3	22.5	Moisure Content (%)	16.7	32.6
Blow Counts	18	22	28			
Blow Counts	18	22	28	1		



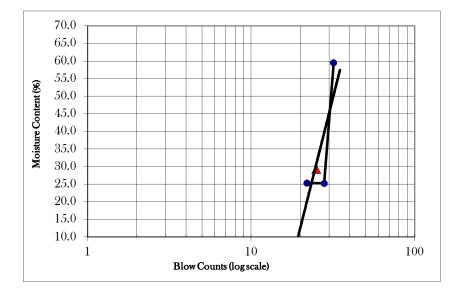
Liquid Limit	26
Plastic Limit	25
Plasticity Index	1

### **Client : Urban Development Directorate (UDD)**

<b>Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)</b>
Project Location : 21 nos. Bara Bihanali govt. School, Bara Bihanali Union
Sample Information

Sample Information:	
Sample Date:	2/2/2016
Test Date:	21/9/2016
Boring Number	<u>BH-20</u>
Sample Number	<u>D4</u>
Depth of Sample(m)	<u>6.0</u>

Determination of Liquid Limit			Determination of Plastic Limit			
Cup Number C10 C14 C220		Cup Number	Ct302	Ct302		
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	123.08	60.13	58.28	Weight of Wet Soil and Cup (g)	13.77	14.21
Weight of Dry Soil and Cup (g)	105.68	55.36	50.22	Weight of Dry Soil and Cup (g)	13.39	13.86
Moisure Content (%)	25.3	25.2	59.5	Moisure Content (%)	30.6	20.5
Blow Counts	22	28	32			
			•	•		



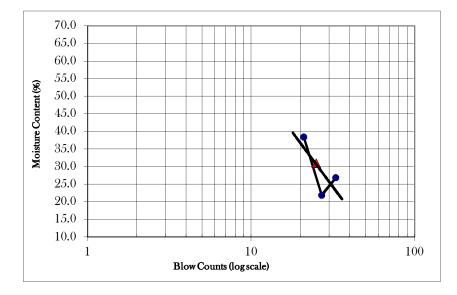
Liquid Limit	29
Plastic Limit	26
Plasticity Index	4

### **Client : Urban Development Directorate (UDD)**

<b>Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)</b>
Project Location : Uttar akdala Govt. Primary School, Uttar akdala Bazar,

- <b>J</b>	
Sample Information:	
Sample Date:	1/2/2016
Test Date:	22/9/2016
Boring Number	<u>BH-21</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Determination of Liquid Limit		Determination of Plastic Limit				
Cup Number	C10	C14	C220	Cup Number	Ct302	Ct302
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	132.08	74.13	65.28	Weight of Wet Soil and Cup (g)	13.45	14.28
Weight of Dry Soil and Cup (g)	105.68	67.36	59.22	Weight of Dry Soil and Cup (g)	13.15	13.88
Moisure Content (%)	38.4	21.9	26.9	Moisure Content (%)	30.0	23.1
Blow Counts	21	27	33			
		-	-	•		



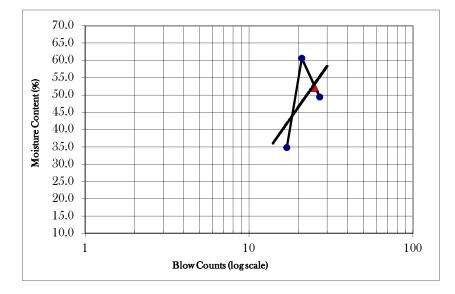
Liquid Limit	31
Plastic Limit	27
Plasticity Index	4

### **Client : Urban Development Directorate (UDD)**

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
Project Location :Nandanpur( Chekamara) Bazar, Mohila Dakhil Madrasha,

Sample Information:	
Sample Date:	2/2/2016
Test Date:	22/9/2016
Boring Number	<u>BH-22</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Determination of Liquid Limit		Determination of Plastic Limit			
C03	C08	C09	Cup Number	Ct111	Ct111
42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
100.95	65.52	66.96	Weight of Wet Soil and Cup (g)	21.16	21.75
85.77	57.5	58.49	Weight of Dry Soil and Cup (g)	20.53	21.45
34.8	60.6	49.4	Moisure Content (%)	64.3	15.8
17	21	27			
	C03 42.13 100.95 85.77 34.8	C03C0842.1344.27100.9565.5285.7757.534.860.6	C03C08C0942.1344.2741.35100.9565.5266.9685.7757.558.4934.860.649.4	C03         C08         C09         Cup Number           42.13         44.27         41.35         Weight of Cup (g)           100.95         65.52         66.96         Weight of Wet Soil and Cup (g)           85.77         57.5         58.49         Weight of Dry Soil and Cup (g)           34.8         60.6         49.4         Moisure Content (%)	C03C08C09Cup NumberCt11142.1344.2741.35Weight of Cup (g)19.55100.9565.5266.96Weight of Wet Soil and Cup (g)21.1685.7757.558.49Weight of Dry Soil and Cup (g)20.5334.860.649.4Moisure Content (%)64.3



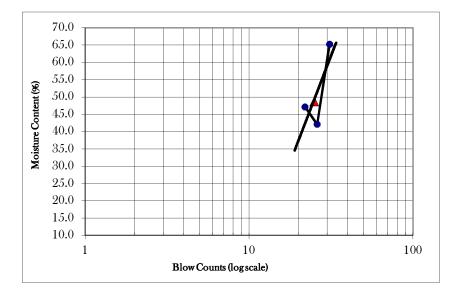
Liquid Limit	52
Plastic Limit	40
Plasticity Index	12

### **Client : Urban Development Directorate (UDD)**

Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)
Project Location : Ganipur Union Complex office, Hasnipur Bazar, Ganipur Union
Sample Information:

Sample Information:	
Sample Date:	6/2/2016
Test Date:	22/9/2016
Boring Number	<u>BH-24</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Determination of Liquid l	Limit			Determination of Plastic Li	mit	
Cup Number	C01	C07	C11	Cup Number	Ct102	Ct102
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	129.18	70.43	61.37	Weight of Wet Soil and Cup (g)	14.59	14.38
Weight of Dry Soil and Cup (g)	99.65	60.37	51.62	Weight of Dry Soil and Cup (g)	13.69	13.88
Moisure Content (%)	47.1	42.1	65.2	Moisure Content (%)	58.4	28.9
Blow Counts	22	26	31			



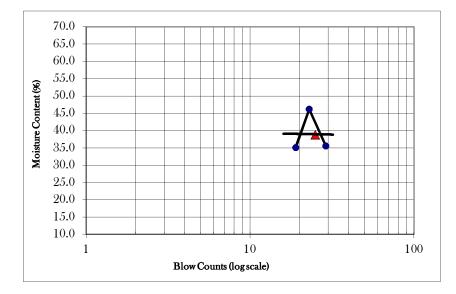
Liquid Limit	49
Plastic Limit	44
Plasticity Index	5

### **Client : Urban Development Directorate (UDD)**

Pro	ojec	t:	Pre	epara	tion of l	Developme	nt Plan for	Fourteen	Upazilas(l	Package-1)
Р	roje	ect	Lo	catior	ı : Sahio	d Sakandaı	· Memoria	l Adarsho	High Scho	ol, Godaoun
~	1		c	. •						

Sample Information:	
Sample Date:	27/1/2016
Test Date:	22/9/2016
Boring Number	<u>BH-26</u>
Sample Number	<u>D4</u>
Depth of Sample(m)	<u>6.0</u>

Limit		Determination of Plastic Limit			
C55	C66	C77	Cup Number	Ct103	Ct103
42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
96.09	62.03	64.6	Weight of Wet Soil and Cup (g)	21.76	21.85
82.09	56.42	58.5	Weight of Dry Soil and Cup (g)	21.54	21.333
35.0	46.2	35.6	Moisure Content (%)	11.1	29.0
19	23	29			
	C55 42.13 96.09 82.09 35.0	C55C6642.1344.2796.0962.0382.0956.4235.046.2	C55C66C7742.1344.2741.3596.0962.0364.682.0956.4258.535.046.235.6	C55         C66         C77         Cup Number           42.13         44.27         41.35         Weight of Cup (g)           96.09         62.03         64.6         Weight of Wet Soil and Cup (g)           82.09         56.42         58.5         Weight of Dry Soil and Cup (g)           35.0         46.2         35.6         Moisure Content (%)	C55C66C77Cup NumberCt10342.1344.2741.35Weight of Cup (g)19.5596.0962.0364.6Weight of Wet Soil and Cup (g)21.7682.0956.4258.5Weight of Dry Soil and Cup (g)21.5435.046.235.6Moisure Content (%)11.1



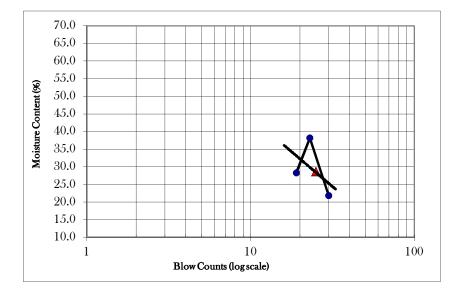
Liquid Limit	39
Plastic Limit	20
Plasticity Index	19

### **Client : Urban Development Directorate (UDD)**

<b>Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)</b>
Project Location : Bagmara Degree College, Ganipur Union

Sample Information:	
Sample Date:	31/1/2016
Test Date:	22/9/2016
Boring Number	<u>BH-27</u>
Sample Number	<u>D8</u>
Depth of Sample(m)	<u>12.0</u>

Determination of Liquid	Limit		Determination of Plastic Limit			
Cup Number	C44	C33	C88	Cup Number	Ct104	Ct104
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	117.89	80.53	75.63	Weight of Wet Soil and Cup (g)	21.76	21.45
Weight of Dry Soil and Cup (g)	101.19	70.52	69.5	Weight of Dry Soil and Cup (g)	21.56	21.23
Moisure Content (%)	28.3	38.1	21.8	Moisure Content (%)	10.0	13.1
Blow Counts	19	23	30			
		-	_	-		



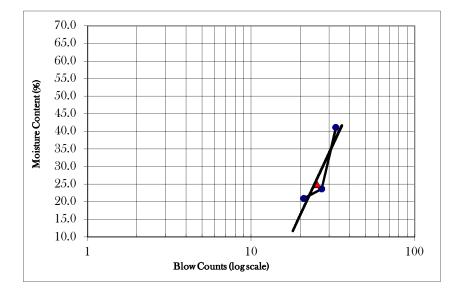
Liquid Limit	29
Plastic Limit	12
Plasticity Index	17

### **Client : Urban Development Directorate (UDD)**

### Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location : Jhikra High School, Jhikra Bazar, Jhikra Union

Sample Information:	
Sample Date:	28/1/2016
Test Date:	23/9/2016
Boring Number	<u>BH-29</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Determination of Liquid	Limit		Determination of Plastic Limit			
Cup Number	C10	C14	C220	Cup Number	Ct302	Ct302
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	120.08	73.43	67.56	Weight of Wet Soil and Cup (g)	13.45	14.48
Weight of Dry Soil and Cup (g)	105.7	66.36	58.56	Weight of Dry Soil and Cup (g)	13.15	14.23
Moisure Content (%)	20.9	23.6	41.1	Moisure Content (%)	30.0	12.0
Blow Counts	21	27	33			



Liquid Limit	25
Plastic Limit	21
Plasticity Index	4

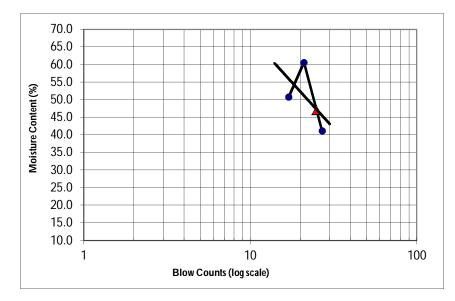
### **Client : Urban Development Directorate (UDD)**

### Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location :Sakoa Bohumuki High School, Sikdar Bazar, Maria Union

Sample Information:

Sample Date:	29/1/2016
Test Date:	23/9/2016
Boring Number	<u>BH-30</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Limit			Determination of Plastic Lin	mit	
C03	C08	C09	Cup Number	Ct111	Ct111
42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
107.95	65.52	66.96	Weight of Wet Soil and Cup (g)	21.16	21.85
85.77	57.5	59.49	Weight of Dry Soil and Cup (g)	20.43	21.65
50.8	60.6	41.2	Moisure Content (%)	83.0	9.5
17	21	27			
	C03 42.13 107.95 85.77	C03C0842.1344.27107.9565.5285.7757.550.860.6	C03C08C0942.1344.2741.35107.9565.5266.9685.7757.559.4950.860.641.2	C03         C08         C09         Cup Number           42.13         44.27         41.35         Weight of Cup (g)           107.95         65.52         66.96         Weight of Wet Soil and Cup (g)           85.77         57.5         59.49         Weight of Dry Soil and Cup (g)           50.8         60.6         41.2         Moisure Content (%)	C03C08C09Cup NumberCt11142.1344.2741.35Weight of Cup (g)19.55107.9565.5266.96Weight of Wet Soil and Cup (g)21.1685.7757.559.49Weight of Dry Soil and Cup (g)20.4350.860.641.2Moisure Content (%)83.0



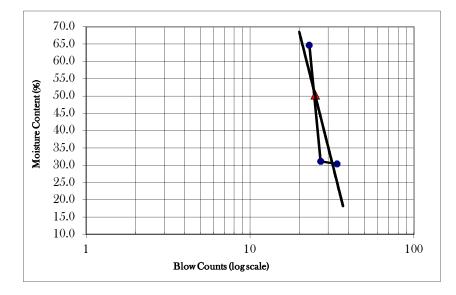
Liquid Limit	47
Plastic Limit	46
Plasticity Index	1

### **Client : Urban Development Directorate (UDD)**

<b>Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)</b>
Project Location : Gangopara Govt. Primary school, Maria Union
Sample Information

Sample Information:	
Sample Date:	10/2/2016
Test Date:	23/9/2016
Boring Number	<u>BH-31</u>
Sample Number	<u>D6</u>
Depth of Sample(m)	<u>9.0</u>

Determination of Liquid	Limit			Determination of Plastic Li	mit	
Cup Number	C01	C07	C11	Cup Number	Ct102	Ct102
Weight of Cup (g)	36.96	36.45	36.67	Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	112.18	70.43	61.37	Weight of Wet Soil and Cup (g)	14.59	14.43
Weight of Dry Soil and Cup (g)	82.65	62.37	55.62	Weight of Dry Soil and Cup (g)	13.83	13.88
Moisure Content (%)	64.6	31.1	30.3	Moisure Content (%)	45.2	31.8
Blow Counts	23	27	34			
			•	•		



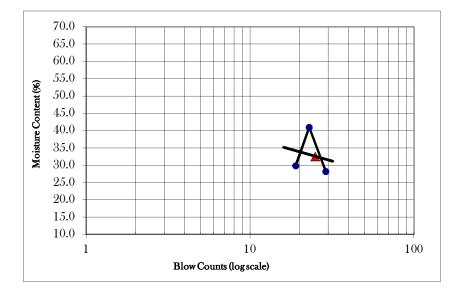
Liquid Limit	50
Plastic Limit	39
Plasticity Index	12

### **Client : Urban Development Directorate (UDD)**

### Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location : Sajura Mirzapur, Goalkandi Union

Sample Information:	
Sample Date:	30/1/2016
Test Date:	23/9/2016
Boring Number	<u>BH-32</u>
Sample Number	<u>D8</u>
Depth of Sample(m)	<u>12.0</u>

Determination of Liquid	Limit			Determination of Plastic La	imit	
Cup Number	C55	C66	C77	Cup Number	Ct103	Ct103
Weight of Cup (g)	42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	103.09	67.03	64.6	Weight of Wet Soil and Cup (g)	21.56	21.65
Weight of Dry Soil and Cup (g)	89.09	60.42	59.5	Weight of Dry Soil and Cup (g)	21.34	21.23
Moisure Content (%)	29.8	40.9	28.1	Moisure Content (%)	12.3	25.0
Blow Counts	19	23	29			



Liquid Limit	33
Plastic Limit	19
Plasticity Index	14

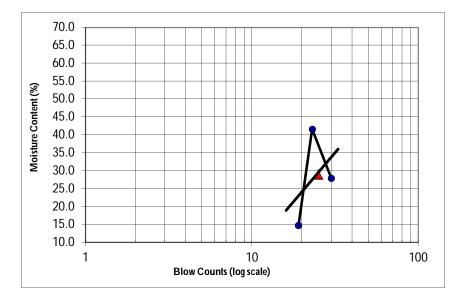
### **Client : Urban Development Directorate (UDD)**

<b>Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)</b>
Project Location : Hamir kutsha Union complex office, Hamir Kutsha Union

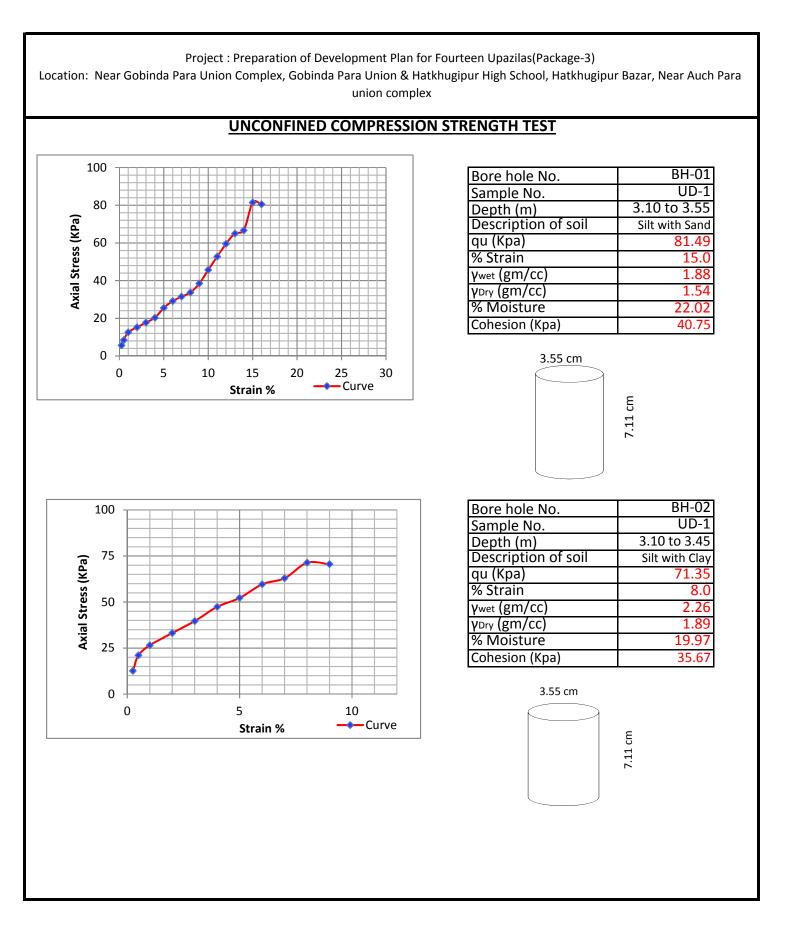
Sample Information:

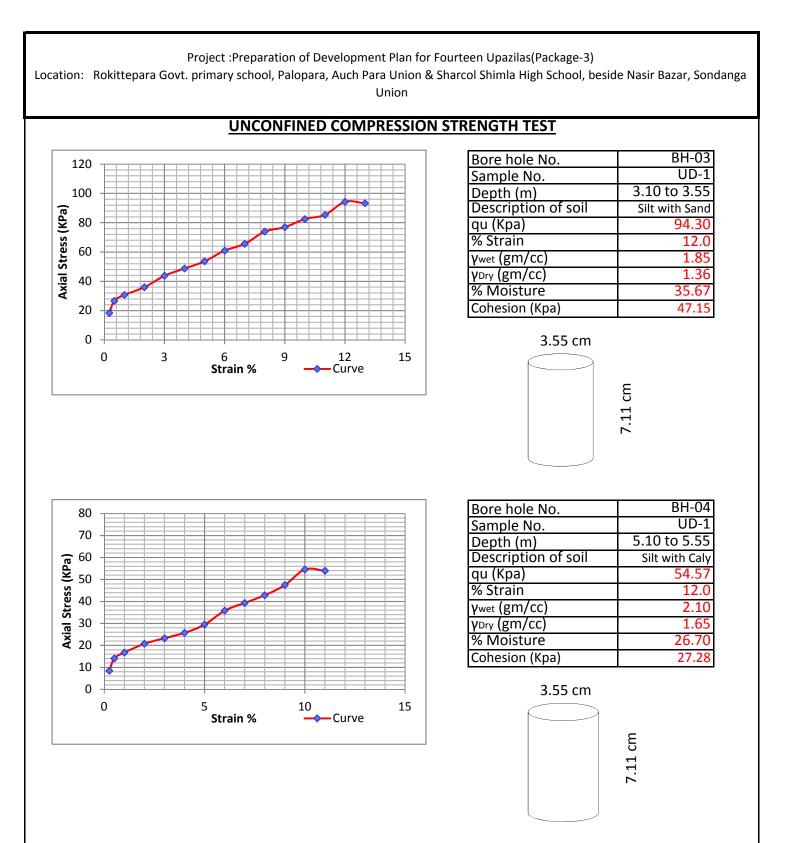
Sample Date:	10/2/2016
Test Date:	23/9/2016
Boring Number	<u>BH-36</u>
Sample Number	<u>D4</u>
Depth of Sample(m)	<u>6.0</u>

Limit			Determination of Plastic Lin	nit	
C44	C33	C88	Cup Number	Ct104	Ct104
42.13	44.27	41.35	Weight of Cup (g)	19.55	19.55
109.89	88.53	78.63	Weight of Wet Soil and Cup (g)	21.16	21.25
101.19	75.52	70.5	Weight of Dry Soil and Cup (g)	21.03	21.11
14.7	41.6	27.9	Moisure Content (%)	8.8	9.0
19	23	30			
	C44 42.13 109.89 101.19 14.7	C44C3342.1344.27109.8988.53101.1975.5214.741.6	C44C33C8842.1344.2741.35109.8988.5378.63101.1975.5270.514.741.627.9	C44         C33         C88         Cup Number           42.13         44.27         41.35         Weight of Cup (g)           109.89         88.53         78.63         Weight of Wet Soil and Cup (g)           101.19         75.52         70.5         Weight of Dry Soil and Cup (g)           14.7         41.6         27.9         Moisure Content (%)	C44C33C88Cup NumberCt10442.1344.2741.35Weight of Cup (g)19.55109.8988.5378.63Weight of Wet Soil and Cup (g)21.16101.1975.5270.5Weight of Dry Soil and Cup (g)21.0314.741.627.9Moisure Content (%)8.8



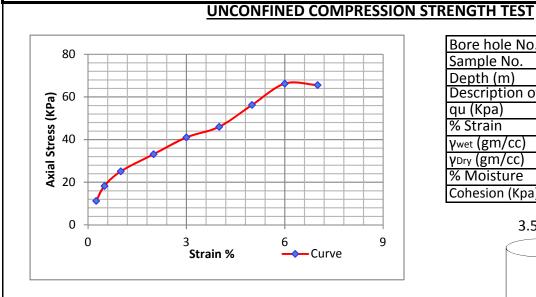
Liquid Limit	29
Plastic Limit	9
Plasticity Index	20



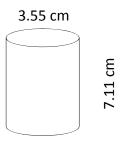


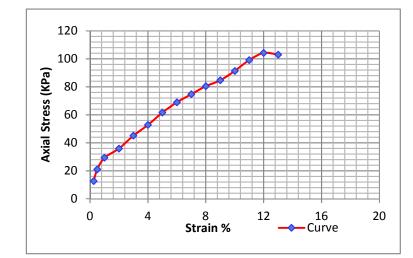
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Location: Ganggopara Girls School, Hat Ganggopara, Auch Para Unionr & Mirpur Dimukki Primary and High School, jolapara Hat, Dwippur Union



Bore hole No.	BH-06
Sample No.	UD-1
Depth (m)	3.10 to 3.55
Description of soil	Silt with Caly
qu (Kpa)	66.27
% Strain	9.0
γ _{wet} (gm/cc)	1.42
γ _{Dry} (gm/cc)	0.82
% Moisture	72.33
Cohesion (Kpa)	33.13

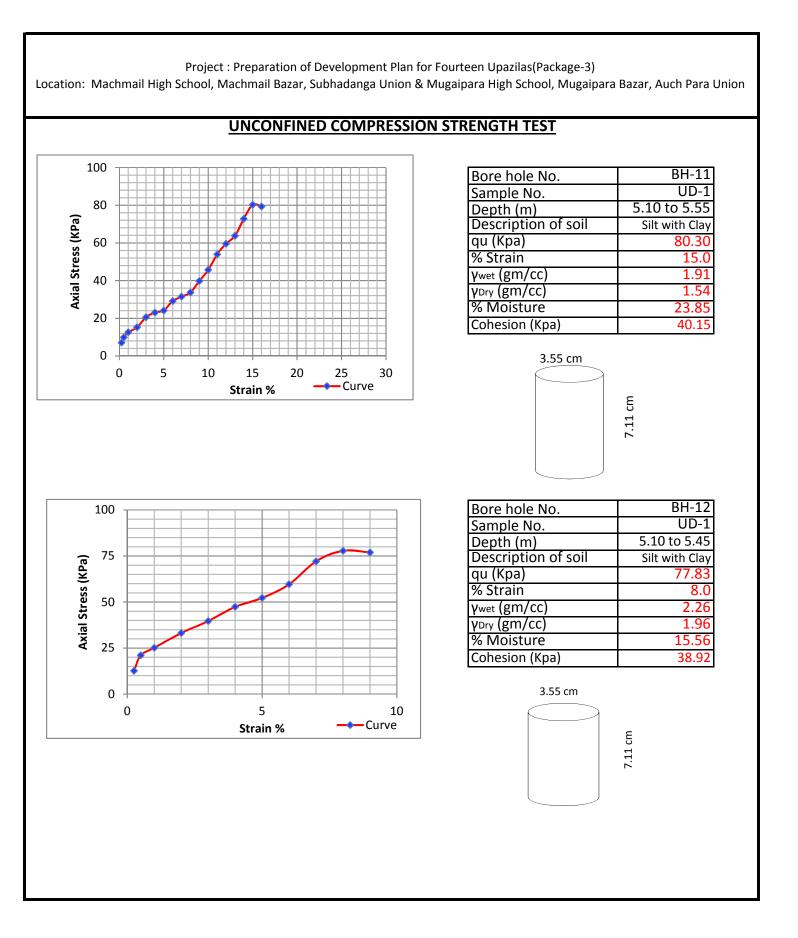


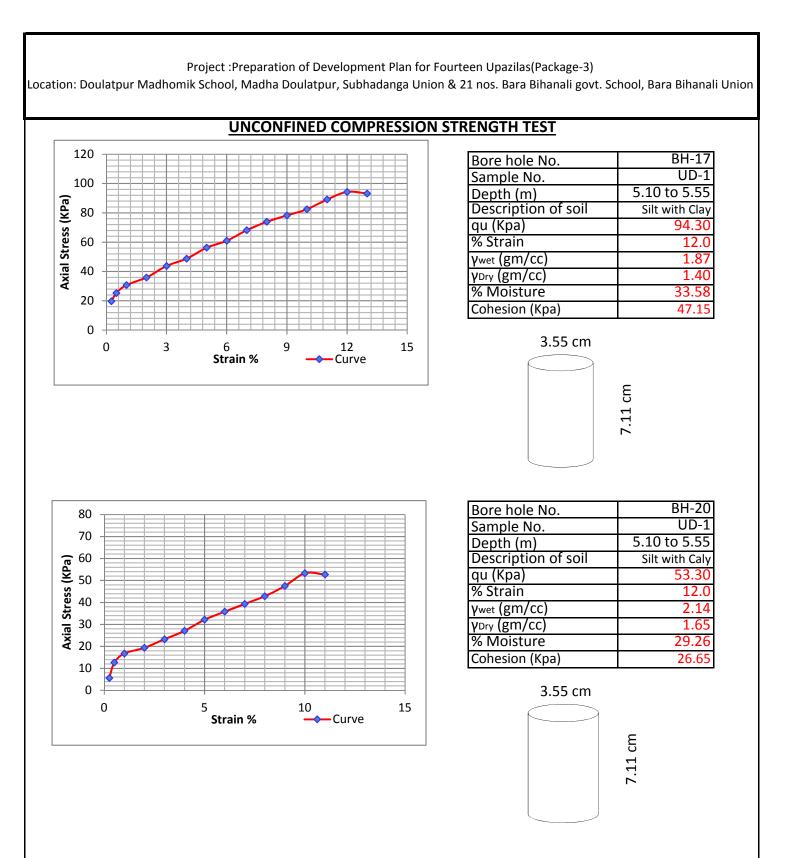


-	
Bore hole No.	BH-09
Sample No.	UD-1
Depth (m)	8.10 to 8.55
Description of soil	Silt with Clay
qu (Kpa)	104.22
% Strain	12.0
γ _{wet} (gm/cc)	1.87
γ _{Dry} (gm/cc)	1.42
% Moisture	32.25
Cohesion (Kpa)	52.11

3.55 cm

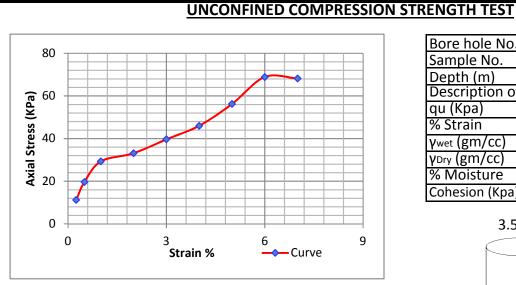




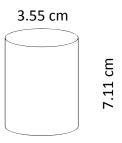


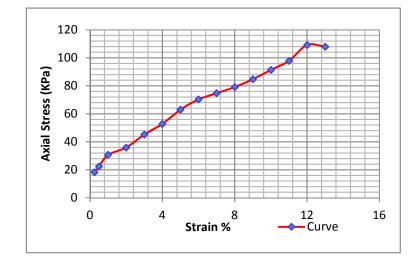
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Location: Uttar akdala Govt. Primary School, Uttar akdala Bazar, Bhabanigong Pourashava & Nandanpur( Chekamara) Bazar, Mohila Dakhil Madrasha, Basu Para Union



Bore hole No.	BH-21
Sample No.	UD-1
Depth (m)	6.10 to 6.55
Description of soil	Silt with Caly
qu (Kpa)	68.92
% Strain	6.0
γ _{wet} (gm/cc)	1.42
γ _{Dry} (gm/cc)	0.85
% Moisture	66.61
Cohesion (Kpa)	34.46





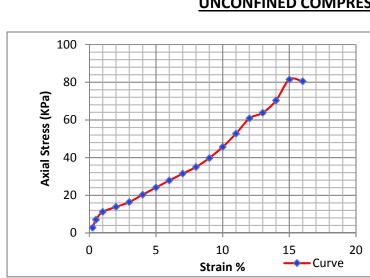
-	
Bore hole No.	BH-22
Sample No.	UD-1
Depth (m)	8.10 to 8.55
Description of soil	Silt with Clay
qu (Kpa)	109.19
% Strain	12.0
γ _{wet} (gm/cc)	1.85
γ _{Dry} (gm/cc)	1.40
% Moisture	31.57
Cohesion (Kpa)	54.59

3.55 cm



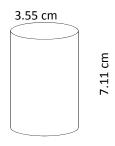
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Ganipur Union Complex office, Hasnipur Bazar, Ganipur Union& Boiloshingho Govt. Primary School, Maria Union **UNCONFINED COMPRESSION STRENGTH TEST** 100 BH-24 Bore hole No. Sample No. UD-1 80 8.10 to 8.55 Depth (m) Axial Stress (KPa) Description of soil Silt with Clay qu (Kpa) 77.90 60 % Strain 15.0 γ_{wet} (gm/cc) 1.91 40 γDry (gm/cc) 1.54 % Moisture 23.85 20 Cohesion (Kpa) 38.95 0 3.55 cm 0 5 10 15 20 25 30 Curve Strain % 7.11 cm Bore hole No. BH-25 100 UD-1 Sample No. 5.10 to 5.55 Depth (m) 75 Description of soil **Clayey Silt** Axial Stress (KPa) qu (Kpa) 77.83 % Strain 8.0 50 γ_{wet} (gm/cc) 2.29 γ_{Dry} (gm/cc) 1.89 % Moisture 21.38 25 Cohesion (Kpa) 38.92 3.55 cm 0 0 5 10 Curve Strain % 7.11 cm

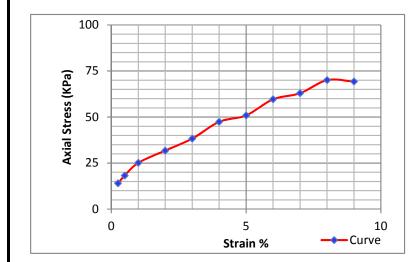
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Sakoa Bohumuki High School, Sikdar Bazar, Maria Union & Gangopara Govt. Primary school, Maria Union

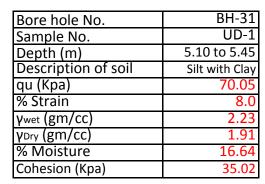


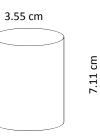
### **UNCONFINED COMPRESSION STRENGTH TEST**

Bore hole No.	BH-30
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	Silt with Clay
qu (Kpa)	81.49
% Strain	15.0
γ _{wet} (gm/cc)	1.92
γ _{Dry} (gm/cc)	1.57
% Moisture	22.53
Cohesion (Kpa)	40.75







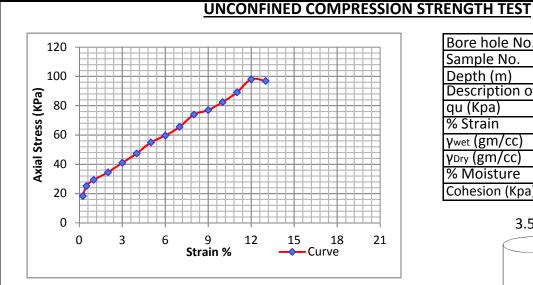


### - Dara hala

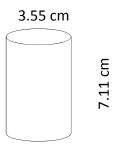


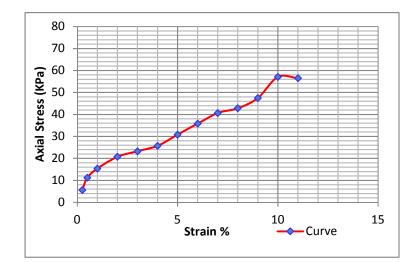
Location: Sajura Mirzapur, Goalkandi Union & Sahid Sakandar Memorial Adarsho High School, Godaoun

Mor, Bhabanigong Pourashava



BH-32
UD-1
8.10 to 8.55
Silt with Clay
98.02
12.0
1.85
1.36
35.67
49.01



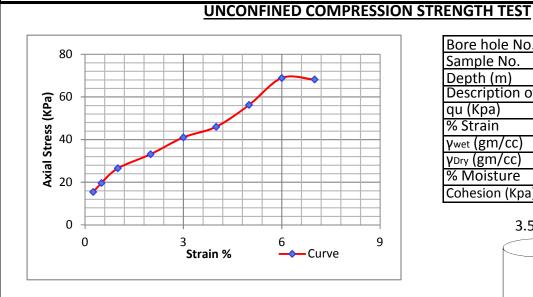


Bore hole No.	BH-26
Sample No.	UD-1
Depth (m)	6.10 to 6.55
Description of soil	Silt with Clay
qu (Kpa)	57.10
% Strain	12.0
γ _{wet} (gm/cc)	2.08
γ _{Dry} (gm/cc)	1.65
% Moisture	25.84
Cohesion (Kpa)	28.55

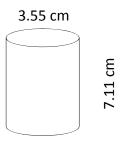


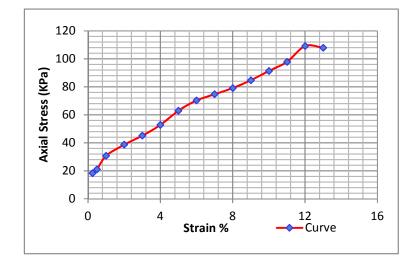


Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Shadhopara Madrasha, Near post office, Sreepur Union & Jhikra High School, Jhikra Bazar, Jhikra Union



#### BH-28 Bore hole No. UD-1 Sample No. 5.10 to 5.55 Depth (m) Description of soil Silt with Sand qu (Kpa) 68.92 % Strain 9.0 γwet (gm/cc) 1.46 γ_{Dry} (gm/cc) 0.80 % Moisture 83.77 Cohesion (Kpa) 34.46





Bore hole No.	BH-29
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	Silt with Clay
qu (Kpa)	109.19
% Strain	12.0
γ _{wet} (gm/cc)	1.77
γ _{Dry} (gm/cc)	1.36
% Moisture	30.47
Cohesion (Kpa)	54.59

3.55 cm

