

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 Faridpur Upazila

September 2016

Submitted By

LETTER OF TRANSMITTAL

EXECUTIVE SUMMARY

Development plan of Faridpur 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, 37 boreholes with SPT program, six MASW and seven Down-hole seismic survey programs have been conducted into the field at Faridpur 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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ABBREVIATIONS

ASTM : American Society for Testing and Materials

AVS30 : Average Shear Wave velocity of 30 meter depth

BH : Borehole

MASW : Multi-Channel Analysis of Surface Wave

N value : Soil resistance or compactness

PGA : Peak Ground Acceleration

PGV : Peak Ground Velocity

PS logging : Primary and Shear wave logging (Down-hole seismic test)

SA : Spectral Acceleration

SPAC : Spatial Autocorrelation

SPT : Standard Penetration Tests

UDD : Urban Development Directorate

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 Faridpur Upazila, Dist: Meherpur; Faridpur Sadar Upazila, Dist: Faridpur; 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.

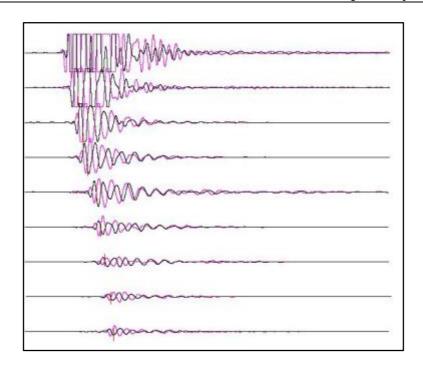
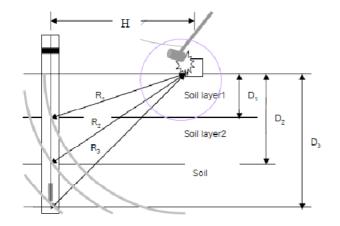


Figure 1: Determination of the Arrival Time of S-Wave

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]

Figure 2: Calculation of the Travel Time

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.

Table 1: MASW Data Acquisition Parameters

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	

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 ($\dot{\omega}$, r) is expressed by Bessel function.

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

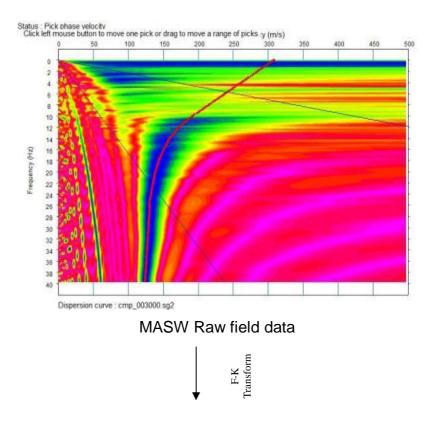
Where, r is the distance between receivers, $\acute{\omega}$ is the angular frequency, c ($\acute{\omega}$) is phase velocity of waves, J_0 is the first kind of Bessel function. The phase velocity was obtained at each frequency using equation (2). A one dimensional inversion using a non-linear least 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):

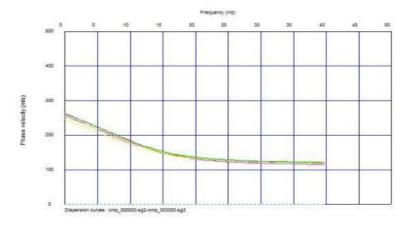
$$Vp = 1.29 + 1.11Vs$$
 [Kitsunezaki et. al., 1990]

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)]

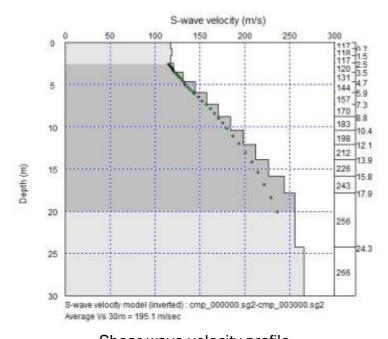
These calculations are carried out along the measuring line, and the S-wave velocity distribution section was analyzed.





Dipersion for Rayleigh wave





Shear wave velocity profile

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, 37 numbers of boreholes have been prepared at Faridpur 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.

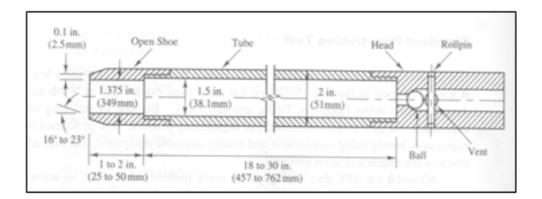


Figure 4: Split-spoon sampler.

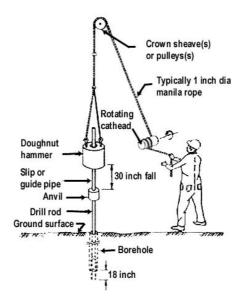


Figure 5: The SPT sampler in place in the boring with hammer

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

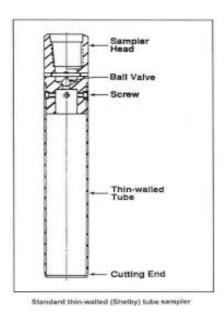


Figure 6: Thin-Walled (Shelby Tube) Sampler

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).

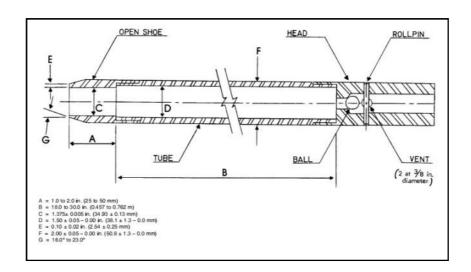


Figure 7: Undisturbed (Split-Spoon) Sampler

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
 - 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 FARIDPUR 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 Faridpur 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.

Table 2: Down-hole Seismic Test (PS logging) and MASW test locations

Surve					
_ y	Survey			_	
Туре	ID	Location	Lat	Long	Union
	50.4	Char Madhabdia Govt.Primary			Char
	PS-1	School, Char Madhabdia Bazar,	00 (50707	00 04 (044	Madhabdia
	(BH-04)	Char Madhabdia Union	23.652707	89.816911	Union
<u>6</u>	D0 0	5 nos. Decreerchar, Munshitanggi			
gin	PS-2	Aftabuddin Madrasha, Decreerchar	00 (4440	00.07074	Decreerchar
l ogo-	(BH-11)	Union	23.61113	89.86364	Union
180	PS-3	Faridpur Zilla School field, Faridpur	00 (0000	00 04447	F '
ot (F	(BH-13)	Sadar	23.60888	89.84447	Faridpur Sadar
Te	DC 4	Hadhokandi Govt. Primary School,			
nic	PS-4	Oposite side of River Research	22 50205	00 02017	Kallumi I Imiam
Sisn	(BH-20)	Institude, Kaijuri Union	23.58205	89.83917	Kaijuri Union
S S	PS-5	Technical Training Centre,			
ا ا		Brahmonkanda, Sreeaungon, Faridpur Sadar	23.5869	89.81373	Foridaur Codor
Downhole Seismic Test (PS Logging)	(BH-22)	'	23.3009	09.013/3	Faridpur Sadar
Do	PS-6	Bakhunda College Field, Bakhunda,			
	(BH-27)	Greda Union	23.54565	89.85487	Greda Union
	B0 =	Madhobpur Govt. Primary School,			
	PS-7	Mallikpur Bazar, Krishnanagar	00 50005	00 70440	Krishnanagar
	(BH-30)	Union	23.53895	89.73418	Union
асе	MASW-1	Mohim School Field, Faridpur Sadar	23.59924	89.82378	Faridpur Sadar
urf	MASW-2	Rajandro College field	23.6025	89.84211	Faridpur Sadar
of S	N // A C \ A // O	26 nos Gothadhar Dangi Govt.	22 5021/	00 00500	
sis (W)	MASW-3	Primary School, Aliabad union	23.58216	89.88592	Aliabad union
aly:		Miregi Govt. Primary School, BASIC			Kanaipur
An (MASW-4	Industrial area, Kanaipur Union	23.55254	89.77844	Union
innel Analysis c Wave (MASW)		'			Ambikapur
lan W	MASW-5	Kamorpur Aziz Institude and	23.59735	89.78988	Union
<u></u>		Primary School, Ambikapur Union			UTIIUTI
Multi-channel Analysis of Surface Wave (MASW)	MASW-6	Shibrampur R. D. Acadamy School	23.64024	89.74545	Majchar Union
Σ		Field , Majchar 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 Faridpur 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 Six different locations at Faridpur Upazilla by 27th to 28th 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 37 points at Faridpur 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.

Table 3: Bore Hole Information Summary at Faridpur Upazila

BH-01	MADHABDIA MOYEZ UDDIN SCHOOL Field, Char Madhabdia Union	23.6842	89.80732	Char Madhabdia Union
BH-02	SOUTH DIGRIRCHAR MADHOBDIA GOVT. PRI. SCHOOL, Madhubdia Union	23.66698	89.83742	Uttar Channel Union
BH-03	Chardurgapur Govt. Primary School field, Ishan Gopalpur	23.67174	89.78958	Ishan Gopalpur
BH-04	Char Madhabdia Govt.Primary School, Char Madhabdia Bazar, Char Madhabdia Union	23.65271	89.81691	Char Madhabdia Union
BH-05	Shibrampur R. D. Acadamy School Field , Majchar Union	23.64033	89.74549	Majchar Union
BH-06	Pallikobi Jasimuddin Saranshala, Ambikapur	23.61221	89.82033	Ambikapur Union
BH-07	Near Madhankali Swicth gate, Ambikapur Union	23.62228	89.85255	Ambikapur Union
BH-08	Adampur Bazar, Goualonda Road, Ambikapur Union	23.62173	89.83853	Ambikapur Union
BH-9	Dhuldi Railgate, Dhuldi Bazar, Majchar Union	23.61963	89.77007	Majchar Union
BH-10	Khalilpur Bazar, Majchar Union	23.61627	89.73603	Majchar Union
BH-11	5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar Union	23.61113	89.86364	Decreerchar Union
BH-12	Yasin College, Faridpur Sadar	23.61196	89.85338	Faridpur Sadar
BH-13	Faridpur Zilla School field, Faridpur Sadar	23.60888	89.84447	Faridpur Sadar
BH-14	Vajon Dangga Govt. Primary School, Faridpur Sadar	23.60272	89.86537	Faridpur Sadar
BH-15	Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar	23.59823	89.84946	Faridpur Sadar
BH-16	94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar	23.60121	89.83946	Faridpur Sadar
BH-17	Mohim School Field, Faridpur Sadar	23.5986	89.82333	Faridpur Sadar
BH-18	Raghu Nandanpur Madrasha, Ambikapur Union	23.59732	89.81214	Ambikapur Union
BH-19	Porunpur Govt. Primary School, Porunpur Bazar, Majchar Union	23.60005	89.75507	Majchar Union
BH-20	Hadhokandi Govt. Primary School, Oposite side of River Research Institude, Kaijuri Union	23.58205	89.83917	Kaijuri Union

BH-21	Johora Begum High School Field, Mia Para Road, Parchim Khabashpur, Faridpur Sadar	23.58869	89.82675	Faridpur Sadar
BH-22	Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar	23.5869	89.81373	Faridpur Sadar
BH-23	Choyata, Aliabad Union	23.57358	89.88176	Aliabad Union
BH-24	Near Payarpur Godaoun, Kaijuri Union	23.56865	89.83886	Kaijuri Union
BH-25	opposite side of Krish poshikhan Institude gate, Gunggabodi, Krishnanagar Union	23.57589	89.79154	Krishnanagar Union
BH-26	Gobinddapur Hat, Krishnanagar Union	23.57146	89.74718	Krishnanagar Union
BH-27	Bakhunda College Field, Bakhunda, Greda Union	23.54565	89.85487	Greda Union
BH-28	Chacia fokirbari Road, Kaijuri Union	23.54129	89.81203	Kaijuri Union
BH-29	Kanaipur Akhak Centre, Kanaipur Union	23.54651	89.77526	Kanaipur Union
BH-30	Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar Union	23.53895	89.73418	Krishnanagar Union
BH-31	Vhatpara Govt. Primary School, Kaijuri Union	23.53291	89.83473	Kaijuri Union
BH-32	Fursha Govt. Primary School, Kanaipur Union	23.5202	89.80351	Kanaipur Union
BH-33	Dokin Char Kamolpur	23.58859	89.84049	
BH-34	Tonthoniar Hat, End of Kanaipur Union	23.4989	89.78552	Kanaipur Union
BH-35	Nasirar Bazar, Dorghapur, Ishan Gopalpur	23.66123	89.76324	Ishan Gopalpur
BH-36	Near Health Coplex, Ishan Gopalpur	23.63583	89.77994	Ishan Gopalpur
BH-37	Doiarampur Govt. Primary School, Doiarampur, Majchar Union	23.61706	89.79298	Majchar 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 Noncohesive soil based on N-values

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°-41°	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

Faridpur 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, 37 boreholes with SPT, 7 downhole seismic tests and 6 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.

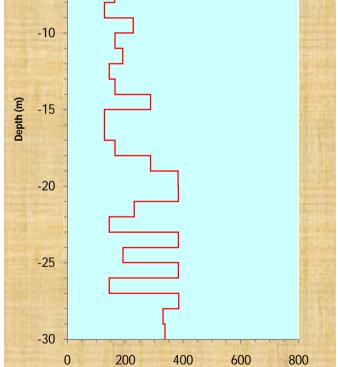
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Appendix A

Downhole Seismic Test (PS Logging) Results and Graphs

Preparation of Deve Package 03	elopn	nent Plan for Fourteen Up	azilas	Geological Survey of Faridpur Upazila
Tested Date	:	7 January 2016		Source : 7kg Sledge Hammer
Location	:	Char Madhabdia G Madhabdia Union	Govt.Primary School, Char Madhabdia Bazar, Char	Downhole Receiver : Tri-axial Geophone
Test Id	:	PS-1 (BH-04)		Recording Equipment : Freedom Data PC
Coordinate	:	Latitude 23.	652707 Longitude 89.816911	Borehole Information : Grouted Cased
Operator	:	The Olson Instrun	nents Downhole Seismic system	Casing Diameter : 75mm PVC Casing
Depth (m) Form EGL		S-wave Velocity	Graphical Representation of S-wave Vellocity	Data Acquisition Procedure
-1		71		Oscilloscope PS Logging Test
-2		87	0	Pump Horizontal plank
-3		207	是	with normal load
-4		312	ACM (BORD)	
-5		125	(1)是李江的	
-6		161	-5 -	$\rightarrow \Delta t \leftarrow z_1$ Hammer
-7		142		Z2 Packer
-8		163		4
-9		128		Test Horizontal Velocity
-10		228	-10	Interval Transducers (Geophone
-11		164		Receivers)
-12		191		Shear Wave Velocity: $R_1^2 = z_1^2 + x^2$ $R_2^2 = z_2^2 + x^2$ Cased
-13		144	100 (100 (100 (100 (100 (100 (100 (100	$V_s = \Delta R/\Delta t$ Cased Borehole
-14		165	e	
-15		287	(E) -15 -	ALCON T
-16		128	Dep	(M91-92) 8L
-17		128	10000000000000000000000000000000000000	
-18		165		And the part part page 1



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-29

288

383

384

231

144

384

192

384

144

384

331

337

Average Vs 30m = 178m/sec



Downhole Seismic Test Data Acquisition

Vs (m/s)

Tested Date	: 7 January 2016		Source : 7kg Sledge Hammer
Location		ar, Munshitanggi Aftabuddin Madrasha, Decreerchar Union	Downhole Receiver : Tri-axial Geophone
Test Id	: PS-2 (BH-11)	an in manager in tabada in madi asna, 2 ssi ssi shar sman	Recording Equipment : Freedom Data PC
Coordinate		.61113 Longitude 89.86364	Borehole Information : Grouted Cased
Operator		ments Downhole Seismic system	Casing Diameter : 75mm PVC Casing
Depth (m)		<u> </u>	
Form EGL	S-wave Velocity	Graphical Representation of S-wave Velocity	Data Acquisition Procedure
-1	148		Oscilloscope PS Logging Test
-2	211	0 7	Pump Horizontal plank
-3	193	建	with normal load
-4	165	ROM BERTO	
-5	147	() () () () () () () () () () () () () (
-6	157	-5 -	→ Δt — Z ₁ Hammer _
-7	203		Z2 Packer
-8	159		4
-9	189		Test Horizontal Velocity
-10	170	-10	Depth Interval Capability Transducers (Geophone
-11	138		Receivers)
-12	100		Shear Wave Velocity: $R_1^2 = Z_1^2 + X^2$ $R_2^2 = Z_2^2 + X^2$ Cased
-13	227	THE PARTY OF THE P	$V_s = \Delta R/\Delta t$ $R_2^2 = Z_2^2 + X^2$ Cased Borehole
-14	156	e	
-15	204	(E) -15	
-16	165		
-17	199		
-18	142		
-19	193	-20 -	
-20	273		
-21	224	有一块支撑	
-22	224		
-23	240	-25	
-24	184		
-25	306		
-26	226	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	
-27	329	20	
-28	259	-30	
-29	295	0 200 400 600 800	
-30	435	Vs (m/s)	Downhole Sciemic Test Date Acquisition
Average Vs 30	m = 191 m/sec		Downhole Seismic Test Data Acquisition

Average Vs 30m = 193m/sec

Tested Date 6 January 2016 : 7kg Sledge Hammer Source Faridpur Zilla School field, Faridpur Sadar Downhole Receiver : Tri-axial Geophone Location Test Id PS-3 (BH-13) Recording Equipment : Freedom Data PC Coordinate Latitude 23.60888 Longitude 89.84447 **Borehole Information Grouted Cased** Operator The Olson Instruments Downhole Seismic system Casing Diameter 75mm PVC Casing Depth (m) S-wave Velocity **Graphical Representation of S-wave Velocity Data Acquisition Procedure** Form EGL 68 -1 **PS Logging Test** -2 102 0 Horizontal plank -3 146 123 -4 -5 178 348 -6 -5 -7 150 -8 181 -9 184 Horizontal Test Velocity Depth 255 -10 Transducers -10 (Geophone -11 131 Receivers) $R_1^2 = Z_1^2 + X^2$ -12 232 **Shear Wave Velocity:** $R_2^2 = Z_2^2 + X^2$ $V_s = \Delta R/\Delta t$ Cased -13 171 Borehole -14 192 Depth (m) -15 -15 184 -16 203 -17 222 -18 178 -19 203 -20 -20 256 -21 136 -22 406 -23 215 -25 -24 133 -25 746 -26 424 -27 539 -30 -28 500 200 400 600 800 -29 0 445 Downhole Seismic Test Data Acquisition Vs (m/s) -30 469

Tested Date	: 5 January 201		Source : 7kg Sledge Hammer
Location	Hadhokandi GKaijuri Union	ovt. Primary School, Oposite side of River Research Institude,	Downhole Receiver : Tri-axial Geophone
Test Id	: PS-4 (BH-20)		Recording Equipment : Freedom Data PC
Coordinate	: Latitude	23.58205 Longitude 89.83917	Borehole Information : Grouted Cased
Operator	: The Olson Inst	ruments Downhole Seismic system	Casing Diameter : 75mm PVC Casing
Depth (m) Form EGL	S-wave Veloci	y Graphical Representation of S-wave Velocity	Data Acquisition Procedure
-1	22		Oscilloscope PS Logging Test
-2	59	0 1	Pump Horizontal plank
-3	88		with normal load
-4	122		
-5	70		
-6	119		$\rightarrow \Delta t \leftarrow z_1$ Hammer
-7	71		z ₂ packer
-8	124		4
-9	195		Test Horizontal Velocity
-10	154	-10 -	Interval Transducers (Geophone
-11	132		Receivers)
-12	164		D 2 - 7 2 + v2
-13	163	ACCOUNT OF THE PARTY OF THE PAR	$V_s = \Delta R/\Delta t$ Cased Borehole
-14	74	E 15	
-15	217	(E) -15	
-16	129		
-17	111		
-18	211	· · · · · · · · · · · · · · · · · · ·	
-19	315	-20 -	
-20	191		
-21	151		
-22	186		
-23	345	-25 -	
-24	265	SURVINE	A LANGE CONTRACTOR OF THE PARTY
-25	267		
-26	240	10000000000000000000000000000000000000	Downhole Seismic Test Data Acquisition
-27	244	-30	
-28	252		
-29	247	0 200 400 600 800 Vs (m/s)	
-30	257	vs (III/s)	
Average Vs 30	0m = 120m/sec		

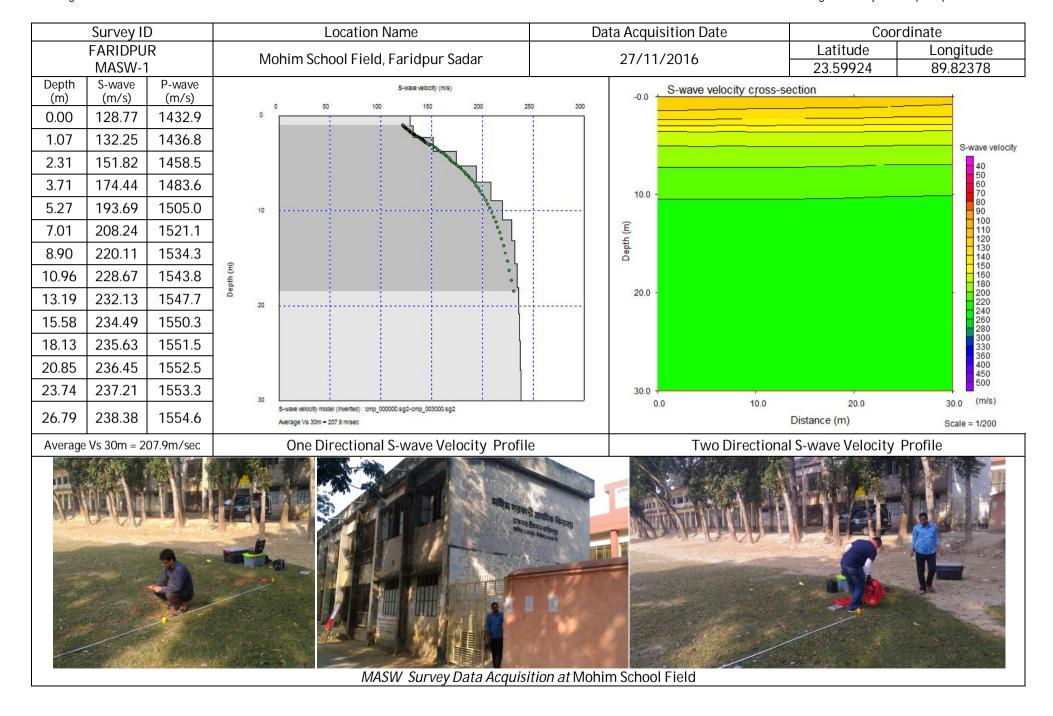
Tested Date :	7 January 2016		Source : 7kg Sledge Hammer
Location :	Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar		Downhole Receiver : Tri-axial Geophone
Test Id :	PS-5 (BH-22)		Recording Equipment : Freedom Data PC
Coordinate :	Latitude 23.5869 Longitude 89.81373		Borehole Information : Grouted Cased
Operator :	The Olson Instru	ments Downhole Seismic system	Casing Diameter : 75mm PVC Casing
Depth (m) Form EGL	S-wave Velocity	Graphical Representation of S-wave Velocity	Data Acquisition Procedure
-1	51		Oscilloscope PS Logging Test
-2	115	0 1	Pump Horizontal plank
-3	129	科学 不远处	with normal load
-4	121	ACOM GENERAL STREET	
-5	122		
-6	199	-5 -	→∆t ← Z ₁ Hammer
-7	112		Z2 packer
-8	200		4
-9	185		Test Horizontal Velocity
-10	119	-10	Depth Interval Transducers (Geophone
-11	165	-10	Receivers)
-12	124		Shear Wave Velocity: $R_1^2 = Z_1^2 + X^2$ $R_2^2 = Z_2^2 + X^2$
-13	171	A SECTION AND A SECTION ASSESSMENT AND A SECTION ASSESSMENT ASSESS	$V_s = \Delta R/\Delta t$ $R_2^2 = Z_2^2 + X^2$ Cased Borehole
-14	184		
-15	125	© -15 - Cobbt ©	
-16	179		
-17	154	DAN DAN	
-18	314	132	
-19	124	-20 -	
-20	135		
-21	331	10000000000000000000000000000000000000	
-22	310		
-23	170	-25	
-24	104	4	
-25	156	15-14 (1) 1-12-	
-26	124	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	
-27	145	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
-28	137	-30	
-29	167	0 200 400 600 800	Downhold Soignic Tost Data Acquisition
-30	193	Vs (m/s)	Downhole Seismic Test Data Acquisition
Average Vs 30	m = 142m/sec		

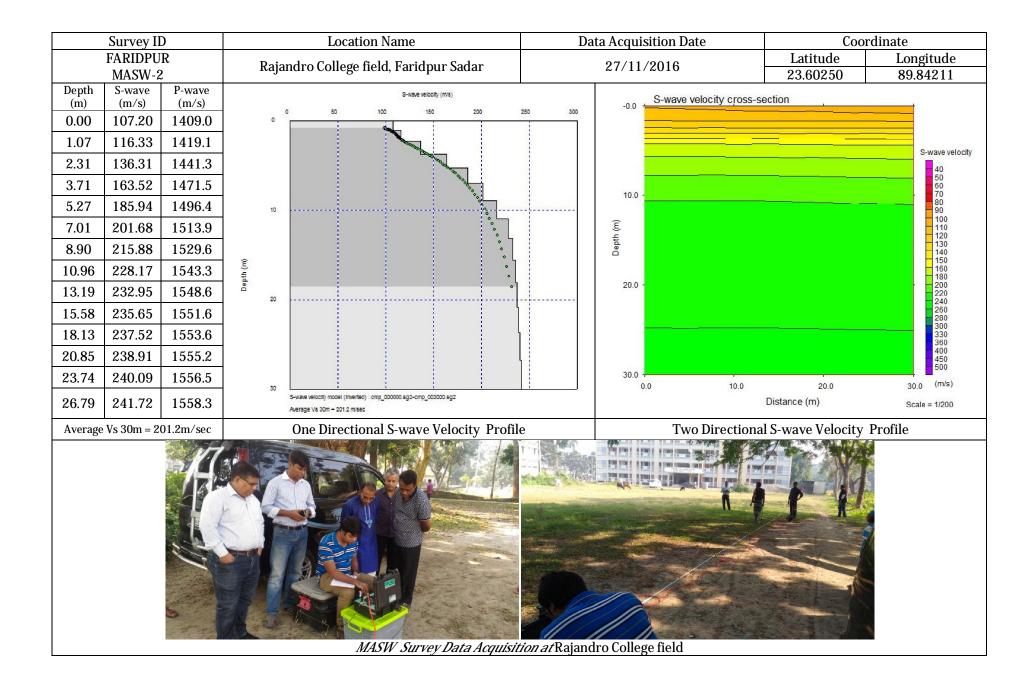
Tested Date :	7 January 2016		Source : 7kg Sledge Hammer
Location :	Bakhunda College Field, Bakhunda, Greda Union		Downhole Receiver : Tri-axial Geophone
Test Id :	PS-6 (BH-27)		Recording Equipment : Freedom Data PC
Coordinate :	Latitude 23.54565 Longitude 89.85487		Borehole Information : Grouted Cased
Operator :	The Olson Instru	ments Downhole Seismic system	Casing Diameter : 75mm PVC Casing
Depth (m) Form EGL	S-wave Velocity	Graphical Representation of S-wave Velocity	Data Acquisition Procedure
-1	149		Oscilloscope PS Logging Test
-2	187	0	Pump Horizontal plank
-3	183	建	with normal load
-4	121	FACE CONTRACTOR	
-5	197	15. 思想出	
-6	141	-5 -	→ ∆t ← Z ₁ Hammer
-7	238		Z ₂
-8	199	建	4
-9	157		Test Horizontal Velocity
-10	110	-10	Interval Transducers
-11	134	-10	(Geophone Receivers)
-12	116		Shear Wave Velocity: $R_1^2 = Z_1^2 + X^2$ $R_2^2 = Z_2^2 + X^2$ Cased
-13	150		$V_s = \Delta R/\Delta t$ $R_2^2 = Z_2^2 + X^2$ Cased Borehole
-14	171	2	
-15	168	E -15 -	
-16	164	(E) -15 -	
-17	135		
-18	152		
-19	247	-20 -	
-20	208	And the second s	
-21	256	第一层地	
-22	258		The state of the s
-23	250	-25	
-24	211		
-25	196		
-26	278	DOMESTICS TO STATE OF THE PARTY	
-27	224	20	
-28	235	-30	
-29	187	0 200 400 600 800	
-30	188	Vs (m/s)	Doumbala Saigmic Test Data Assuration
Average Vs 30m	n = 175.7 m/sec		Downhole Seismic Test Data Acquisition

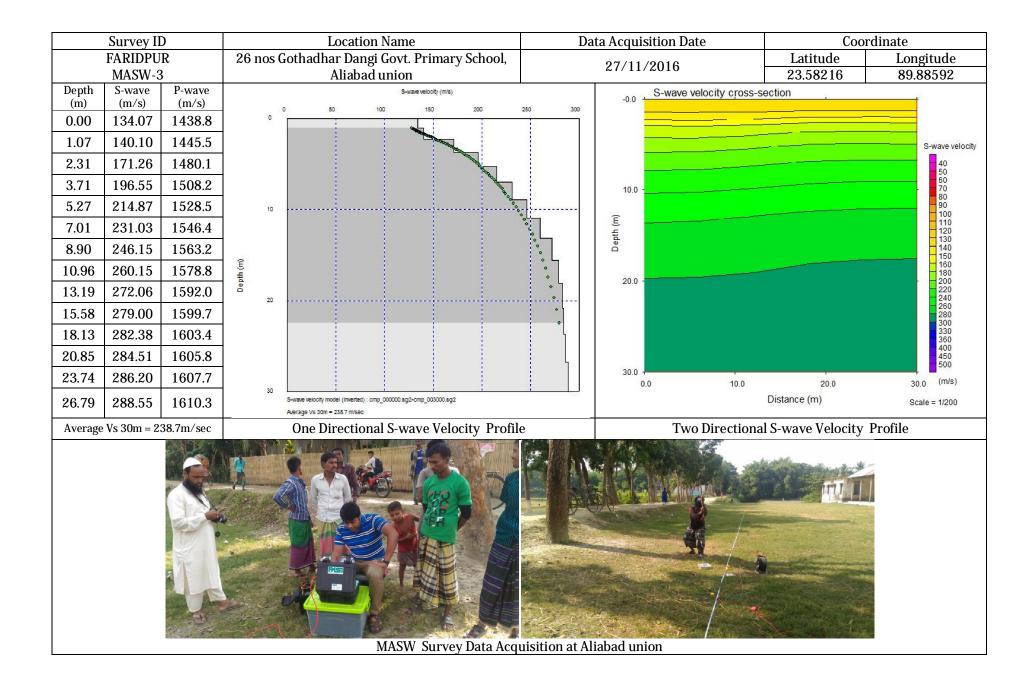
Tested Date	: 6 January 2016		Source : 7kg Sledge Hammer
Location	: Madhobpur Govt	. Primary School, Mallikpur Bazar, Krishnanagar Union	Downhole Receiver : Tri-axial Geophone
Test Id	: PS-7 (BH-30)		Recording Equipment : Freedom Data PC
Coordinate		.53895 Longitude 89.73418	Borehole Information : Grouted Cased
Operator		ments Downhole Seismic system	Casing Diameter : 75mm PVC Casing
Depth (m) Form EGL	S-wave Velocity	Graphical Representation of S-wave Velocity	Data Acquisition Procedure
-1	135		Oscilloscope PS Logging Test
-2	155	0 7	Pump Horizontal plank
-3	183		with normal load
-4	185	FIGURE STATE OF THE STATE OF TH	
-5	202		
-6	181	_5	→ ∆t ← Hammer
-7	201		z ₁ z ₂ Z z packer
-8	190		4
-9	227		Test Horizontal Volenity
-10	200		Depth Interval Velocity Transducers
-11	184	-10 -	(Geophone Receivers)
-12	213	新·美田	Shear Wave Velocity: $R_1^2 = Z_1^2 + x^2$
-13	202		$V_s = \Delta R/\Delta t$ $R_2^2 = Z_2^2 + X^2$ Cased Borehole
-14	190		
-15	201	(E) -15 -	
-16	189	ebtt	
-17	223		
-18	157		
-19	167	-20	
-20	164		A D
-21	126		
-22	251		
-23	269	7E - 1	
-24	232	-25	
-25	251		
-26	200		
-27	279		
-28	314	-30	
-29	229	0 200 400 600 800	
-30	191	Vs (m/s)	
Average Vs 30)m = 195.2 m/sec		Downhole Seismic Test Data Acquisition

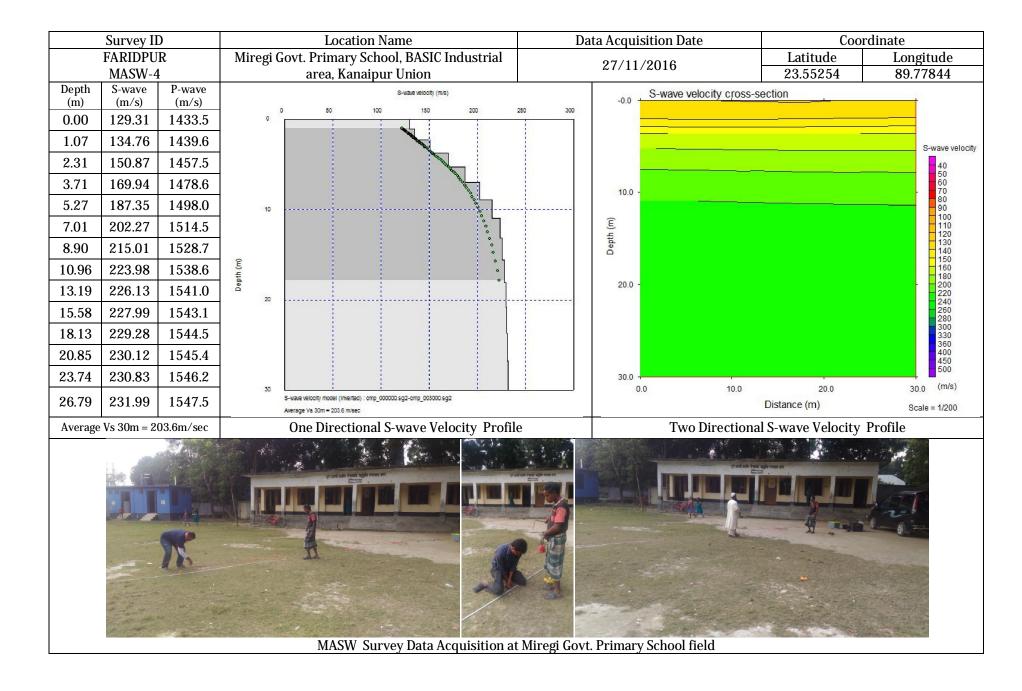
Appendix B

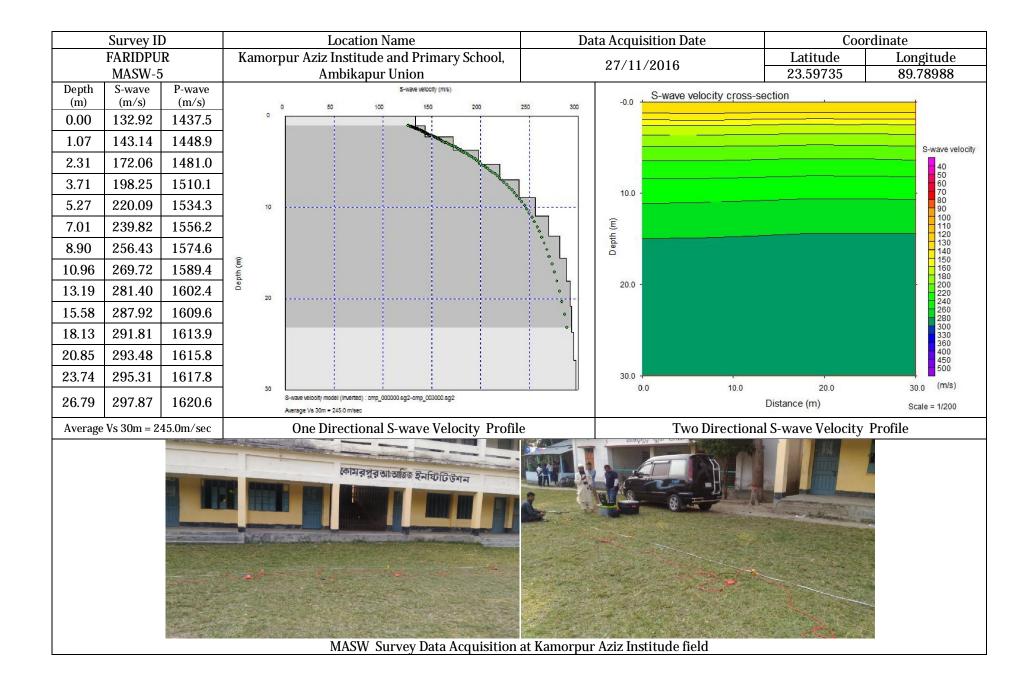
Multi-channel Analysis of Surface Wave (MASW) Results and Graphs

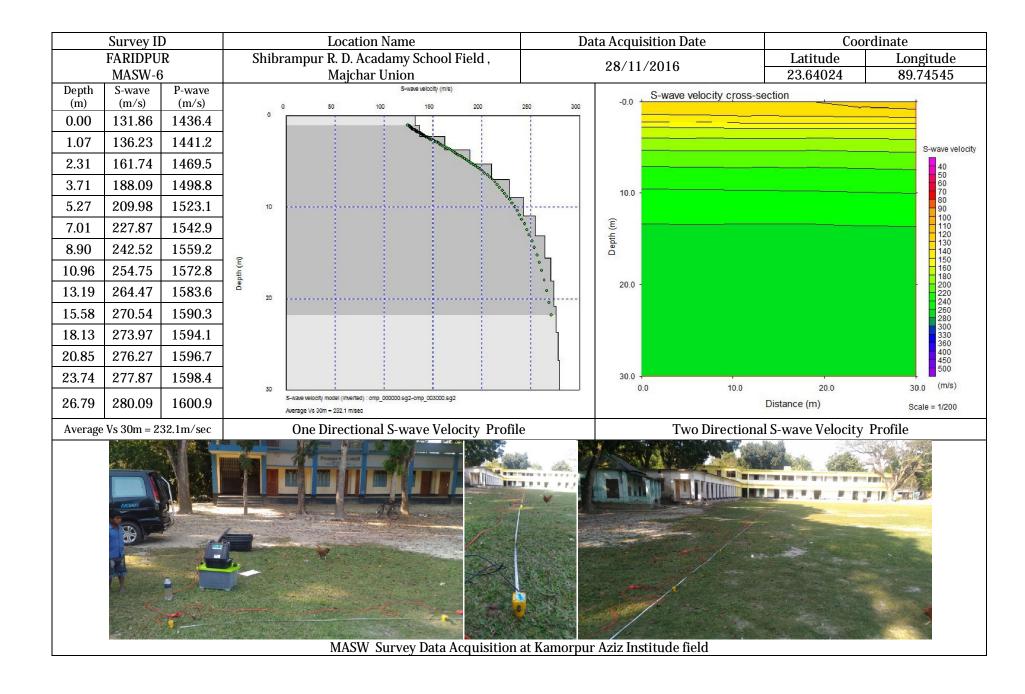












Appendix C

Geotechnical Borehole Logs and Graphs

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-01 Exixting ground level: 11.99 Method of Boring: Percussion Ground water level: 3.05m below EGL Boring Dia.:100(mm) Started on: 04.01.2016 Boring Depth: 30.0m Completed on: 04.01.2016 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: MADHABDIA MOYEZ UDDIN SCHOOL Field, Char Madhabdia Coordinates: Lat-23.684196 Long-89.807318 SPT blows per 0.3 m penetration Number Standard Penetration Test Thickness(m) Blows on Spoon N-Values Ξ Visual Description Sample Depth Layer 5cm 5cm 5cm 10 20 30 40 50 60 70 80 0 1.5 Light Brown very loose fine SAND 4.5 with Silt 1 1 1 2 3.0 1 1 2 4.5 3 7 12 19 6.0 4 8 10 18 3 7 3 10 9.0 Light Grey medium dense fine SAND 12.0 3 5 6 11 with Silt 3 5 6 11 12.0 12 3 5 7 13.5 3 4 7 15.0 11 3 6 12 6 4 8 14 6 18.0 5 7 9 16 19.5 6 10 14 24 21.0 7 12 14 26 Light Grey medium dense medium to 13.5 fine SAND with Silt 6 10 12 22 24.0 9 20 6 11 25.5 7 9 13 22 27.0 8 12 12 24 28.5 9 12 14 26 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-02 Exixting ground level: 12.99 Method of Boring: Percussion Ground water level: 6.71m below EGL Boring Dia.:100(mm) Started on: 05.01.2016 Boring Depth: 30.0m Completed on: 05.01.2016 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Clay Silt Sand Location: SOUTH DIGRIRCHAR MADHOBDIA GOVT. PRI. SCHOOL, Madhubdia **Coordinates:** Lat-23.666975 Long-89.837415 SPT blows per 0.3 m penetration Number Standard Penetration Test Thickness(m) Blows on Spoon N-Values Ξ Visual Description Sample Depth _ayer | 5cm 5cm 10 20 30 40 50 60 70 80 Brown soft silty CLAY 3.0 1 2 2 4 1.5 2 2 4 3.0 1 2 3 5 4.5 Light Grey soft to medium stiff SILT 6.0 1 3 3 6 6.0 with Clay and Sand 2 2 2 4 7.5 2 2 3 5 9.0 2 3 4 7 Light Brown to Grey loose to medium dense fine SAND with silt 3 10 4 6 12.0 12 4 5 7 5 9 17 15.0 8 5 9 9 18 5 19 8 11 18.0 7 11 14 25 19.5 6 10 13 23 Light Grey medium dense medium to 16.5 fine SAND with silt 9 6 13 22 22.5 7 10 14 24 24.0 6 9 14 23 25.5 7 10 13 23 27.0 7 8 13 21 28.5 7 10 13 23 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-03 Exixting ground level: 9.0 Method of Boring: Percussion Ground water level: 3.05m below EGL Boring Dia.:100(mm) Started on: 07.01.2016 Boring Depth: 30.0m Completed on: 07.01.2016 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Chardurgapur Govt. Primary School field, Ishan Gopalpur Coordinates: Lat-23.67174 Long-89.78958 SPT blows per 0.3 m penetration Standard Penetration Test Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Sample Depth Layer 5cm 5cm 5cm 10 20 30 40 50 60 70 80 0 1.5 Light Brown very loose fine SAND 4.5 with Silt 1 0 1 1 3.0 1 1 1 2 4.5 3 7 12 19 6.0 4 8 10 18 7.5 3 7 3 10 9.0 Light Grey medium dense to loose 12.0 3 3 4 7 10.5 fine SAND with Silt 3 5 6 11 12.0 12 3 5 7 13.5 3 4 6 10 15.0 3 6 6 12 4 8 14 6 18.0 5 7 9 16 19.5 6 10 14 24 21.0 7 12 12 24 Light Grey medium dense medium to 13.5 fine SAND with Silt 6 10 12 22 24.0 9 9 18 6 25.5 7 10 10 20 27.0 8 12 12 24 28.5 9 12 14 26 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-04 Exixting ground level: 11.99 Method of Boring: Percussion Ground water level: 6.54m below EGL Boring Dia.:100(mm) Started on: 06.01.2016 Boring Depth: 30.0m Completed on: 06.01.2016 :Urban Development Directorate (UDD) Client Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Char Madhabdia Govt. Primary School, Char Madhabdia Bazar, Char Silt Sand Clay Madhabdia Coordinates: Lat-23.652707 Long-89.816911 SPT blows per 0.3 m penetration Number Standard Penetration Test Thickness(m) Blows on Spoon N-Values Ξ Visual Description Depth _ayer | 5cm 5cm 10 20 30 40 50 60 70 Brown soft silty CLAY 3.0 1 2 3 1.5 2 2 4 3.0 1 2 2 4 4.5 Light Grey soft to medium stiff SILT 2 6.0 1 3 5 6.0 with Clay and Sand 2 2 2 4 7.5 2 2 3 5 9.0 2 3 4 7 Light Brown to Grey loose to medium dense fine SAND with silt 3 10 4 6 12.0 12 4 5 7 5 9 17 15.0 8 5 9 9 18 5 7 10 17 18.0 7 10 12 22 19.5 6 9 12 21 Light Grey medium dense medium to 16.5 fine SAND with silt 6 9 13 22 22.5 7 10 14 24 24.0 6 8 12 20 25.5 7 10 13 23 27.0 7 8 13 21 28.5 7 10 13 23 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-05 Exixting ground level: 14.99 Method of Boring: Percussion Ground water level: 3.66m below EGL Boring Dia.:100(mm) Started on: 08.01.2016 Boring Depth: 30.0m Completed on: 08.01.2016 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Silt Sand Clay Location: Shibrampur R. D. Acadamy School Field, Majchar Coordinates: Lat-23.64033 Long-89.74549 SPT blows per 0.3 m penetration Standard Penetration Test Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Sample Depth Layer 5cm 5cm 10 20 30 40 50 60 70 80 2 4 6 1.5 Brown loose to medium dense very 4.5 fine to fine SAND little silt 2 3 5 8 3.0 3 4 6 10 4.5 3 5 3 8 6.0 2 7 3 4 7.5 Redish Brown to Grey loose medium 3 5 9.0 5 10 to fine SAND 3 4 5 9 10.5 2 5 3 8 12.0 3 3 6 9 7 7 6 13 15.0 6 7 7 14 6 7 9 16 18.0 7 10 10 20 19.5 7 12 11 23 21.0 Light grey medium dense fine to 16.5 medium SAND with Silt 3 5 7 12 22.5 5 7 7 14 24.0 6 9 9 18 25.5 7 10 12 22 27.0 6 8 10 18 28.5 7 12 14 26 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-06 Exixting ground level: 11.0 Method of Boring: Percussion Ground water level: 5.18m below EGL Boring Dia.:100(mm) Started on: 10.01.2016 Boring Depth: 30.0m Completed on: 10.01.2016 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Silt Sand Clay Location: Pallikobi Jasimuddin Saranshala, Ambikapur Coordinates: Lat-23.61221 Long-89.82033 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Blows on Spoon N-Values Ξ Visual Description Sample Depth 5cm 5cm 10 20 30 40 50 60 70 80 Brown medium stiff SILT with very 3.0 1 2 3 5 1.5 fine sand 2 7 3 4 3.0 2 3 4 7 4.5 Light Grey loose very fine to fine 3.8 SAND with silt 2 5 7 12 6.0 4 8 12 20 7.5 25 10 20 45 9.0 10 23 25 48 10.5 5 9 4 4 12.0 3 6 7 13 13.5 3 5 8 15.0 3 3 10 4 6 16.5 5 7 7 14 Light Grey dense to medium dense 23.2 very fine to medium SAND 5 7 8 15 19.5 6 10 11 21 21.0 9 6 12 21 22.5 9 12 20 8 24.0 10 9 14 23 25.5 12 13 15 28 27.0 10 14 16 30 28.5 12 17 20 37 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-07 Exixting ground level: 11.04 Method of Boring: Percussion Ground water level: 1.22.00m below EGL Boring Dia.:100(mm) Started on: 31.12.2015 Boring Depth: 30.0m Completed on: 31.12.2015 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Near Madhankali Swicth gate, Ambikapur Coordinates: Lat-23.62228 Long-89.85255 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Depth 5cm 5cm 10 20 30 40 50 60 70 80 2 1.5 2 1 3.0 1 2 3 Light Grey very soft to soft SILT with 10.5 Clay and Sand 1 0 1 1 6.0 1 0 1 1 7.5 1 1 1 2 9.0 2 1 1 1 10.5 10 3 4 6 12.0 9 4 6 15 Light Brown to Grey medium dense 9.0 5 7 10 17 15.0 fine SAND little Silt 6 8 10 18 6 9 20 11 18.0 7 10 9 19 4 6 8 14 21.0 5 9 7 16 22.5 6 8 8 16 24.0 Light Grey medium dense fine to 10.5 medium SAND trace silt 6 10 10 20 25.5 6 8 14 22 27.0 7 9 12 21 28.5 6 10 14 24 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-08 Exixting ground level: 10.05 Method of Boring: Percussion Ground water level: 3.66m below EGL Boring Dia.:100(mm) Started on: 01.01.2016 Boring Depth: 30.0m Completed on: 01.01.2016 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Adampur Bazar, Goualonda Road, Ambikapur Coordinates: Lat-23.62173 Long-89.83853 SPT blows per 0.3 m penetration Standard Penetration Test Layer Number Blows on Spoon N-Values Ξ Visual Description Symbols Sample Depth 5cm 5cm 5cm 10 20 30 40 50 60 70 4 6 10 16 1.5 7 11 14 25 3.0 4 7 10 17 4.5 15 4 6 9 6.0 Light Brown to Grey medium dense 13.5 fine SAND with sillt. 4 7 9 16 7.5 6 9 14 23 9.0 7 10 12 22 10.5 7 25 14 11 12.0 6 12 15 27 5 7 7 14 15.0 4 6 9 15 5 7 9 16 18.0 4 8 8 16 19.5 5 8 11 19 21.0 Light Grey medium dense fine to 16.5 medium SAND 6 10 10 20 22.5 6 10 9 19 24.0 7 10 12 22 25.5 7 13 24 11 27.0 8 12 14 26 28.5 9 13 13 26 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-09 Exixting ground level: 13.0 Method of Boring: Percussion Ground water level: 1.22m below EGL Boring Dia.:100(mm) Started on: 08.01.2016 Boring Depth: 30.0m Completed on: 08.01.2016 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Clay Silt Sand Location: Dhuldi Railgate, Dhuldi Bazar, Majchar Coordinates: Lat-23.61963 Long-89.77007 SPT blows per 0.3 m penetration Number Standard Penetration Test Thickness(m) Blows on Spoon N-Values Ξ Symbols Visual Description Sample Depth _ayer | 5cm 5cm 10 20 30 40 50 60 70 80 Brown very soft clayey SILT 1.5 1 0 1 1.5 Ligth Grey loose to medium dense 5 7 3.0 3 10 3.0 very fine to fine SAND with Silt 5 5 7 12 4.5 Ligth Grey very soft SILT with very 3.0 1 0 1 1 6.0 fine Sand 1 0 1 1 7 14 20 34 9.0 8 12 16 28 Ligth Grey medium dense fine SAND 6 10 18 9.0 8 with Silt 6 8 11 19 4 5 8 13 15.0 8 4 6 14 19 25 44 12 18.0 14 21 29 50 19.5 10 17 21 38 21.0 8 13 18 31 22.5 Light Grey dense to medium dense 13.5 medium to fine SAND 8 16 27 11 24.0 14 32 8 18 25.5 8 8 12 20 27.0 6 9 11 20 28.5 7 12 16 28 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-10 Exixting ground level: 16.99 Method of Boring: Percussion Ground water level: 5.18m below EGL Boring Dia.:100(mm) Started on: 07.01.2016 Boring Depth: 30.0m Completed on: 07.01.2016 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Khalilpur Bazar, Majchar Coordinates: Lat-23.61627 Long-89.73603 SPT blows per 0.3 m penetration Standard Penetration Test Layer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Sample Depth 5cm 5cm 10 20 30 40 50 60 70 80 Brown soft silty CLAY 2.0 2 3 1.5 7 3 3 4 3.0 3 4 6 10 4.5 4 5 6 11 6.0 7 14 15 29 7.5 10 14 20 34 Light Brown loose to medium dense 15.0 fine SAND with silt 6 10 16 4 10.5 7 10 17 4 12.0 7 8 6 14 13.5 7 10 10 20 15.0 8 10 13 23 4 5 6 11 18.0 6 8 9 17 19.5 6 6 9 15 21.0 6 7 7 14 22.5 Light Grey medium dense to dense 13.0 medium to fine SAND little silt 7 8 10 18 24.0 7 10 21 11 25.5 12 16 28 27.0 8 13 16 29 28.5 10 17 19 36 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-11 Exixting ground level: 12.0 Method of Boring: Percussion Ground water level: 4.57m below EGL Boring Dia.:100(mm) Started on: 31.12.2015 Boring Depth: 30.0m Completed on: 31.12.2015 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Clay Silt Sand Location: 5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar Coordinates: Lat-23.61113 Long-89.86364 SPT blows per 0.3 m penetration Number Standard Penetration Test Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Sample Depth _ayer | 5cm 5cm 10 20 30 40 50 60 70 80 Landfill 1.5 1 2 3 1.5 1 2 3 5 3.5 Brown soft to medium stiff silty CLAY 2 2 2 4 4.5 3 4 6 10 6.0 3 4 5 9 7.5 Light Grey loose to medium dense 7 9.0 3 5 12 8.0 very fine to fine SAND with silt 6 9 4 15 10.5 5 7 12 19 12.0 4 6 7 13 5 7 9 16 15.0 3 5 7 12 16.5 3 6 12 6 18.0 5 7 7 14 19.5 6 8 10 18 Light Grey medium dense medium to 17.0 fine SAND 7 6 6 12 22.5 6 12 4 6 24.0 7 14 4 7 25.5 7 10 8 18 27.0 7 10 12 22 28.5 6 12 14 26 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-12 Exixting ground level: 15.99 Method of Boring: Percussion Ground water level: 4.27m below EGL Boring Dia.:100(mm) Started on: 29.12.2015 Boring Depth: 30.0m Completed on: 30.12.2015 :Urban Development Directorate (UDD) Client Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Yasin College, Faridpur Sadar Coordinates: Lat-23.61196 Long-89.85338 SPT blows per 0.3 m penetration Standard Penetration Test Layer Number Thickness(m) Blows on Spoon N-Values Ξ Symbols Visual Description Sample Depth 5cm 5cm 10 20 30 40 50 60 70 80 Brown soft SILT with very fine sand 2.0 1 2 3 1.5 3 4 5 9 3.0 3 4 4 8 4.5 Light Grey loose very fine to fine 6.0 3 5 9 4 6.0 3 4 6 10 7.5 7 6 8 15 9.0 6 8 10 18 10.5 5 10 12 22 12.0 10 6 14 24 13.5 6 11 16 27 15.0 6 10 13 23 16.5 7 8 10 18 18.0 Light Grey medium dense fine to 22.0 medium SAND 5 6 8 14 19.5 6 7 9 16 21.0 7 8 10 18 22.5 6 9 10 19 24.0 5 8 10 18 25.5 5 7 9 16 27.0 6 8 12 20 28.5 7 10 13 23 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-13 Exixting ground level: 14.94 Method of Boring: Percussion Ground water level: 3.96 m below EGL Boring Dia.:100(mm) Started on: 29.12.2015 Boring Depth: 30.0m Completed on: 29.12.2015 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Faridpur Zilla School field, Faridpur Sadar Coordinates: Lat-23.60888 Long-89.84447 SPT blows per 0.3 m penetration Standard Penetration Test Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Sample Depth Layer 5cm 5cm 5cm 10 20 30 40 50 60 70 80 2 3 5 1.5 Light Brown loose to medium dense 5.0 fine SAND 3 7 5 12 3.0 3 5 6 11 4.5 3 7 3 4 6.0 2 3 3 6 7.5 4 5 6 11 Light Grey to Brown loose to medium 10.0 dense fine SAND 5 7 7 14 10.5 2 5 3 8 12.0 3 10 4 6 3 5 6 15.0 11 5 7 4 12 5 8 14 6 18.0 7 7 8 15 19.5 6 7 7 14 21.0 Light Grey medium dense medium to 4 8 15.0 5 13 - 22 ! fine SAND 5 10 18 8 24.0 5 10 17 7 25.5 6 9 15 24 27.0 7 10 12 22 28.5 6 8 10 18 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-14 Exixting ground level: 13.0 Method of Boring: Percussion Ground water level: 2.74m below EGL Boring Dia.:100(mm) Started on: 31.12.2015 Boring Depth: 30.0m Completed on: 31.12.2015 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Vajon Dangga Govt. Primary School, Faridpur Sadar Coordinates: Lat-23.60272 Long-89.86537 SPT blows per 0.3 m penetration Standard Penetration Test Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Depth _ayer | 5cm 5cm 10 20 30 40 50 60 70 80 2 3 1 1.5 Brown soft silty CLAY 3.6 2 2 2 4 3.0 1 1 2 4.5 Light Brown to Light Grey very soft 3.4 silty CLAY with very fine sand 1 2 1 1 6.0 10 3 4 6 7.5 5 7 7 14 9.0 3 4 6 10 10.5 3 5 9 4 12.0 Light Grey loose to medium dense 3 5 6 11 13.0 fine SAND little silt 7 9 10 19 15.0 8 9 12 21 5 12 20 8 18.0 6 10 12 22 19.5 17 26 24 50 21.0 17 30 20 50 22.5 9 10 12 22 24.0 Light Grey dense to medium dense 10.0 medium to fine SAND trace silt 10 10 13 23 25 ! 8 9 10 19 27.0 9 13 15 28 28.5 10 13 14 27 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-15 Exixting ground level: 8.00 Method of Boring: Percussion Ground water level: 2.44m below EGL Boring Dia.:100(mm) Started on: 30.12.2015 Boring Depth: 30.0m Completed on: 30.12.2015 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Clay Silt Sand Location: Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar Coordinates: Lat-23.59823 Long-89.84946 SPT blows per 0.3 m penetration Number Standard Penetration Test Blows on Spoon N-Values Ξ Visual Description Depth Layer 5cm 5cm 5cm 10 20 30 40 50 60 70 80 2 3 1.5 4.5 Brown soft to very soft silty CLAY 1 1 1 2 3.0 1 1 2 4.5 Light Grey medium stiff SILT with 1.5 very fine snad 5 1 2 3 6.0 2 3 3 6 7.5 3 3 3 6 9.0 Light Grey loose to medium dense 7.0 very fine SAND 8 13 18 31 10.5 8 10 14 24 12.0 4 6 8 14 4 5 6 15.0 11 5 5 7 12 16.5 5 10 18 8 18.0 5 9 11 20 19.5 6 9 13 22 21.0 Light Grey medium dense to dense 17.0 fine to medium SAND 6 11 12 23 22.5 7 13 15 28 24.0 7 12 26 14 25.5 7 13 16 29 27.0 8 15 17 32 28.5 8 16 20 36 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-16 Exixting ground level: 13.93 Method of Boring: Percussion Ground water level: 1.52m below EGL Boring Dia.:100(mm) Started on: 30.12.2015 Boring Depth: 30.0m Completed on: 30.12.2015 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Clay Silt Sand Location: 94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar Coordinates: Lat-23.60121 Long-89.83946 SPT blows per 0.3 m penetration Number Standard Penetration Test Blows on Spoon N-Values Ξ Visual Description Depth _ayer | 5cm 5cm 5cm 10 20 30 40 50 60 70 0 1.5 4.5 Brown very soft to soft CALY 1 1 2 3 3.0 1 2 3 4.5 Light Grey soft SILT 2.0 1 2 2 4 6.0 1 1 2 2 2 4 6 9.0 Light Grey loose to very loose very 2 2 3 5 10.5 fine SAND with silt 2 2 1 1 12.0 2 1 1 1 6 10 10 20 15.0 6 10 12 22 7 13 15 28 18.0 23.5 6 8 10 18 19.5 5 7 8 15 21.0 Light Grey medium dense very fine to fine SAND little silt 6 9 10 19 22.5 6 10 18 8 24.0 7 10 12 22 25.5 6 9 10 19 27.0 7 10 10 20 28.5 7 12 23 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Layer 4 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-17 Exixting ground level: 11.0 Method of Boring: Percussion Ground water level: 1.95m below EGL Boring Dia.:100(mm) Started on: 27.12.2015 Boring Depth: 30.0m Completed on: 27.12.2015 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Mohim School Field, Faridpur Sadar Coordinates: Lat-23.5986 Long-89.823334 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Sample Depth 5cm 5cm 10 20 30 40 50 60 70 80 Brown soft silty CLAY 2.0 2 3 1.5 0 1 3.0 1 0 1 1 Light Grey very soft to soft SILT with very fine sand 5 1 2 3 6.0 8.5 1 0 1 1 7.5 2 7 Light Grey medium stiff SILT with 3 4 9.0 very fine sand and organic matter 2 3 3 6 10.5 2 2 3 5 12.0 3 7 3 4 13.5 5 8 14 15.0 6 6 9 7 16 4 5 6 11 18.0 4 6 7 13 Light Grey medium stiff to stiff SILT 19.5 with very fine sand 3 3 4 7 21.0 3 5 4 9 22.5 4 4 6 10 24.0 5 4 5 9 25.5 4 5 9 4 27.0 5 6 8 14 28.5 6 7 9 16 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-18 Exixting ground level: 9.00 Method of Boring: Percussion Ground water level: 4.88m below EGL Boring Dia.:100(mm) Started on: 28.12.2015 Boring Depth: 30.0m Completed on: 29.12.2015 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Raghu Nandanpur Madrasha, Ambikapur Coordinates: Lat-23.59732 Long-89.81214 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Sample Depth 5cm 5cm 5cm 10 20 30 40 50 60 70 80 Brown medium stiff SILT with very 3.0 1 2 3 5 1.5 fine sand 2 3 3 6 3.0 2 3 4 7 4.5 Light Grey loose to medium dense 4.5 very fine to fine SAND with silt 2 4 4 8 6.0 4 8 12 20 7.5 25 10 20 45 9.0 10 23 25 48 10.5 5 9 4 4 12.0 13 3 6 7 13.5 3 3 6 15.0 3 3 4 4 8 16.5 5 7 7 14 18.0 Light Grey dense to medium dense 22.5 very fine to medium SAND 5 7 8 15 19.5 6 10 9 19 21.0 9 6 11 20 22.5 9 12 20 8 24.0 10 9 14 23 25.5 12 13 15 28 27.0 10 14 16 30 28.5 12 17 20 37 30.0 End of Boring Disturbed Sample(Split Spoon) Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-19 Exixting ground level: 13.0 Method of Boring: Percussion Ground water level: 2.74m below EGL Boring Dia.:100(mm) Started on: 06.01.2016 Boring Depth: 30.0m Completed on: 06.01.2016 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Porunpur Govt. Primary School, Porunpur Bazar, Majchar Coordinates: Lat-23.60005 Long-89.75507 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Depth 5cm 5cm 10 20 30 40 50 60 70 80 1 2 1.5 2 1 1 3.0 Brown very soft to medium stiff silty 7.5 CLAY with very fine sand 1 1 2 3 4.5 2 3 1 1 6.0 1 2 3 5 3 4 6 10 9.0 3 4 7 11 10.5 Light Grey loose to medium dense 7.5 fine SAND with silt 5 10 19 9 12.0 22 6 9 13 4 4 5 9 15.0 5 4 6 11 9 16 20 36 18.0 10 16 18 34 19.5 12 14 15 29 21.0 Light Grey medium dense to very 15.0 10 15 17 32 22.5 dense medium to fine SAND 9 13 15 28 24.0 17 20 37 10 25.5 19 23 42 11 27.0 11 21 25 46 28.5 13 24 27 51 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-20 Exixting ground level: 12.99 Method of Boring: Percussion Ground water level: 2.44m below EGL Boring Dia.:100(mm) Started on: 01.01.2016 Boring Depth: 30.0m Completed on: 02.01.2016 :Urban Development Directorate (UDD) Client Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Hadhokandi Govt. Primary School, Oposite side of River Research Clay Silt Sand Institude, Kaijuri Coordinates: Lat-23.58205 Long-89.83917 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Depth 5cm 5cm 10 20 30 40 50 60 70 1 2 2 4 1.5 Brown soft to medium stiff CLAY 2 6.0 1 1 3 3.0 2 3 3 6 4.5 3 5 9 4 6.0 2 2 4 6 7.5 3.9 Dark medium stiff Organic CLAY 1 2 3 5 9.0 4 5 8 13 10.5 5 7 18 11 12.0 5 10 7 17 13.5 3 5 7 12 15.0 3 5 6 11 16.5 3 7 10 17 18.0 Light Grey medium dense to dense 4 8 12 20 20.1 fine to medium SAND 6 12 15 27 21.0 6 10 14 24 22.5 7 12 16 28 24.0 6 9 20 11 25.5 13 16 29 27.0 8 12 16 28 28.5 10 15 20 35 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-21 Exixting ground level: 12.0 Method of Boring: Percussion Ground water level: 3.35m below EGL Boring Dia.:100(mm) Started on: 27.12.2015 Boring Depth: 30.0m Completed on: 28.12.2015 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Johora Begum High School Field, Mia Para Road, Parchim Khabashpur, Silt Sand Clay Faridpur Sadar Coordinates: Lat-23.58869 Long-89.82675 SPT blows per 0.3 m penetration Standard Penetration Test Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Depth _ayer | 5cm 5cm 10 20 30 40 50 60 70 0 1 1.5 Brown very soft to soft silty CLAY 3.5 1 1 2 3 3.0 Light Grey medium dense fine SAND 5 10 12 22 4.5 with silt 2.5 Brown loose fine Sand with mica 2 7 4 3 6.0 Dark Grey medium stiff organic CLAY 1 2 4 6 3 5 8 13 9.0 7.5 2 2 3 5 10.5 Light Grey medium stiff to stiff SILT with very fine sand 3 5 13 8 12.0 3 2 4 6 Light Grey loose very fine to fine 3 2 5 7 15.0 3.5 SAND little silt 10 4 4 6 16.5 8 13 15 28 18.0 17 7 14 31 19.5 10 13 20 33 21.0 10 17 22 39 22.5 Light Grey medium dense to dense 13.0 medium to fine SAND trace silt 9 14 16 30 24.0 13 9 15 28 25.5 15 19 34 27.0 9 13 13 26 28.5 8 12 15 27 30.0 End of Boring Disturbed Sample(Split Spoon) Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-22 Exixting ground level: 14.98 Method of Boring: Percussion Ground water level: 1.52m below EGL Boring Dia.:100(mm) Started on: 29.12.2015 Boring Depth: 30.0m Completed on: 29.12.2015 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Clay Silt Sand Location: Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar Coordinates: Lat-23.58869 Long-89.82675 SPT blows per 0.3 m penetration Number Standard Penetration Test Thickness(m) Blows on Spoon N-Values Ξ Visual Description Depth _ayer | 5cm 5cm 5cm 10 20 30 40 50 60 70 80 2 1.5 1 2 3 3.0 Brown very soft to medium stiff silty 7.5 CLAY 1 2 2 4 4.5 2 7 3 4 6.0 2 3 3 6 7.5 Black medium stiff Organic CLAY 2 3.0 3 5 8 9.0 2 3 4 7 7 2 3 4 12.0 Light Grey loose to medium dense 3 6.0 3 5 8 fine SAND with silt 3 5 7 12 15.0 3 4 7 11 3 4 5 9 18.0 4 5 8 13 19.5 4 5 8 13 21.0 3 5 5 10 Light Grey siftt to very stiff SILT with 13.5 clay and fine sand 4 12 18 6 24.0 10 16 4 6 25.5 5 7 10 17 27.0 5 8 11 19 28.5 6 8 13 21 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-23 Exixting ground level: 11.0 Method of Boring: Percussion Ground water level: 4.57m below EGL Boring Dia.:100(mm) Started on: 31.12.2015 Boring Depth: 30.0m Completed on: 31.12.2015 :Urban Development Directorate (UDD) Client Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Choyata, Aliabad Coordinates: Lat-23.57358 Long-89.88176 SPT blows per 0.3 m penetration Standard Penetration Test Layer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Depth 5cm 5cm 10 20 30 40 50 60 70 80 1 2 3 5 1.5 Brown medium stiff to soft silty CLAY 3.5 1 2 2 4 3.0 3 4 5 9 4.5 3 5 6 11 6.0 3 6 8 14 7.5 4 6 10 16 9.0 Light Grey loose to medium dense 12.2 fine SAND with silt 6 9 15 4 10.5 5 7 18 11 12.0 20 6 8 12 13.5 5 6 8 14 15.0 5 6 6 12 6 11 19 8 18.0 6 10 13 23 19.5 6 9 13 22 21.0 Light Grey medium dense to dense 7 14 11 25 22.5 14.3 fine to medium SAND with silt 8 10 18 8 24.0 8 10 11 21 25.5 10 13 15 28 27.0 9 15 17 32 28.5 10 16 18 34 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-24 Exixting ground level: 8.03 Method of Boring: Percussion Ground water level: 2.44m below EGL Boring Dia.:100(mm) Started on: 02.01.2016 Boring Depth: 30.0m Completed on: 02.01.2016 :Urban Development Directorate (UDD) Client Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Silt Sand Clay Location: Near Payarpur Godaoun, Kaijuri Coordinates: Lat-23.56865 Long-89.83886 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Sample Depth 5cm 5cm 10 20 30 40 50 60 70 80 Brown soft silty CLAY 3.0 1 2 3 1.5 2 2 2 4 3.0 2 3 3 6 4.5 Light Grey loose fine SAND 5.0 5 10 4 6 6.0 2 5 3 8 7.5 1 2 2 4 9.0 1 2 3 5 10.5 2 6 Light Grey medium stiff to stiff SILT 3 3 12.0 8.5 with clay and fine sand 3 9 4 5 4 5 6 15.0 11 5 12 7 19 6 10 14 24 18.0 4 8 12 20 19.5 6 10 16 26 21.0 7 12 16 28 22.5 Light Grey medium dense fine to 13.5 medium SAND little silt 6 10 12 22 24.0 7 13 24 11 25.5 6 12 14 26 27.0 7 12 16 28 28.5 8 13 15 28 30.0 End of Boring Disturbed Sample(Split Spoon) Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-25 Exixting ground level: 12.99 Method of Boring: Percussion Ground water level: 3.66m below EGL Boring Dia.:100(mm) Started on: 04.01.2016 Boring Depth: 30.0m Completed on: 04.01.2016 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Krish poshikhan Institude gate, Gunggabodi, Krishnanagar Coordinates: Lat-23.57589 Long-89.79154 SPT blows per 0.3 m penetration Number Standard Penetration Test Thickness(m) Blows on Spoon N-Values Ξ Visual Description Sample Depth Layer 5cm 5cm 5cm 10 20 30 40 50 60 70 80 Light grey very soft to soft silty CLAY 2 1 2 3 3.0 1 2 2 4 4.5 2 1 1 1 6.0 1 1 2 7.5 1 1 2 3 9.0 20.0 2 2 1 4 Light grey soft to medium stiff SILT with clay and sand 2 1 2 4 12.0 1 2 3 5 2 2 3 5 15.0 2 3 3 6 2 2 2 4 18.0 2 2 3 5 19.5 6 9 14 23 21.0 4 3 4 8 22.5 Light Grey loose to medium dense 6.0 fine SAND with silt 2 4 6 10 24.0 3 5 7 12 25 ! 5 7 18 11 27.0 Light Grey medium dense fine to 4.0 medium SAND 6 9 14 23 28.5 7 10 16 26 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-26 Exixting ground level: 14.99 Method of Boring: Percussion Ground water level: 3.66m below EGL Boring Dia.:100(mm) Started on: 04.01.2016 Boring Depth: 30.0m Completed on: 04.01.2016 :Urban Development Directorate (UDD) Client Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Silt Sand Clay Location: Gobinddapur Hat, Krishnanagar Coordinates: Lat-23.571456 Long-89.747182. SPT blows per 0.3 m penetration Standard Penetration Test Layer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Depth 5cm 5cm 5cm 10 20 30 40 50 60 70 80 2 3 1.5 4.5 Brown very soft to soft silty CLAY 2 1 1 1 3.0 1 2 3 4.5 Light Grey medium stiff SILT with 1.5 very fine snad 2 5 1 3 6.0 2 4 6 10 7.5 3 5 8 13 9.0 Light Grey loose to medium dense 7.0 very fine SAND 8 13 18 31 10.5 8 10 14 24 12.0 4 6 8 14 4 5 6 15.0 11 5 5 7 12 16.5 5 10 18 8 18.0 5 9 11 20 19.5 6 11 17 28 21.0 Light Grey medium dense to dense 17.0 fine to medium SAND 6 11 12 23 22.5 7 10 15 25 24.0 7 12 14 26 25.5 7 12 15 27 27.0 8 15 17 32 28.5 8 16 20 36 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-27 Exixting ground level: 10.0 Method of Boring: Percussion Ground water level: 3.66m below EGL Boring Dia.:100(mm) Started on: 02.01.2016 Boring Depth: 30.0m Completed on: 03.01.2016 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Bakhunda College Field, Bakhunda, Greda Coordinates: Lat-23.54565 Long-89.85487 SPT blows per 0.3 m penetration Standard Penetration Test Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Sample Depth _ayer | 5cm 5cm 10 20 30 40 50 60 70 80 Brown very soft silty CLAY 3.0 1 2 1.5 2 1 1 3.0 1 2 3 5 4.5 2 2 4 6 6.0 1 2 3 5 7.5 Light Grey medium stiff SILT with clay and fine sand 2 2 3 5 9.0 2 2 2 4 10.5 2 2 5 3 12.0 2 3 3 6 6 11 20 15.0 9 5 8 10 18 2 3 5 8 18.0 2 2 3 5 Light Grey medium dense to loose 12.4 fine SAND with silt 2 3 4 7 21.0 2 3 3 6 22.5 3 3 5 8 24.0 4 5 6 11 25 ! 12 16 30 14 27.0 Light Grey medium dense to dense 3.6 fine to medium SAND little silt 14 15 18 33 28.5 17 20 23 43 30.0 End of Boring Disturbed Sample(Split Spoon) Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-28 Exixting ground level: 10.0 Method of Boring: Percussion Ground water level: 2.13m below EGL Boring Dia.:100(mm) Started on: 02.01.2016 Boring Depth: 30.0m Completed on: 02.01.2016 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Silt Sand Clay Location: Chacia fokirbari Road, Kaijuri Coordinates: Lat-23.54129 Long-89.81203 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Sample Depth 5cm 5cm 10 20 30 40 50 60 70 80 Brown soft silty CLAY 2.0 1 2 2 4 1.5 2 3 5 3.0 3 4 4 8 4.5 3 5 4 9 6.0 Light Grey loose to medium dense 9.0 very fine SAND with silt 3 5 5 10 7.5 7 4 5 12 9.0 4 5 9 4 10.5 2 2 2 4 12.0 Light Grey soft SILT with very fine 3.0 SAND 2 2 2 4 4 10 16 15.0 6 5 7 12 19 Light Grey medium dense medium to 6 10 13 23 8.5 fine SAND little silt 6 12 15 27 7 12 16 28 21.0 7 10 13 23 22.5 8 13 18 31 24.0 15 18 33 8 25.5 Light Grey dense medium to fine 7.5 SAND little silt 9 15 26 11 27.0 10 16 17 33 28.5 10 18 21 39 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-29 Exixting ground level: 11.0 Method of Boring: Percussion Ground water level: 3.66m below EGL Boring Dia.:100(mm) Started on: 04.01.2016 Boring Depth: 30.0m Completed on: 04.01.2016 :Urban Development Directorate (UDD) Client Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Silt Sand Clay Location: Kanaipur Akhak Centre, Kanaipur Coordinates: Lat-23.54651 Long-89.77526 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Depth 5cm 5cm 10 20 30 40 50 60 70 80 1 2 3 1.5 Brown very soft to soft silty CLAY 3.8 1 1 2 3.0 1 2 3 4.5 Light Grey very loose to loose very 3.7 fine SAND with silt 1 2 1 1 6.0 1 2 2 4 7.5 4 4 5 9 9.0 4 6 10 4 10.5 5 6 4 11 12.0 Light Grey loose to medium dense 12.0 4 6 8 14 fine SAND with silt 17 8 15 32 15.0 8 12 15 27 10 14 15 29 18.0 8 17 21 38 10 20 27 47 21.0 10 18 23 41 22.5 8 12 15 27 24.0 Light Grey medium dense to very 10.5 dense fine to medium SAND trace silt 7 12 28 16 25 ! 8 17 31 14 27.0 8 15 18 33 28.5 9 17 20 37 30.0 End of Boring Disturbed Sample(Split Spoon) Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-30 Exixting ground level: 13.0 Method of Boring: Percussion Ground water level: 4.88m below EGL Boring Dia.:100(mm) Started on: 05.01.2016 Boring Depth: 30.0m Completed on: 05.01.2016 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Silt Sand Clay Location: Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar Coordinates: Lat-23.53895 Long-89.73418 SPT blows per 0.3 m penetration Number Standard Penetration Test Blows on Spoon N-Values Ξ Visual Description Depth _ayer | 5cm 5cm 10 20 30 40 50 60 70 80 2 1.5 4.5 Brown very soft to soft silty CLAY 2 1 1 1 3.0 1 2 3 4.5 2 1 1 1 6.0 Light Grey soft SILT with clay and 3.5 fine sand 2 1 1 1 7.5 6 8 12 20 9.0 6 9 12 21 10.5 6 7 10 17 12.0 Light Grey medium dense fine SAND 9.0 with silt 5 7 8 15 5 7 8 15 15.0 6 9 8 17 8 14 18 32 18.0 8 13 18 31 19.5 10 16 20 36 21.0 9 14 18 32 22.5 Light Grey dense medium to fine 13.0 SAND 10 15 19 34 24.0 18 21 39 11 25.5 17 21 38 11 27.0 10 13 20 33 28.5 11 19 24 43 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-31 Exixting ground level: 10.99 Method of Boring: Percussion Ground water level: 1.83m below EGL Boring Dia.:100(mm) Started on: 03.01.2016 Boring Depth: 30.0m Completed on: 03.01.2016 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Vhatpara Govt. Primary School, Kaijuri Coordinates: Lat-23.53291 Long-89.83473 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Sample Depth 5cm 5cm 10 20 30 40 50 60 70 80 1 2 3 1.5 Brown soft to very soft clayey SILT 3.8 2 1 1 1 3.0 2 3 4 7 4.5 3 9 4 5 6.0 2 3 3 6 7.5 Light Grey soft to medium stiff SILT 2 9.0 10.2 2 3 5 with very fine sand 2 3 5 1 10.5 2 2 2 4 12.0 2 7 3 4 3 7 13 15.0 6 3 5 5 10 4 5 7 12 18.0 4 5 6 11 19.5 4 4 5 9 21.0 Light Grey loose to medium dense 16.0 very to fine SAND with silt 5 5 4 10 22.5 4 5 6 11 24.0 5 6 7 13 25.5 5 5 8 13 27.0 6 6 8 14 28.5 7 8 10 18 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-32 Exixting ground level: 10.99 Method of Boring: Percussion Ground water level: 2.62m below EGL Boring Dia.:100(mm) Started on: 05.01.2016 Boring Depth: 30.0m Completed on: 05.01.2016 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Fursha Govt. Primary School, Kanaipur Coordinates: Lat-23.5202 Long-89.80351 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Sample Depth 5cm 5cm 10 20 30 40 50 60 70 80 2 3 1 1.5 Brown soft to medium stiff silty CLAY 3.8 2 2 4 6 3.0 1 1 2 4.5 1 0 1 1 6.0 Light Grey very soft to soft SILT with 7.2 1 1 1 2 7.5 very fine sand 1 1 1 2 9.0 2 1 1 1 3 5 9 4 12.0 Light Grey loose to medium dense 4.0 fine SAND with silt 3 10 13.5 4 6 4 5 15.0 6 11 5 8 4 13 3 5 8 13 18.0 4 6 9 15 19.5 5 7 10 17 21.0 Light Grey medium dense medium to 4 9 15.0 7 16 - 22 ! fine SAND 3 5 7 12 24.0 8 14 4 6 25.5 4 7 9 16 27.0 6 9 10 19 28.5 7 10 14 24 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-33 Exixting ground level: 12.97 Method of Boring: Percussion Ground water level: 5.49m below EGL Boring Dia.:100(mm) Started on: 10.01.2016 Boring Depth: 30.0m Completed on: 10.01.2016 :Urban Development Directorate (UDD) Client Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Dokin Char Kamolpur Coordinates: Lat-23.498898 Long-89.84049 SPT blows per 0.3 m penetration Standard Penetration Test Layer Number Blows on Spoon N-Values Ξ Visual Description Sample Depth 5cm 5cm 10 20 30 40 50 60 70 80 Brown very soft silty CLAY 3.0 1 0 1.5 0 1 3.0 2 2 2 4 4.5 2 1 1 1 6.0 Light Grey very soft to soft SILT with 8.0 clay and fine sand 1 2 3 7.5 1 2 2 4 9.0 2 2 3 5 10.5 10 21 25 46 12.0 21 39 8 18 13.5 6 10 18 15.0 8 6 10 12 22 8 18 26 44 18.0 8 18 23 41 Light Grey medium dense to dense 19.0 fine to medium SAND with silt 9 16 25 41 21.0 10 18 25 43 22.5 10 15 21 36 24.0 10 14 18 32 25.5 16 22 38 11 27.0 10 19 23 42 28.5 12 20 25 45 30.0 End of Boring Disturbed Sample(Split Spoon) Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-34 Exixting ground level: 6.00 Method of Boring: Percussion Ground water level: 4.86m below EGL Boring Dia.:100(mm) Started on: 10.01.2016 Boring Depth: 30.0m Completed on: 10.01.2016 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Silt Sand Clay Location: Tonthoniar Hat, End of Kanaipur Union Coordinates: Lat-23.498898 Long-89.785518 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Sample Depth 5cm 5cm 10 20 30 40 50 60 70 80 1 2 3 1.5 Brown soft to medium stiff silty CLAY 3.8 2 2 3 5 3.0 1 1 2 4.5 1 0 1 1 6.0 Light Grey very soft to soft SILT with 7.2 1 1 2 3 7.5 very fine sand 1 1 1 2 9.0 2 2 4 1 10.5 3 5 9 4 12.0 Light Grey loose to medium fine 4.0 SAND with silt 3 10 13.5 4 6 4 6 12 15.0 6 5 8 4 13 3 5 7 12 18.0 4 6 10 16 19.5 5 7 10 17 21.0 Light Grey medium dense medium to 4 9 15.0 6 15 - 22 ! fine SAND 3 5 7 12 24.0 10 16 4 6 25.5 4 7 9 16 27.0 6 9 10 19 28.5 7 10 14 24 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-35 Exixting ground level: 16.99 Method of Boring: Percussion Ground water level: 4.28m below EGL Boring Dia.:100(mm) Started on: 09.01.2016 Boring Depth: 30.0m Completed on: 09.01.2016 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Nasirar Bazar, Dorghapur, Ishan Gopalpur Coordinates: Lat-23.661227 Long-89.763238 SPT blows per 0.3 m penetration Standard Penetration Test Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Sample Depth Layer 5cm 5cm 5cm 10 20 30 40 50 60 70 80 2 4 6 1.5 Brown loose very fine to fine SAND 4.5 little silt 2 7 3 4 3.0 3 4 6 10 4.5 3 7 3 4 6.0 2 7 3 4 7.5 Redish Brown to Grey loose medium 9.0 3 4 5 9 to fine SAND 3 4 5 9 10.5 2 5 9 4 12.0 3 3 5 8 7 7 7 14 15.0 6 7 7 14 6 10 18 8 18.0 11 7 8 19 19.5 7 11 13 24 21.0 Light grey medium dense fine to 16.5 medium SAND with Silt 3 7 6 13 22.5 5 7 7 14 24.0 6 9 9 18 25.5 7 10 12 22 27.0 6 8 10 18 28.5 7 12 14 26 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-36 Exixting ground level: 11.00 Method of Boring: Percussion Ground water level: 3.66m below EGL Boring Dia.:100(mm) Started on: 09.01.2016 Boring Depth: 30.0m Completed on: 09.01.2016 Client :Urban Development Directorate (UDD) Legend: : Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Silt Sand Clay Location: Near Health Coplex, Ishan Gopalpur Coordinates: Lat-23.635825 Long-89.77994 SPT blows per 0.3 m penetration Standard Penetration Test -ayer Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Symbols Sample Depth 5cm 5cm 10 20 30 40 50 60 70 80 Brown very soft clayey SILT 1.5 1 0 1 1.5 Ligth Grey loose to medium dense 5 7 3.0 3 10 3.0 very fine to fine SAND with Silt 5 5 7 12 4.5 Ligth Grey very soft SILT with very 3.0 1 0 1 1 6.0 fine Sand 1 1 1 2 7 8 12 20 9.0 8 16 26 10 Ligth Grey medium dense fine SAND 6 10 18 9.0 8 12.0 with Silt 6 8 11 19 4 5 8 13 15.0 9 4 7 16 19 25 44 12 18.0 14 21 29 50 19.5 10 17 21 38 21.0 8 14 18 32 22.5 Light Grey medium dense to dense 13.5 medium to fine SAND 8 9 16 25 24.0 14 32 8 18 25.5 8 8 12 20 27.0 6 9 11 20 28.5 7 12 16 28 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

GEOTECHNICAL BOREHOLE LOG Bore hole No: BH-37 Exixting ground level: 13.99 Method of Boring: Percussion Ground water level: 3.66m below EGL Boring Dia.:100(mm) Started on: 09.01.2016 Boring Depth: 30.0m Completed on: 09.01.2016 Client :Urban Development Directorate (UDD) Legend: Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Silt Sand Clay Location: Doiarampur Govt. Primary School, Doiarampur, Majchar Coordinates: Lat-23.617063 Long-89.792976 SPT blows per 0.3 m penetration Standard Penetration Test Number Thickness(m) Blows on Spoon N-Values Ξ Visual Description Sample Depth Layer 5cm 5cm 5cm 10 20 30 40 50 60 70 80 2 2 4 1.5 Ligth Grey loose fine to very fine 6.0 4 3 2 5 3.0 SAND 2 2 4 6 4.5 3 3 5 8 6.0 3 4 6 10 7.5 7 4 4 11 9.0 3 5 7 12 10.5 14 4 6 8 12.0 10 5 7 17 13.5 4 9 15 15.0 6 6 20 8 12 Light Grey loose to medium dense 7 24.0 10 13 23 18.0 medium to fine SAND 5 6 6 12 19.5 6 8 8 16 21.0 7 9 10 19 22.5 4 7 9 16 24.0 5 7 7 14 25.5 5 10 16 6 27.0 6 8 12 20 28.5 7 10 14 24 30.0 End of Boring Disturbed Sample(Split Spoon) Layer 1 Undisturbed Sample(Shelby Tube)

Appendix D

Geotechnical Laboratory Test Results and Graphs

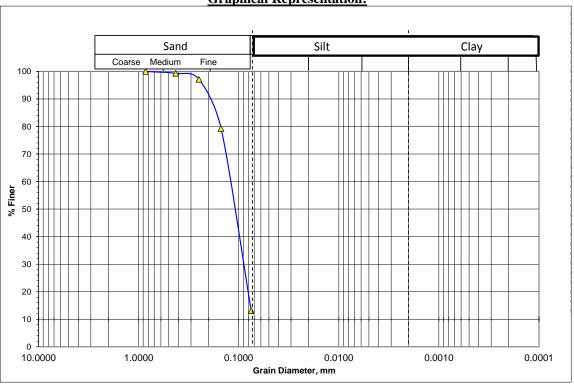
Client: Urban Development Directorate (UDD)

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

Project Location : MADHABDIA MOYEZ UDDIN SCHOOL Field, Char Madhabdia
Bore Hole No: BH-F01 Sampled Date: 04/01/2016
Sample No: D-06 Test Date: 05/02/2016

Depth (m) : 9.0

Graphical Representation:



Fines or % of silt and clay = 13 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) = 87 (0.005mm size) & (0.001mm size) = 13

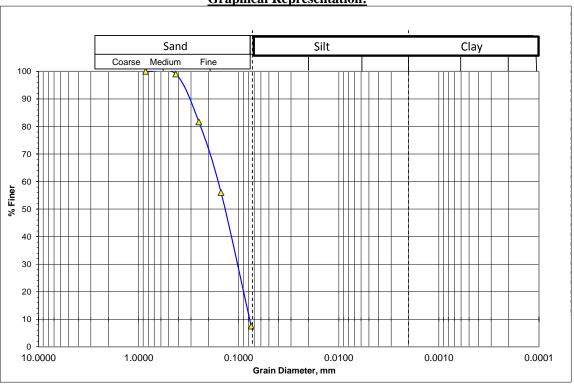
Client: Urban Development Directorate (UDD)

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

Project Location : MADHABDIA MOYEZ UDDIN SCHOOL Field, Char Madhabdia
Bore Hole No: BH-F01 Sampled Date: 04/01/2016
Sample No: D-14 Test Date: 05/02/2016

Depth (m) : 21.0





Fines or % of silt and clay = 7 Mean Diameter, $D_{50} = 0.14$ mm Silt-Factor, $f = 1.76 \text{xsqrt}(D_{50}) = 0.66$ % Particles (from the grain -size analysis graph (0.075 mm size) = 93(0.005 mm size) & (0.001 mm size) = 7

Client: Urban Development Directorate (UDD)

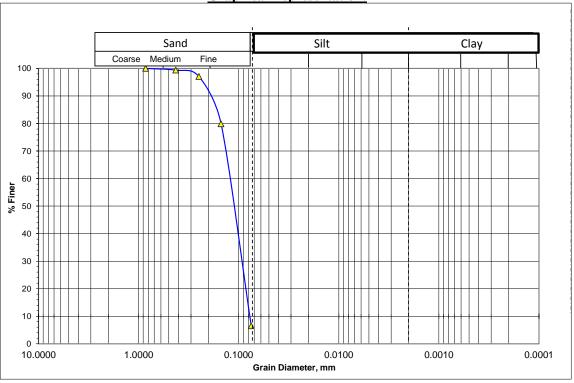
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: SOUTH DIGRIRCHAR MADHOBDIA GOVT. PRI. SCHOOL, Madhubdia

Bore Hole No: BH-F02 Sampled Date: 05/01/2016 Sample No: D-07 Test Date: 05/02/2016

Depth (m) : 10.5

Graphical Representation:



Fines or % of silt and clay = 6Mean Diameter, $D_{50} = 0.115$ mm Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.60$ % Particles (from the grain -size analysis graph $(0.075mm \ size) = 94$

Client: Urban Development Directorate (UDD)

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

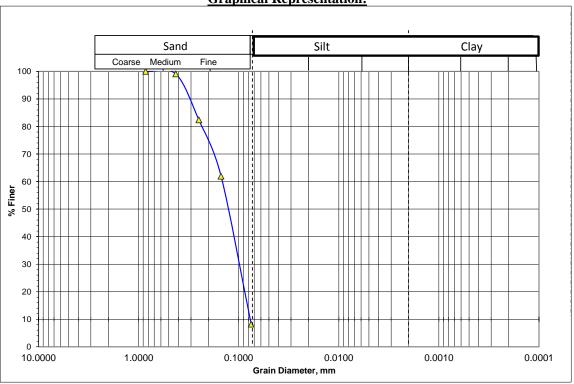
Project Location: SOUTH DIGRIRCHAR MADHOBDIA GOVT. PRI. SCHOOL, Madhubdia

 Bore Hole No: BH-F02
 Sampled Date: 05/01/2016

 Sample No: D-11
 Test Date: 05/02/2016

Depth (m) : 16.5

Graphical Representation:



Fines or % of silt and clay = 8 Mean Diameter, $D_{50} = 0.13$ mm Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.63$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 92

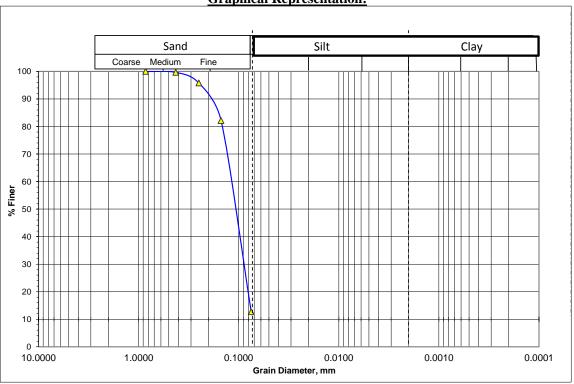
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Chardurgapur Govt. Primary School field, Ishan Gopalpur

Bore Hole No: BH-F03 Sampled Date: 07/01/2016 Sample No: D-02 Test Date: 05/02/2016

Depth (m) : 3.0

Graphical Representation:



Fines or % of silt and clay = 12 Mean Diameter, $D_{50} = 0.105$ mm Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.57$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 88

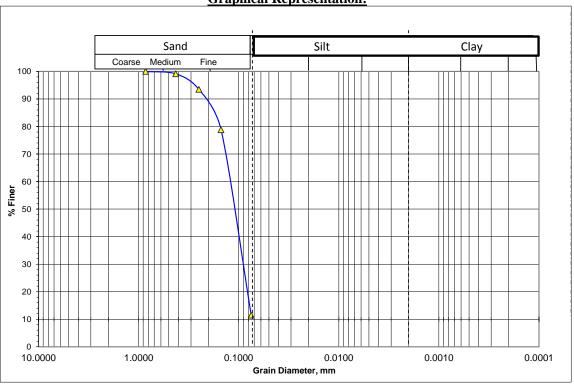
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Chardurgapur Govt. Primary School field, Ishan Gopalpur

Bore Hole No: BH-F03 Sampled Date: 07/01/2016 Sample No: D-05 Test Date: 05/02/2016

Depth (m) : 7.5

Graphical Representation:



Fines or % of silt and clay = 11 Mean Diameter, $D_{50} = 0.11$ mm Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.58$ % Particles (from the grain -size analysis graph $(0.075mm \ size) = 89$

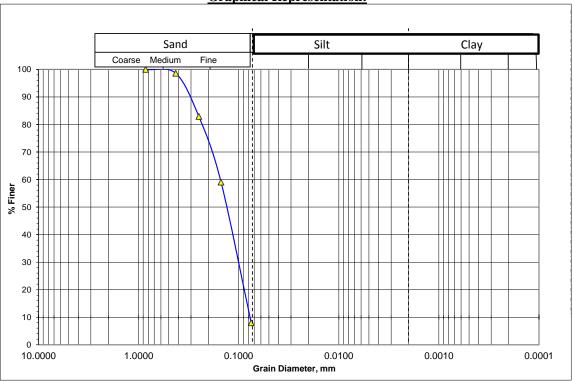
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Chardurgapur Govt. Primary School field, Ishan Gopalpur

Bore Hole No: BH-F03 Sampled Date: 07/01/2016 Sample No: D-14 Test Date: 05/02/2016

Depth (m) : 21.0





Fines or % of silt and clay = 7 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) = 93(0.005mm size) & (0.001mm size) = 7

Client: Urban Development Directorate (UDD)

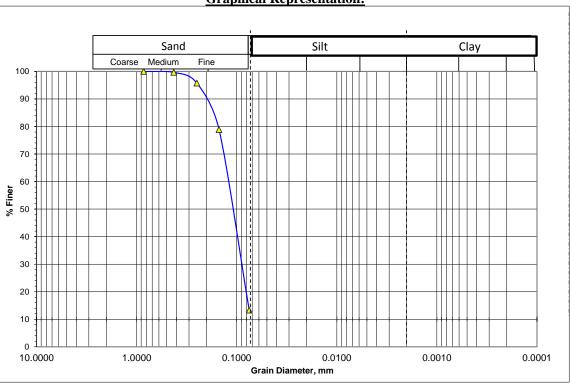
Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Char Madhabdia Govt. Primary School, Char Madhabdia Bazar, Char Madhabdia

Bore Hole No: BH-F04 Sampled Date: 06/01/2016 Sample No: D-08 Test Date: 05/02/2016

Depth (m) : 12.0





Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.58$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 87

Client: Urban Development Directorate (UDD)

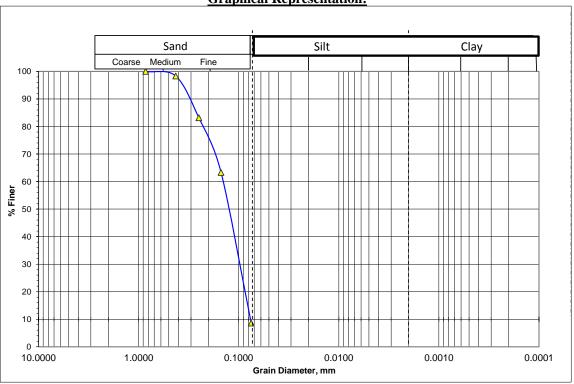
Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Char Madhabdia Govt. Primary School, Char Madhabdia Bazar, Char Madhabdia

Bore Hole No: BH-F04 Sampled Date: 06/01/2016 Sample No: D-11 Test Date: 05/02/2016

Depth (m) : 16.5





Fines or % of silt and clay = 8Mean Diameter, $D_{50} = 0.13$ mm Silt-Factor, $f = 1.76 x sqrt(D_{50}) = 0.63$ % Particles (from the grain -size analysis graph

(0.075 mm size) = 92

Client: Urban Development Directorate (UDD)

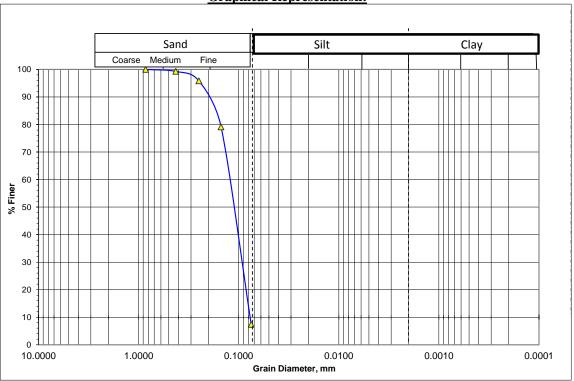
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Shibrampur R. D. Acadamy School Field, Majchar

Bore Hole No: BH-F05 Sampled Date: 08/01/2016 Sample No: D-02 Test Date: 05/02/2016

Depth (m) : 3.0

Graphical Representation:



Fines or % of silt and clay = 7

Mean 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) = 93

Client: Urban Development Directorate (UDD)

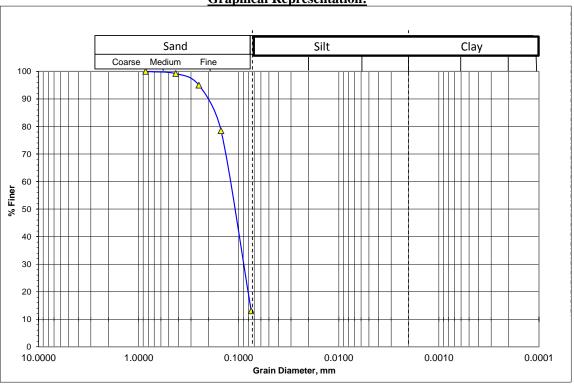
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Shibrampur R. D. Acadamy School Field, Majchar

Bore Hole No: BH-F05 Sampled Date: 08/01/2016 Sample No: D-05 Test Date: 05/02/2016

Depth (m) : 7.5

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.58$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 87

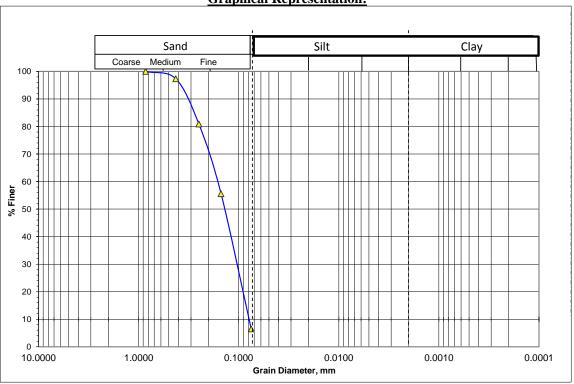
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Chardurgapur Govt. Primary School field, Ishan Gopalpur

Bore Hole No: BH-F03 Sampled Date: 07/01/2016 Sample No: D-11 Test Date: 05/02/2016

Depth (m) : 16.5

Graphical Representation:



Fines or % of silt and clay = 6Mean Diameter, $D_{50} = 0.145$ mm Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.67$ % Particles (from the grain -size analysis graph $(0.075mm \ size) = 94$

Client: Urban Development Directorate (UDD)

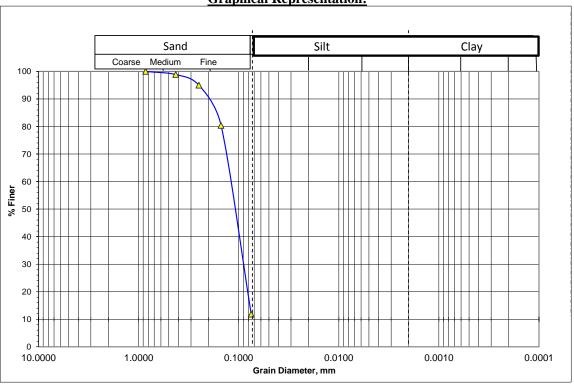
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Pallikobi Jasimuddin Saranshala, Ambikapur

Bore Hole No: BH-F05 Sampled Date: 10/01/2016 Test Date: Sample No: D-05 05/02/2016

Depth (m) : 7.5

Graphical Representation:



Fines or % of silt and clay = 12Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.58$

% Particles (from the grain -size analysis graph

(0.075 mm size) =

Client: Urban Development Directorate (UDD)

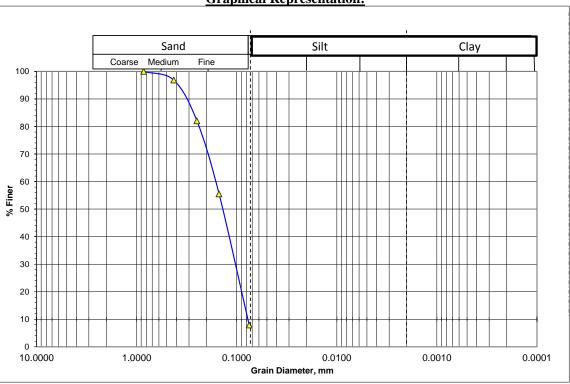
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Pallikobi Jasimuddin Saranshala, Ambikapur

Bore Hole No: BH-F05 Sampled Date: 10/01/2016 Sample No: D-11 Test Date: 05/02/2016

Depth (m) : 16.5





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

 $(0.075 \,\mathrm{mm \ size}) = 93$

Client: Urban Development Directorate (UDD)

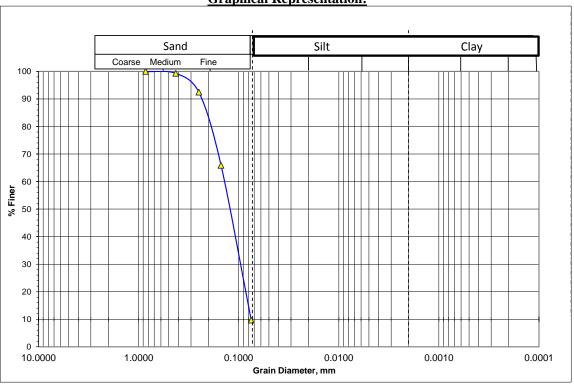
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Near Madhankali Swicth gate, Ambikapur

Bore Hole No: BH-F07 Sampled Date: 31/12/2015 Sample No: D-09 Test Date: 05/02/2016

Depth (m) : 13.5





Fines or % of silt and clay = 10

Mean Diameter, $D_{50} = 0.13$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.63$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 90

Client: Urban Development Directorate (UDD)

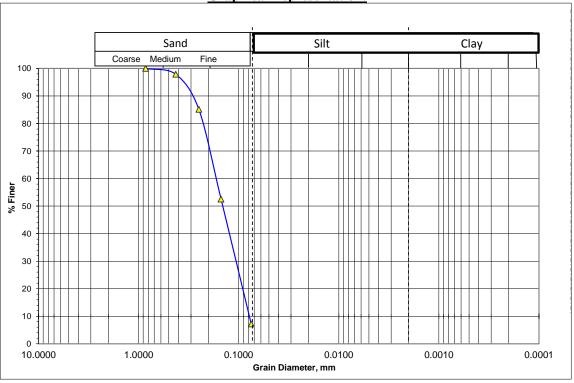
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Near Madhankali Swicth gate, Ambikapur

Bore Hole No: BH-F07 Sampled Date: 31/12/2015 Sample No: D-15 Test Date: 05/02/2016

Depth (m) : 22.5





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

 $(0.075 \,\mathrm{mm \; size}) = 93$

Client: Urban Development Directorate (UDD)

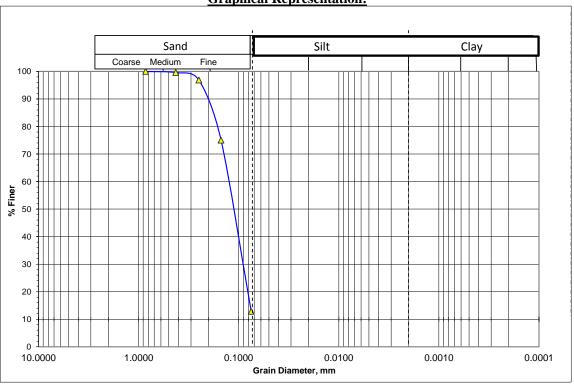
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Adampur Bazar, Goualonda Road, Ambikapur

Bore Hole No: BH-F08 Sampled Date: 01/01/2016 Sample No: D-02 Test Date: 05/02/2016

Depth (m) : 3.0





Fines or % of silt and clay = 12Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.60$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 88

Client: Urban Development Directorate (UDD)

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

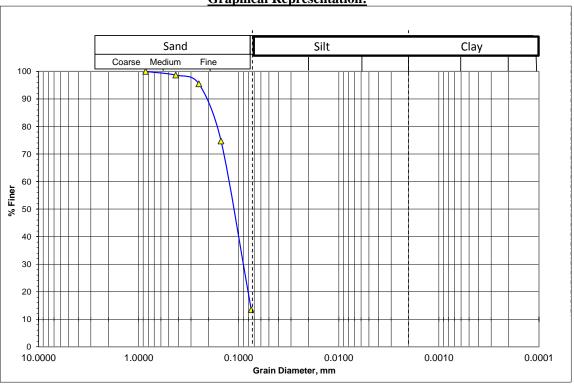
Project Location: Adampur Bazar, Goualonda Road, Ambikapur

 Bore Hole No: BH-F08
 Sampled Date: 01/01/2016

 Sample No: D-10
 Test Date: 05/02/2016

Depth (m) : 15.0





Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.12$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.61$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 87

Client: Urban Development Directorate (UDD)

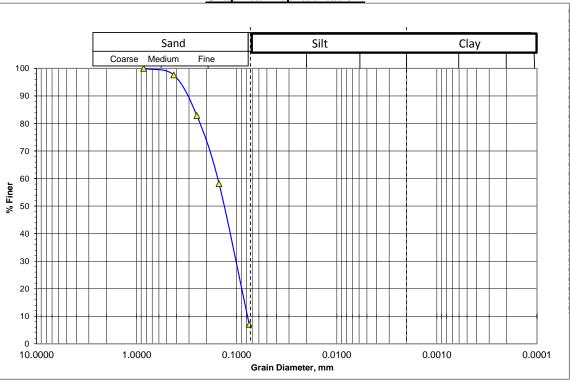
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Adampur Bazar, Goualonda Road, Ambikapur

Bore Hole No: BH-F08 Sampled Date: 01/01/2016 Sample No: D-17 Test Date: 05/02/2016

Depth (m) : 25.5





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

(0.075 mm size) = 94

Client: Urban Development Directorate (UDD)

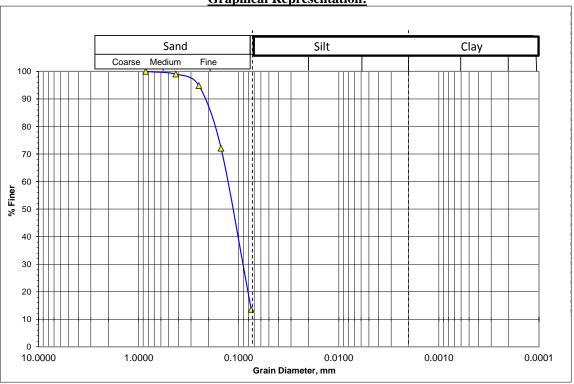
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Dhuldi Railgate, Dhuldi Bazar, Majchar

Bore Hole No: BH-F09 Sampled Date: 08/01/2016 Sample No: D-07 Test Date: 05/02/2016

Depth (m) : 10.5





Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.12$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.61$

% Particles (from the grain -size analysis graph

 $(0.075 \,\mathrm{mm \; size}) = 87$

Client: Urban Development Directorate (UDD)

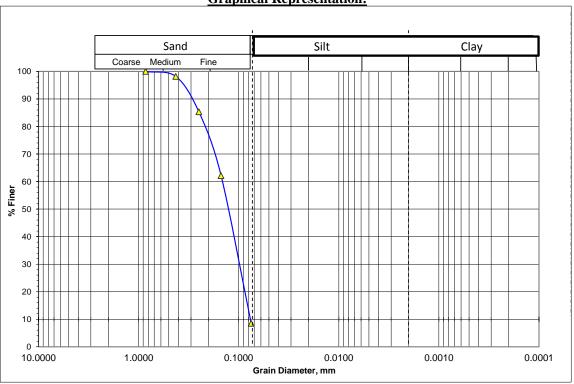
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Dhuldi Railgate, Dhuldi Bazar, Majchar

Bore Hole No: BH-F09 Sampled Date: 08/01/2016 Sample No: D-13 Test Date: 05/02/2016

Depth (m) : 19.5





Fines or % of silt and clay = 8 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) = 92(0.005mm size) & (0.001mm size) = 8

Client: Urban Development Directorate (UDD)

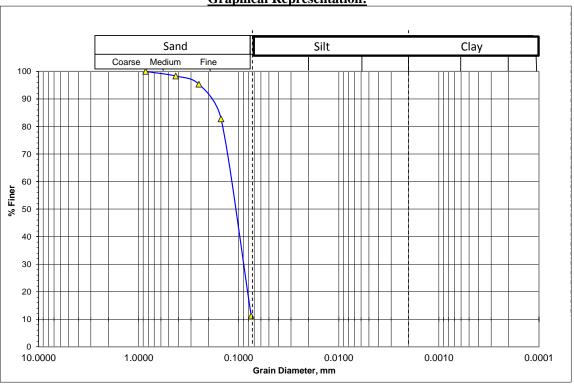
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Khalilpur Bazar, Majchar

Bore Hole No: BH-F10 Sampled Date: 07/01/2016 Test Date: Sample No: D-03 07/02/2016

Depth (m) : 4.5

Graphical Representation:



Fines or % of silt and clay = 11 Mean Diameter, $D_{50} = 0.11$ mm Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.58$ % Particles (from the grain -size analysis graph

(0.075 mm size) =

Client: Urban Development Directorate (UDD)

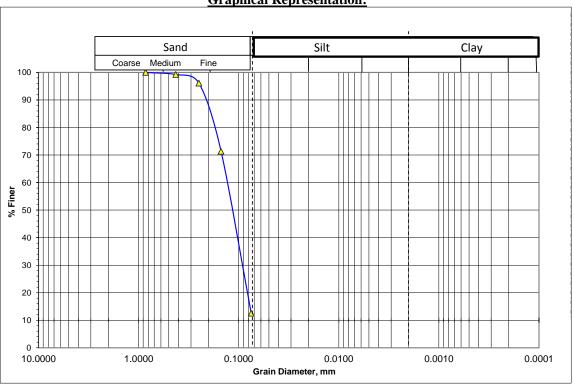
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Khalilpur Bazar, Majchar

Bore Hole No: BH-F10 Sampled Date: 07/01/2016 Sample No: D-09 Test Date: 07/02/2016

Depth (m) : 13.5





Fines or % of silt and clay = 12

 $Mean\ Diameter,\ D_{50}=\ 0.12\ mm$

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.61$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 88

Client: Urban Development Directorate (UDD)

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

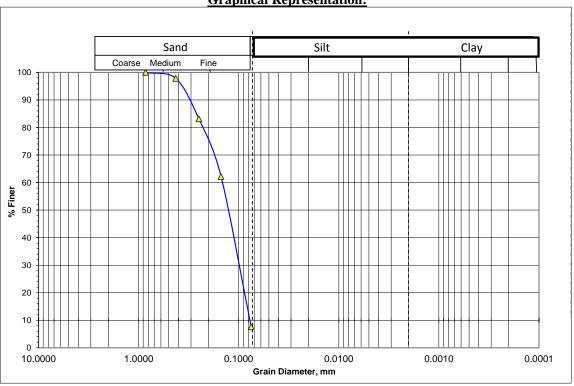
Project Location: Khalilpur Bazar, Majchar

 Bore Hole No: BH-F10
 Sampled Date: 07/01/2016

 Sample No: D-15
 Test Date: 07/02/2016

Depth (m) : 22.5





Fines or % of silt and clay = 7

Mean Diameter, $D_{50} = 0.13$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.63$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 93

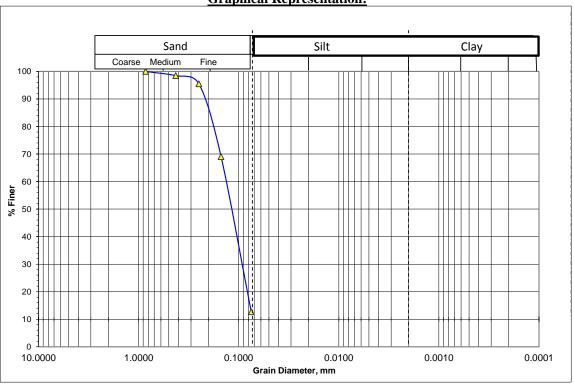
Client: Urban Development Directorate (UDD)

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

Project Location : 5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar Bore Hole No: BH-F11 Sampled Date: 31/12/2015 Sample No: D-06 Test Date: 05/02/2016

Depth (m) : 9.0

Graphical Representation:



Fines or % of silt and clay = 12 Mean Diameter, $D_{50} = 0.125$ mm Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.62$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 88

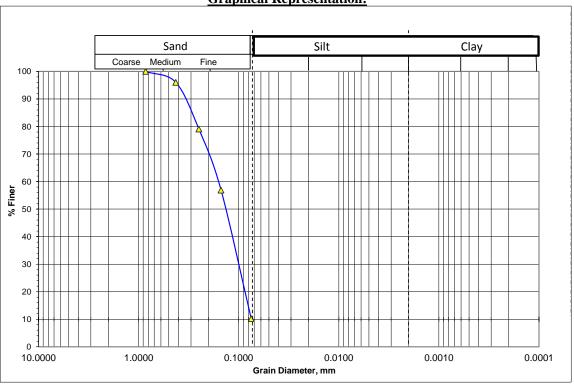
Client: Urban Development Directorate (UDD)

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

Project Location : 5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar Bore Hole No: BH-F11 Sampled Date: 31/12/2015 Sample No: D-12 Test Date: 05/02/2016

Depth (m) : 18.0

Graphical Representation:



Fines or % of silt and clay = 10 Mean Diameter, $D_{50} = 0.145$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.67$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 90

Client: Urban Development Directorate (UDD)

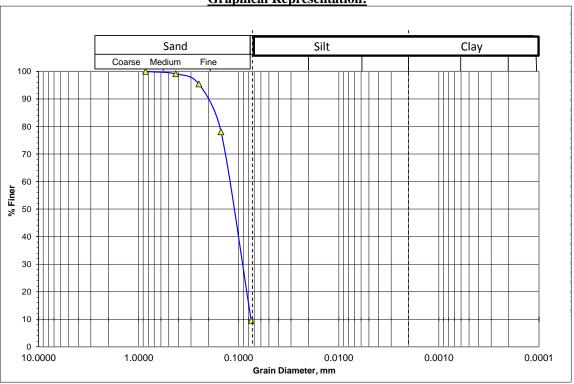
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Yasin College, Faridpur Sadar

Bore Hole No: BH-F12 Sampled Date: 29/12/2015 Sample No: D-04 Test Date: 06/02/2016

Depth (m) : 6.0

Graphical Representation:



Fines or % of silt and clay = 9

Mean Diameter, $D_{50} = 0.115$ mm Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.60$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 91

Client: Urban Development Directorate (UDD)

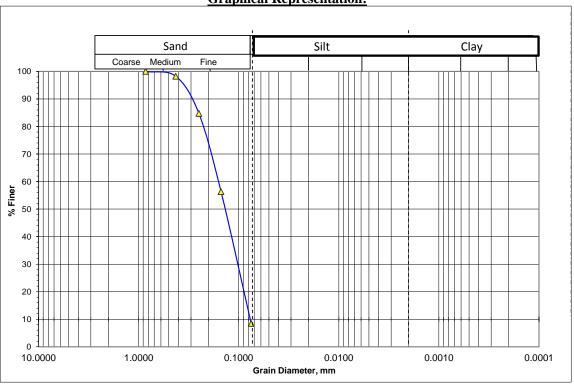
Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Yasin College, Faridpur Sadar

Bore Hole No: BH-F12 Sampled Date: 29/12/2015 Sample No: D-13 Test Date: 06/02/2016

Depth (m) : 19.5

Graphical Representation:



Fines or % of silt and clay = 8 Mean Diameter, $D_{50} = 0.145$ mm Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.67$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 92

Client: Urban Development Directorate (UDD)

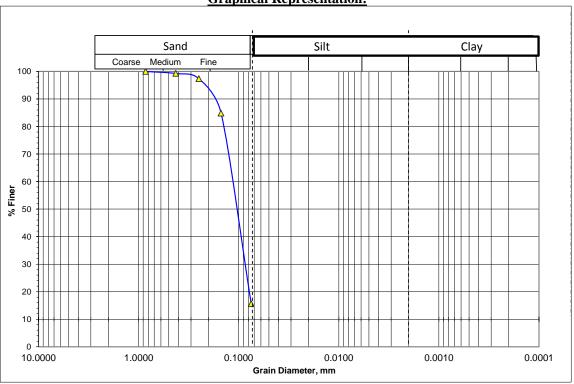
Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Faridpur Zilla School field, Faridpur Sadar

Bore Hole No: BH-F13 Sampled Date: 29/12/2015 Sample No: D-02 Test Date: 06/02/2016

Depth (m) : 3.0

Graphical Representation:



Fines or % of silt and clay = 15

Mean Diameter, $D_{50} = 0.1$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.56$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 85

Client: Urban Development Directorate (UDD)

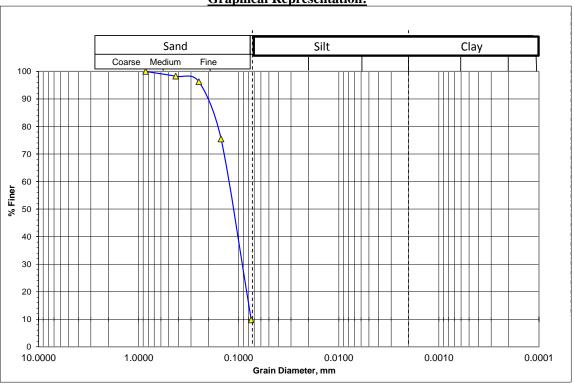
Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Faridpur Zilla School field, Faridpur Sadar

Bore Hole No: BH-F13 Sampled Date: 29/12/2015 Sample No: D-07 Test Date: 06/02/2016

Depth (m) : 10.5





Fines or % of silt and clay = 9 Mean Diameter, $D_{50} = 0.12$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.61$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 91

Client: Urban Development Directorate (UDD)

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

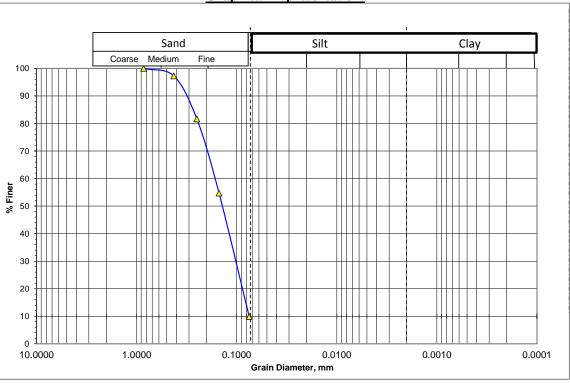
Project Location: Faridpur Zilla School field, Faridpur Sadar

 Bore Hole No: BH-F13
 Sampled Date: 29/12/2015

 Sample No: D-14
 Test Date: 06/02/2016

Depth (m) : 21.0





Fines or % of silt and clay = 9

Mean Diameter, $D_{50} = 0.15$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.68$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 91

Client: Urban Development Directorate (UDD)

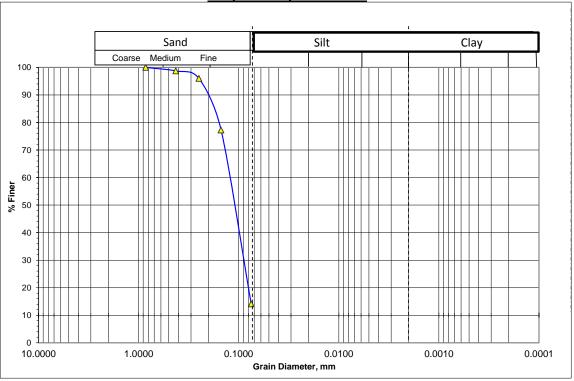
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Vajon Dangga Govt. Primary School, Faridpur Sadar

Bore Hole No: BH-F14 Sampled Date: 31/12/2015 Sample No: D-08 Test Date: 06/02/2016

Depth (m) : 12.0

Graphical Representation:



Fines or % of silt and clay = 14 Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.60$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 86

Client: Urban Development Directorate (UDD)

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

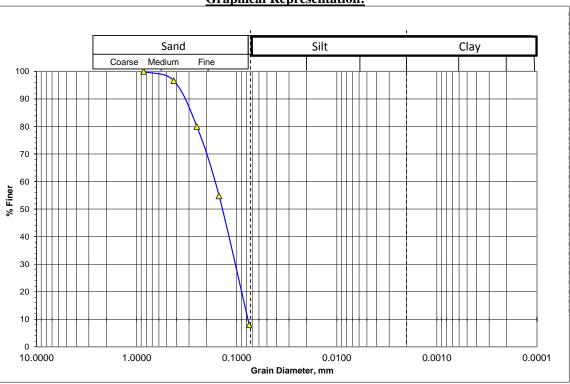
Project Location : Vajon Dangga Govt. Primary School, Faridpur Sadar

 Bore Hole No: BH-F14
 Sampled Date: 31/12/2015

 Sample No: D-16
 Test Date: 06/02/2016

Depth (m) : 24.0





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

(0.075 mm size) = 92

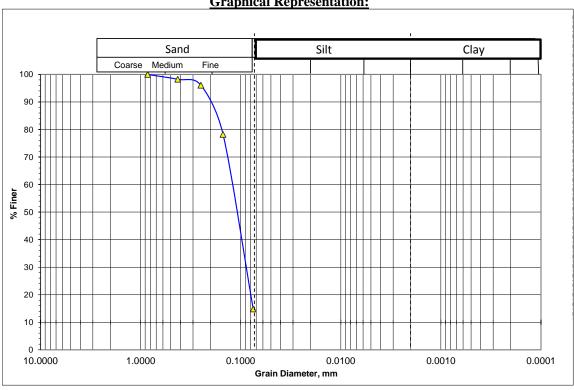
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar

Bore Hole No: BH-F15 Sampled Date: 30/12/2015 Test Date: Sample No: D-06 06/02/2016

Depth (m) : 9.0

Graphical Representation:



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

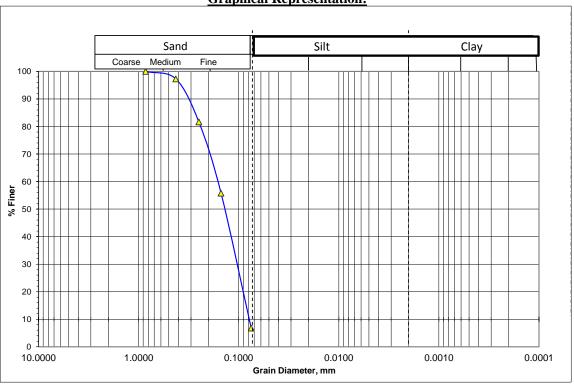
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar

Bore Hole No: BH-F15 Sampled Date: 30/12/2015 Test Date: Sample No: D-12 06/02/2016

Depth (m) : 18.0

Graphical Representation:



Fines or % of silt and clay = 7Mean Diameter, $D_{50} = 0.145$ mm Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.67$ % Particles (from the grain -size analysis graph

(0.075 mm size) =

Client: Urban Development Directorate (UDD)

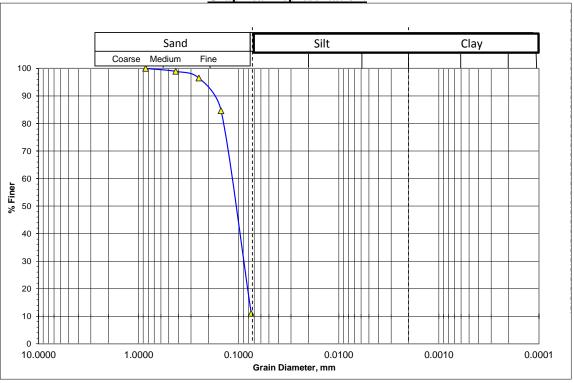
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : 94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar Bore Hole No: BH-F16 Sampled Date: 30/12/2015

Sample No: D-06 Test Date: 07/02/2016

Depth (m) : 9.0

Graphical Representation:



Fines or % of silt and clay = 11

Mean Diameter, $D_{50} = 0.105$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.57$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 89

Client: Urban Development Directorate (UDD)

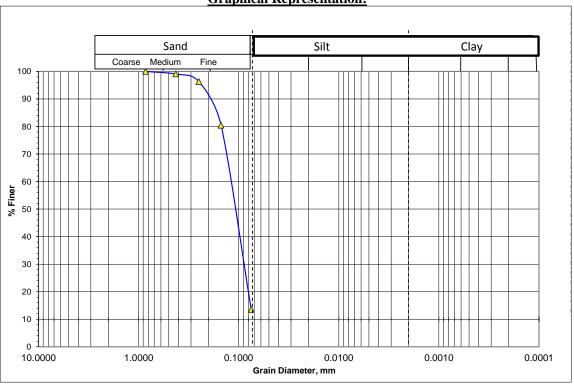
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location : 94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar Bore Hole No: BH-F16 Sampled Date: 30/12/2015

Sample No: D-15 Test Date: 07/02/2016

Depth (m) : 22.5

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.58$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 87

Client: Urban Development Directorate (UDD)

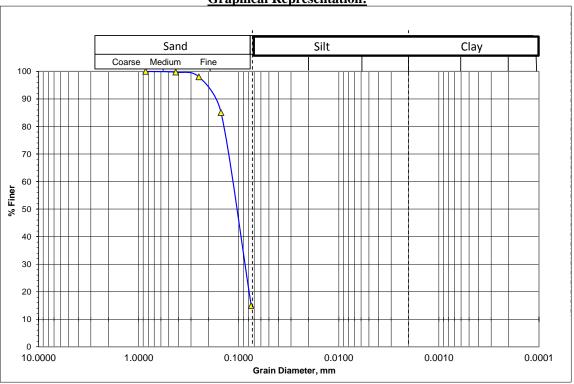
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Raghu Nandanpur Madrasha, Ambikapur

Bore Hole No: BH-F18 Sampled Date: 28/12/2015 Sample No: D-04 Test Date: 07/02/2016

Depth (m) : 6.0

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

(0.075 mm size) = 86

Client: Urban Development Directorate (UDD)

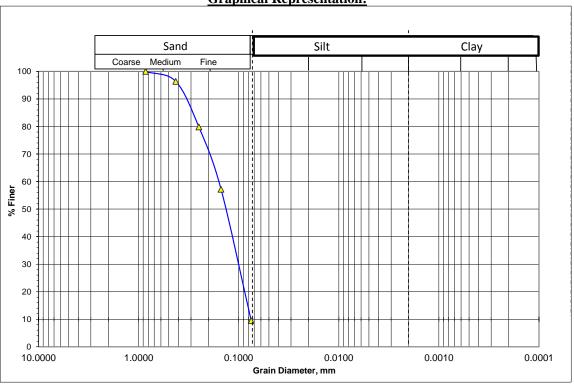
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Raghu Nandanpur Madrasha, Ambikapur

Bore Hole No: BH-F18 Sampled Date: 28/12/2015 Test Date: Sample No: D-13 07/02/2016

Depth (m) : 19.5





Fines or % of silt and clay = 9 Mean Diameter, $D_{50} = 0.145$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.67$

% Particles (from the grain -size analysis graph

(0.075 mm size) =

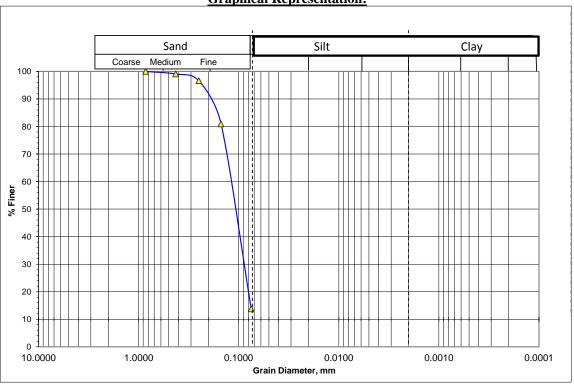
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Porunpur Govt. Primary School, Porunpur Bazar, Majchar

Bore Hole No: BH-F19 Sampled Date: 06/01/2016 Sample No: D-07 Test Date: 07/02/2016

Depth (m) : 10.5





Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.58$

% Particles (from the grain -size analysis graph

 $(0.075 \,\mathrm{mm \; size}) = 87$

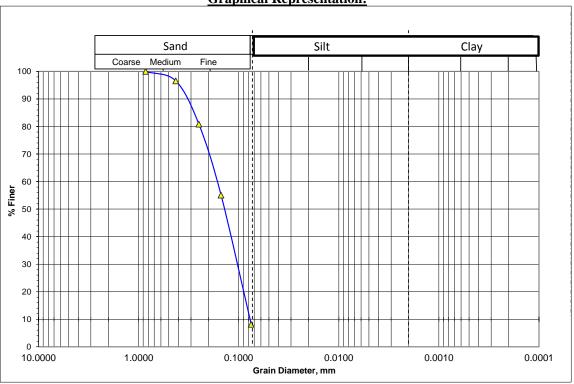
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Porunpur Govt. Primary School, Porunpur Bazar, Majchar

Bore Hole No: BH-F19 Sampled Date: 06/01/2016 Test Date: Sample No: D-14 07/02/2016

Depth (m) : 21.0





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

(0.075 mm size) =

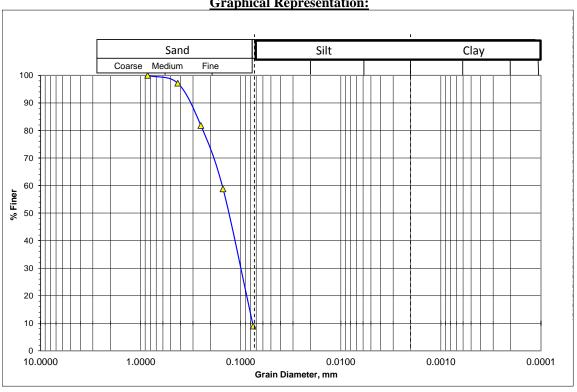
Client: Urban Development Directorate (UDD)

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

Project Location: Hadhokandi Govt. Primary School, River Research Institude, Kaijuri Bore Hole No: BH-F20 Sampled Date: 01/01/2016 Test Date: Sample No: D-11 07/02/2016

Depth (m) : 16.5

Graphical Representation:



Fines or % of silt and clay = 8Mean Diameter, $D_{50} = 0.135$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.65$

% Particles (from the grain -size analysis graph

(0.075 mm size) =

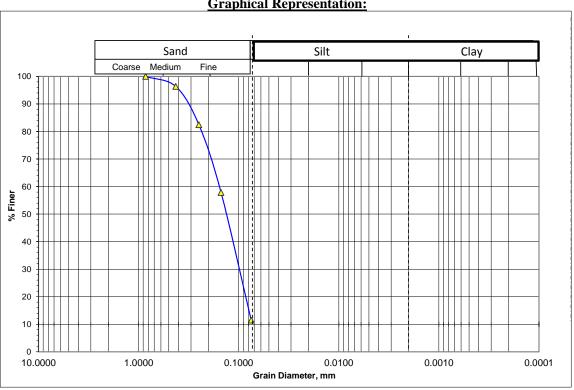
Client: Urban Development Directorate (UDD)

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

Project Location: Johora Begum High School Field, Parchim Khabashpur, Faridpur Sadar Bore Hole No: BH-F21 Sampled Date: 27/12/2015 Test Date: Sample No: D-13 07/02/2016

Depth (m) : 19.5

Graphical Representation:



Fines or % of silt and clay = 11 Mean Diameter, $D_{50} = 0.13$ mm Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.63$

% Particles (from the grain -size analysis graph

(0.075 mm size) =

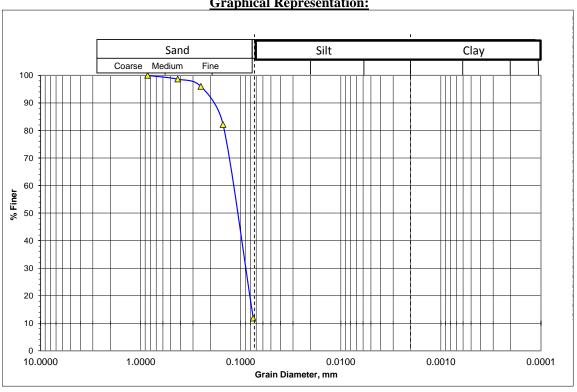
Client: Urban Development Directorate (UDD)

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

Project Location: Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar Bore Hole No: BH-F22 Sampled Date: 29/12/2015 Test Date: Sample No: D-08 07/02/2016

Depth (m) : 12.0

Graphical Representation:



Fines or % of silt and clay = 12

Mean Diameter, $D_{50} = 0.105$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.57$

% Particles (from the grain -size analysis graph

(0.075 mm size) =

Client: Urban Development Directorate (UDD)

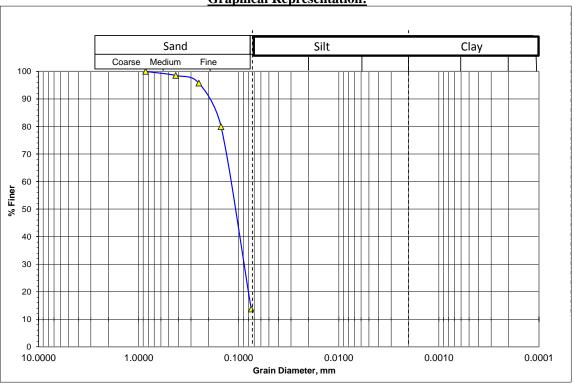
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Choyata, Aliabad

Bore Hole No: BH-F23 Sampled Date: 31/12/2015 Sample No: D-05 Test Date: 09/02/2016

Depth (m) : 7.5

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.58$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 87

Client: Urban Development Directorate (UDD)

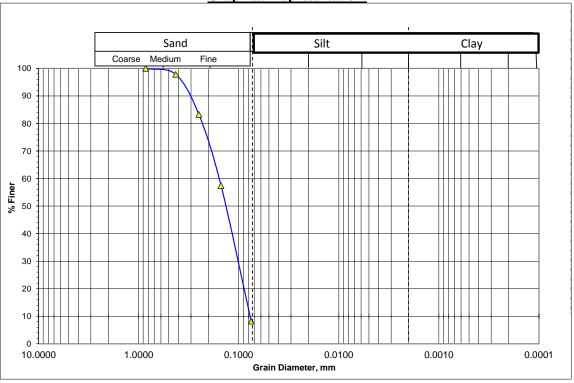
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Choyata, Aliabad

Bore Hole No: BH-F23 Sampled Date: 31/12/2015 Sample No: D-13 Test Date: 09/02/2016

Depth (m) : 19.5





Fines or % of silt and clay = 8 Mean Diameter, $D_{50} = 0.14$ mm Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.66$ % Particles (from the grain -size analysis graph $(0.075mm \ size) = 92$

Client: Urban Development Directorate (UDD)

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

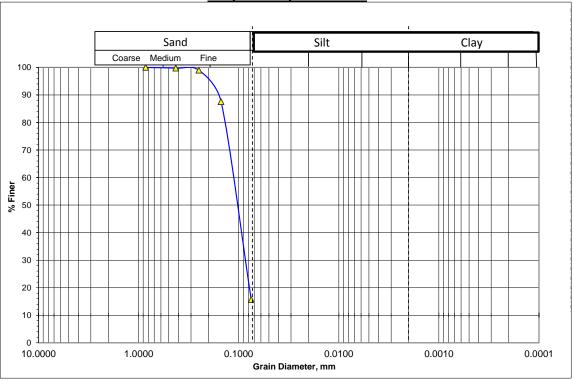
Project Location: Near Payarpur Godaoun, Kaijuri

 Bore Hole No: BH-F24
 Sampled Date: 02/01/2016

 Sample No: D-03
 Test Date: 08/02/2016

Depth (m) : 4.5

Graphical Representation:



Fines or % of silt and clay = 16 Mean Diameter, $D_{50} = 0.1$ mm Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.56$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 84

Client: Urban Development Directorate (UDD)

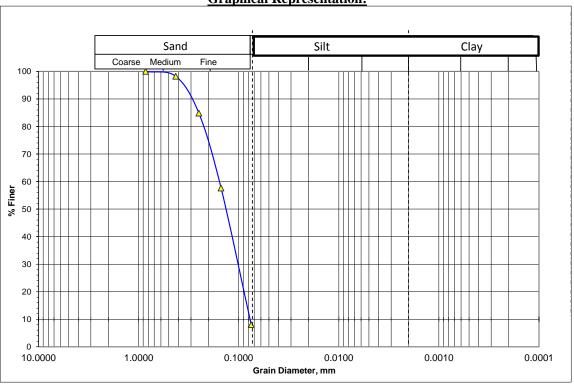
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Near Payarpur Godaoun, Kaijuri

Bore Hole No: BH-F24 Sampled Date: 02/01/2016 Sample No: D-15 Test Date: 08/02/2016

Depth (m) : 22.5





Fines or % of silt and clay = 7 Mean Diameter, $D_{50} = 0.135$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.65$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 93

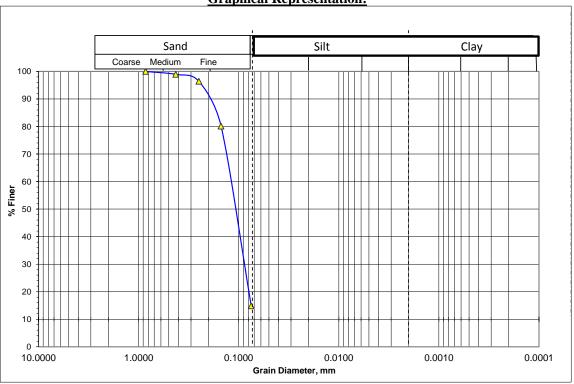
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Krish poshikhan Institude gate, Gunggabodi, Krishnanagar

Bore Hole No: BH-F25 Sampled Date: 04/01/2016 Test Date: Sample No: D-16 08/02/2016

Depth (m) : 24.0

Graphical Representation:



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

(0.075 mm size) =86

Client: Urban Development Directorate (UDD)

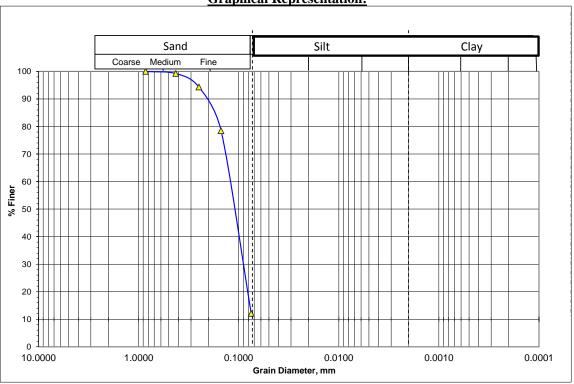
Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Gobinddapur Hat, Krishnanagar

Bore Hole No: BH-F26 Sampled Date: 04/01/2016 Sample No: D-06 Test Date: 09/02/2016

Depth (m) : 9.0

Graphical Representation:



Fines or % of silt and clay = 12Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.60$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 88

Client: Urban Development Directorate (UDD)

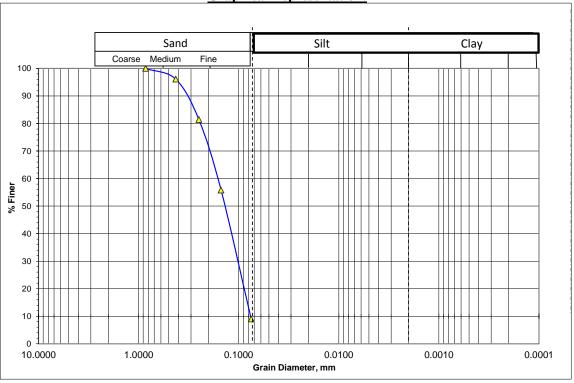
Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Gobinddapur Hat, Krishnanagar

Bore Hole No: BH-F26 Sampled Date: 04/01/2016 Sample No: D-12 Test Date: 09/02/2016

Depth (m) : 18.0





Fines or % of silt and clay = 9 Mean Diameter, $D_{50} = 0.145$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.67$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 91

Client: Urban Development Directorate (UDD)

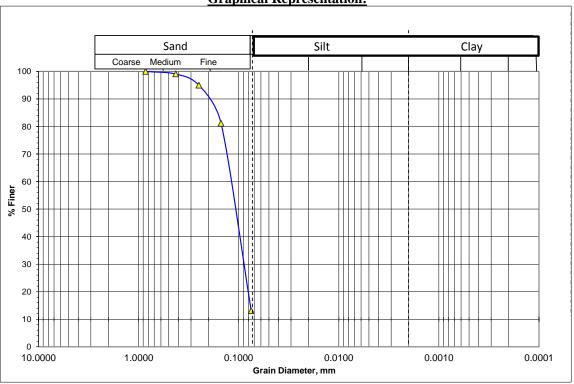
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Bakhunda College Field, Bakhunda, Greda

Bore Hole No: BH-F27 Sampled Date: 02/01/2016 Sample No: D-12 Test Date: 08/02/2016

Depth (m) : 18.0





Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.11$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.58$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 87

Client: Urban Development Directorate (UDD)

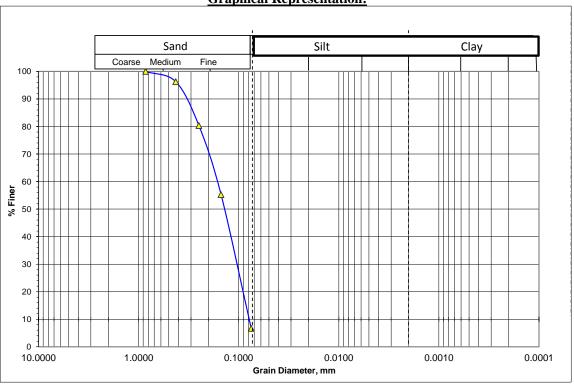
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Bakhunda College Field, Bakhunda, Greda

Bore Hole No: BH-F27 Sampled Date: 02/01/2016 Sample No: D-19 Test Date: 08/02/2016

Depth (m) : 28.5





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

Client: Urban Development Directorate (UDD)

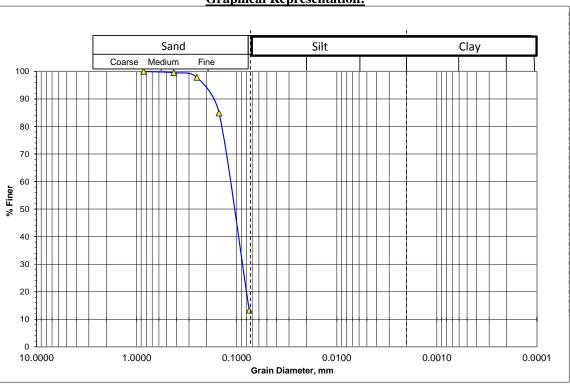
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Chacia fokirbari Road, Kaijuri

Bore Hole No: BH-F28 Sampled Date: 02/01/2016 Sample No: D-03 Test Date: 09/02/2016

Depth (m) : 4.5

Graphical Representation:



Fines or % of silt and clay = 13

Mean Diameter, $D_{50} = 0.105$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.57$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 87

Client: Urban Development Directorate (UDD)

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

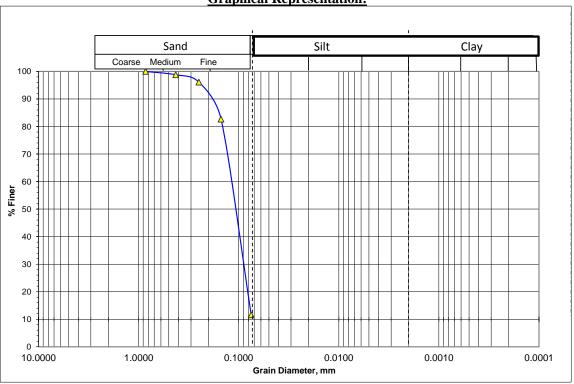
Project Location: Chacia fokirbari Road, Kaijuri

 Bore Hole No: BH-F28
 Sampled Date: 02/01/2016

 Sample No: D-11
 Test Date: 09/02/2016

Depth (m) : 16.5





Fines or % of silt and clay = 11

Mean 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) = 89

Client: Urban Development Directorate (UDD)

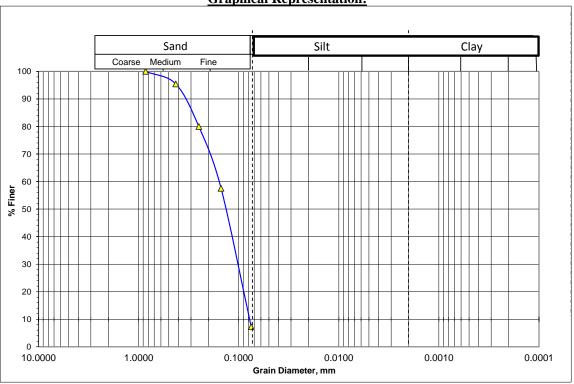
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Chacia fokirbari Road, Kaijuri

Bore Hole No: BH-F28 Sampled Date: 02/01/2016 Sample No: D-16 Test Date: 09/02/2016

Depth (m) : 24.0





Fines or % of silt and clay = 7 Mean Diameter, $D_{50} = 0.145$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.67$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 93

Client: Urban Development Directorate (UDD)

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

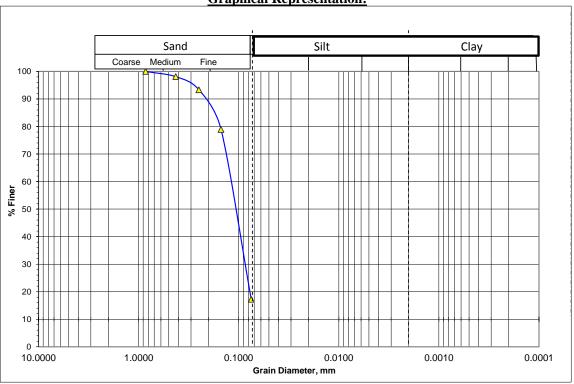
Project Location: Kanaipur Akhak Centre, Kanaipur

 Bore Hole No: BH-F29
 Sampled Date: 04/01/2016

 Sample No: D-07
 Test Date: 09/02/2016

Depth (m) : 10.5





Fines or % of silt and clay = 17

Mean Diameter, $D_{50} = 0.105$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.57$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 83

Client: Urban Development Directorate (UDD)

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

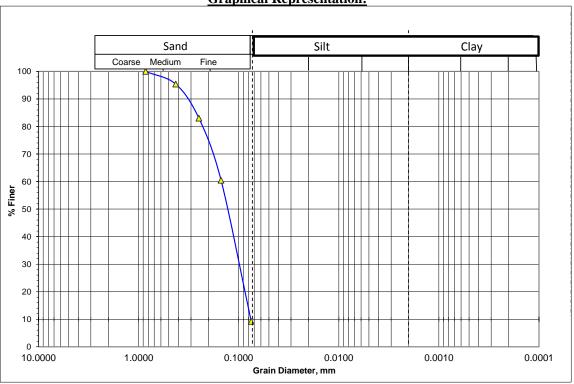
Project Location: Kanaipur Akhak Centre, Kanaipur

 Bore Hole No: BH-F29
 Sampled Date: 04/01/2016

 Sample No: D-15
 Test Date: 09/02/2016

Depth (m) : 22.5

Graphical Representation:



Fines or % of silt and clay = 10

Mean Diameter, $D_{50} = 0.14$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.66$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 90

Client: Urban Development Directorate (UDD)

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

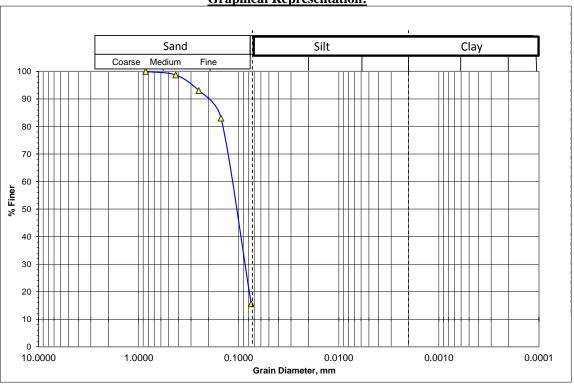
Project Location: Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar

 Bore Hole No: BH-F30
 Sampled Date: 05/01/2016

 Sample No: D-08
 Test Date: 09/01/2016

Depth (m) : 12.0





Fines or % of silt and clay = 15

Mean Diameter, $D_{50} = 0.1$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.56$

% Particles (from the grain -size analysis graph

 $(0.075 \,\mathrm{mm \; size}) = 85$

Client: Urban Development Directorate (UDD)

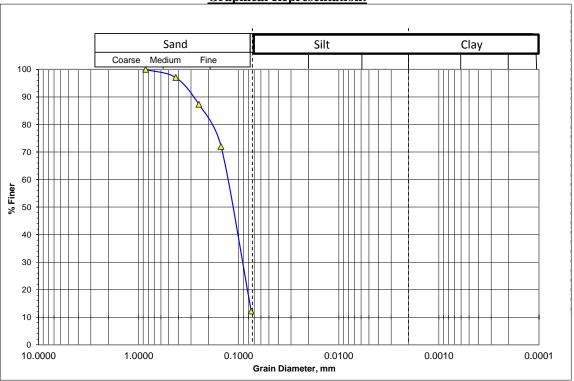
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar

Bore Hole No: BH-F30 Sampled Date: 05/01/2016 Test Date: Sample No: D-14 09/01/2016

Depth (m) : 21.0

Graphical Representation:



Fines or % of silt and clay = 12Mean Diameter, $D_{50} = 0.12$ mm Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.61$ % Particles (from the grain -size analysis graph

(0.075 mm size) =

Client: Urban Development Directorate (UDD)

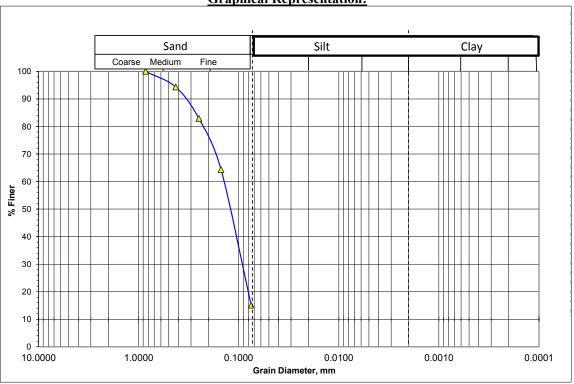
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Vhatpara Govt. Primary School, Kaijuri

Bore Hole No: BH-F31 Sampled Date: 03/01/2016 Sample No: D-12 Test Date: 09/02/2016

Depth (m) : 18.0





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

Client: Urban Development Directorate (UDD)

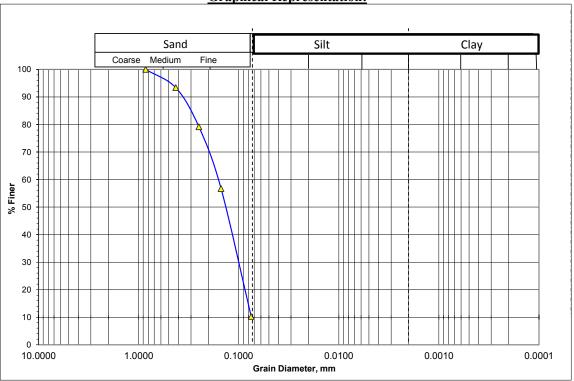
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Vhatpara Govt. Primary School, Kaijuri

Bore Hole No: BH-F31 Sampled Date: 03/01/2016 Sample No: D-17 Test Date: 09/02/2016

Depth (m) : 25.5





Fines or % of silt and clay = 10 Mean Diameter, $D_{50} = 0.145$ mm Silt-Factor, $f = 1.76 \text{xsqrt}(D_{50}) = 0.67$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 90

Client: Urban Development Directorate (UDD)

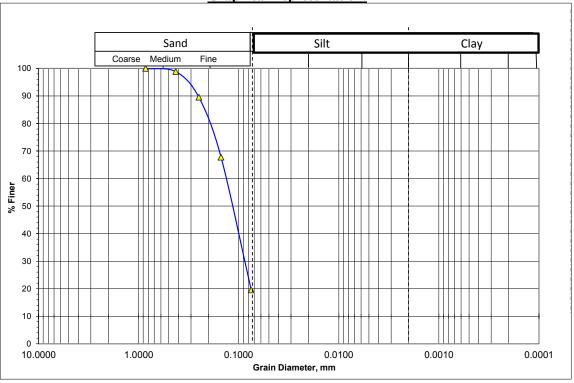
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Fursha Govt. Primary School, Kanaipur

Bore Hole No: BH-F32 Sampled Date: 05/01/2016 Sample No: D-09 Test Date: 08/02/2016

Depth (m) : 13.5





Fines or % of silt and clay = 20 Mean Diameter, D_{50} = 0.12 mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.61$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 80

Client: Urban Development Directorate (UDD)

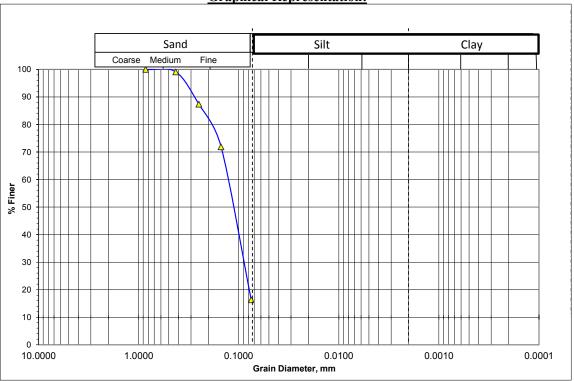
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Fursha Govt. Primary School, Kanaipur

Bore Hole No: BH-F32 Sampled Date: 05/01/2016 Sample No: D-13 Test Date: 08/02/2016

Depth (m) : 19.5





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

Client: Urban Development Directorate (UDD)

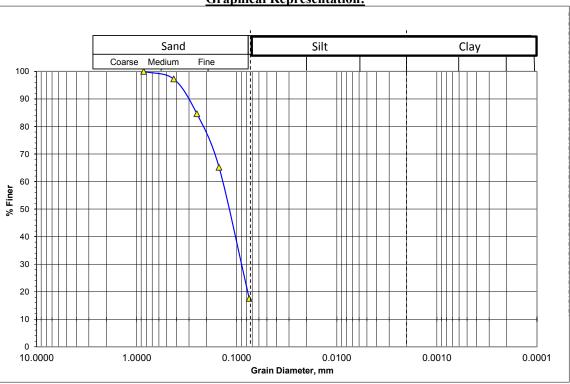
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Dokin Char Kamolpur

Bore Hole No: BH-F33 Sampled Date: 10/01/2016 Sample No: D-09 Test Date: 08/02/2016

Depth (m) : 13.5





Fines or % of silt and clay = 17 Mean Diameter, $D_{50} = 0.125$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.62$

% Particles (from the grain -size analysis graph

(0.075 mm size) =

Client: Urban Development Directorate (UDD)

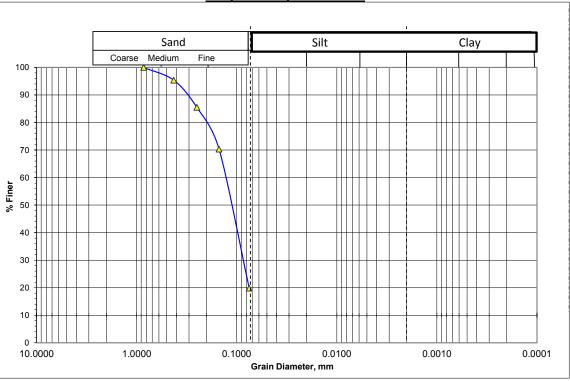
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Dokin Char Kamolpur

Bore Hole No: BH-F33 Sampled Date: 10/01/2016 Sample No: D-15 Test Date: 08/02/2016

Depth (m) : 22.5





Fines or % of silt and clay = 20 Mean Diameter, $D_{50} = 0.115$ mm

Silt-Factor, $f = 1.76x \text{sqrt}(D_{50}) = 0.60$

9% Partiales (from the grain size analysis gr

% Particles (from the grain -size analysis graph

(0.075 mm size) = 80

Client: Urban Development Directorate (UDD)

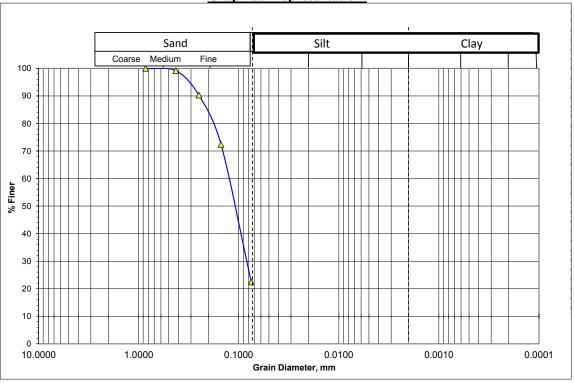
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Tonthoniar Hat, End of Kanaipur Union

Bore Hole No: BH-F34 Sampled Date: 10/01/2016 Sample No: D-8 Test Date: 08/02/2016

Depth (m) : 12.0





Fines or % of silt and clay = 22 Mean Diameter, $D_{50} = 0.11$ mm Silt-Factor, $f = 1.76 \text{xsqrt}(D_{50}) = 0.58$ % Particles (from the grain -size analysis graph (0.075 mm size) = 78(0.005 mm size) & (0.001 mm size) = 22

Tested by : Md. Ashadullah

Client: Urban Development Directorate (UDD)

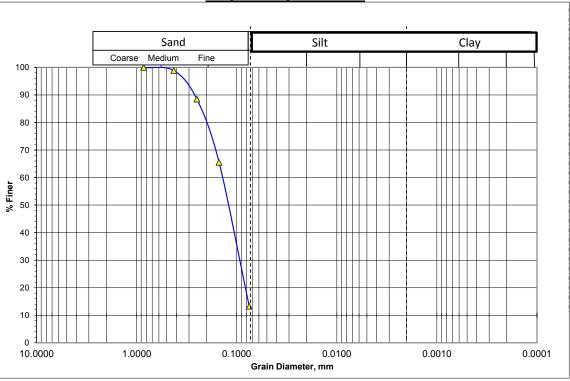
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Tonthoniar Hat, End of Kanaipur Union

Bore Hole No: BH-F34 Sampled Date: 10/01/2016 Sample No: D-14 Test Date: 08/02/2016

Depth (m) : 21.0





Fines or % of silt and clay = 13 Mean Diameter, $D_{50} = 0.13$ mm

Silt-Factor, $f = 1.76x sqrt(D_{50}) = 0.63$

% Particles (from the grain -size analysis graph

(0.075 mm size) = 87

Client: Urban Development Directorate (UDD)

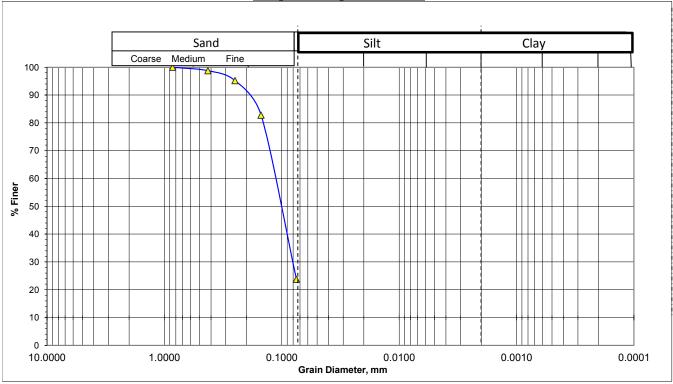
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Nasirar Bazar, Dorghapur, Ishan Gopalpur

Bore Hole No: BH-F35 Sampled Date: 09/01/2016
Sample No: D-02 Test Date: 08/02/2016

Depth (m) : 3.0





Fines or % of silt and clay = 24

Mean Diameter, $D_{50} = 0.1$ mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.56$

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

(0.075 mm size) = 76

Client: Urban Development Directorate (UDD)

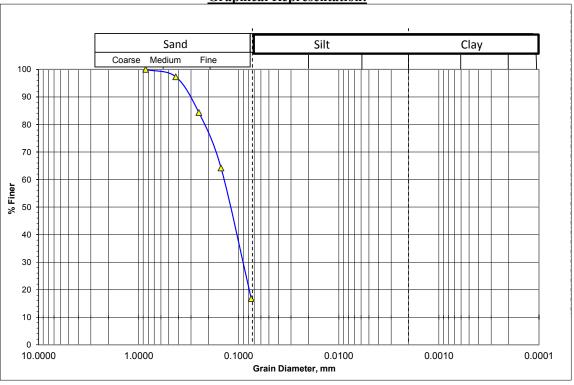
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Near Health Coplex, Ishan Gopalpur

Bore Hole No: BH-F36 Sampled Date: 09/01/2016 Sample No: D-7 Test Date: 08/02/2016

Depth (m) : 10.5





Fines or % of silt and clay = 17 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) = 83 (0.005mm size) & (0.001mm size) = 17

Tested by : Md. Ashadullah

Client: Urban Development Directorate (UDD)

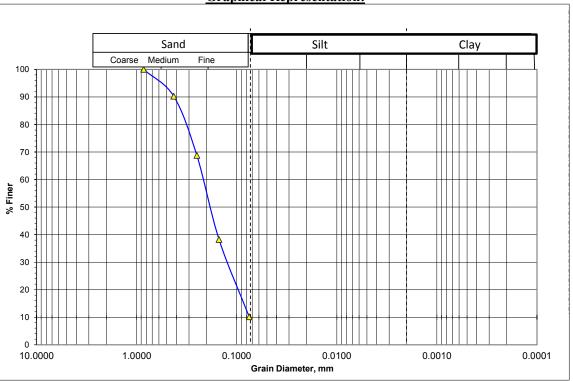
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Near Health Coplex, Ishan Gopalpur

Bore Hole No: BH-F36 Sampled Date: 09/01/2016 Sample No: D-13 Test Date: 08/02/2016

Depth (m) : 19.5





Fines or % of silt and clay = 10 Mean Diameter, $D_{50} = 0.18$ mm Silt-Factor, $f = 1.76 \text{xsqrt}(D_{50}) = 0.75$ % Particles (from the grain -size analysis graph (0.075 mm size) = 90(0.005 mm size) & (0.001 mm size) = 10

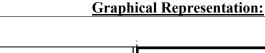
Tested by : Md. Ashadullah

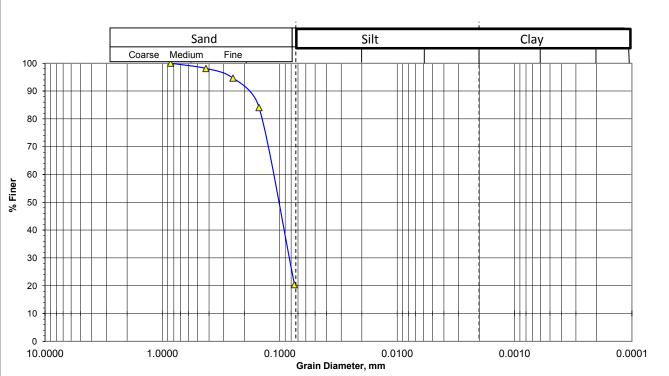
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Doiarampur Govt. Primary School, Doiarampur, Majchar

Bore Hole No: BH-F37 Sampled Date: 09/01/2016 Sample No: D-02 Test Date: 08/02/2016

Depth (m): 3.0





Fines or % of silt and clay = 20

Mean Diameter, $D_{50} =$ 0.1 mm

Silt-Factor, $f = 1.76xsqrt(D_{50}) =$ 0.56

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

(0.075 mm size) =

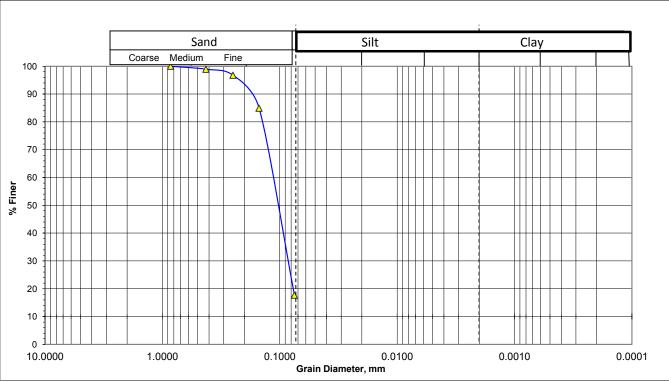
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Doiarampur Govt. Primary School, Doiarampur, Majchar

Bore Hole No: BH-F37 Sampled Date: 09/01/2016
Sample No: D-06 Test Date: 08/02/2016

Depth (m) : 9.0





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).

(0.075 mm size) = 83

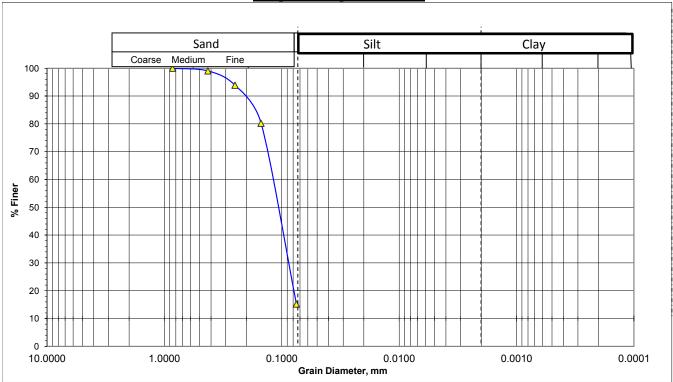
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Doiarampur Govt. Primary School, Doiarampur, Majchar

Bore Hole No: BH-F37 Sampled Date: 09/01/2016
Sample No: D-15 Test Date: 08/02/2016

Depth (m) : 22.5





Fines or % of silt and clay = 15

Mean 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) = 85

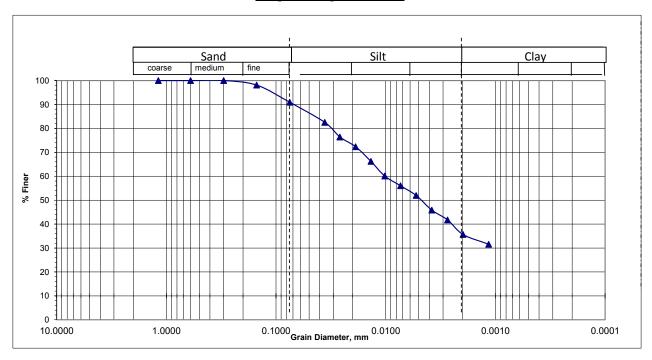
Client: Urban Development Directorate (UDD)

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

Project Location: Char Madhabdia Govt. Primary School, Char Madhabdia Bazar, Char Madhabdia

Bore Hole No : BH F04 Sample No. D27 Sampled Date: 06/01/2016 Depth (m) : 40.5 Test Date : 04/06/2016

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 (0.075 mm size) = 9%, Silt (0.005 mm size) = 55% & Clay (0.001 mm size) = 36%

Client: Urban Development Directorate (UDD)

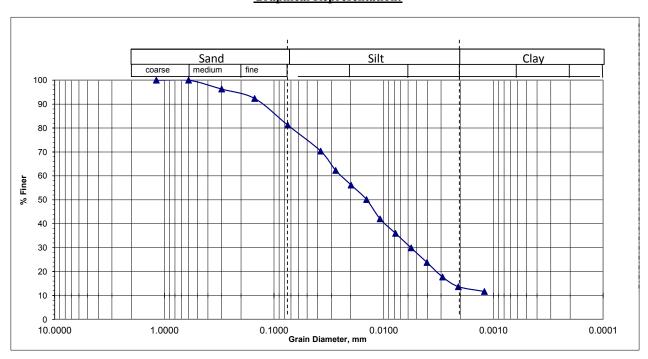
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Pallikobi Jasimuddin Saranshala, Ambikapur

Bore Hole No : BH F06 Sample No. D2 Sampled Date: 10/01/2016

Depth (m) : 3.0 Test Date : 15/02/2016

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 (0.075 mm size) = 20%, Silt (0.005 mm size) = 67% & Clay (0.001 mm size) = 13%

Client: Urban Development Directorate (UDD)

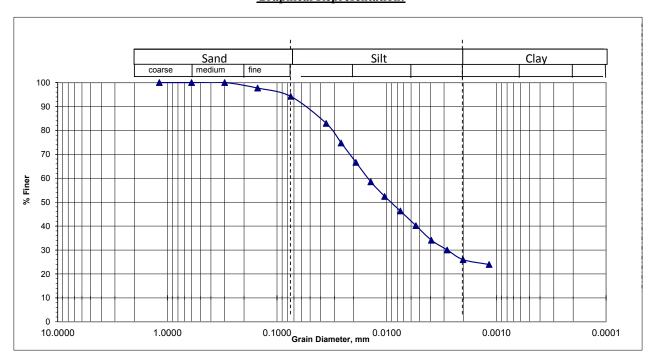
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Near Madhankali Swicth gate, Ambikapur

Bore Hole No : BH F07 Sample No. D3 Sampled Date: 31/12/2015

Depth (m) : 4.5 Test Date : 16/02/2016

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

Client: Urban Development Directorate (UDD)

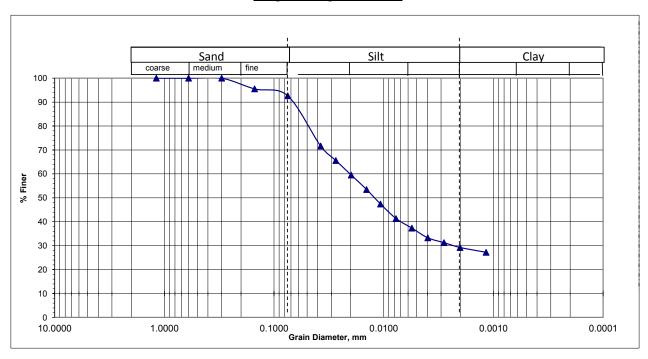
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Dhuldi Railgate, Dhuldi Bazar, Majchar

Bore Hole No : BH F09 Sample No. D4 Sampled Date: 08/01/2016

Depth (m) : 6.0 Test Date : 16/02/2016

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 (0.075 mm size) = 8%, Silt (0.005 mm size) = 63% & Clay (0.001 mm size) = 29%

Client: Urban Development Directorate (UDD)

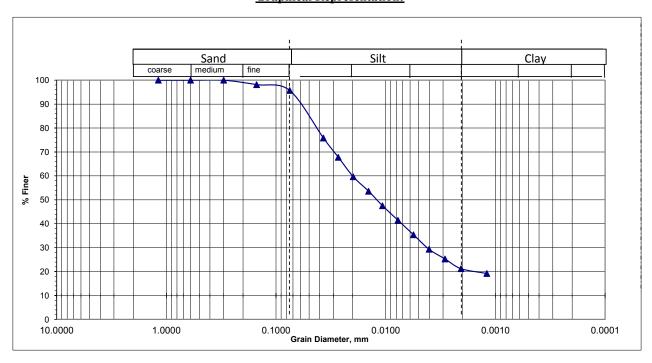
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: 5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar

Bore Hole No : BH F11 Sample No. D3 Sampled Date: 31/12/2015

Depth (m) : 4.5 Test Date : 16/02/2016

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

Client: Urban Development Directorate (UDD)

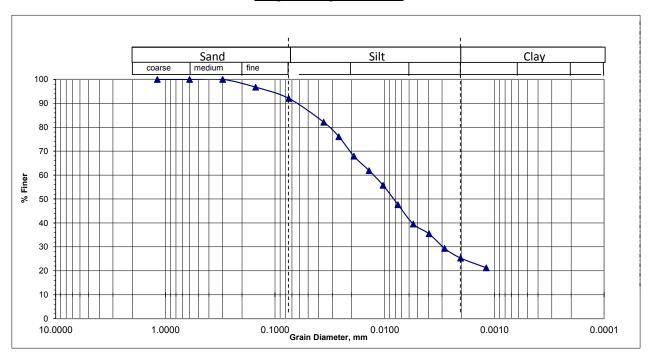
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Dokin Char Kamolpur

Bore Hole No : BH F33 Sample No. D4 Sampled Date: 10/01/2016

Depth (m) : 6.0 Test Date : 24/02/2016

Graphical Representation:



Mean Diameter, $D_{50} = 0.008 \text{ mm}$

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

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

Sand (0.075 mm size) = 8%, Silt (0.005 mm size) = 67% & Clay (0.001 mm size) = 25%

Client: Urban Development Directorate (UDD)

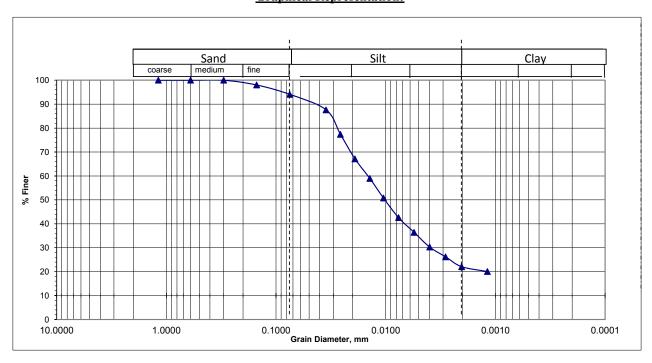
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Vajon Dangga Govt. Primary School, Faridpur Sadar

Bore Hole No : BH F14 Sample No. D3 Sampled Date: 31/12/2015

Depth (m) : 4.5 Test Date : 19/02/2016

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

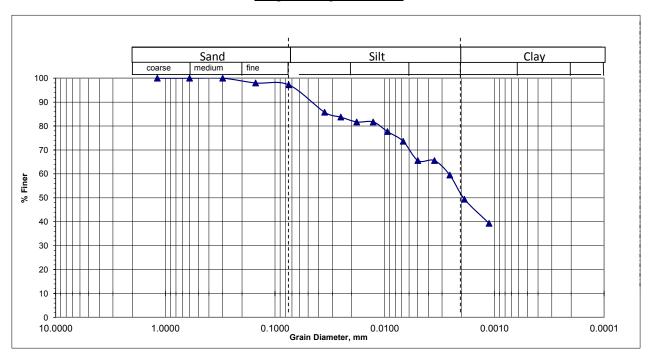
Client: Urban Development Directorate (UDD)

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

Project Location: Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar

Bore Hole No : BH F15 Sample No. D2 Sampled Date: 30/12/2015 Depth (m) : 3.0 Test Date : 20/02/2016

Graphical Representation:



Mean Diameter, $D_{50} = 0.002 \text{ mm}$

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.08$

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

Sand (0.075 mm size) = 3%, Silt (0.005 mm size) = 45% & Clay (0.001 mm size) = 52%

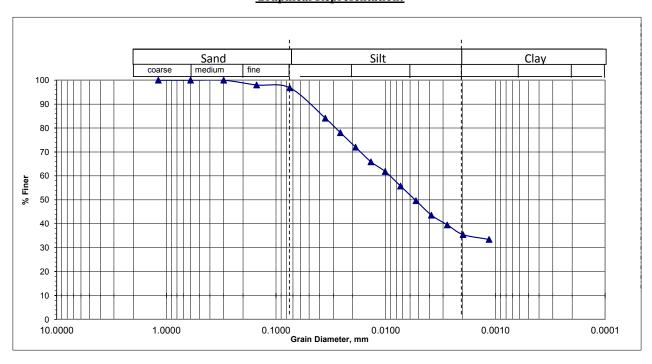
Client: Urban Development Directorate (UDD)

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

Project Location: 94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar

Bore Hole No : BH F16 Sample No. D2 Sampled Date: 30/12/2015 Depth (m) : 3.0 Test Date : 20/02/2016

Graphical Representation:



Mean Diameter, $D_{50} = 0.002 \text{ mm}$

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.08$

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

Sand (0.075 mm size) = 3%, Silt (0.005 mm size) = 62% & Clay (0.001 mm size) = 35%

Client: Urban Development Directorate (UDD)

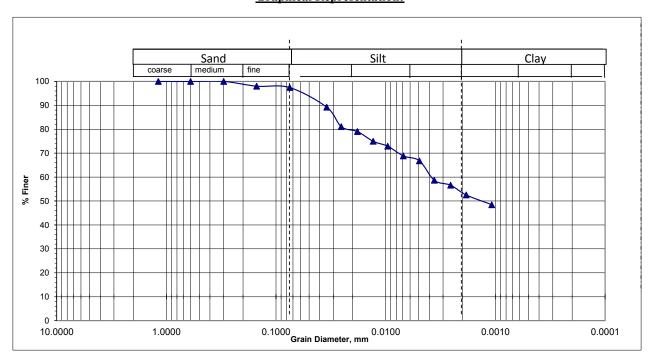
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Mohim School Field, Faridpur Sadar

Bore Hole No : BH F17 Sample No. D1 Sampled Date: 27/12/2015

Depth (m) : 1.5 Test Date : 21/02/2016

Graphical Representation:



Mean Diameter, $D_{50} = 0.0015 \text{ mm}$

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.07$

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

Sand (0.075 mm size) = 3%, Silt (0.005 mm size) = 43% & Clay (0.001 mm size) = 54%

Client: Urban Development Directorate (UDD)

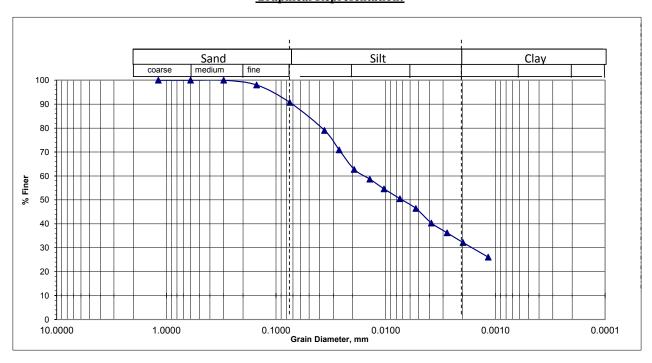
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Mohim School Field, Faridpur Sadar

Bore Hole No : BH F17 Sample No. D3 Sampled Date: 27/12/2015

Depth (m) : 4.5 Test Date : 21/02/2016

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 (0.075 mm size) = 10%, Silt (0.005 mm size) = 57% & Clay (0.001 mm size) = 33%

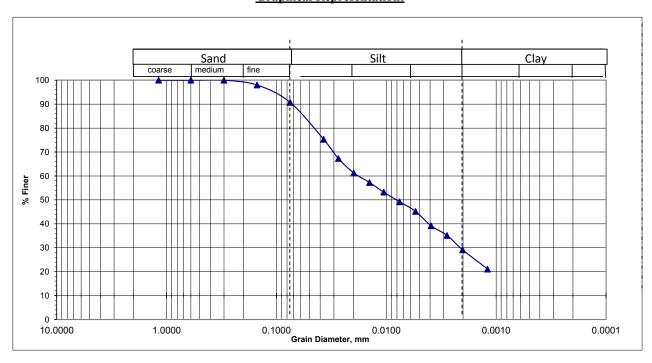
Client: Urban Development Directorate (UDD)

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

Project Location: Mohim School Field, Faridpur Sadar

Bore Hole No : BH F17 Sample No. D10 Sampled Date: 27/12/2015 Depth (m) : 15.0 Test Date : 21/02/2016

Graphical Representation:



Mean Diameter, $D_{50} = 0.008 \text{ mm}$

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

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

Sand (0.075 mm size) = 10%, Silt (0.005 mm size) = 60% & Clay (0.001 mm size) = 30%

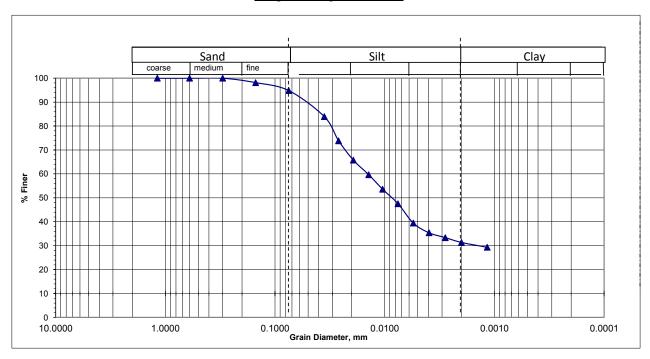
Client: Urban Development Directorate (UDD)

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

Project Location: Raghu Nandanpur Madrasha, Ambikapur

Bore Hole No : BH F18 Sample No. D2 Sampled Date: 28/12/2015 Depth (m) : 3.0 Test Date : 19/02/2016

Graphical Representation:



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

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

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

Sand (0.075 mm size) = 5%, Silt (0.005 mm size) = 63% & Clay (0.001 mm size) = 32%

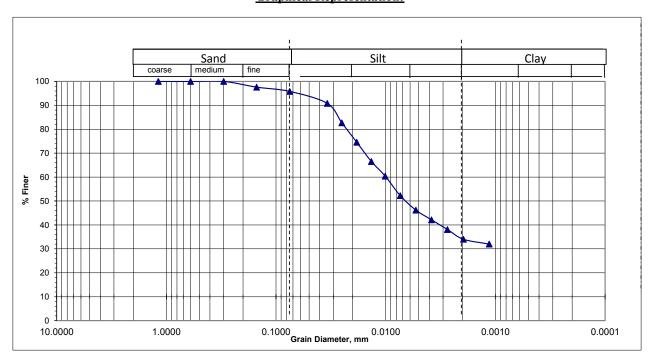
Client: Urban Development Directorate (UDD)

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Porunpur Govt. Primary School, Porunpur Bazar, Majchar

Bore Hole No : BH F19 Sample No. D2 Sampled Date: 06/01/2016

Depth (m) : 3.0 Test Date : 23/02/2016

Graphical Representation:



Mean Diameter, $D_{50} = 0.03 \text{ mm}$

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.30$

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

Sand (0.075 mm size) = 5%, Silt (0.005 mm size) = 61% & Clay (0.001 mm size) = 34%

Client: Urban Development Directorate (UDD)

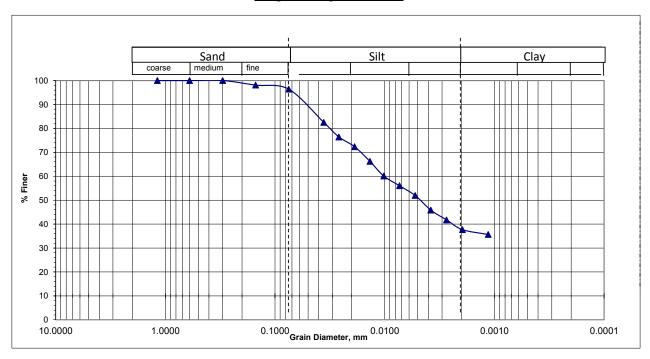
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Hadhokandi Govt. Primary School, River Research Institude, Kaijuri

Bore Hole No : BH F20 Sample No. D2 Sampled Date: 01/01/2016

Depth (m) : 3.0 Test Date : 22/02/2016

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 (0.075 mm size) = 4%, Silt (0.005 mm size) = 58% & Clay (0.001 mm size) = 38%

Client: Urban Development Directorate (UDD)

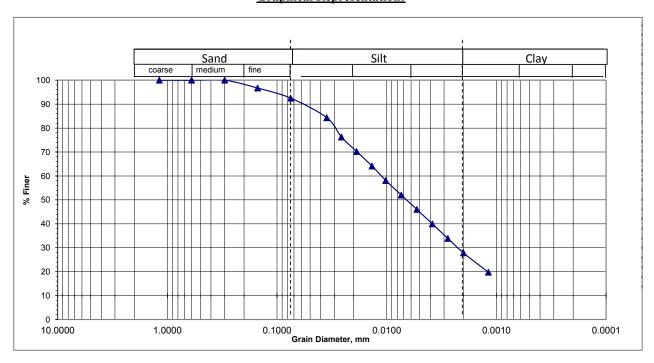
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Hadhokandi Govt. Primary School, River Research Institude, Kaijuri

Bore Hole No : BH F20 Sample No. D5 Sampled Date: 01/01/2016

Depth (m) : 7.5 Test Date : 22/02/2016

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 (0.075 mm size) = 8%, Silt (0.005 mm size) = 65% & Clay (0.001 mm size) = 27%

Client: Urban Development Directorate (UDD)

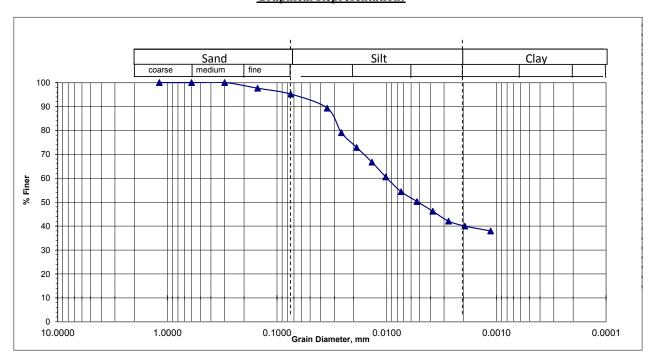
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Johora Begum High School Field, Mia Para Road, Parchim Khabashpur, Faridpur Sadar

Bore Hole No : BH F21 Sample No. D3 Sampled Date: 27/12/2015

Depth (m) : 4.5 Test Date : 23/02/2016

Graphical Representation:



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

Silt-Factor, $f = 1.76xsqrt(D_{50}) = 0.13$

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

Sand (0.075 mm size) = 5%, Silt (0.005 mm size) = 55% & Clay (0.001 mm size) = 40

Client: Urban Development Directorate (UDD)

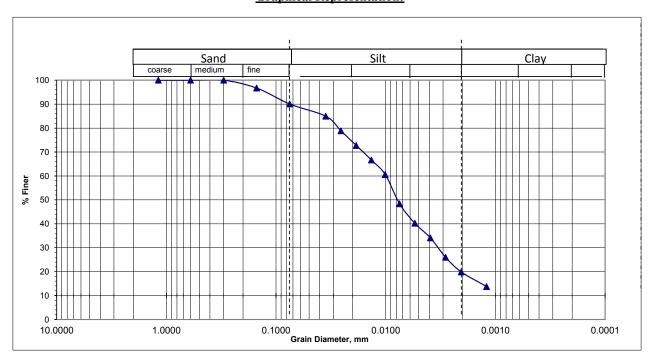
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Johora Begum High School Field, Mia Para Road, Parchim Khabashpur, Faridpur Sadar

Bore Hole No : BH F21 Sample No. D6 Sampled Date: 27/12/2015

Depth (m) : 9.0 Test Date : 23/02/2016

Graphical Representation:



Mean Diameter, $D_{50} = 0.008 \text{ mm}$

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

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

Sand (0.075 mm size) = 10%, Silt (0.005 mm size) = 61% & Clay (0.001 mm size) = 19%

Client: Urban Development Directorate (UDD)

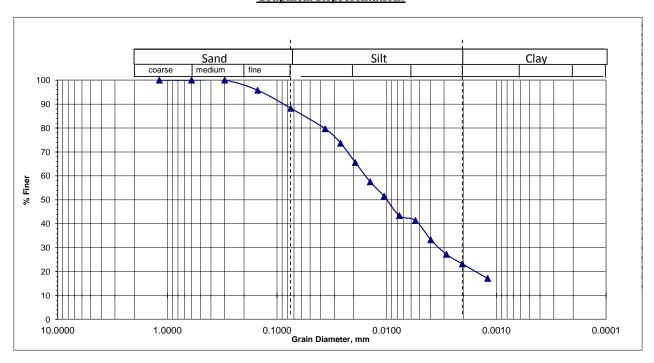
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Near Payarpur Godaoun, Kaijuri

Bore Hole No : BH F24 Sample No. D7 Sampled Date: 02/01/2016

Depth (m) : 10.5 Test Date : 27/02/2016

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 (0.075 mm size) = 12%, Silt (0.005 mm size) = 65% & Clay (0.001 mm size) = 23%

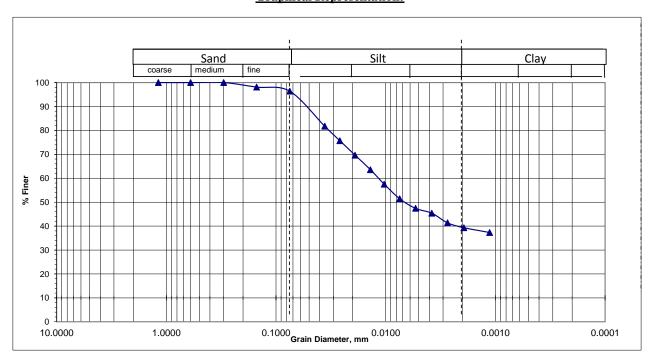
Client: Urban Development Directorate (UDD)

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

Project Location: Krish poshikhan Institude gate, Gunggabodi, Krishnanagar

Bore Hole No : BH F205 Sample No. D2 Sampled Date: 04/01/2016 Depth (m) : 3.0 Test Date : 27/02/2016

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 (0.075 mm size) = 4%, Silt (0.005 mm size) = 56% & Clay (0.001 mm size) = 40%

Client: Urban Development Directorate (UDD)

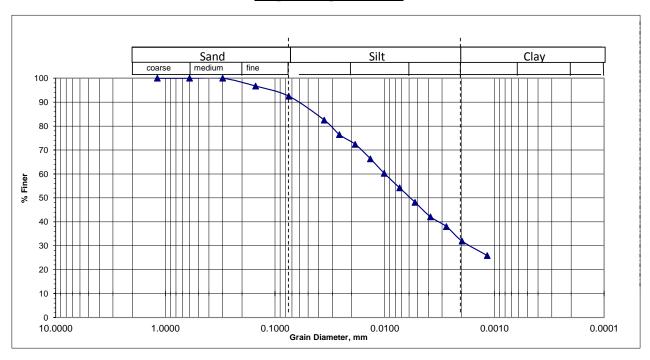
 $Project: Preparation \ of \ Development \ Plan \ for \ Fourteen \ Upazilas (Package-3)$

Project Location: Krish poshikhan Institude gate, Gunggabodi, Krishnanagar

Bore Hole No : BH F25 Sample No. D9 Sampled Date: 04/01/2016

Depth (m) : 13.5 Test Date : 27/02/2016

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 (0.075 mm size) = 8%, Silt (0.005 mm size) = 60% & Clay (0.001 mm size) = 32%

Client: Urban Development Directorate (UDD)

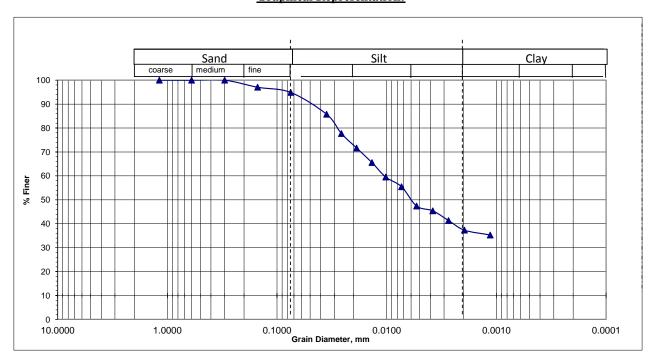
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Gobinddapur Hat, Krishnanagar

Bore Hole No : BH F26 Sample No. D2 Sampled Date: 04/01/2016

Depth (m) : 3.0 Test Date : 27/02/2016

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 (0.075 mm size) = 5%, Silt (0.005 mm size) = 58% & Clay (0.001 mm size) = 37%

Client: Urban Development Directorate (UDD)

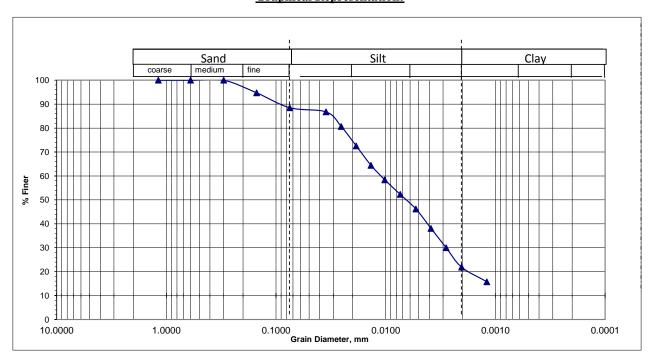
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Bakhunda College Field, Bakhunda, Greda

Bore Hole No : BH F27 Sample No. D5 Sampled Date: 02/01/2016

Depth (m) : 7.5 Test Date : 26/02/2016

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 (0.075 mm size) = 12%, Silt (0.005 mm size) = 68% & Clay (0.001 mm size) = 20%

Client: Urban Development Directorate (UDD)

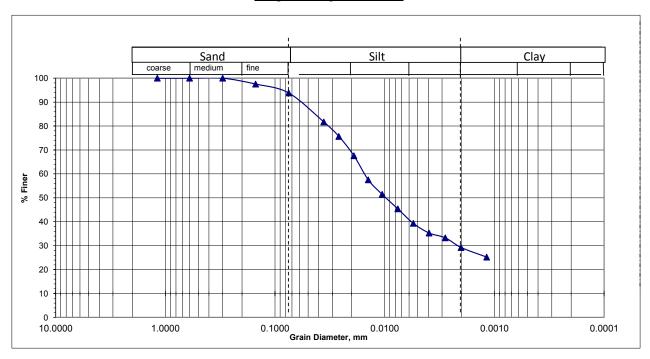
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Kanaipur Akhak Centre, Kanaipur

Bore Hole No : BH F29 Sample No. D2 Sampled Date: 04/01/2016

Depth (m) : 3.0 Test Date : 25/02/2016

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 (0.075 mm size) = 7%, Silt (0.005 mm size) = 63% & Clay (0.001 mm size) = 30%

Client: Urban Development Directorate (UDD)

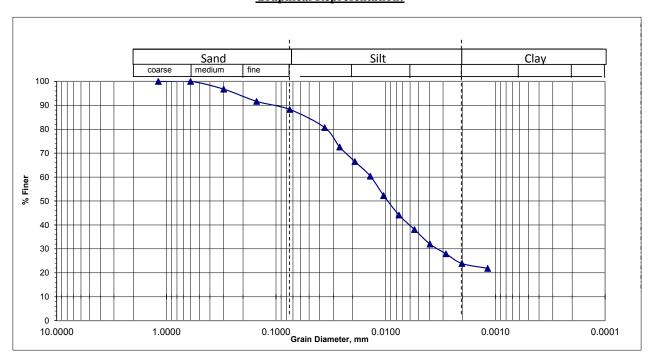
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar

Bore Hole No : BH F30 Sample No. D4 Sampled Date: 05/01/2016

Depth (m) : 6.0 Test Date : 25/02/2016

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 (0.075 mm size) = 12%, Silt (0.005 mm size) = 65% & Clay (0.001 mm size) = 23%

Client: Urban Development Directorate (UDD)

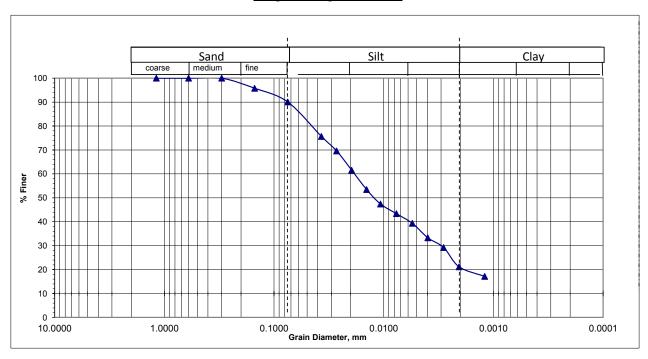
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Vhatpara Govt. Primary School, Kaijuri

Bore Hole No : BH F31 Sample No. D4 Sampled Date: 03/01/2016

Depth (m) : 6.0 Test Date : 25/02/2016

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 (0.075 mm size) = 10%, Silt (0.005 mm size) = 70% & Clay (0.001 mm size) = 20%

Client: Urban Development Directorate (UDD)

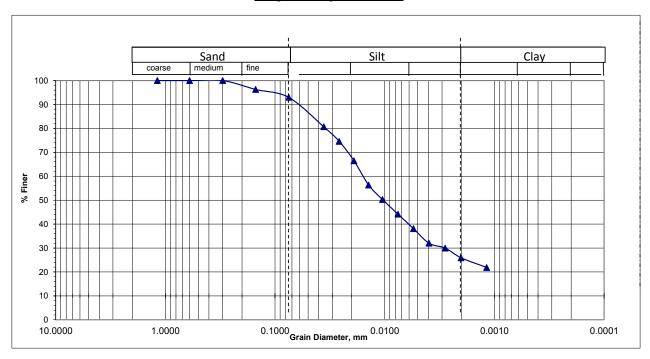
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Fursha Govt. Primary School, Kanaipur

Bore Hole No : BH F32 Sample No. D4 Sampled Date: 05/01/2016

Depth (m) : 6.0 Test Date : 24/02/2016

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 (0.075 mm size) = 8%, Silt (0.005 mm size) = 66% & Clay (0.001 mm size) = 26%

Client: Urban Development Directorate (UDD)

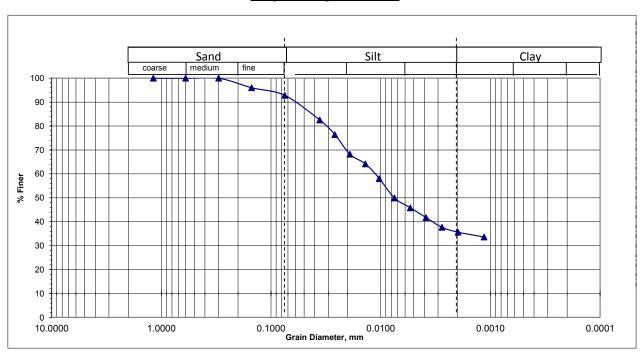
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Tonthoniar Hat, End of Kanaipur Union

Bore Hole No : BH F34 Sample No. D2 Sampled Date: 10/01/2016

Depth (m) : 3.0 Test Date : 24/02/2016

Graphical Representation:



Mean Diameter, $D_{50} = 0.008 \text{ mm}$

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

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

Sand (0.075 mm size) = 8%, Silt (0.005 mm size) = 57% & Clay (0.001 mm size) = 35%

Client: Urban Development Directorate (UDD)

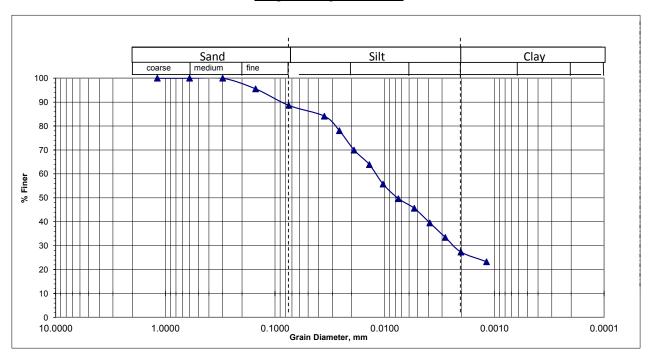
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Project Location: Near Health Coplex, Ishan Gopalpur

Bore Hole No : BH F36 Sample No. D4 Sampled Date: 09/01/2016

Depth (m) : 6.0 Test Date : 24/02/2016

Graphical Representation:



Mean Diameter, $D_{50} = 0.008 \text{ mm}$

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

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

Sand (0.075 mm size) = 12%, Silt (0.005 mm size) = 61% & Clay (0.001 mm size) = 27%

Client: Urban Development Directorate (UDD)

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

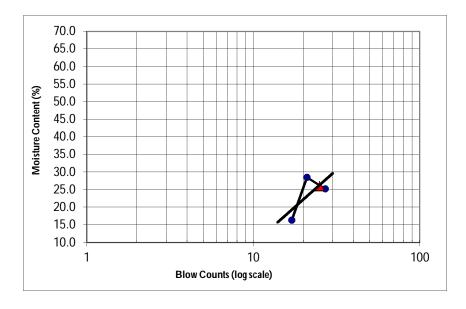
Project Location: SOUTH DIGRIRCHAR MADHOBDIA GOVT. PRI. SCHOOL, Madhubdia

Sample Information:

Sample Date: 5/1/2016Test Date: 12/9/2016Boring Number BH-02Sample Number D1Depth of Sample(m) 1.5

Limit		
C55	C66	C77
42.13	44.27	41.35
99.09	65.03	71.6
91.09	60.42	65.5
16.3	28.5	25.3
17	21	27
	C55 42.13 99.09 91.09 16.3	C55 C66 42.13 44.27 99.09 65.03 91.09 60.42 16.3 28.5

Determination of Plastic Limit		
Cup Number	Ct103	Ct103
Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	21.19	21.55
Weight of Dry Soil and Cup (g)	21.04	21.13
Moisure Content (%)	10.1	26.6
<u> </u>	-	



Liquid Limit	26
Plastic Limit	18
Plasticity Index	8

Client: Urban Development Directorate (UDD)

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

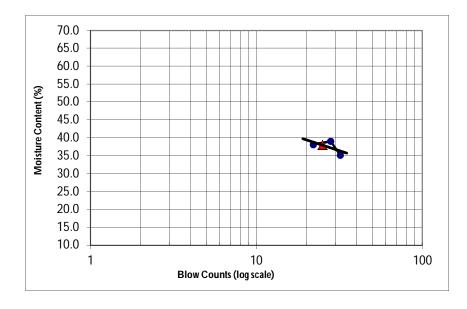
Project Location: Char Madhabdia Govt.Primary School, Char Madhabdia Bazar, Char Madhabdia

Sample Information:

Sample Date: 6/1/2016Test Date: 12/9/2016Boring Number BH-04Sample Number D1Depth of Sample(m) 1.5

Determination of Liquid I	Limit		
Cup Number	C10	C14	C220
Weight of Cup (g)	36.96	36.45	36.67
Weight of Wet Soil and Cup (g)	118.08	64.13	52.28
Weight of Dry Soil and Cup (g)	95.68	56.36	48.22
Moisure Content (%)	38.1	39.0	35.2
Blow Counts	22	28	32

Determination of Plastic Limit		
Ct302	Ct302	
12.15	12.15	
13.77	14.08	
13.35	13.66	
35.0	27.8	
	Ct302 12.15 13.77 13.35	



Liquid Limit_	38
Plastic Limit	31
Plasticity Index	7

Client: Urban Development Directorate (UDD)

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

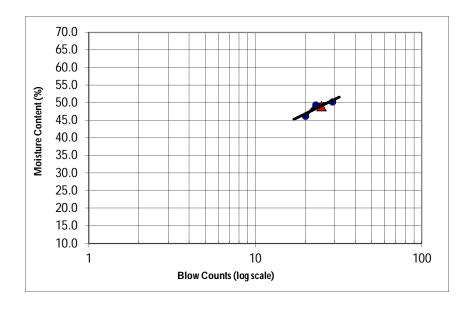
Project Location: Khalilpur Bazar, Majchar

Sample Information:

Sample Date: 7/1/2016Test Date: 12/9/2016Boring Number BH-10Sample Number D1Depth of Sample(m) 1.5

Determination of Liquid I	imit		
Cup Number	C03	C08	C09
Weight of Cup (g)	42.13	44.27	41.35
Weight of Wet Soil and Cup (g)	105.95	65.52	71.61
Weight of Dry Soil and Cup (g)	85.77	58.5	61.49
Moisure Content (%)	46.2	49.3	50.2
Blow Counts	20	23	29

Ct111	Ct111
19.55	19.55
21.86	21.95
21.62	21.2
11.6	45.5
	19.55 21.86 21.62



Liquid Limit_	49
Plastic Limit	29
Plasticity Index	20

Client : Urban Development Directorate (UDD)

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

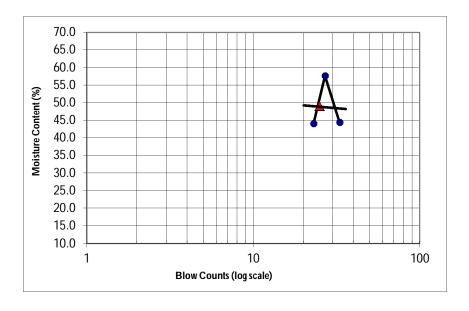
Project Location: 5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar

Sample Information:

Sample Date: 31/12/2015Test Date: 12/9/2016Boring Number $\underline{BH-11}$ Sample Number $\underline{D2}$ Depth of Sample(m) $\underline{3.0}$

Determination of Liquid I	Limit		
Cup Number	C01	C07	C11
Weight of Cup (g)	36.96	36.45	36.67
Weight of Wet Soil and Cup (g)	117.18	69.43	55.37
Weight of Dry Soil and Cup (g)	92.65	57.37	49.62
Moisure Content (%)	44.0	57.6	44.4
Blow Counts	23	27	33

Ct102	Ct102
12.15	12.15
14.45	14.38
13.85	13.56
35.3	58.2
	12.15 14.45 13.85



Liquid Limit_	49
Plastic Limit	47
Plasticity Index	2

Client: Urban Development Directorate (UDD)

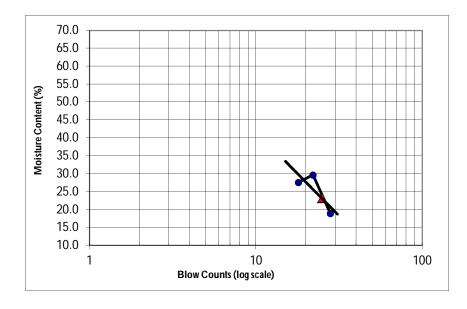
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Vajon Dangga Govt. Primary School, Faridpur Sadar

Sample Information:

Sample Date: 31/12/2015Test Date: 12/9/2016Boring Number $\underline{BH-14}$ Sample Number $\underline{D2}$ Depth of Sample(m) $\underline{3.0}$

Determination of Liquid Limit			
Cup Number	C44	C33	C88
Weight of Cup (g)	42.13	44.27	41.35
Weight of Wet Soil and Cup (g)	100.89	70.53	73.63
Weight of Dry Soil and Cup (g)	88.19	64.52	68.5
Moisure Content (%)	27.6	29.7	18.9
Blow Counts	18	22	28

Determination of Plastic Limit		
Cup Number	Ct104	Ct104
Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	21.86	21.65
Weight of Dry Soil and Cup (g)	21.54	21.23
Moisure Content (%)	16.1	25.0



Liquid Limit	23
Plastic Limit	21
Plasticity Index	3

Client: Urban Development Directorate (UDD)

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

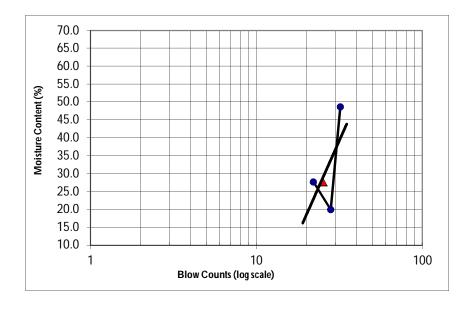
Project Location: Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar

Sample Information:

Sample Date: 30/12/2015Test Date: 13/9/2016Boring Number $\underline{BH-15}$ Sample Number $\underline{D2}$ Depth of Sample(m) $\underline{3.0}$

Determination of Liquid Limit			
Cup Number	C10	C14	C220
Weight of Cup (g)	36.96	36.45	36.67
Weight of Wet Soil and Cup (g)	117.08	65.13	61.28
Weight of Dry Soil and Cup (g)	99.68	60.36	53.22
Moisure Content (%)	27.7	19.9	48.7
Blow Counts	22	28	32

Determination of Plastic Limit		
Ct302	Ct302	
12.15	12.15	
13.77	14.18	
13.3	13.96	
40.9	12.2	
	Ct302 12.15 13.77 13.3	



Liquid Limit	28
Plastic Limit	27
Plasticity Index	1

Client : Urban Development Directorate (UDD)

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

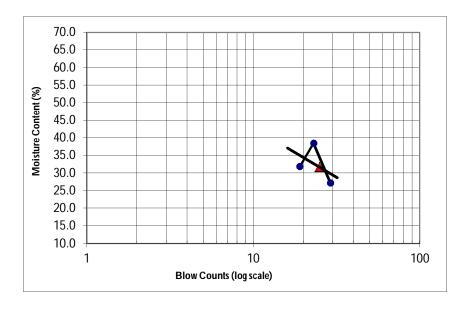
Project Location: 94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar

Sample Information:

Sample Date: 30/12/2015Test Date: 13/9/2016Boring Number $\underline{BH-16}$ Sample Number $\underline{D2}$ Depth of Sample(m) $\underline{3.0}$

Determination of Liquid Limit			
Cup Number	C03	C08	C09
Weight of Cup (g)	42.13	44.27	41.35
Weight of Wet Soil and Cup (g)	104.95	69.52	74.61
Weight of Dry Soil and Cup (g)	89.77	62.5	67.49
Moisure Content (%)	31.9	38.5	27.2
Blow Counts	19	23	29

Determination of Plastic Limit		
11		
55		
85		
39		
.0		



Liquid Limit	32
Plastic Limit	21
Plasticity Index	11

Client: Urban Development Directorate (UDD)

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

Project Location: Mohim School Field, Faridpur Sadar

Sample Information:

 Sample Date:
 27/12/2015

 Test Date:
 13/9/2016

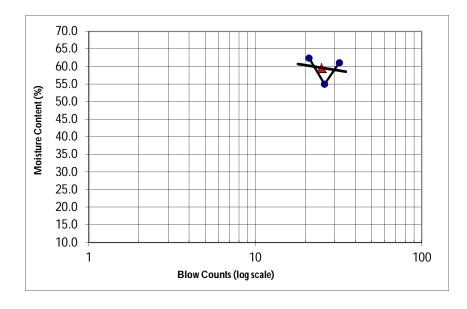
 Boring Number
 BH-17

 Sample Number
 D1

 Depth of Sample(m)
 1.5

Determination of Liquid Limit			
Cup Number	C01	C07	C11
Weight of Cup (g)	36.96	36.45	36.67
Weight of Wet Soil and Cup (g)	124.18	70.43	62.37
Weight of Dry Soil and Cup (g)	90.65	58.37	52.62
Moisure Content (%)	62.5	55.0	61.1
Blow Counts	21	26	32

Determination of Plastic Limit		
Cup Number	Ct102	Ct102
Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	14.75	14.68
Weight of Dry Soil and Cup (g)	13.85	13.79
Moisure Content (%)	52.9	54.3
morare content ()	02.,	•



Liquid Limit	60
Plastic Limit	54
Plasticity Index	6

Client: Urban Development Directorate (UDD)

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

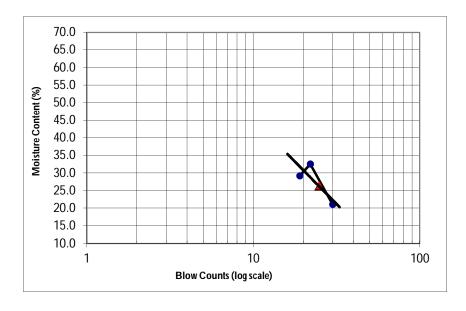
Project Location: Hadhokandi Govt. Primary School, Oposite side of River Research Institude, Kaijuri

Sample Information:

Sample Date: 1/1/2016Test Date: 13/9/2016Boring Number BH-20Sample Number D3Depth of Sample(m) 4.5

Determination of Liquid Limit			
Cup Number	C55	C66	C77
Weight of Cup (g)	42.13	44.27	41.35
Weight of Wet Soil and Cup (g)	95.09	63.03	70.6
Weight of Dry Soil and Cup (g)	83.09	58.42	65.5
Moisure Content (%)	29.3	32.6	21.1
Blow Counts	19	22	30

Determination of Plastic Limit		
Cup Number	Ct103	Ct103
Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	21.66	21.55
Weight of Dry Soil and Cup (g)	21.39	21.29
Moisure Content (%)	14.7	14.9



Liquid Limit	26
Plastic Limit	15
Plasticity Index	12

Client: Urban Development Directorate (UDD)

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

Project Location: Johora Begum High School Field, Parchim Khabashpur, Faridpur Sadar

Sample Information:

 Sample Date:
 27/12/2015

 Test Date:
 13/9/2016

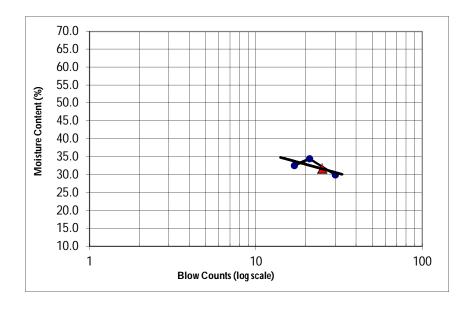
 Boring Number
 BH-21

 Sample Number
 D1

 Depth of Sample(m)
 1.5

Determination of Liquid Limit				
•		Gaa	Goo	
Cup Number	C44	C33	C88	
Weight of Cup (g)	42.13	44.27	41.35	
Weight of Wet Soil and Cup (g)	101.89	75.53	76.63	
Weight of Dry Soil and Cup (g)	87.19	67.52	68.5	
Moisure Content (%)	32.6	34.5	29.9	
Blow Counts	17	21	30	

Determination of Plastic Limit		
Cup Number	Ct104	Ct104
Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	21.76	21.37
Weight of Dry Soil and Cup (g)	21.39	21.03
Moisure Content (%)	20.1	23.0



Liquid Limit	32
Plastic Limit	22
Plasticity Index	10

Client: Urban Development Directorate (UDD)

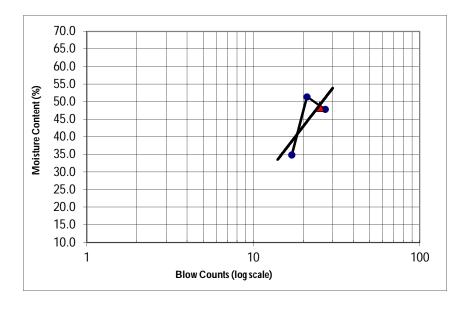
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Project Location: Krish poshikhan Institude gate, Gunggabodi, Krishnanagar

Sample Information:

Sample Date: 4/1/2016Test Date: 14/9/2016Boring Number BH-19Sample Number D1Depth of Sample(m) 1.5

Determination of Liquid Limit			
Cup Number	C03	C08	C09
Weight of Cup (g)	42.13	44.27	41.35
Weight of Wet Soil and Cup (g)	96.95	60.52	66.69
Weight of Dry Soil and Cup (g)	82.77	55	58.49
Moisure Content (%)	34.9	51.4	47.8
Blow Counts	17	21	27

Determination of Plastic Limit		
Cup Number	Ct111	Ct111
Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	21.06	21.75
Weight of Dry Soil and Cup (g)	20.53	21.59
Moisure Content (%)	54.1	7.8



Liquid Limit	49
Plastic Limit	31
Plasticity Index	18

Client: Urban Development Directorate (UDD)

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

Project Location: Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar

Sample Information:

 Sample Date:
 29/12/2015

 Test Date:
 14/9/2016

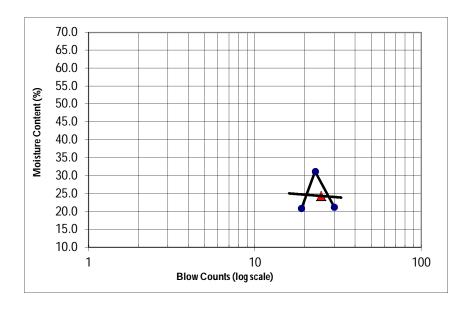
 Boring Number
 BH-22

 Sample Number
 D5

 Depth of Sample(m)
 7.5

Determination of Liquid Limit			
Cup Number	C44	C33	C88
Weight of Cup (g)	42.13	44.27	41.35
Weight of Wet Soil and Cup (g)	109.89	69.53	70.63
Weight of Dry Soil and Cup (g)	98.19	63.52	65.5
Moisure Content (%)	20.9	31.2	21.2
Blow Counts	19	23	30

Determination of Plastic Limit		
Cup Number	Ct104	Ct104
Weight of Cup (g)	19.55	19.55
Weight of Wet Soil and Cup (g)	21.86	21.45
Weight of Dry Soil and Cup (g)	21.44	21.23
Moisure Content (%)	22.2	13.1
Moisure Content (%)	22.2	13.1



Liquid Limit	24
Plastic Limit	18
Plasticity Index	7

Client : Urban Development Directorate (UDD)

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

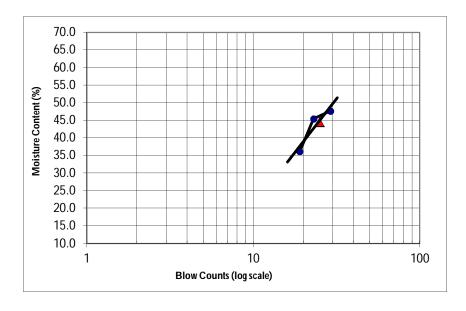
Project Location: Choyata, Aliabad

Sample Information:

Sample Date: 31/12/2016Test Date: 14/9/2016Boring Number BH-23Sample Number D1Depth of Sample(m) 1.5

Determination of Liquid I	imit		
Determination of Liquid I	⊒IIIIIt	T	
Cup Number	C55	C66	C77
Weight of Cup (g)	42.13	44.27	41.35
Weight of Wet Soil and Cup (g)	91.09	59.03	64.6
Weight of Dry Soil and Cup (g)	78.09	54.42	57.1
Moisure Content (%)	36.2	45.4	47.6
Blow Counts	19	23	29

Determination of Plastic Limit		
Ct103	Ct103	
19.55	19.55	
21.86	21.75	
21.44	21.23	
22.2	31.0	
	Ct103 19.55 21.86 21.44	



Liquid Limit	45
Plastic Limit	27
Plasticity Index	18

Client : Urban Development Directorate (UDD)

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

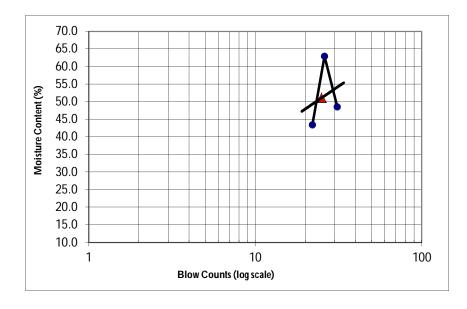
Project Location: Near Payarpur Godaoun, Kaijuri

Sample Information:

Sample Date: 2/1/2016Test Date: 14/9/2016Boring Number BH-24Sample Number D1Depth of Sample(m) 1.5

Determination of Liquid Limit			
Cup Number	C01	C07	C11
Weight of Cup (g)	36.96	36.45	36.67
Weight of Wet Soil and Cup (g)	121.18	75.43	60.37
Weight of Dry Soil and Cup (g)	95.65	60.37	52.62
Moisure Content (%)	43.5	63.0	48.6
Blow Counts	22	26	31

Determination of Plastic Limit		
Ct102	Ct102	
12.15	12.15	
14.59	14.38	
13.59	13.96	
69.4	23.2	
	Ct102 12.15 14.59 13.59	



Liquid Limit	51
Plastic Limit	46
Plasticity Index	5

Client : Urban Development Directorate (UDD)

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

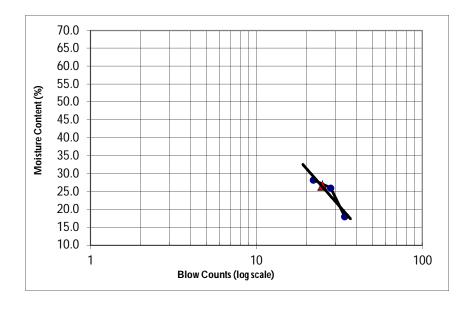
Project Location: Gobinddapur Hat, Krishnanagar

Sample Information:

Sample Date: 4/1/2016Test Date: 14/9/2016Boring Number BH-26Sample Number D1Depth of Sample(m) 1.5

D-4iti	114		
Determination of Liquid I	_1mit	-	
Cup Number	C10	C14	C220
Weight of Cup (g)	36.96	36.45	36.67
Weight of Wet Soil and Cup (g)	125.08	74.13	63.28
Weight of Dry Soil and Cup (g)	105.68	66.36	59.22
Moisure Content (%)	28.2	26.0	18.0
Blow Counts	22	28	34

Determination of Plastic Limit		
Cup Number	Ct302	Ct302
Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	13.45	14.18
Weight of Dry Soil and Cup (g)	13.35	13.66
Moisure Content (%)	8.3	34.4
Moisure Content (%)	8.3	54.4



Liquid Limit	27
Plastic Limit	21
Plasticity Index	5

Client: Urban Development Directorate (UDD)

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

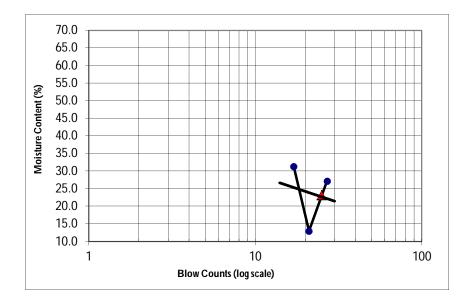
Project Location: Bakhunda College Field, Bakhunda, Greda

Sample Information:

Sample Date: 2/1/2016Test Date: 15/9/2016Boring Number BH-27Sample Number D1Depth of Sample(m) 1.5

Determination of Liquid Limit			
Cup Number	C55	C66	C77
Weight of Cup (g)	42.13	44.27	41.35
Weight of Wet Soil and Cup (g)	105.09	67.03	74.6
Weight of Dry Soil and Cup (g)	90.09	64.42	67.5
Moisure Content (%)	31.3	13.0	27.2
Blow Counts	17	21	27

Determination of Plastic Limit		
Ct103	Ct103	
19.55	19.55	
21.76	21.75	
21.44	21.33	
16.9	23.6	
	Ct103 19.55 21.76 21.44	



Liquid Limit	23
Plastic Limit	20
Plasticity Index	3

Client: Urban Development Directorate (UDD)

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

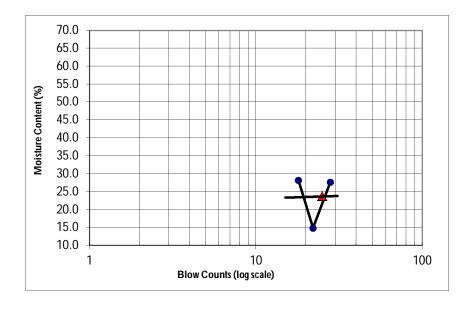
Project Location: Chacia fokirbari Road, Kaijuri

Sample Information:

Sample Date: 2/1/2016Test Date: 15/9/2016Boring Number BH-28Sample Number D1Depth of Sample(m) 1.5

Determination of Liquid Limit				
Cup Number	C44	C33	C88	
Weight of Cup (g)	42.13	44.27	41.35	
Weight of Wet Soil and Cup (g)	99.89	67.53	69.63	
Weight of Dry Soil and Cup (g)	87.19	64.52	63.5	
Moisure Content (%)	28.2	14.9	27.7	
Blow Counts	18	22	28	

Determination of Plastic Limit		
Ct104	Ct104	
19.55	19.55	
21.96	21.63	
21.51	21.33	
23.0	16.9	
	Ct104 19.55 21.96 21.51	



Liquid Limit	24
Plastic Limit	20
Plasticity Index	4

Client : Urban Development Directorate (UDD)

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

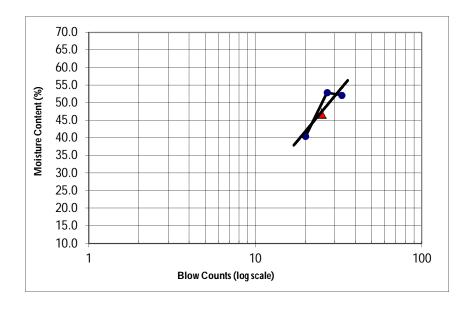
Project Location: Kanaipur Akhak Centre, Kanaipur

Sample Information:

Sample Date: 4/1/2016Test Date: 15/9/2016Boring Number BH-29Sample Number D2Depth of Sample(m) 3.0

Determination of Liquid Limit				
C01	C07	C11		
36.96	36.45	36.67		
115.18	68.43	56.37		
92.65	57.37	49.62		
40.5	52.9	52.1		
20	27	33		
	C01 36.96 115.18 92.65 40.5	C01 C07 36.96 36.45 115.18 68.43 92.65 57.37 40.5 52.9		

Determination of Plastic Limit		
Cup Number	Ct102	Ct102
Weight of Cup (g)	12.15	12.15
Weight of Wet Soil and Cup (g)	14.61	14.39
Weight of Dry Soil and Cup (g)	13.85	13.76
Moisure Content (%)	44.7	39.1



Liquid Limit	47
Plastic Limit	42
Plasticity Index	5

Client: Urban Development Directorate (UDD)

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

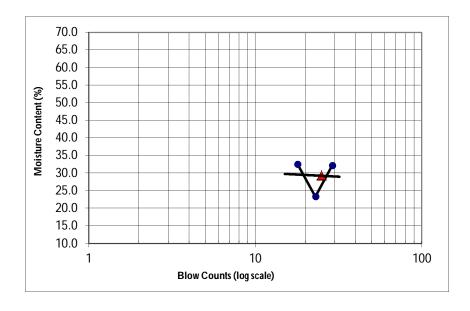
Project Location: Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar

Sample Information:

Sample Date: 5/1/2016Test Date: 15/9/2016Boring Number BH-30Sample Number D2Depth of Sample(m) 3.0

Determination of Liquid I	Limit		
Cup Number	C03	C08	C09
Weight of Cup (g)	42.13	44.27	41.35
Weight of Wet Soil and Cup (g)	99.95	65.52	70.61
Weight of Dry Soil and Cup (g)	85.77	61.5	63.49
Moisure Content (%)	32.5	23.3	32.2
Blow Counts	18	23	29

Ct111	Ct111
19.55	19.55
21.96	21.95
21.62	21.26
16.4	40.4
	19.55 21.96 21.62



Liquid Limit	29
Plastic Limit	28
Plasticity Index	1

Client: Urban Development Directorate (UDD)

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

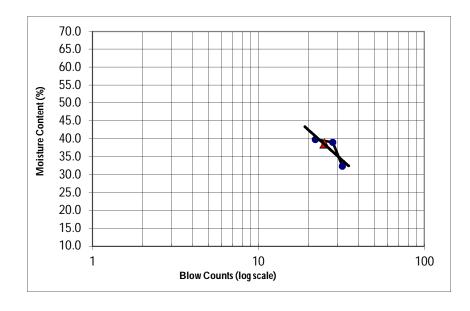
Project Location: Tonthoniar Hat, End of Kanaipur Union

Sample Information:

Sample Date: 10/1/2016Test Date: 15/9/2016Boring Number $\underline{BH-34}$ Sample Number $\underline{D2}$ Depth of Sample(m) $\underline{3.0}$

Determination of Liquid Limit			
Cup Number	C10	C14	C220
Weight of Cup (g)	36.96	36.45	36.67
Weight of Wet Soil and Cup (g)	119.08	64.13	53.28
Weight of Dry Soil and Cup (g)	95.68	56.36	49.22
Moisure Content (%)	39.9	39.0	32.4
Blow Counts	22	28	32

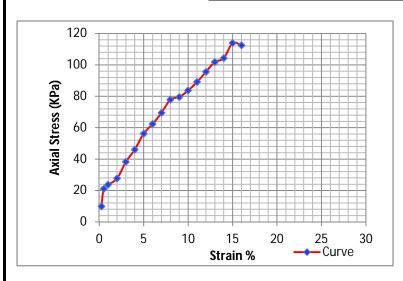
Determination of Plastic Limit		
Ct302	Ct302	
12.15	12.15	
13.77	14.08	
13.35	13.76	
35.0	19.9	
	Ct302 12.15 13.77 13.35	



Liquid Limit	39
Plastic Limit	27
Plasticity Index	11

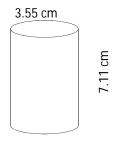
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

Location: SOUTH DIGRIRCHAR MADHOBDIA GOVT. PRI. SCHOOL, Madhubdia & Char Madhabdia Govt.Primary School, Char Madhabdia Bazar, Char Madhabdia

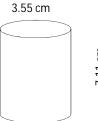


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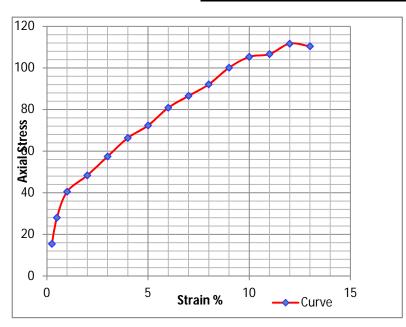
Bore hole No.	BH-02
Sample No.	UD-1
Depth (m)	3.10 to 3.55
	ilty clay with sand
qu (Kpa)	113.85
% Strain	15.0
γwet (gm/cc)	1.91
γDry (gm/cc)	1.44
% Moisture	32.34
Cohesion (Kpa)	56.93



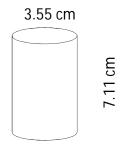
Bore hole No.	BH-04
Sample No.	UD-1
Depth (m)	2.10 to 2.55
Description of soil	Clay with Sand
qu (Kpa)	46.70
% Strain	8.0
γwet (gm/cc)	2.19
γDry (gm/cc)	1.84
% Moisture	18.81
Cohesion (Kpa)	23.35



Project :Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Near Madhankali Swicth gate, Ambikapur & Dhuldi Railgate, Dhuldi Bazar, Majchar

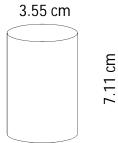


Bore hole No.	BH-07
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soilsilt w	ith Clay and Sand
qu (Kpa)	111.67
% Strain	12.0
γwet (gm/cc)	1.84
γDry (gm/cc)	1.49
% Moisture	23.54
Cohesion (Kpa)	55.83



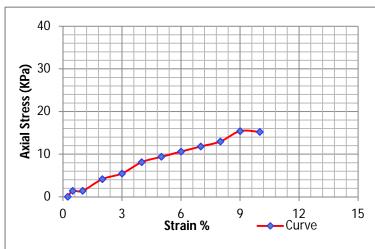
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Bore hole No.	BH-09
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	SILT with Sand
qu (Kpa)	62.26
% Strain	8.0
γwet (gm/cc)	2.20
γDry (gm/cc)	1.77
% Moisture	24.19
Cohesion (Kpa)	31.13



Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: 5 nos. Decreerchar, Munshitanggi Aftabuddin Madrasha, Decreerchar
& Vajon Dangga Govt. Primary School, Faridpur Sadar

UNCONFINED COMPRESSION STRENGTH TEST

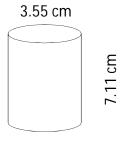


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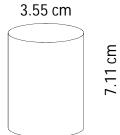
Strain %

--- Curve

Bore hole No.	BH-11
Sample No.	UD-1
Depth (m)	3.10 to 3.55
Description of soil	Silty Clay
qu (Kpa)	15.40
% Strain	9.0
γwet (gm/cc)	1.39
γDry (gm/cc)	0.78
% Moisture	78.05
Cohesion (Kpa)	7.70

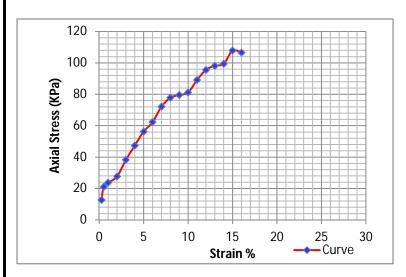


-	
Bore hole No.	BH-14
Sample No.	UD-1
Depth (m)	4.40 to 4.85
Description of soil Silt	y Clay
qu (Kpa)	40.20
% Strain	14.0
γwet (gm/cc)	1.82
γDry (gm/cc)	1.36
% Moisture	33.59
Cohesion (Kpa)	20.10



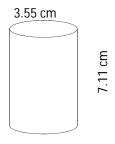
Project: Preparation of Development Plan for Fourteen Upazilas (Package-3)

Location: Chan Chairman Pukurpar, Baitul-Noor Mosjid, Faridpur Sadar &94 nos. Zhiltuki Govt. Primary School, Panir Tangki Mor, Faridpur Sadar

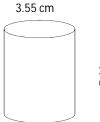


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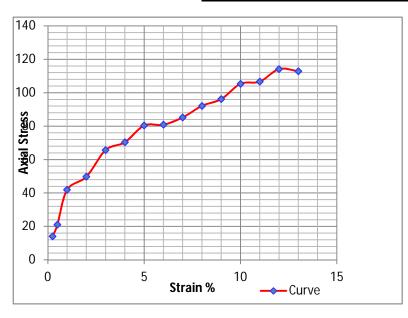
Bore hole No.	BH-15
Sample No.	UD-1
Depth (m)	3.10 to 3.55
Description of soil	Silty Clay
qu (Kpa)	107.86
% Strain	15.0
γwet (gm/cc)	2.01
γDry (gm/cc)	1.44
% Moisture	39.29
Cohesion (Kpa)	53.93



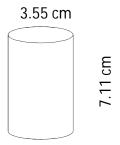
Bore hole No.	BH-16
Sample No.	UD-1
Depth (m)	3.10 to 3.55
Description of soil	Clay with Sand
qu (Kpa)	51.89
% Strain	8.0
γwet (gm/cc)	2.12
γDry (gm/cc)	1.84
% Moisture	15.21
Cohesion (Kpa)	25.94



Project :Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Mohim School Field, Faridpur Sadar & Raghu Nandanpur Madrasha, Ambikapur

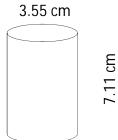


Bore hole No.	BH-17
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	Silt With Sand
qu (Kpa)	114.15
% Strain	12.0
γwet (gm/cc)	1.92
γDry (gm/cc)	1.52
% Moisture	26.46
Cohesion (Kpa)	57.08



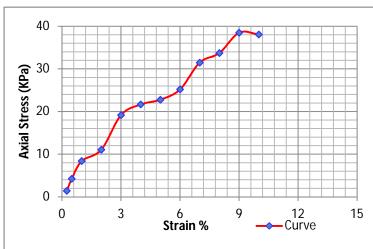
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BH-18
UD-1
2.10 to 2.55
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36.17

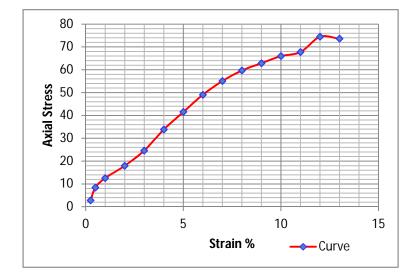


Project: Preparation of Development Plan for Fourteen Upazilas(Package-3)

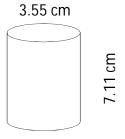
Location: Hadhokandi Govt. Primary School, Oposite side of River Research Institude, Kaijuri & Johora Begum High School Field, Mia Para Road, Parchim Khabashpur, Faridpur Sadar



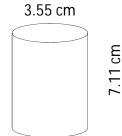
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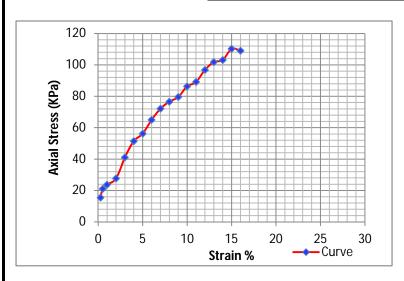
Bore hole No.	BH-20
Sample No.	UD-1
Depth (m)	4.10 to 4.55
Description of soil	Clay
qu (Kpa)	38.49
% Strain	9.0
γwet (gm/cc)	1.42
γDry (gm/cc)	1.11
% Moisture	27.93
Cohesion (Kpa)	19.25

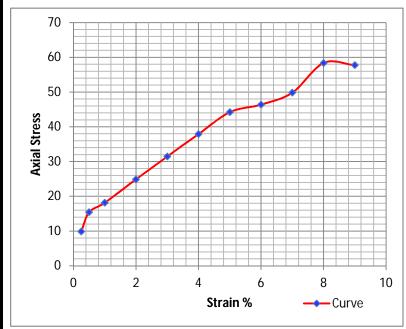


Bore hole No.	BH-21
Sample No.	UD-1
Depth (m)	2.10 to 2.55
Description of soil	Silty Clay
qu (Kpa)	40.20
% Strain	14.0
γwet (gm/cc)	1.87
γDry (gm/cc)	0.51
% Moisture	267.79
Cohesion (Kpa)	20.10

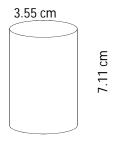


Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Technical Training Centre, Brahmonkanda, Sreeaungon, Faridpur Sadar
& Choyata, Aliabad





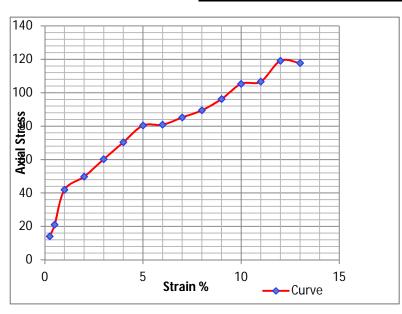
Bore hole No.	BH-22
Sample No.	UD-1
Depth (m)	4.10 to 4.55
Description of soil	Silty Clay
qu (Kpa)	110.26
% Strain	15.0
γwet (gm/cc)	2.02
γDry (gm/cc)	1.51
% Moisture	33.63
Cohesion (Kpa)	55.13



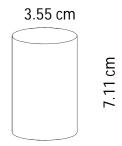
Bore hole No.	BH-23
Sample No.	UD-1
Depth (m)	3.10 to 3.55
Description of soil	Silty Clay
qu (Kpa)	58.37
% Strain	8.0
γwet (gm/cc)	2.17
γDry (gm/cc)	1.93
% Moisture	12.34
Cohesion (Kpa)	29.19



Project :Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Near Payarpur Godaoun, Kaijuri & Krish poshikhan Institude gate, Gunggabodi, Krishnanagar

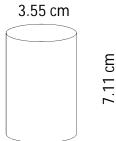


Bore hole No.	BH-24
Sample No.	UD-1
Depth (m)	2.20 to 2.65
Description of soil	Silty Clay
qu (Kpa)	119.11
% Strain	12.0
γwet (gm/cc)	1.94
γDry (gm/cc)	1.56
% Moisture	24.83
Cohesion (Kpa)	59.56

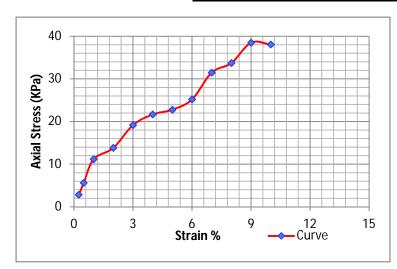


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Bore hole No.	BH-25
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	SILT with Sand
qu (Kpa)	76.14
% Strain	10.0
γwet (gm/cc)	2.29
γDry (gm/cc)	1.85
% Moisture	23.84
Cohesion (Kpa)	38.07

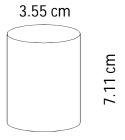


Project :Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Gobinddapur Hat, Krishnanagar &Bakhunda College Field, Bakhunda, Greda

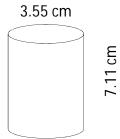


80					
70					
60					
Axial Stress 20 30					
# 5 40					
95 A					
20					
10					
0	•				
	0	5		10	15
		:	Strain %	_	← Cu

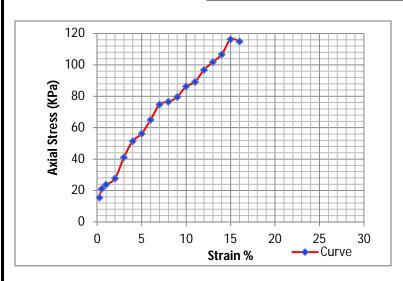
Bore hole No.	BH-26
Sample No.	UD-1
Depth (m)	3.20 to 3.65
Description of soil	Silty Clay
qu (Kpa)	38.49
% Strain	9.0
γwet (gm/cc)	1.58
γDry (gm/cc)	1.20
% Moisture	31.86
Cohesion (Kpa)	19.25



_	
Bore hole No.	BH-27
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil Silty	with Clay & Sand
qu (Kpa)	40.20
% Strain	14.0
γwet (gm/cc)	2.01
γDry (gm/cc)	1.40
% Moisture	44.20
Cohesion (Kpa)	20.10

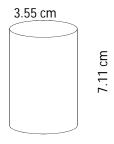


Project :Preparation of Development Plan for Fourteen Upazilas(Package-3)
Location: Madhobpur Govt. Primary School, Mallikpur Bazar, Krishnanagar
& Tonthoniar Hat, End of Kanaipur Union

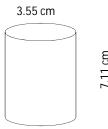


	70											—— ——
	60								/			
	50							_N	/			
Stress	40 - 30 -											
Axial	30			/ *								
	20	F N										
	10											
	0		2		4		6			8		10
					7	in %				- Сι	ırve	

Bore hole No.	BH-30
Sample No.	UD-1
Depth (m)	5.20 to 5.65
Description of soil	Clay With Sand
qu (Kpa)	116.25
% Strain	15.0
γwet (gm/cc)	1.88
γDry (gm/cc)	1.43
% Moisture	31.67
Cohesion (Kpa)	58.13



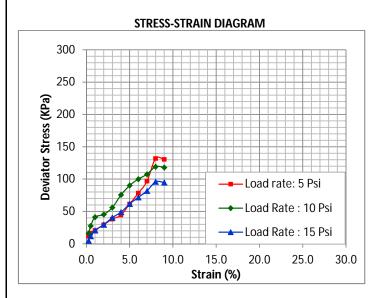
Bore hole No.	BH-34
Sample No.	UD-1
Depth (m)	5.10 to 5.55
Description of soil	Silt with Sand
qu (Kpa)	64.86
% Strain	8.0
γwet (gm/cc)	2.02
γDry (gm/cc)	1.79
% Moisture	13.32
Cohesion (Kpa)	32.43



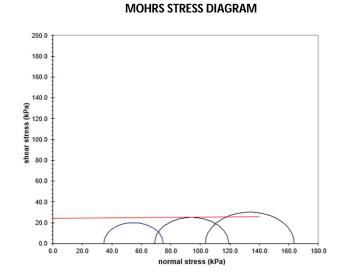
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) SOUTH DIGRIRCHAR MADHOBDIA GOVT. PRI. SCHOOL, Madhubdia

Triaxial Compression Test

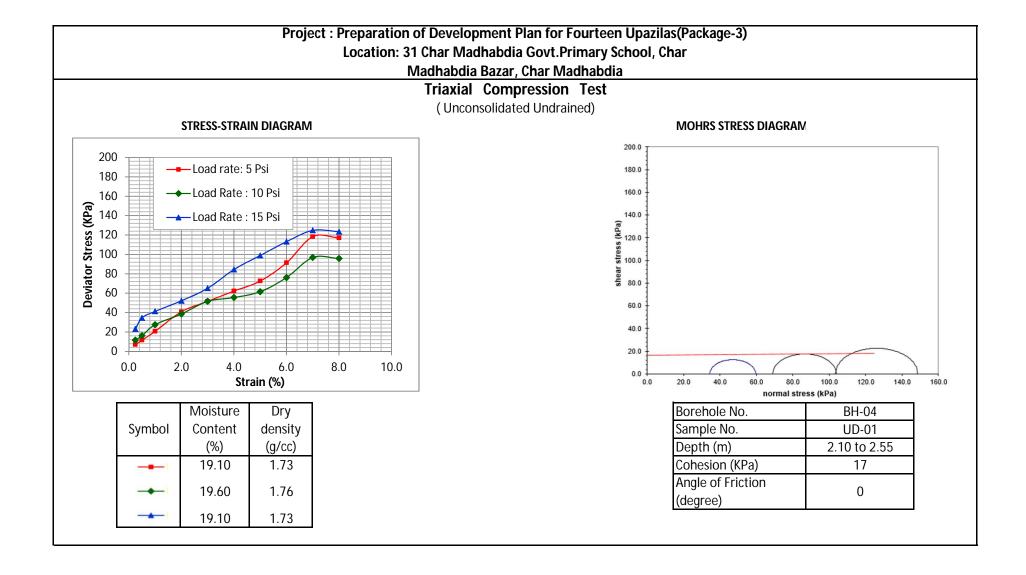
(Unconsolidated Undrained)



	Moisture	Dry
Symbol	Content	density
	(%)	(g/cc)
•	22.97	1.70
-	27.57	1.67
	22.66	1.69



Borehole No.	BH-02
Sample No.	UD-01
Depth (m)	5.10 to 5.55
Cohesion (KPa)	24
Angle of Friction	0
(Degree)	U



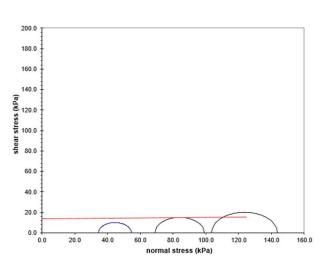
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Near Madhankali Swicth gate, Ambikapur

Triaxial Compression Test

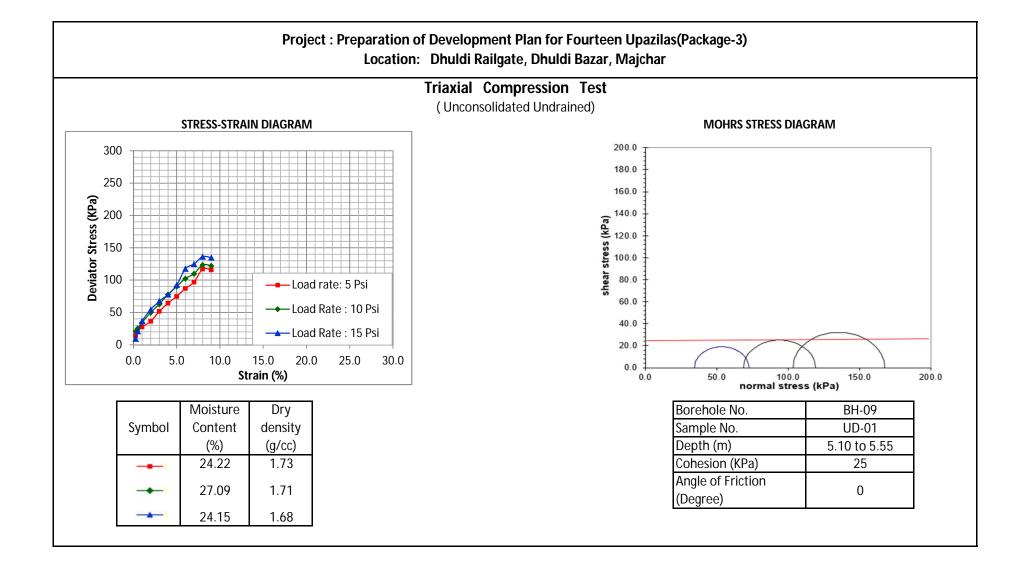
(Unconsolidated Undrained)

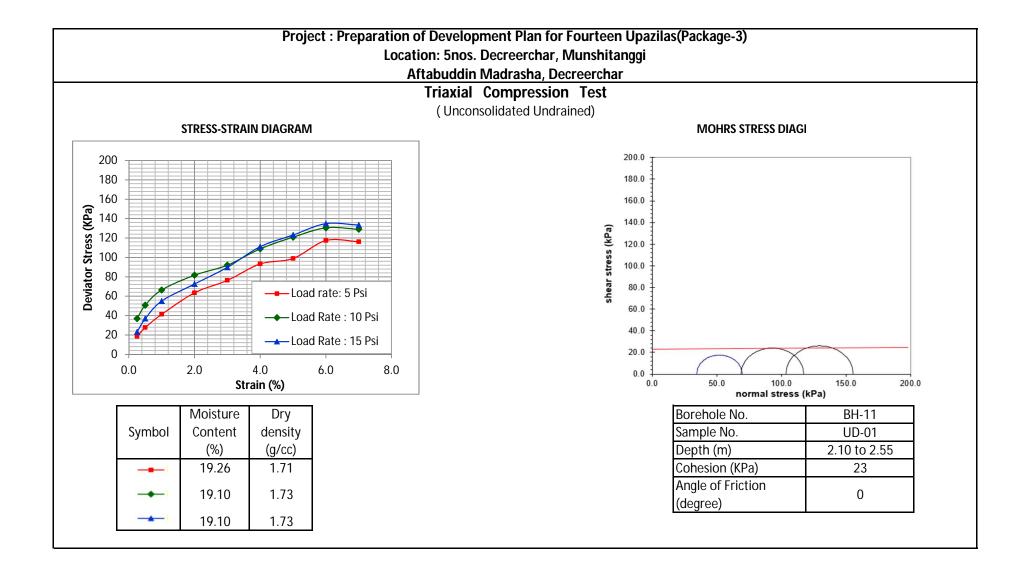
	Moisture	Dry
Symbol	Content	density
	(%)	(g/cc)
-	22.23	1.68
-	23.61	1.60
_	25.17	1.57

Strain (%)



Borehole No.	BH-07
Sample No.	UD-01
Depth (m)	5.10 to 5.55
Cohesion (KPa)	15
Angle of Friction	0
(degree)	U

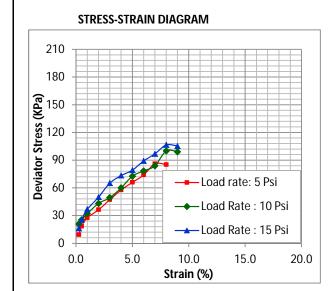




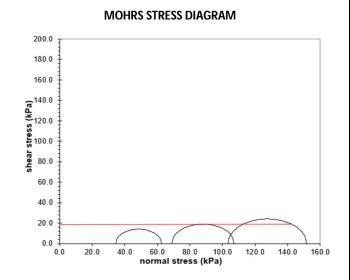
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Vajon Dangga Govt. Primary School, Faridpur

Triaxial Compression Test

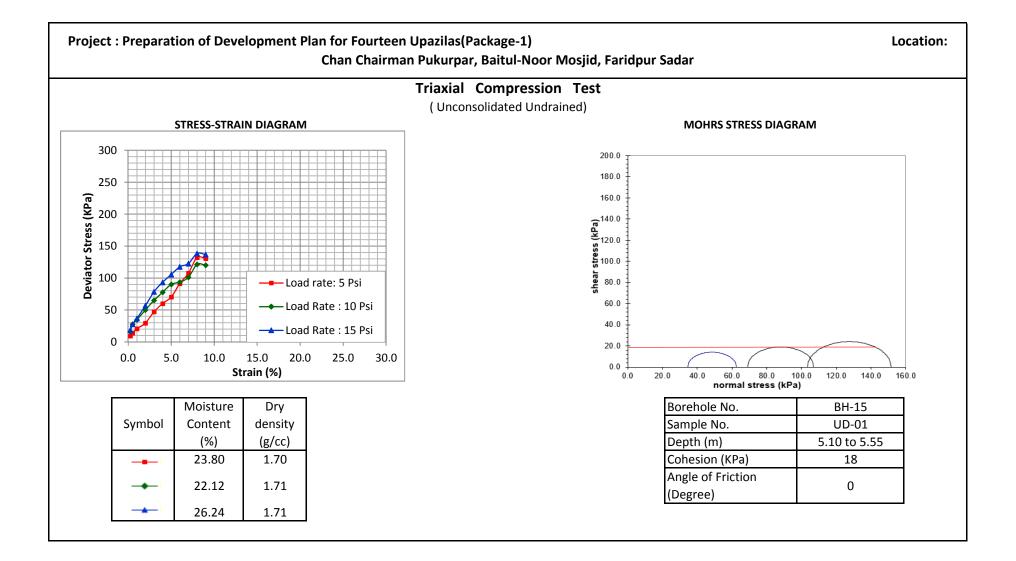
(Unconsolidated Undrained)

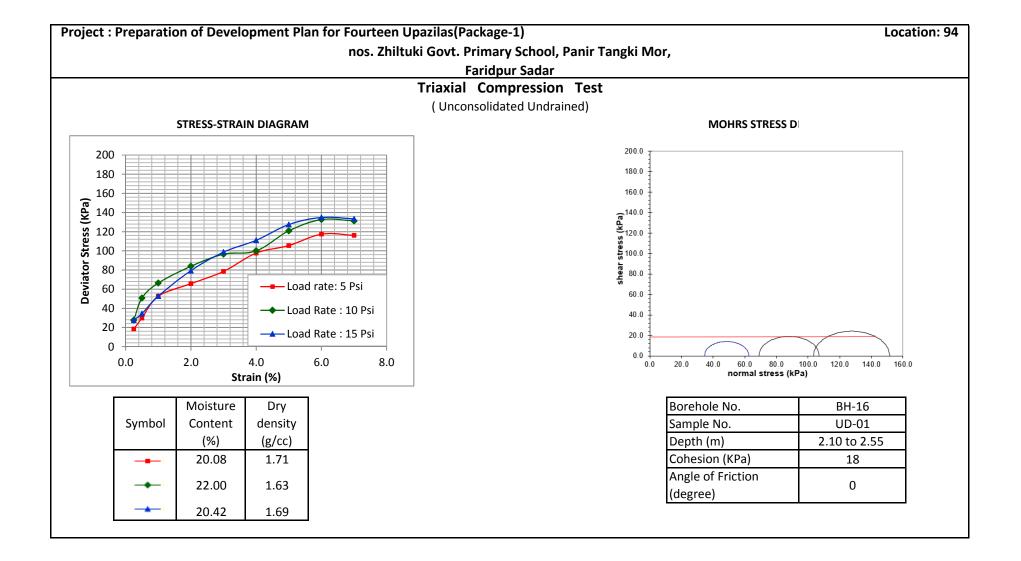


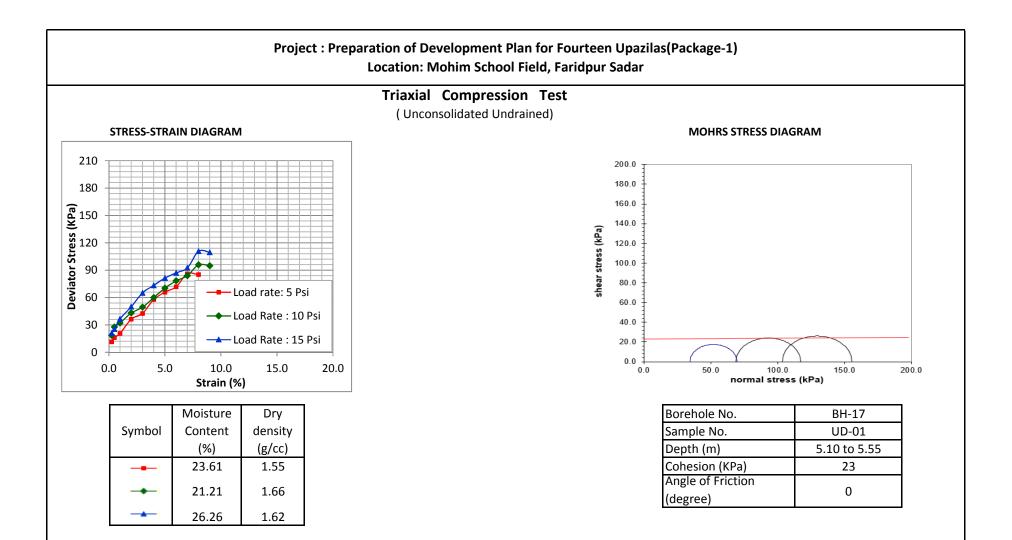
	Moisture	Dry
Symbol	Content	density
	(%)	(g/cc)
-	15.61	1.75
-	23.76	1.66
-	23.31	1.65

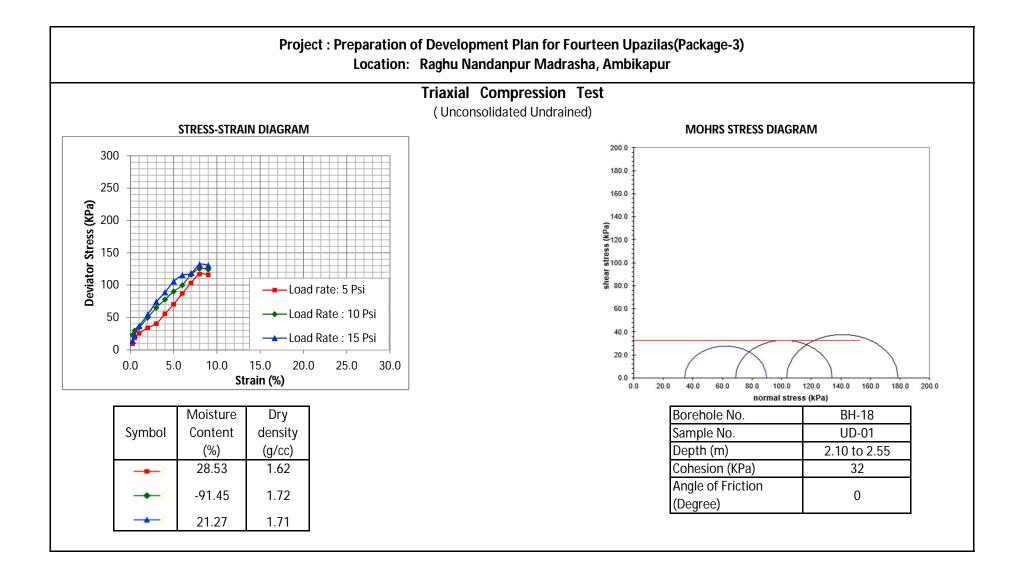


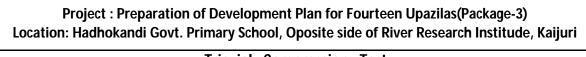
Borehole No.	BH-14
Sample No.	UD-01
Depth (m)	4.40 to 4.85
Cohesion (KPa)	19
Angle of Friction	0
(degree)	U

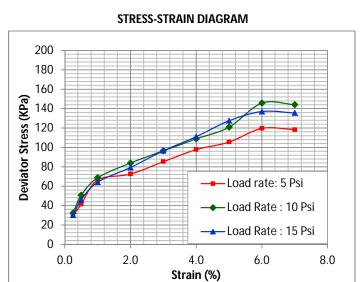








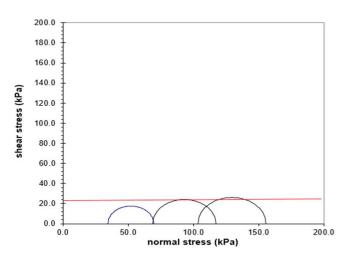




	Moisture	Dry
Symbol	Content	density
	(%)	(g/cc)
-	19.06	1.66
-	23.94	1.62
-	25.87	1.66

Triaxial Compression Test

(Unconsolidated Undrained)



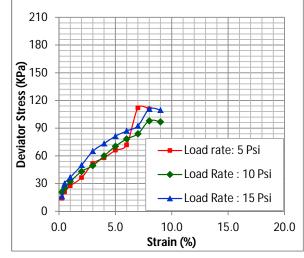
Borehole No.	BH-20
Sample No.	UD-01
Depth (m)	4.10 to 4.55
Cohesion (KPa)	23
Angle of Friction	0
(degree)	U

Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Johora Begum High School Field, Mia Para Road

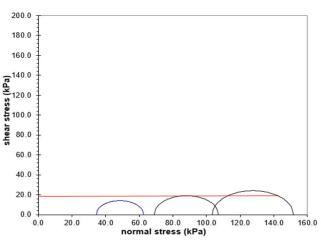
Triaxial Compression Test

(Unconsolidated Undrained)

STRESS-STRAIN DIAGRAM

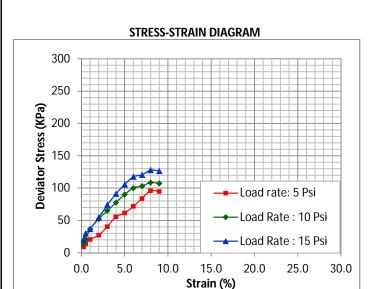


	Moisture	Dry
Symbol	Content	density
	(%)	(g/cc)
-	1.98	2.01
-	28.13	1.60
_	28.76	1.57



Borehole No.	BH-21
Sample No.	UD-01
Depth (m)	2.10 to 2.55
Cohesion (KPa)	17
Angle of Friction	0
(degree)	U

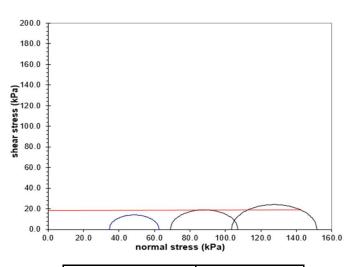




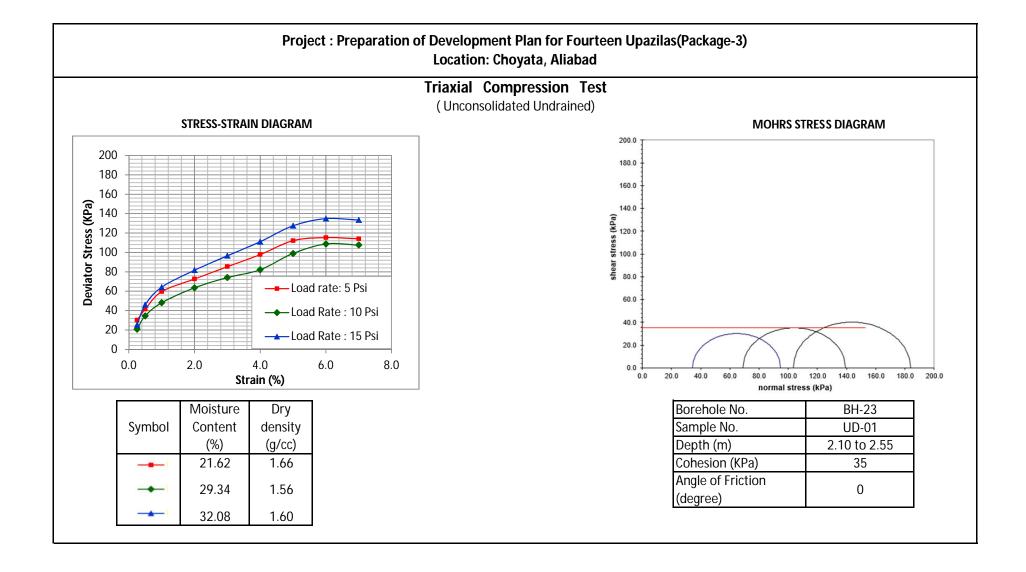
	Moisture	Dry
Symbol	Content	density
	(%)	(g/cc)
-	26.33	1.65
-	25.86	1.68
	23.31	1.68

Triaxial Compression Test

(Unconsolidated Undrained)



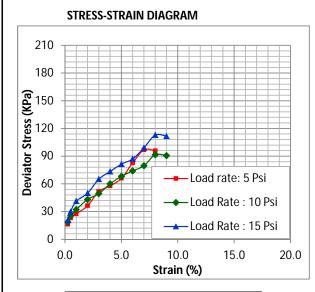
Borehole No.	BH-22
Sample No.	UD-01
Depth (m)	4.10 to 4.55
Cohesion (KPa)	17
Angle of Friction	0
(Degree)	U



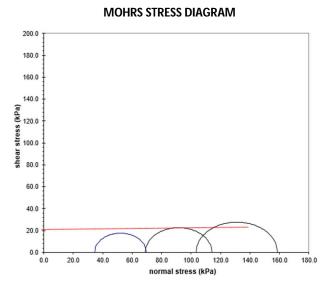
Project : Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Near Payarpur Godaoun, Kaijuri

Triaxial Compression Test

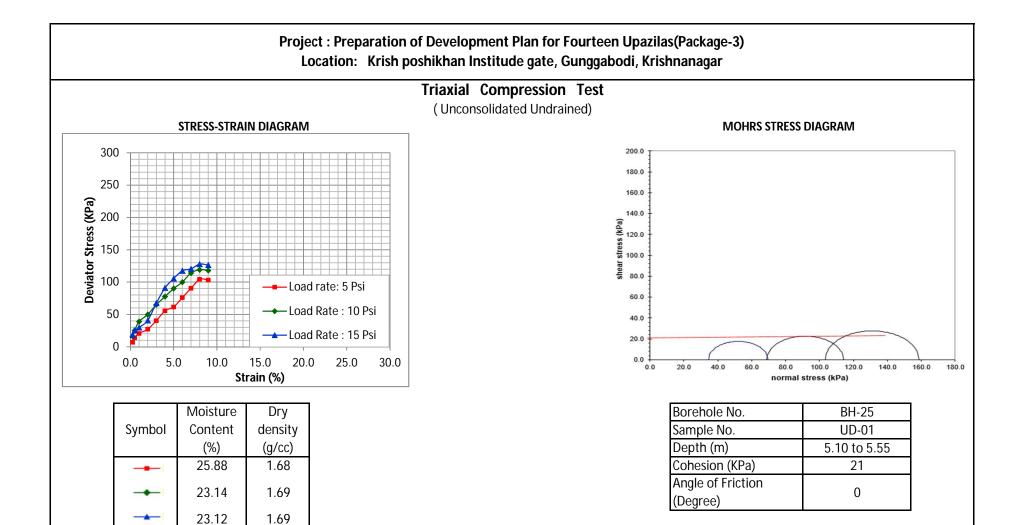
(Unconsolidated Undrained)

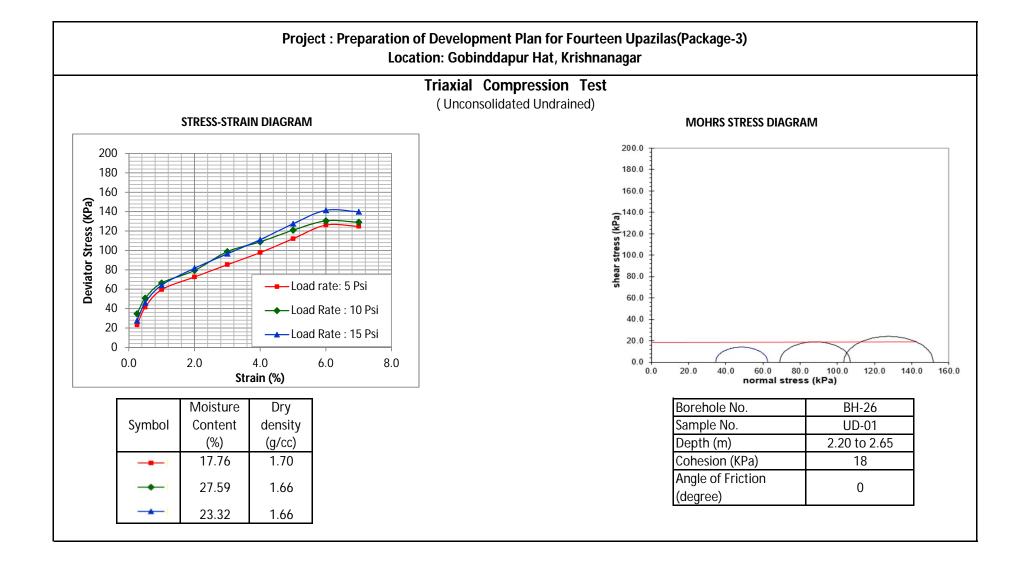


	Moisture	Dry
Symbol	Content	density
	(%)	(g/cc)
	24.32	1.62
-	30.63	1.52
	23.37	1 57



Borehole No.	BH-24
Sample No.	UD-01
Depth (m)	2.20 to 2.65
Cohesion (KPa)	21
Angle of Friction	0
(degree)	U

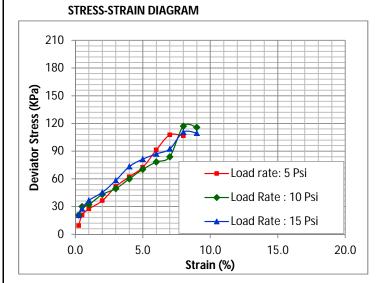




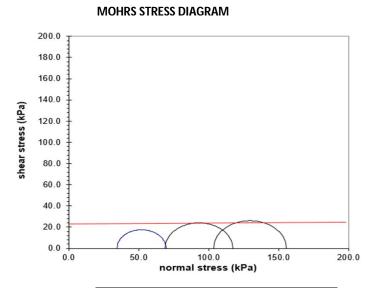
Project: Preparation of Development Plan for Fourteen Upazilas(Package-3) Location: Bakhunda College Field, Bakhunda, Greda

Triaxial Compression Test

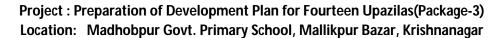
(Unconsolidated Undrained)

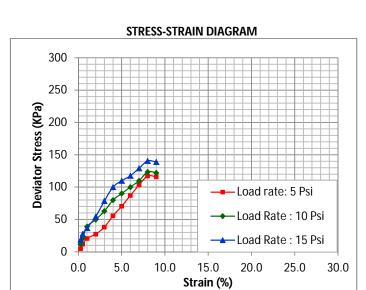


	Moisture	Dry
Symbol	Content	density
	(%)	(g/cc)
-	17.30	1.70
-	27.74	1.57
_	23.37	1.57



Borehole No.	BH-27
Sample No.	UD-01
Depth (m)	5.10 to 5.55
Cohesion (KPa)	23
Angle of Friction	0
(degree)	U

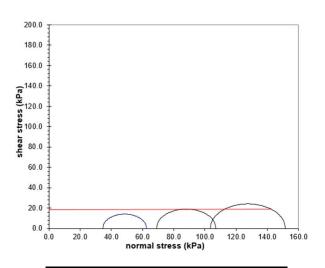




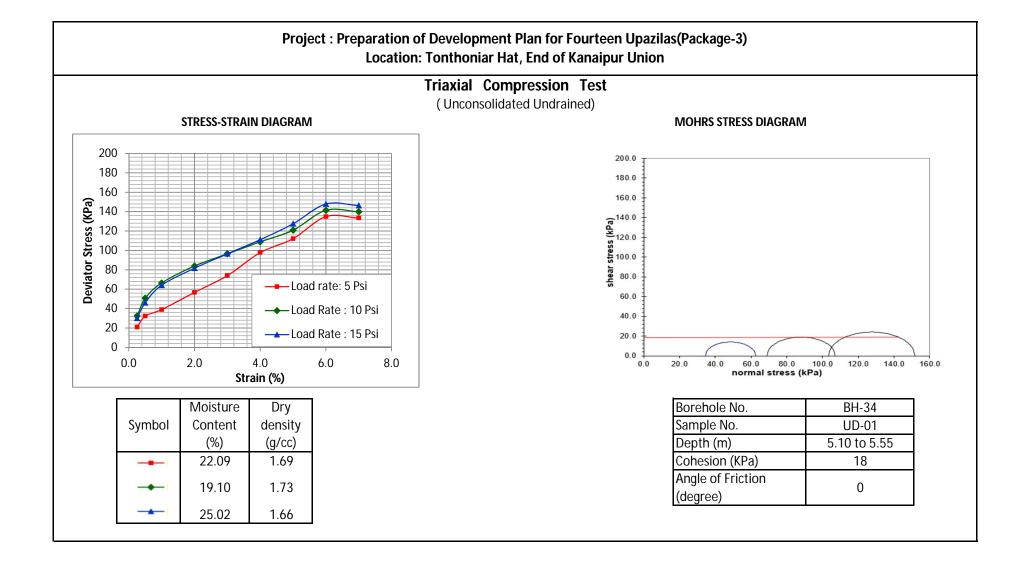
	Moisture	Dry	
Symbol	Content	density	
	(%)	(g/cc)	
•	25.04	1.68	
-	22.12	1.71	
	25.20	1.72	

Triaxial Compression Test

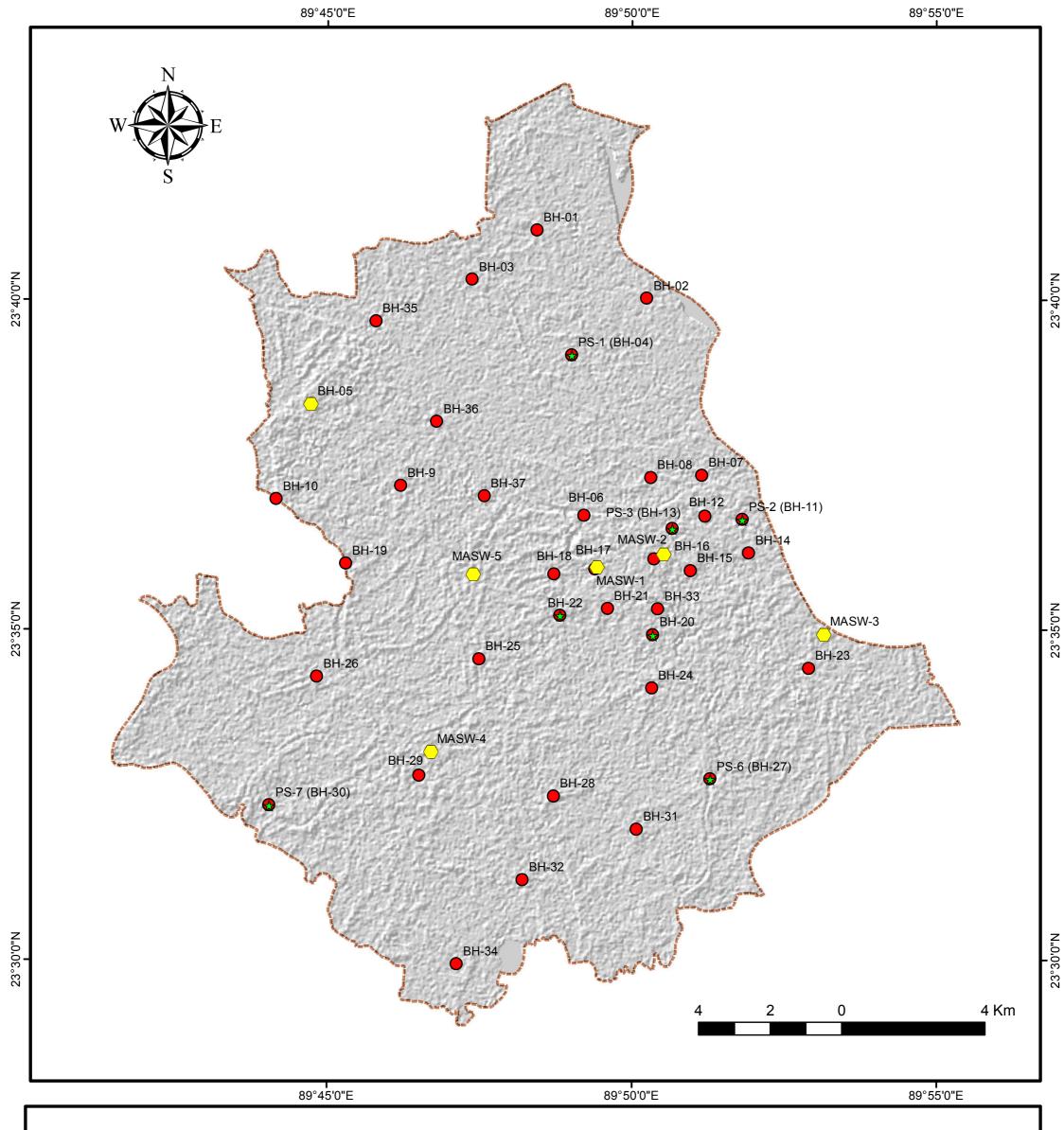
(Unconsolidated Undrained)



Borehole No.	BH-30
Sample No.	UD-01
Depth (m)	5.20 to 5.65
Cohesion (KPa)	19
Angle of Friction	0
(Degree)	U



Appendix E
All Thematic Maps and Final Infrastructure Suitability Map



Geotechnical and Geophysical Test locations of Faridpur Sadar Upazila

Legend

Work Locations

Geotechnical and Geophysical Test

- Standard Penetration Test (SPT) Drilling
- Multi-channel Analysis of Surface Wave (MASW)
- ★ Downhole Seismic Test (PS Logging)

Upazila Boundary

This map has been produced by ploting the co-ordinates of all the Geotchnical and Geophysical works which was aquired during field investigation. The drilling depth of those boroholes are up to 30m from the existing ground level (EGL).

Coordinate System: BUTM2010

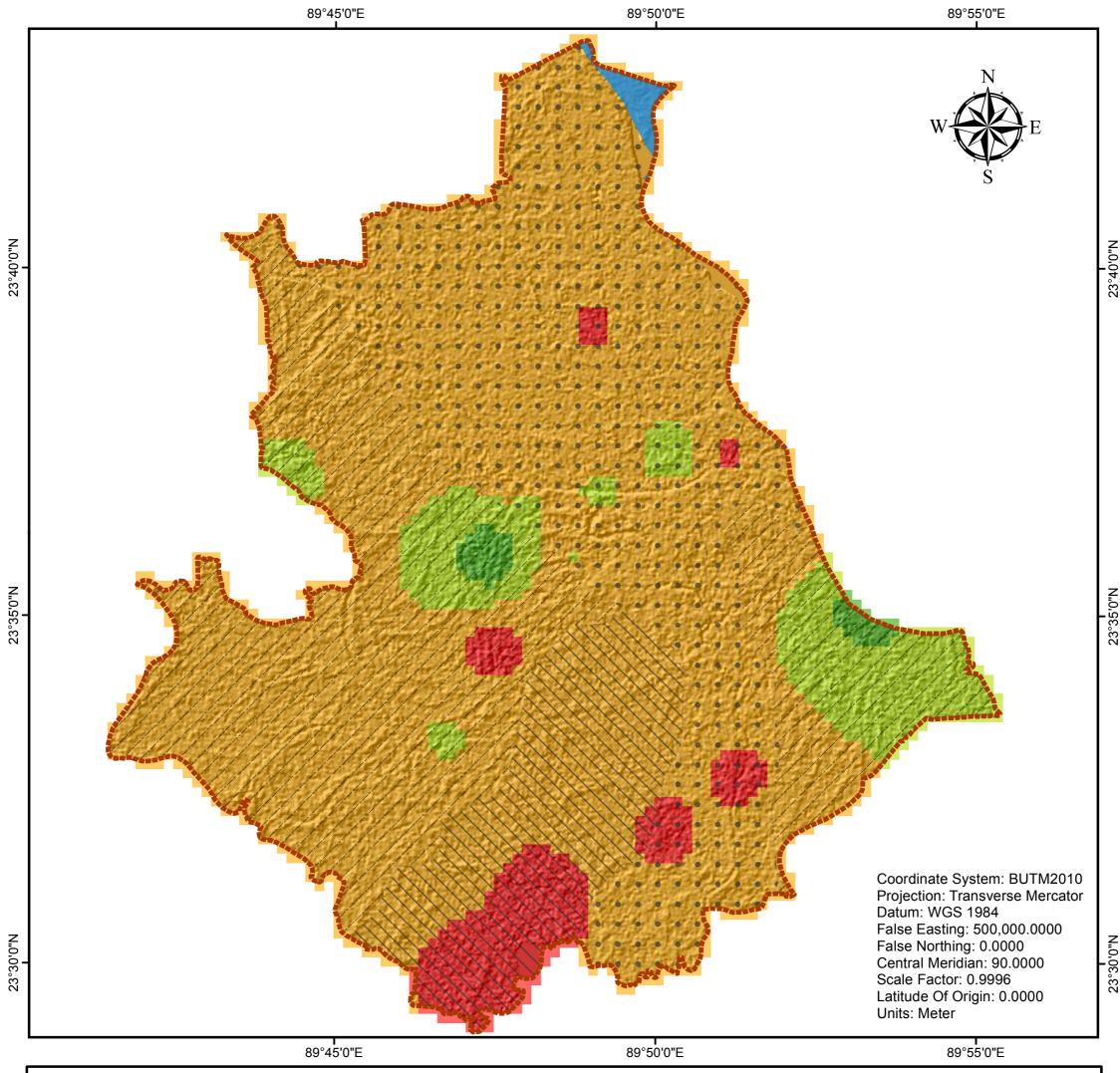
Projection: Transverse Mercator

Projection: Transverse Mercator

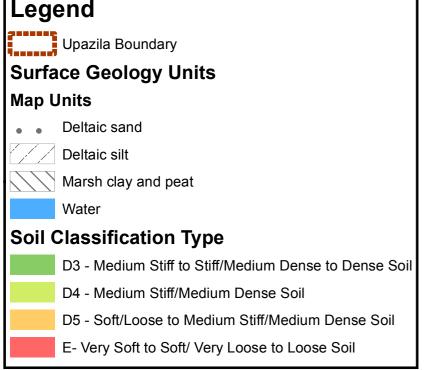
Datum: WGS 1984

False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000

Units: Meter



Engineering Geological Map based on Avarage Shear wave Velocity (upto30m)



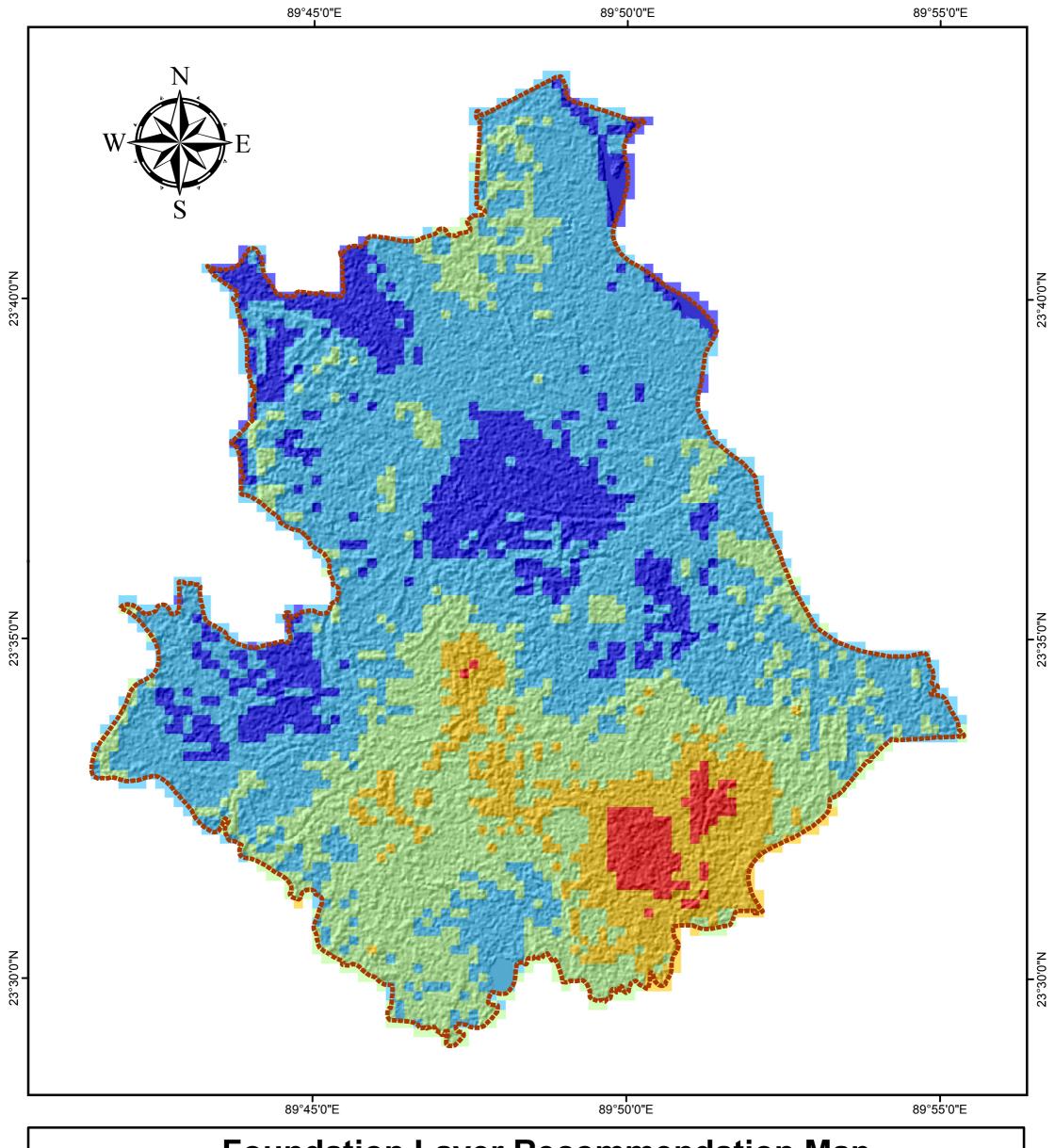
Site Site class description		Shear wave velocity (m/sec)	
		Min	Max
Α	HARD ROCK Eastem United States only	1500	
В	ROCK	760	1500
	VERY DENSE SOIL AND SOFT ROCK		
С	Unstrained shear strength u _s > 2000psf (u _s = 100kPa) or N = 50 blows/ft	360	760
	STIFF SOILS		
D	Stiff soil with undrained shear strength 1000 psf = u_s = 2000 psf ($50KPa < u_s < 100KPa$) or $15 = N = 50$ blows/ft	180	360
	SOFT SOILS		
E	Profile with more than 10 ft (3m) of soft clay defined as soil with plasticity index PI > 20, moisture content w > 40% and undrained shear strength u _s < 1000psf		180
	(50kpa) (N = 15 blows/ft)		
F	SOILS REQUIRING SITE SPECIFIC EVALUATIONS 1. Soils vulnerable potential failures or collapse under seismic loading: e.g., liquefiable soils, quick and highly sensitive clays, collapse weakly connected soils. 2. Peats and/or highly organic clays: (10ft (3m) or thicker layer) 3. Very high plasticity clays: (25ft (8m) or thicker layer with plasticity index > 75) 4. Very thick soft/medium stiff clays:		
	(120ft (36m) or thicker layer)		

This map was produced by interpolating velocity of the soil layer in different Bore hole. Afterward it was classified by their velocity range according to according to a method provided by NEHRP (stands for National Earthquake Hazard Reduction Program, USA) Provisions but as most of the shear wave velocity of soil is within 168-244m/s the classification was modified as follows.

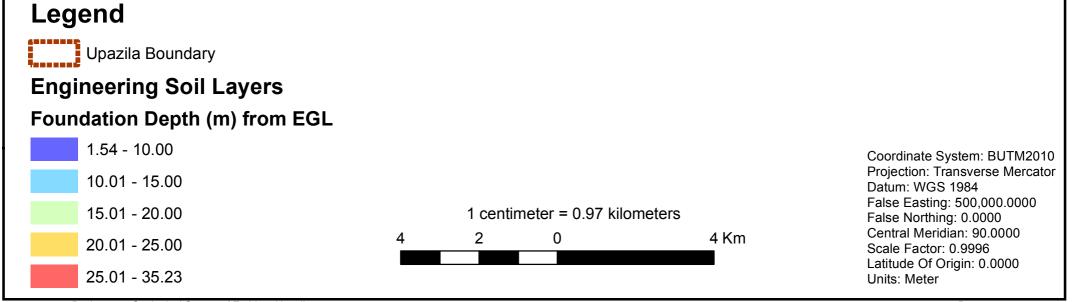
Ground Class

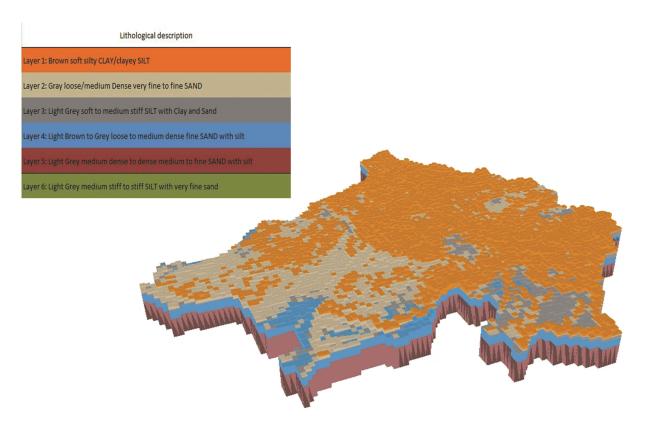
4	C	360 - 760 m/sec	Very Dense/ Hard Soil and Soft rock	
	D 1	300 - 360 m/sec	Stiff/ Dense to very dense/Hard Soil	
	D2	250 - 300 m/sec	Stiff/Dense Soil	
	D3	220 - 250 m/sec	Medium Stiff to Stiff / Medium Dense to Dense Soil	
	D4	200 - 220 m/sec	Medium Stiff/Medium Dense Soil	
	D5	D5 180 - 200 m/sec Soft/Loose to Medium Stiff/ Medium Dense Soil		
	E	E - 180 m/sec Very Soft to Soft / Very Loose to Loose Soil		
	Modified classification of the soils applied in this study			
;	Scale:			
	1 centimeter = 1 kilometers			
	4	2	0	4 Km

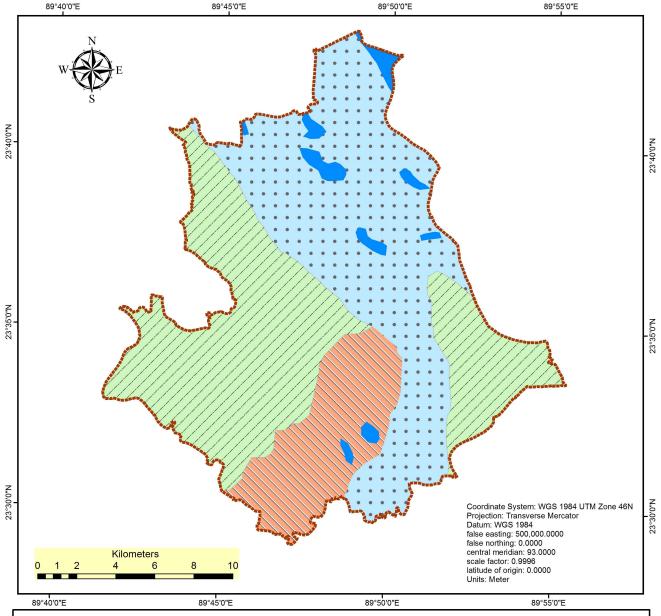
Soil Type



Foundation Layer Recommendation Map







Surface Geology of Faridpur Sadar Upazila

Legend



Upazila Boundary

Surface Geology Units Map Unit



Deltaic sand



Deltaic silt



Marsh clay and peat



Water

Deltaic Sand and Deltaic Silt:

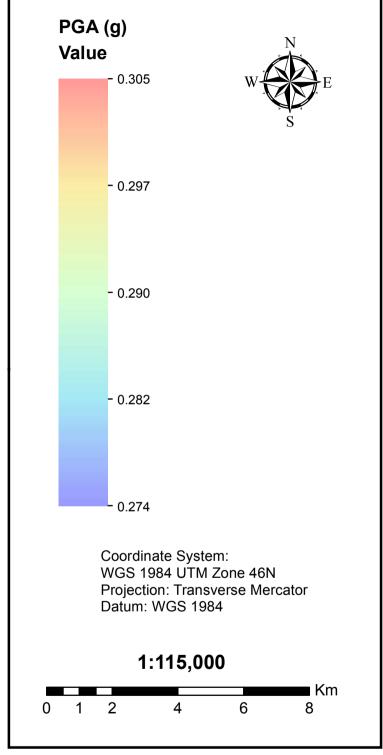
Deltaic sands accumulate in fluvial and tidal channels, distributary-mouth bars, beach ridges, barrier islands, and on delta-front platforms. It consists of sand, slit, clay and organic matters. The deposit may be sand or slit depending on the river water energy. Sands are particle sizes having 1/16 to 2 mm diameter. Sediment particles ranging from 0.004 to 0.06 mm (0.00016 to 0.0024 inch) in diameter irrespective of mineral type are called Silt. Silt is easily transported by moving currents but settles in still water. Hence river deposits are ideally rich in silty deposits. Energy content for silt deposition is slightly lower than sand body.

Marshy Clay and Peat:

Peat soils and Marshy clays in the surface geology of the area is indication of swampy and humid environment of present active river plain deposits. In these soils, partially or wholly decomposed organic matters are present. These soils have a low infrastructure and of low quality on engineering value. Peat and muck layers are black to dark brown, strongly reduced, and neutral in reaction under persisting conditions. When these layers are allowed to dry, they become extensively acidic. The unit is seasonally flooded by both increased river water and rainwater hence, remains wet around this time. During the dry season where mineral topsoil is present they become dry. Under dry condition mineral top-soils are mainly grey or dark grey and become strongly acidic.

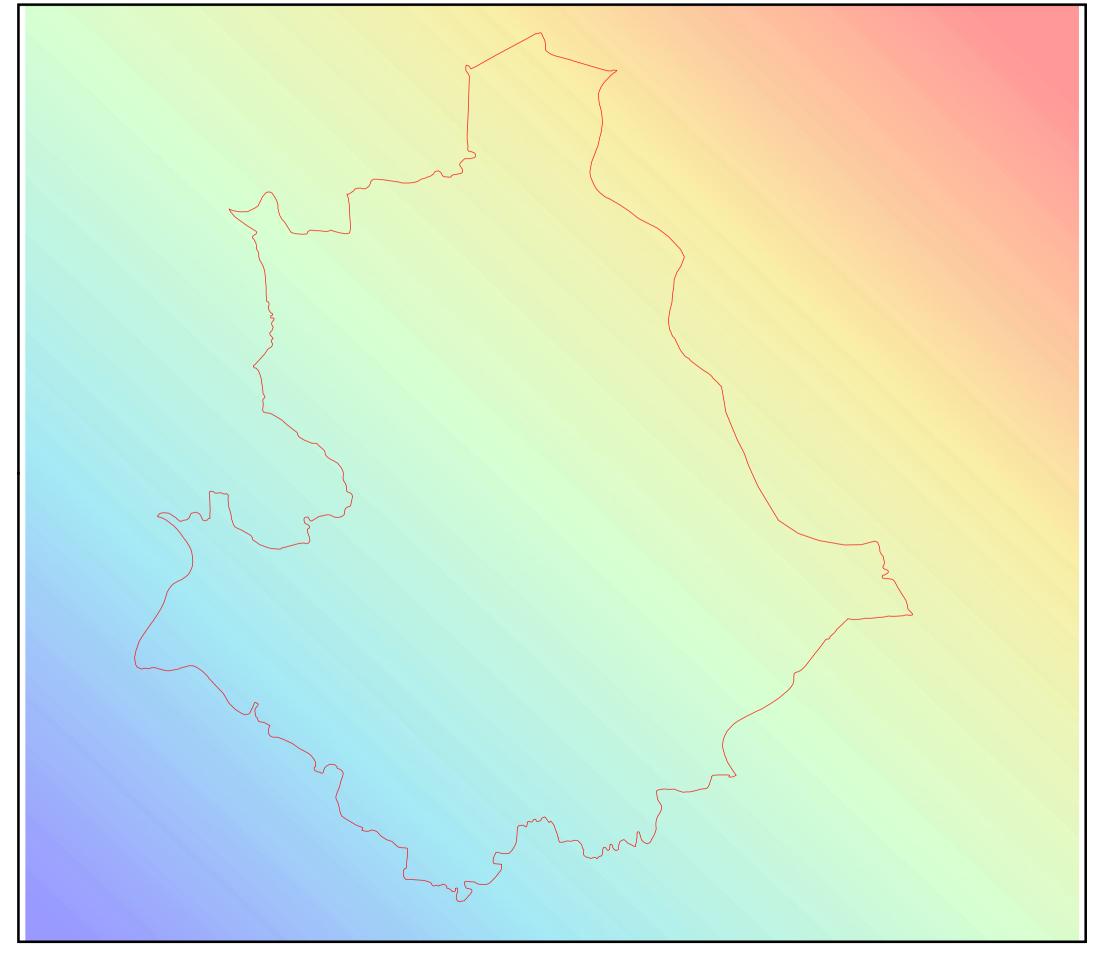
Peak Ground Acceleration (PGA) (g) at Engineering SeismicBaserock (Vs30=760 m/sec) Corresponding to a Probabillity of Exceedance of 10% in 50 years

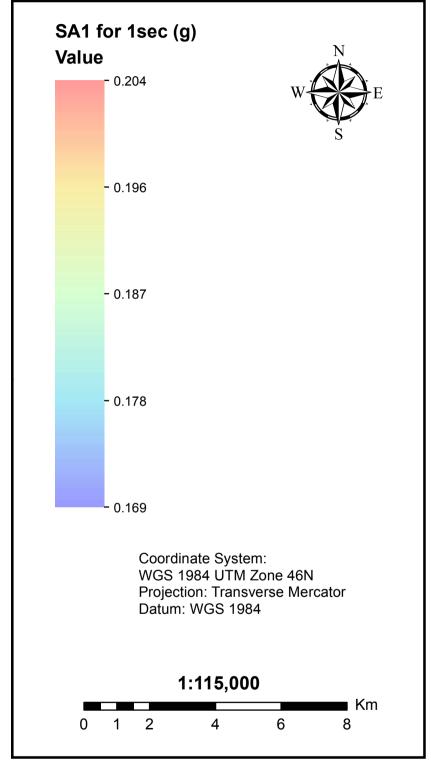




The probabilistic analysis was performed using the CRISIS2007 developed by Mario Ordaz et Al 2007), Engineering Institute National Autonomous University of Mexico (UNAM). This program calculates seismic hazard using the standard methodology for probabilistic seismic hazard analysis. Earthquake data of past hundred years and characteristics of tectonically active faults in and around Bangladesh were considered for this analysis.

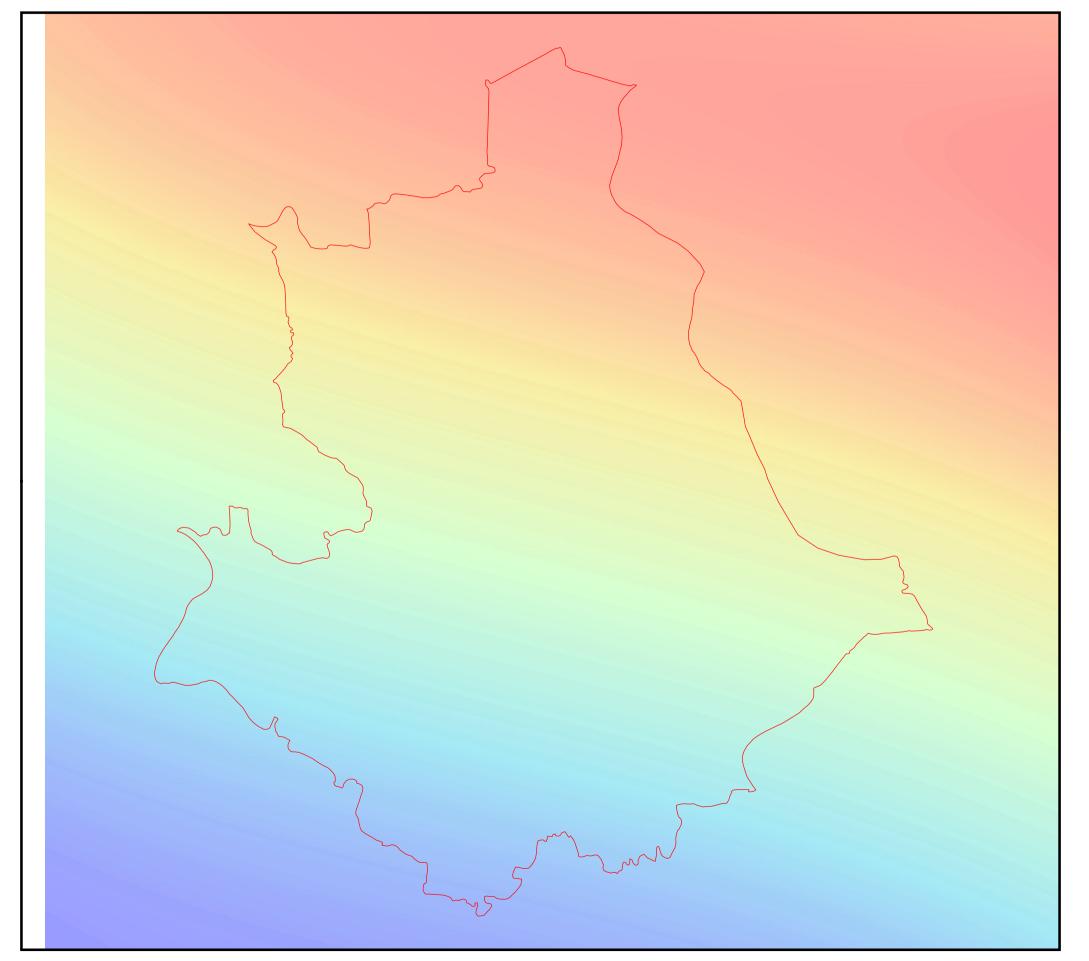
Spectral Acceleration (SA) (g) for 1 sec Structural period at Engineering Seismic Baserock (Vs30=760 m/sec) Corresponding to a Probabillity of Exceedance of 10% in 50 years

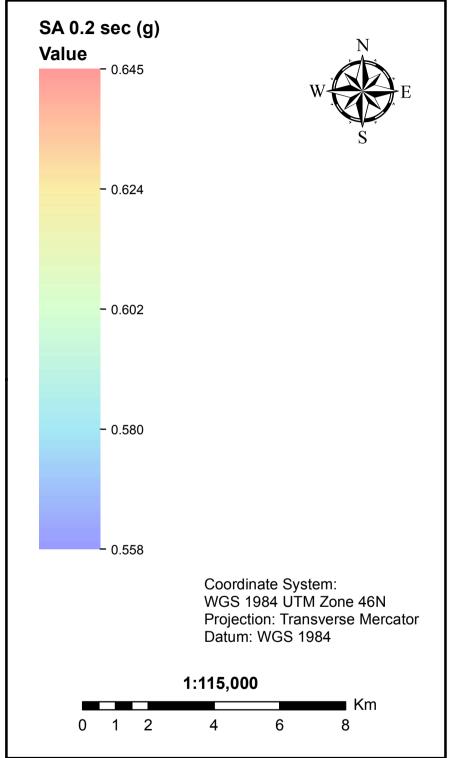




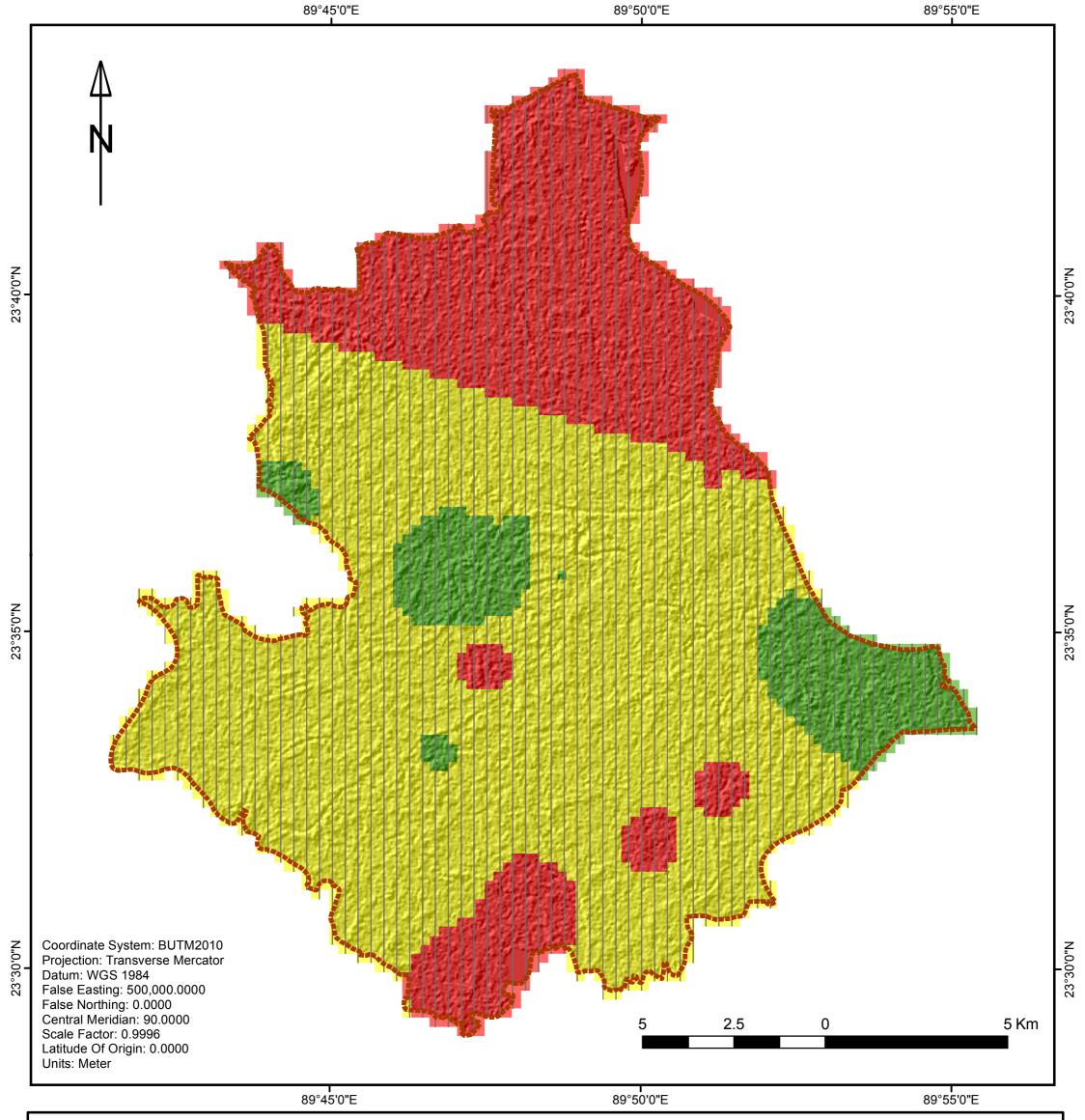
The probabilistic analysis was performed using the CRISIS2007 developed by Mario Ordaz et Al 2007), Engineering Institute National Autonomous University of Mexico (UNAM). This program calculates seismic hazard using the standard methodology for probabilistic seismic hazard analysis. Earthquake data of past hundred years and characteristics of tectonically active faults in and around Bangladesh were considered for this analysis.

Spectral Acceleration (SA) (g) for 0.2 sec Structural period at Engineering Seismic Baserock (Vs30=760 m/sec) Corresponding to a Probability of Exceedance of 10% in 50 years

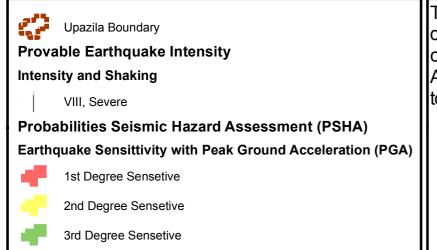




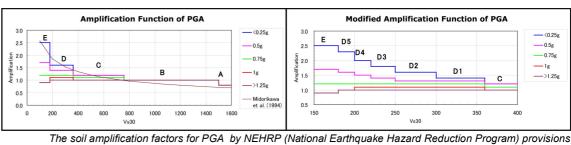
The probabilistic analysis was performed using the CRISIS2007 developed by Mario Ordaz et Al 2007), Engineering Institute National Autonomous University of Mexico (UNAM). This program calculates seismic hazard using the standard methodology for probabilistic seismic hazard analysis. Earthquake data of past hundred years and characteristics of tectonically active faults in and around Bangladesh were considered for this analysis.



Peak Ground Acceleration (PGA) (g) at Engineering Seismic Ground Surface (Depth upto 30m) Corresponding to a Probability of Exceedance of 10% in 50 years



This map was produced by multiplying PGA values with Amplification factors corresponded for different soil type. as the Vs is within 168-244m/s so soil was classified as (E,D5,D4,D3). thus the amplification factor was also modified. Spectral Accelaration (PGA) (g) at Engneering Ground Surface(Depth upto 30) corresponging to probalility of exceedance of 10% in 50 year was count for each grid.



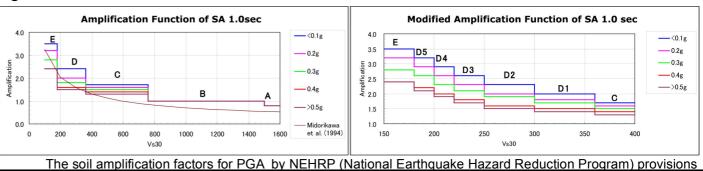
Spectral Acceleration (SA) (g) for 1 sec Structural period at Engineering Seismic Ground Surface (Depth upto 30m) Corresponding to a Probability of Exceedance of 10% in 50 years

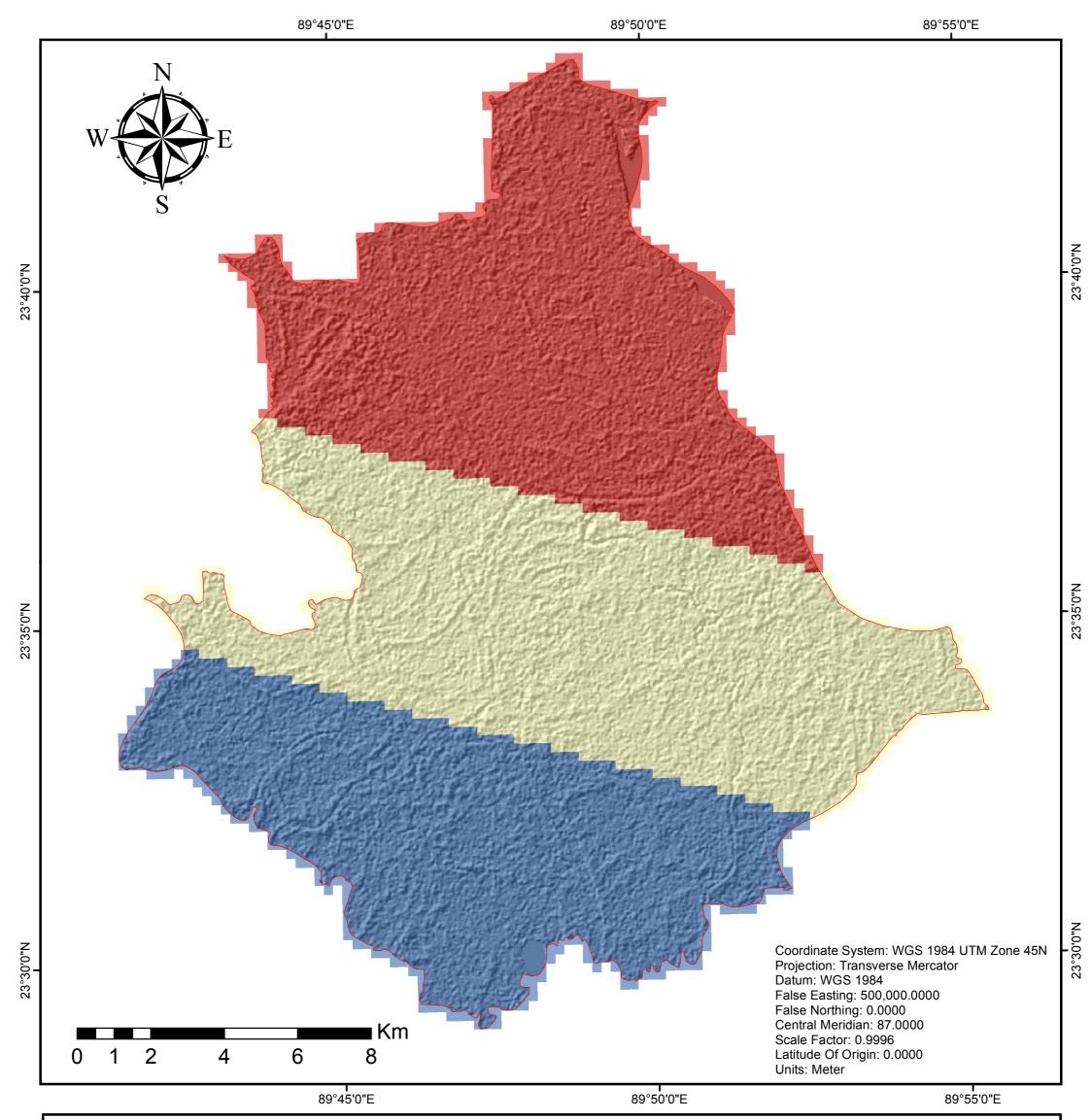


0.4872 - 0.5484

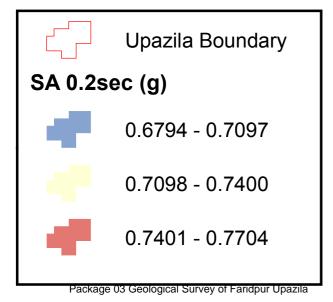
0.5485 - 0.6098

This map was produced by multiplying SA values with Amplification factors corresponded for different soil type. as the Vs is within 168-244m/s so soil was classified as (E,D5,D4,D3). Thus the amplification factor was also modified. Spectral Accelaration (SA) (g) for 1 sec at Engneering Ground Surface(Depth upto 30)corresponding to probability of exceedance of 10% in 50 year was count for each grid.





Spectral Acceleration (SA) (g) for 0.2 sec Structural period at Engineering Seismic Ground Surface (Depth upto 30m) Corresponding to a Probability of Exceedance of 10% in 50 years



different soil type. as the Vs is within 168-244m/s so soil was classified as (E,D5,D4,D3). Thus the amplification factor was also modified. Spectral Accelaration for 0.2 sec at Engneering Ground Surface(Depth upto 30) corresponging to probalility of exceedance of 10% in 50 year was count for each grid.

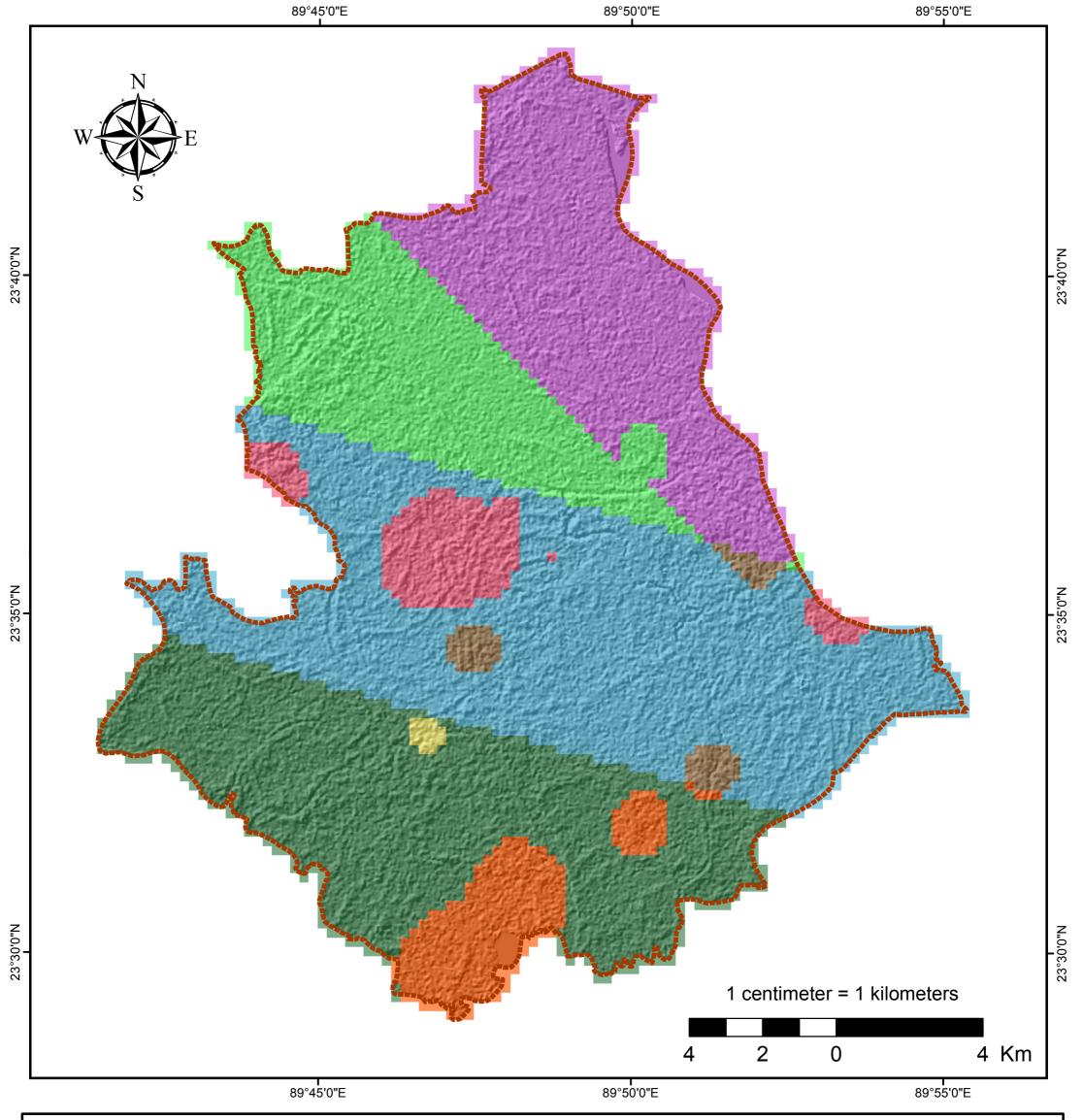
Amplification Function of PGA

Modified Amplification Function of PGA

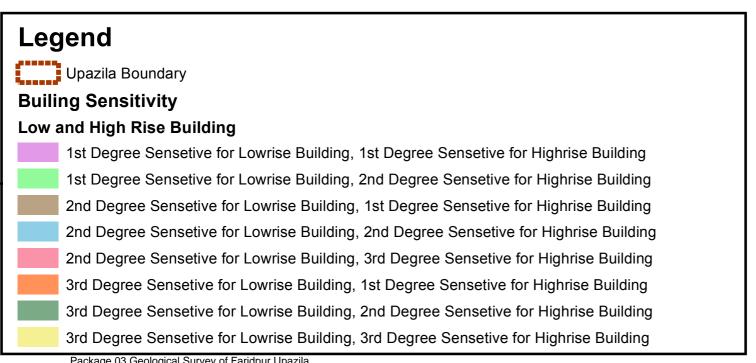
Modified Amplification Function of PGA

The soil amplification factors for PGA by NEHRP (National Earthquake Hazard Reduction Program) provisions

This map was produced by multiplying SA values with Amplification factors corresponded for



Building Height Recommendation Map of Faridpur Sadar Upazila

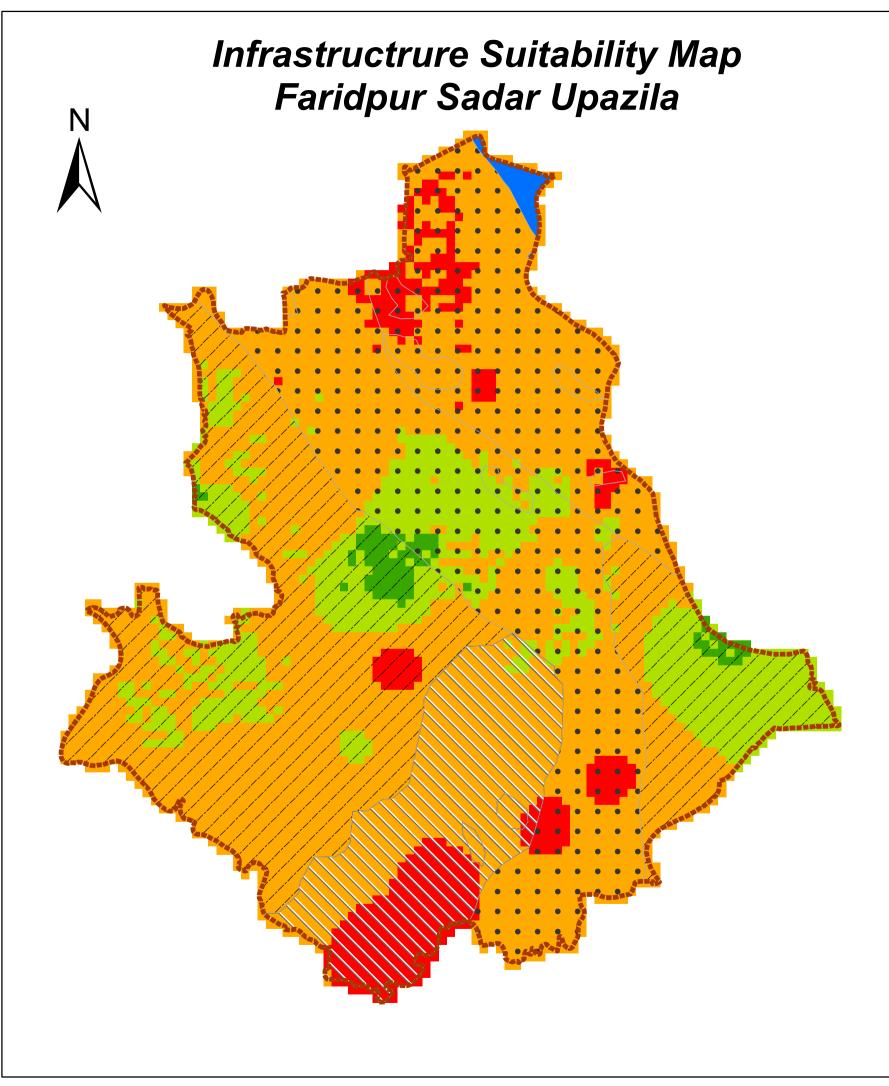


Coordinate System: BUTM2010 Projection: Transverse Mercator

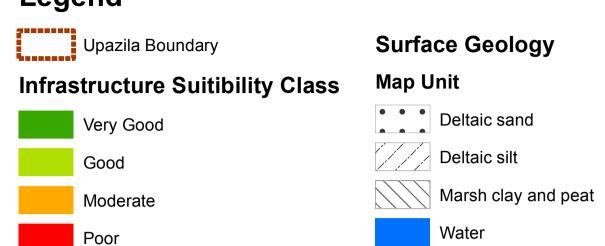
Datum: WGS 1984

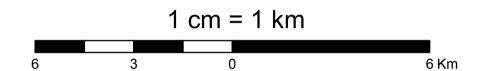
False Easting: 500,000.0000 False Northing: 0.0000 Central Meridian: 90.0000 Scale Factor: 0.9996 Latitude Of Origin: 0.0000

Units: Meter



Legend





nfrastructure Suitability Infrastructure Foundation Suitability		Suggested Land Use Suitability	
Very Good	linfrastructure requires pile foundation placed on Soil	Commercial area Residential area Industrial zone	
Good	4-6 story light infrastructure is suitable in Madhupur Clay. General foundation depth is within 5 m, at places higher Large and tall infrastructure requires pile foundation placed on layer no 3 or 5	Commercial area Residential area Industrial zone	
Moderate	investigation and proper foundation design. Deep pile	Industrial zone Residential area Commercial area Agricultural Zone Park and Recreation	
Poor	design is required for all types of infrastructure, due to	Agricultural zone Flood flow zone Wetland Rural settIement Park and Recreation	
	essential, due to very low bearing capacity and high	Agricultural zone Flood flow zone Wetland Rural settlement Park and Recreation	

Package 03 Geological Survey of Faridpur Upazila