

8 ボーリング調査結果

**GEOLOGICAL SURVEY AND TESTING
FOR
THE PROJECT FOR RECONSTRUCTION OF
THE THIRD PRIMARY SHOOOL IN MALE'
IN
THE REPUBLIC OF MALDIVES**

January 2002

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**DRAFT REPORT ON GEOLOGICAL SURVEY AND TESTING FOR
BASIC DESIGN STUDY ON THE PROJECT FOR
RECONSTRUCTION OF THAAJUDDEEN SCHOOL, MALE,
REPUBLIC OF MALDIVES**

1.0 ORIGIN

The Ministry of Education of the Republic of Maldives (MoE) has envisaged a Project to reconstruct the Thaajuddeen School of Male and Messes Mohri Architect and Associates Inc. (MAAI) of 2-4-13, Chuo-ku, Tokyo, Japan has been appointed as the Consulting Engineers for the Project. The MAAI has required to investigate the sub soil conditions of the Site earmarked for the Project in order to evaluate the parameters involved with designing the foundation system of the new buildings. Under the above circumstances Messes Ground Engineering Consultants (Pvt) Ltd. of No. 24, Station Road, Wattala, Sri Lanka, (GECL) has been entrusted by MAAI with the sub soil investigation after accepting their Financial Proposal of 21st November 2001.

2.0 SCOPE

The scope of work was to drill four bore holes, one up to a depth of 20.0m, and three up to a depth of 10m in the proposed foundation area in order to facilitate the necessary soil investigations. The four bore holes were to be drilled while carrying out Standard Penetration Tests at every 1.0m intervals. However, the bore holes were to be terminated if a bearing layer having SPT N value more than 50 for consecutive 3m before reaching the above stipulated depths.

Disturbed and undisturbed soil samples were to be obtained from every cohesive soil layer.

Following laboratory tests were to be conducted on the soil samples obtained.

1. Specific gravity of soil granule.
2. Weight per unit volume.
3. Grading test.
4. Water content.
5. Liquid limit.
6. Plastic limit.
7. Unconfined compression test.
8. Triaxial compression test.
9. Consolidation test.
10. Horizontal soil bearing test.

The Report should include the location plan of the bore holes, soil profiles, bore hole log data, results of the laboratory tests carried out and suggestions of supporting layer and building foundation.

3.0 LOCATION

The proposed site is located adjacent to the existing school building at Kabaa – Aisha Rani Higur, Block 399, Maafanu 20-01, Male in Republic of Maldives.

The Site location and the bore hole locations are shown in Figure 1A in Annexure A to the Report. All the four locations of the bore holes were pre-decided by MAAI and those were located on the ground physically and shown to the Representative of the MAAI.

4.0 WORK CARRIED OUT

4.1 GENERAL

A YBM 05 Light Weight rotary type drilling machine along with a drilling team has been mobilized for this work on the 17th December 2001 and the fieldwork was completed on 24th December 2001.

The first bore hole was to be drilled was BH 01. A coral bed rock having SPT N value more than 50 for a depth of three consecutive meters was met at 11.65m. Therefore the bore hole was terminated at 14.65m without drilling up to a depth of 20m. The second bore hole was drilled at BH 02 and it was penetrated to a depth of 10m. The third and fourth bore holes was drilled at BH 03 and BH 04 and those were penetrated beyond 10m depth in order to find out the coral bed encountered in the BH 01 on the request of the Consultant's Representative. The depth of the third and fourth bore holes were 11.45m and 11.55m respectively.

Standard Penetration Tests were conducted and disturbed soil samples have been obtained from every 1.0 / 1.5 metre intervals through out the full drilled depth.

No undisturbed soil samples could be collected as there were no cohesive soil layers encountered in any of the bore holes.

Disturbed soil samples were obtained from every SPT location and whenever the soil type changed. All the samples were put in transparent containers and sealed in such a way that moisture from the samples will not get released to the atmosphere.

The depth to the ground water table is measured in every bore after 24 hours of termination of the same so that there is sufficient period of time for the water table to be stabilised.

The Work was continuously supervised by the Representative of the MAAI.

The soil samples were airlifted to the GECL laboratory in Sri Lanka for subjecting to the necessary laboratory tests.

The ground water sample for the same tests were obtained from the bore hole No BH 04 which has been drilled through the worst fill area where the water could be contaminated mostly.

4.2 STANDARD PENETRATION TEST (SPT)

Standard Penetration Tests (SPT) were conducted inside the bore holes in accordance with ASTM-D 1586 at every 1.0 interval throughout the total depth.

4.3 SAMPLING AND CLASSIFICATION

The sub soil strata were recovered using a split spoon sampler, by other dry blocking methods. Disturbed samples, what ever that could be recovered have been collected continuously at 1.0m intervals and when ever the soil type changes.

The soil samples were examined visually using a 10 x 1 magnifying glass and classified according to the Unified Soil Classification System at site. The classification was verified in the laboratory under the microscope. The soil classification of each stratum is given in the vertical soil profiles attached under the Annexure B to the Report.

4.4 WATER TABLE

The water levels of the ground water table with respect to the existing ground level at the bore hole locations have been observed and are reported in the vertical soil profiles under Annexure B to this Report.

The depth to the water level measured form the existing ground surface is given below.

BH 01 :	0.76m below the existing ground level.
BH 02 :	0.84m above the existing ground level.
BH 03 :	0.63m above the existing ground level.
BH 03 :	0.65m above the existing ground level.

No considerable variation in the ground water level is observed with the variation of the tide levels in the surrounding sea.

4.5 LABORATORY TESTING

The soil samples which were to be subjected for the following laboratory tests were selected with the approval of the MAAI in such a way that all the soil strata will be represented.

1.	Specific gravity of soil granule.	(SG)
2.	Grading test.	(GT)
3.	Water content.	(WC)
4.	Sulphate content of soil	(S-SO4)
5.	Chloride content of soil	(S-Cl)
6.	Sulphate content of ground water	(W-SO4)
7.	Chloride content of ground water	(W-Cl)

The soil sample for Sulphate and Chloride contents tests is selected at the depth of 3.0m where the foundation will be placed most possibly. The schedule of the laboratory tests is given in the Table No 01.

4.6 SOIL PROFILE

The vertical soil profiles are reported under Annexure B.

TABLE No. 01

Sample No	Bore Hole No	Depth (m)	SG	GT	WC	S-SO4	S-Cl	W-SO4	W-Cl
01	BH 01	1.00-1.45	*	*	*				
02	BH 01	3.00-3.45		*	*				
03	BH 01	4.00-4.45		*	*				
04	BH 01	11.00-11.45		*	*				
05	BH 01	7.00-7.45		*	*				
06	BH 01	9.00-9.45		*	*				
07	BH 01	10.00-10.45		*	*				
08	BH 01	1.00-1.45	*		*				
09	BH 02	1.00-1.45	*		*				
10	BH 02	5.00-5.45	*		*				
11	BH 02	7.00-7.45	*		*				
12	BH 02	9.00-9.45	*		*				
13	BH 02	9.00-9.45		*	*				
14	BH 02	10.00-10.45		*	*				
15	BH 04	9.00-9.45		*	*				
16	BH 04	10.00-10.45		*	*				
17	BH 03	3.00-3.45				*	*		
18	BH 04	Water						*	*

5.0 DISCUSSION

The total sub soil system of the site is comprised of an imported fill, thick prism of depositional soils and sedimentary basement rock.

A vertical cross section through the bore holes have been constructed and given under the Annexure C to the Report as Figure II A and Figure II B. The ground surface of the Site is assumed as nearly horizontal and plane for the purpose of construction of the vertical cross sections.

The Site appears to be partly reclaimed land formed by filling imported material.

The top most soil stratum is a 0.10m (BH 03) to 0.30m (BH 04) thick grayish brown coloured Top soil layer which contains partially decayed parts of vegetation, which is common all over the Site.

The reclaimed portion is restricted to the area of BH 01 and BH 04. The reclamation has been done by using waste material mixed with sea sand. The thickness of the filled layer varies from 1.85m in BH 01 to 2.95m in BH 04. In BH 01 the filled material is dominantly sea sand with little waste material and in BH 04 it vise versa. The inorganic portion of the filled material could be classified as loose, fine to coarse sand with some gravel.

The top soil stratum of BH 02 and BH 03 area is a 1.85m (BH 02) to 4.90m (BH 03) thick loose to dense, fine to coarse sand with some gravel and cobbles. This stratum continues into the BH 01 and BH 04 area underneath the filled layer.

The above sand layer is followed by a layer of loose to dense, very fine to coarse sand layer whose thickness varies from 3.15m (BH 03) to 5.90m (BH 02).

Subsequent to the above stratum a very loose to extremely dense / very stiff very fine sand / silt layer has been encountered. The particle size of this silty sand layer becomes very fine towards silt in the BH 04 area. A 1.05m cavity has been encountered on the top of this silty sand layer in the BH 04. No water losses have been encountered while penetrating this cavity. The lateral extension of the cavity can not be quantified with the available data.

Again another loose to dense very fine to coarse sand layer has been come across below the silty stratum in BH 01 and BH 04. This layer has not been found in BH 03.

The final soil stratum found in the area is a very thin, extremely dense, slightly plastic clayey sand layer deposited on the highly weathered coral bed rock. This was found only in the BH 01.

Almost all the sands encountered in the bore holes could be categorised, in general, as coral sands.

The highly weathered to slightly weathered coral rock bed has been encountered at the depth of 11.65m in BH 01 and at the depth of 11.10m in BH 04. But according to our experience in the Male Island this coral bed is again followed by depositional soils in many of the places. Since the thickness of the coral bed is not known consideration of pile foundations is not advisable. If pile foundations are considered further investigations should be carried out in order to establish the thickness of the coral bed and the compressive strength of the rock.

No highly compressible, cohesive, clay layers have been encountered in any of the bore holes.

The filled depth of BH 01 and BH 04 contains a mixture of sand, pieces of clothes, pieces of timber and other waste materials decomposed to a certain degree that the material of those can not be identified clearly. The filled material in BH 04 area is very much inferior than those of BH 01 area as far as the strength and settlement characteristics are concerned. Also, the worse fill area (BH 04) is more close to the sea than the less worse (BH 01) fill area, and therefore the effect of sea level changes will be more in the BH 04 area. However, it is not advisable to place heavy foundations in the filled zone, within the depth of fill. It is not possible to demarcate the boundary of the filled area by the data obtained from the bore holes. A thorough knowledge of the lateral boundary between the filled zone and the original ground is very important when the locations of building foundations are decided. Also, special care should be taken to ensure that the foundations are located in such a way that those are placed either on the original ground or on filled zone (ie; one foundation will not share both filled zone and original ground as its base). Such arrangement would reduce the problems caused by differential settlement between the filled zone and the original ground. This could be achieved by controlling the length of buildings to be constructed.

The ground water table has been identified at the depth between 0.65m (BH 04) and 0.84m (BH 02). The variation of the water table during the period of investigation was negligible and therefore it could be mentioned that the variation of the ground water table in the Site area due to the variation of the sea level changes is minimal. Also, it should be mentioned that the tidal variation during the period of investigation was not at the peak.

6.0 RECOMMENDATIONS

1. Allowable bearing capacities that could be recommended for different depths in soil overburden at the bore hole locations for shallow foundations are given in Table No1.

TABLE NO. 1

Depth (m) from the existing ground level	Allowable maximum bearing Capacity (kN./m ²)			
	Filled Zone		Original Ground	
	BH 01	BH 04	BH 02	BH 03
1.0	40	40	75	75
2.0	50	50	75	75
3.0	150	75	125	100
4.0	150	100	150	225
5.0	200	200	200	250

The anticipated settlements due to the above-recommended bearing pressures is around 30mm, which is well within the tolerable limits.

The water table is assumed to be at the existing ground level for the evaluation of above allowable bearing capacities.

Shallow individual footings, strip foundations or raft foundations could be considered for the proposed structures.

Also, it is advisable that the foundations should not be placed in the region of ground water table fluctuation.

The allowable bearing capacity has been calculated using the following equation proposed by Brinch Hensen.

$$b = (0.5 * Y' * B' * N_y * d_y * s_y) + (q' * N_q * d_q * s_q)$$

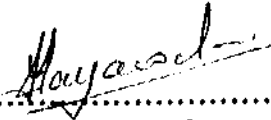
- Where
- b = Bearing capacity of the soil at given depth
 - Y' = Effective density of soil
 - B' = Half of the breadth of the foundation
 - N_y = Bearing capacity factor
 - N_q = Bearing capacity factor
 - Q' = Effective stress at the depth of the foundation
 - d_y, s_y, d_q, s_q are depth and shape factors whose values are 1 in case of the strip foundations.

The anticipated settlement has been calculated using the following equation proposed by Mayerhoff.

$$S = \frac{1.9 * b'}{N}$$

Where S = Anticipated total settlement in mm
b' = Allowable bearing capacity
N = Average of the SPT N value of the affected depth.

2. The lateral extension of the filled zone should be established in order to decide the locations of the proposed structures.
3. If pile foundations are considered a more detail investigation should be conducted.


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S. K. Jayawardana
BSc.(Hons), MSc, CEng.(Lond), MIMM(Lond).

.....
15.01.2002
Date

ANNEXURE A

Location Plans of the Site and the Bore Holes

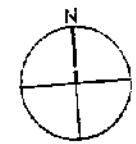
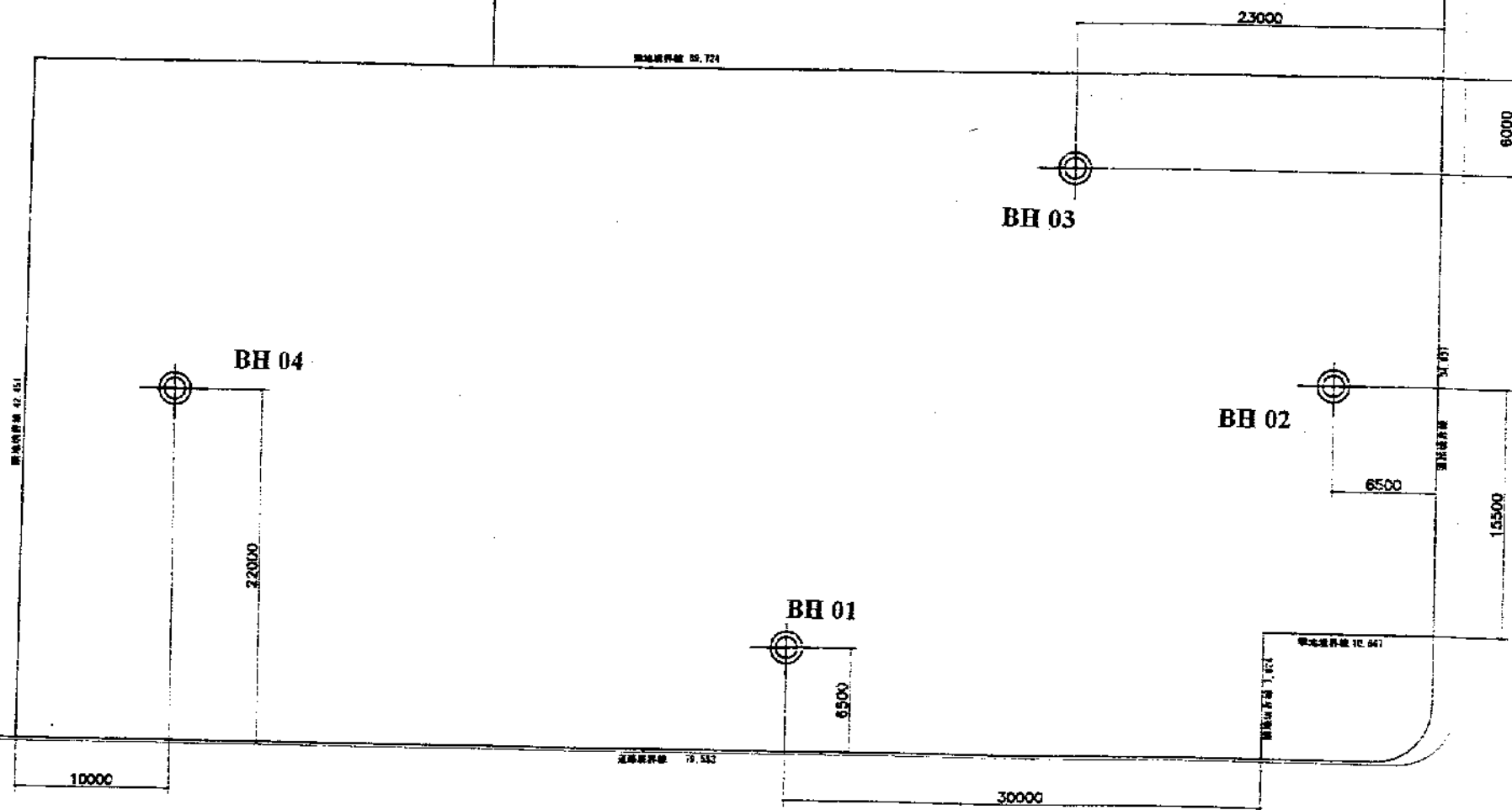


Figure I

Location Plan of the Bore Holes
(not to scale)

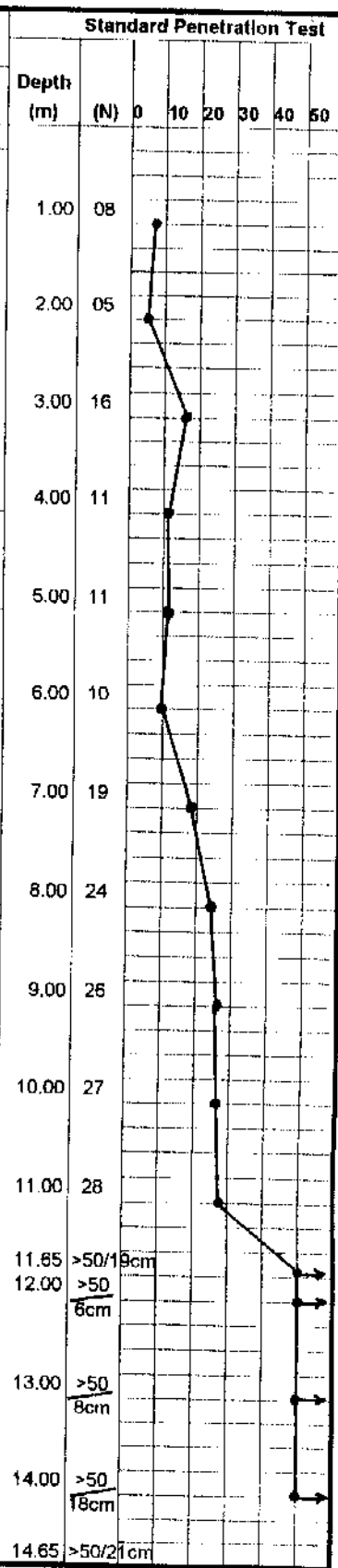
ANNEXURE B

Vertical Soil Profiles

GEOLOGICAL RECORD OF BORING

Project : Reconstruction of Thajudeen Sch **Date of Drilling:** 19/12/2001- 20/12/2001
Client : Mohri Architects **Angle from the vertical:** 0
Bore Hole Number : BH 0.1 **Depth of Hole (m):** 14.65
Ground Elevation : Assumed as 0.00 **Depth to the ground water level:** 0.76m from the EGL
Dia. of the hole (mm) : 100 **Logged By:** BSY

Elevation (m)	Depth (m)	Thickness (m)	Field Observations				Standard Penetration Test													
			Column Section	Soil / Rock Classifn.	Colour	Description	Depth (m)	(N)	0	10	20	30	40	50						
0.00																				
0.25	0.25	0.25		SW	Gr. Br.	Top soil with vegetable matter.														
0.50						FILL														
0.75																				
1.00																				
1.25																				
1.50																				
1.75																				
2.00	2.10	1.85																		
2.25																				
2.50																				
2.75																				
3.00																				
3.25																				
3.50																				
3.75																				
4.00	4.00	2.00																		
4.25																				
4.50																				
4.75																				
5.00	4.95	0.95																		
5.25																				
5.50																				
5.75																				
6.00																				
6.25																				
6.50																				
6.75																				
7.00																				
7.25																				
7.50																				
7.75																				
8.00	7.90	2.95																		
8.25																				
8.50																				
8.75																				
9.00																				
9.25																				
9.50																				
9.75																				
10.00	10.00	2.10																		
10.25																				
10.50																				
10.75																				
11.00																				
11.25	11.25	1.25																		
11.50																				
11.75	11.65	0.40																		
12.00																				
12.25																				
12.50																				
12.75																				
13.00																				
13.25																				
13.50																				
13.75																				
14.00																				
14.25																				
14.50																				
14.75	14.65	3.00																		



GEOLOGICAL RECORD OF BORING

Project :	Reconstruction of Thajudeen Sch	Date of Drilling:	21/12/2001
Client :	Mohri Architects	Angle from the vertical:	0
Bore Hole Number :	BH 02	Depth of Hole (m):	10.45
Ground Elevation :	Assumed as 0.00	Depth to the ground water level:	0.84m from the EGL
Dia. of the hole (mm) :	100	Logged By:	BSY

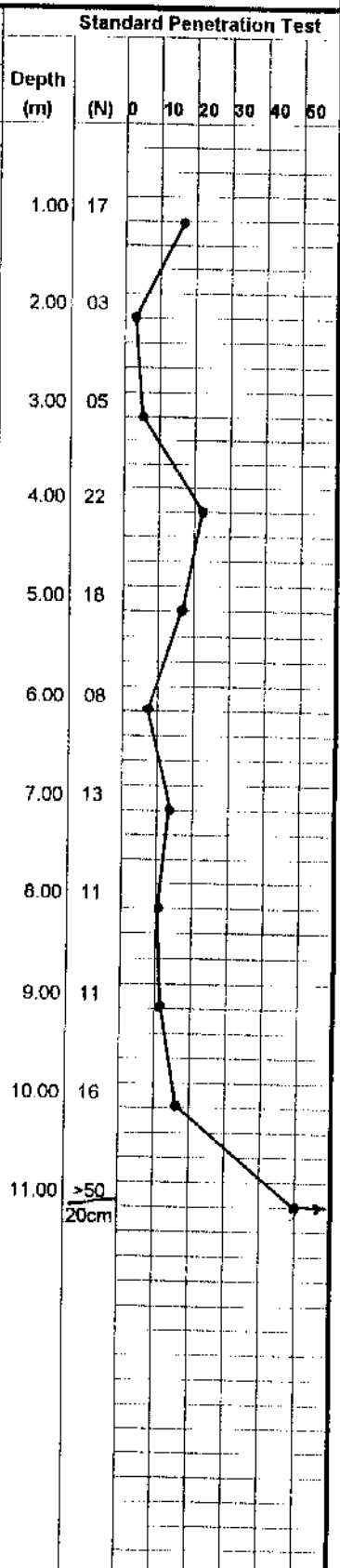
Elevation (m)	Depth (m)	Thickness (m)	Field Observations				Standard Penetration Test													
			Column Section	Soil / Rock Classifn.	Colour	Description	Depth (m)	(N)	0	10	20	30	40	50						
0.00																				
0.25	0.25	0.25		SW	Gr. Br.	Top soil with vegetable matter.														
0.50																				
0.75																				
1.00	1.00	0.75		SW	Grayish and brownish white	Medium, fine to coarse sand and gravels with some cobbles.														
1.25																				
1.50																				
1.75																				
2.00	2.10	1.10		SW / GW		Medium, fine to coarse sand and gravels with some cobbles.														
2.25																				
2.50																				
2.75																				
3.00																				
3.25	3.20	1.10				Medium, fine to coarse sand with some cobbles.														
3.50																				
3.75																				
4.00																				
4.25																				
4.50																				
4.75																				
5.00																				
5.25																				
5.50																				
5.75																				
6.00																				
6.25																				
6.50																				
6.75																				
7.00																				
7.25																				
7.50																				
7.75																				
8.00	8.00	4.80																		
8.25																				
8.50																				
8.75																				
9.00	9.08	1.08																		
9.25																				
9.50																				
9.75																				
10.00																				
10.25																				
10.50	10.45	1.37																		
10.75																				
11.00																				
11.25																				
11.50																				
11.75																				
12.00																				
12.25																				
12.50																				
12.75																				
13.00																				
13.25																				
13.50																				
13.75																				
14.00																				
14.25																				
14.50																				
14.75																				

Bore hole terminated at 10.45m below the existing ground level in depositional soils.

GEOLOGICAL RECORD OF BORING

Project : Reconstruction of Thajudeen Sch **Date of Drilling:** 22/12/2001
Client : Mohri Architects **Angle from the vertical:** 0
Bore Hole Number : BH 03 **Depth of Hole (m):** 11.45
Ground Elevation : Assumed as 0.00 **Depth to the ground water level:** 0.63m from the EGL
Dia. of the hole (mm) : 100 **Logged By:** BSY

Elevation (m)	Depth (m)	Thickness (m)	Field Observations			Standard Penetration Test													
			Column Section	Soil / Rock Classifn.	Colour	Description	Depth (m)	(N)	0	10	20	30	40	50					
0.00																			
0.25	0.10	0.10		SW	Br. white	Top soil with some vegetable matter.													
0.50																			
0.75																			
1.00																			
1.25																			
1.50																			
1.75																			
2.00																			
2.25	2.30	2.20		SW / GW	Brownish white or whitish brown	Medium to very loose, fine to coarse sand and gravels with some cobbles.													
2.50																			
2.75																			
3.00																			
3.25																			
3.50																			
3.75																			
4.00	4.00	1.70																	
4.25																			
4.50																			
4.75																			
5.00	5.00	1.00																	
5.25																			
5.50																			
5.75																			
6.00	6.00	1.00		SW	Brownish white or whitish brown	Medium to loose, fine to coarse sand with some gravels and cobbles.													
6.25																			
6.50																			
6.75																			
7.00																			
7.25																			
7.50																			
7.75																			
8.00																			
8.25	8.15	2.15																	
8.50																			
8.75																			
9.00	9.00	0.85			- do -	Medium, very fine to coarse but dominantly fine sand mixed with pieces of sea shells.													
9.25																			
9.50																			
9.75																			
10.00	10.00	1.00		ML	- do -	Medium, very fine to coarse but dominantly fine sand mixed with small amount of gravels													
10.25																			
10.50																			
10.75																			
11.00	11.00	10.00			- do -	Medium, very fine to coarse but dominantly fine sand mixed with small amount of gravels and cobbles.													
11.25																			
11.50	11.35	0.35			- do -	Extremely dense, coarse to fine sand with pieces of corals.													
11.75																			
12.00																			
12.25																			
12.50																			
12.75																			
13.00																			
13.25																			
13.50																			
13.75																			
14.00																			
14.25																			
14.50																			
14.75																			



Bore hole terminated at 11.45m below the existing ground level on hard coral bed.

GEOLOGICAL RECORD OF BORING

Project : Reconstruction of Thajudeen Sch **Date of Drilling:** 23/12/2001
Client : Mohri Architects **Angle from the vertical:** 0
Bore Hole Number : BH 04 **Depth of Hole (m):** 11.45
Ground Elevation : Assumed as 0.00 **Depth to the ground water level:** 0.65m from the EGL
Dia. of the hole (mm) : 100 **Logged By:** BSY

Elevation (m)	Depth (m)	Thickness (m)	Field Observations			Standard Penetration Test													
			Column Section	Soil / Rock Classifn.	Colour	Description	Depth (m)	(N)	0	10	20	30	40	50					
0.00																			
0.25	0.30	0.30		SW	Gr. br.	Top soil with vegetable matter.													
0.50																			
0.75																			
1.00																			
1.25																			
1.50																			
1.75																			
2.00																			
2.25																			
2.50																			
2.75																			
3.00																			
3.25	3.25	2.95																	
3.50																			
3.75																			
4.00	4.00	0.75				Brownish white	Loose, fine to coarse sand and gravels with pieces of sea shells												
4.25																			
4.50																			
4.75																			
5.00	5.00	1.00				Grayish white	Loose to medium, very fine to coarse but dominantly fine sand with small amount of gravel and sea shells.												
5.25																			
5.50																			
5.75																			
6.00	6.00	1.00				SW	Medium, very fine to coarse sand with small amount of gravels.												
6.25																			
6.50																			
6.75																			
7.00																			
7.25																			
7.50																			
7.75																			
8.00	8.05	2.05				Whitish brown or brownish white	Medium, well graded fine to coarse sand with gavel and small amount of cobbles.												
8.25																			
8.50																			
8.75																			
9.00	9.10	1.05				Cavity	Drill bit dropped without any resistance. But 100% water recovery was there.												
9.25																			
9.50																			
9.75																			
10.00																			
10.25	10.15	1.05				ML	Very loose to loose, very fine to coarse but dominantly fine sand mixed with small amount of gravel and pieces of sea shells.												
10.50																			
10.75																			
11.00	11.10	0.95				SW	Loose, fine to coarse sand with small amount of plastic fines and pieces of sea shells												
11.25																			
11.50	11.55	0.45				Coral	Brownish white Highly disintegrated coral bed rock.												
11.75																			
12.00																			
12.25																			
12.50																			
12.75																			
13.00																			
13.25																			
13.50																			
13.75																			
14.00																			
14.25																			
14.50																			
14.75																			

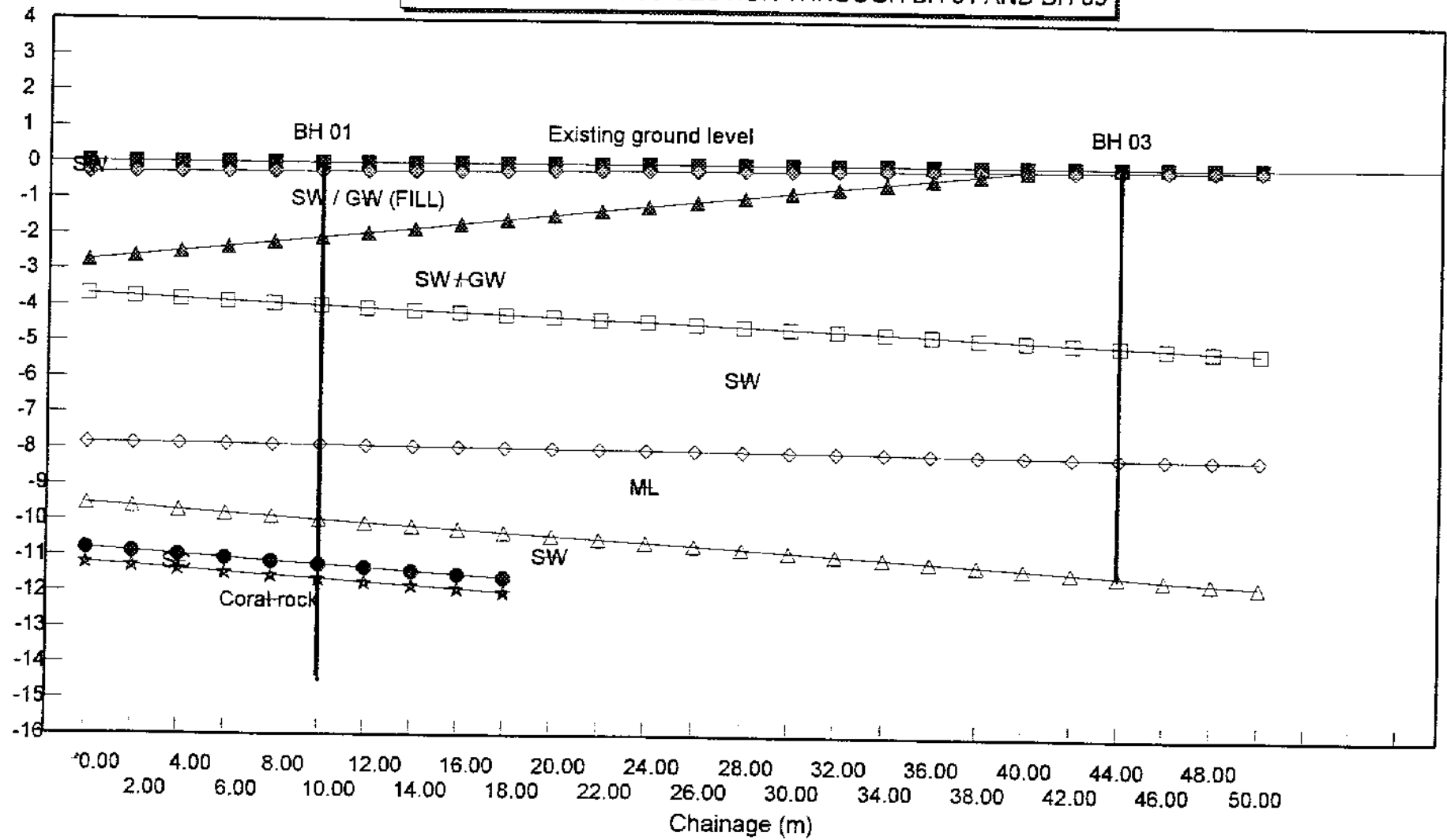
Bore hole terminated at 11.55m below the existing ground level in hard coral bed.

ANNEXURE C

Vertical Cross Section

FIGURE II - A

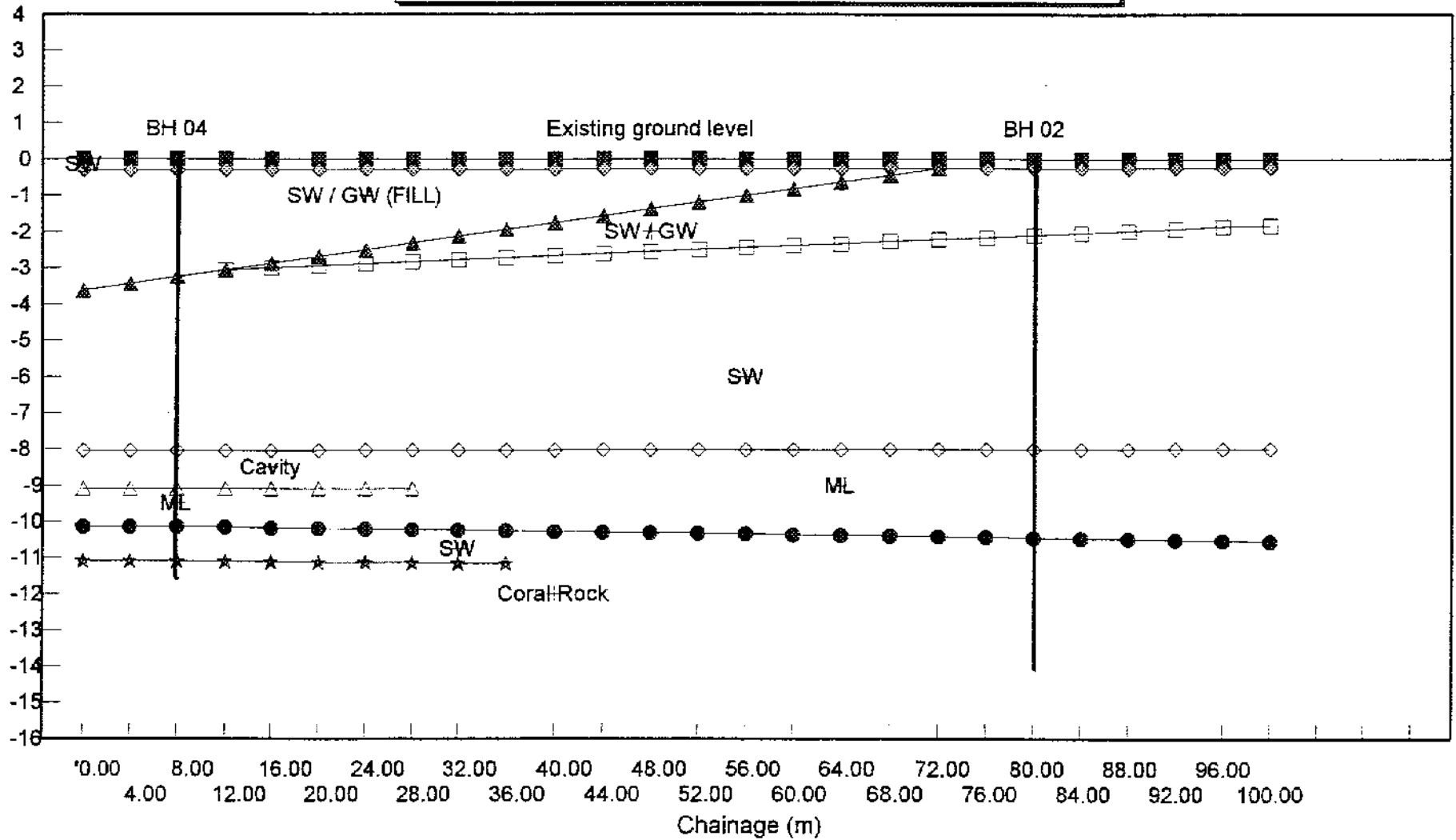
GENERALISED CROSS SECTION THROUGH BH 01 AND BH 03



- | | | | |
|--------------------------------|----------------------------------|---------------------------------|------------------------------|
| ■ Elev. of existing Ground | ◇ Elev. of bot. of first SW laye | ▲ Elev. of bot. of FILL layer | □ Elev. of bot. of SW/GW lay |
| ◊ Elev. of bot. of second SW I | △ Elev. of bot. of ML layer | ● Elev. of bot. of third SW lay | ★ Elev. of bot. of SC layer |

FIGURE II - B

GENERALISED CROSS SECTION THROUGH BH 04 AND BH 02



■ Elev. of existing Ground	◇ Elev. of bot. of first SW laye	▲ Elev. of bot. of FILL layer	◻ Elev. of bot. of SW/GW lay
◊ Elev. of bot. of second SW I	△ Elev. of bot. of Cavity	● Elev. of bot. of ML layer	★ Elev. of bot. of third SW lay

ANNEXURE D

Results of the Laboratory Tests

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

SPECIFIC GRAVITY TEST

PROJECT	: Reconstruction of Thaajuddeen School									DATE	: 29/12/2001
CLIENT	: Mohri Architect & Associates Inc.										
LOCATION	: Rep. of Maldives										
BORE HOLE NO.	No.	0 1		0 1		0 2		0 2			
SAMPLE NO.	No.										
DEPTH	(m)	1.00 - 1.45		11.00 - 11.45		1.00 - 1.45		5.00 - 5.45			
SOIL SPECIMEN NO.		0 8		0 4		0 9		1 0			
Mass of gas jar and plate (m1)	(g)	1191.0	1083.0	1180.0	1075.0	1186.0	1191.0	1083.0	1186.0		
Mass of gas jar, plate and soil (m2)	(g)	1591.0	1485.0	1394.0	1284.0	1589.0	1551.0	1483.0	1585.0		
Mass of gas jar, plate, soil and water (m3)	(g)	3845.0	3759.1	3723.5	3631.9	3857.3	3808.5	3751.7	3854.6		
Mass of gas jar, plate and water (m4)	(g)	3587.5	3498.0	3587.5	3498.0	3606.5	3587.5	3498.0	3606.5		
m2 - m1	(g)	400.00	402.00	214.00	209.00	403.00	360.00	400.00	399.00		
m4 - m1	(g)	2396.50	2415.00	2407.50	2423.00	2420.50	2396.50	2415.00	2420.50		
m3 - m2	(g)	2254.00	2274.10	2329.50	2347.90	2268.30	2257.50	2268.70	2269.60		
(M4 -M1)-(M3 -M2)	(ml)	142.50	140.90	78.00	75.10	152.20	139.00	146.30	150.90		
SG = $\frac{M2 - M1}{(M4 -M1)-(M3 -M2)}$		2.81	2.85	2.74	2.78	2.65	2.59	2.73	2.64		
Average Specific Gravity		2.83		2.76		2.62		2.69			
Remarks	:										
Tested by	:	B.S.Yapa									
Computed by	:	S.K.Jayawardana									

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

SPECIFIC GRAVITY TEST

PROJECT	: Reconstruction of Thaaajuddeen School	DATE	: 31/12/2001
CLIENT	: Mohri Architect & Associates Inc.		
LOCATION	: Rep. of Maldives		
BORE HOLE NO.	No.	0 2	0 2
SAMPLE NO.	No.		
DEPTH	(m)	7.00 - 7.45	9.00 - 9.45
SOIL SPECIMEN NO.		1 1	1 2
Mass of gas jar and plate (m1)	(g)	1206.5	1191.0
Mass of gas jar, plate and soil (m2)	(g)	1607.0	1591.0
Mass of gas jar, plate, soil and water (m3)	(g)	3864.4	3840.0
Mass of gas jar, plate and water (m4)	(g)	3603.5	3587.5
m2 - m1	(g)	400.50	400.00
m4 - m1	(g)	2397.00	2396.50
m3 - m2	(g)	2257.40	2249.00
(M4 -M1)-(M3 -M2)	(ml)	139.60	147.50
SG = $\frac{M2 - M1}{(M4 -M1)-(M3 -M2)}$		2.87	2.71
Average Specific Gravity		2.79	2.71
Remarks	:		
Tested by	: B.S.Yapa		
Computed by	: S,K,Jayawardana		

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

GRAIN SIZE DISTRIBUTION - SIEVE ANALYSIS

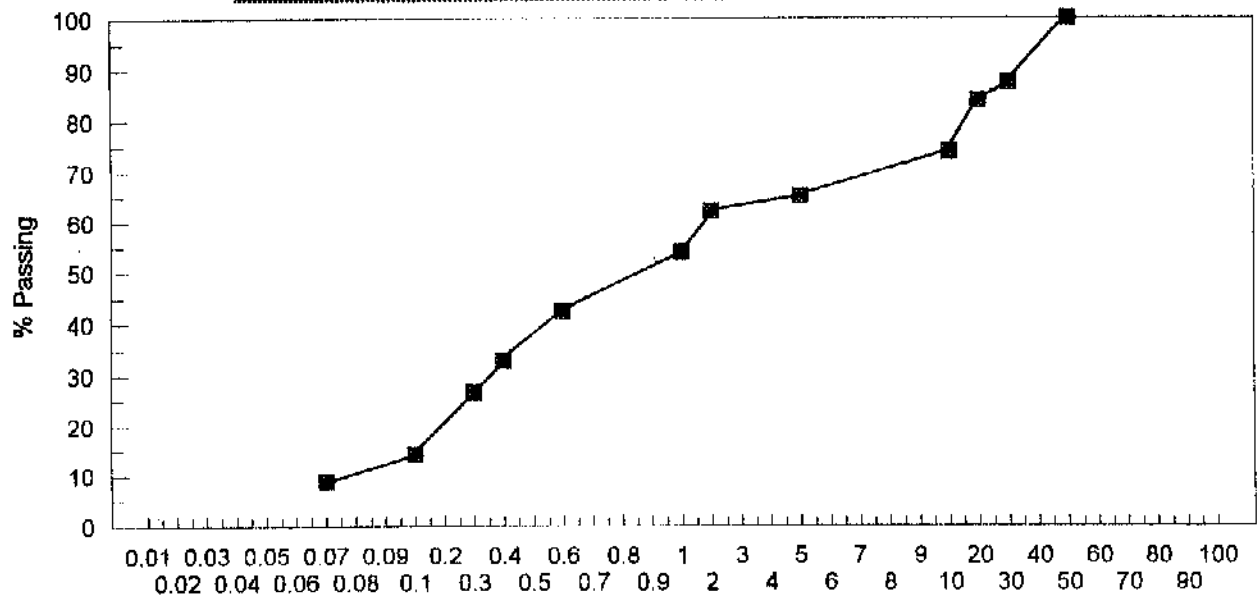
PROJECT Reconstruction of Thaajuddeen School
LOCATION Rep. of Maldives
BORE HOLE NO. 01
DEPTH (m) 1.00 - 1.45
SAMPLE NO. 01
Test Method BS 1377 75 No 2.7

Date : 29 Dec 2001

Weight of the soil + pan = 96.90 g
 Weight of the pan = 6.10 g
 Weight of the soil = 90.80 g

Sieve Size/ Partical Size mm	Weight g	Retained %	Cum. Retained %	% Passing %	Remarks
50.00		0.00	0.00	100.00	
28.00	11.20	12.33	12.33	87.67	
20.00	3.31	3.65	15.98	84.02	
14.00		0.00	15.98	84.02	
10.00	9.10	10.02	26.00	74.00	
5.00	7.90	8.70	34.70	65.30	
2.00	2.83	3.12	37.82	62.18	
1.18	7.33	8.07	45.89	54.11	
0.60	10.61	11.69	57.58	42.42	
0.425	8.61	9.48	67.06	32.94	
0.300	5.61	6.18	73.24	26.76	
0.150	11.30	12.44	85.68	14.32	
0.075	5.01	5.52	91.20	8.80	

PARTICLE SIZE DISTRIBUTION CURVE



GROUND ENGINEERING CONSULTANTS (PVT) LTD.

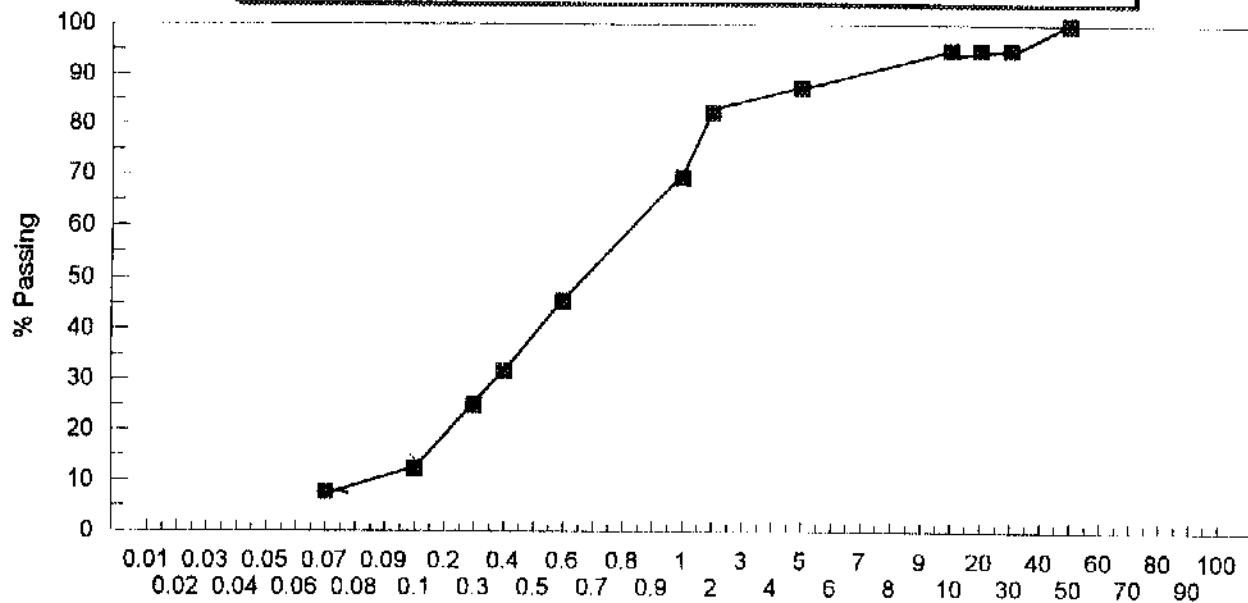
GRAIN SIZE DISTRIBUTION - SIEVE ANALYSIS

PROJECT Reconstruction of Thaaajuddeen School **Date** 29 Dec 2001
LOCATION Rep. of Maldives
BORE HOLE NO. 01
DEPTH (m) 3.00 - 3.45
SERIAL NO. 02
Test Method BS 1377 75 No 2.7

Weight of the soil + pan = 114.20 g
 Weight of the pan = 6.10 g
 Weight of the soil = 108.10 g

Sieve Size/ Partical Size mm	Weight g	Retained %	Cum. Retained %	% Passing %	Remarks
50.00		0.00	0.00	100.00	
28.00	5.41	5.00	5.00	95.00	
20.00		0.00	5.00	95.00	
14.00		0.00	5.00	95.00	
10.00		0.00	5.00	95.00	
5.00	8.21	7.59	12.60	87.40	
2.00	5.42	5.01	17.61	82.39	
1.18	14.01	12.96	30.57	69.43	
0.60	25.92	23.98	54.55	45.45	
0.425	14.90	13.78	68.33	31.67	
0.300	7.20	6.66	75.00	25.00	
0.150	13.91	12.87	87.86	12.14	
0.075	4.80	4.44	92.30	7.70	

PARTICLE SIZE DISTRIBUTION CURVE



GROUND ENGINEERING CONSULTANTS (PVT) LTD.

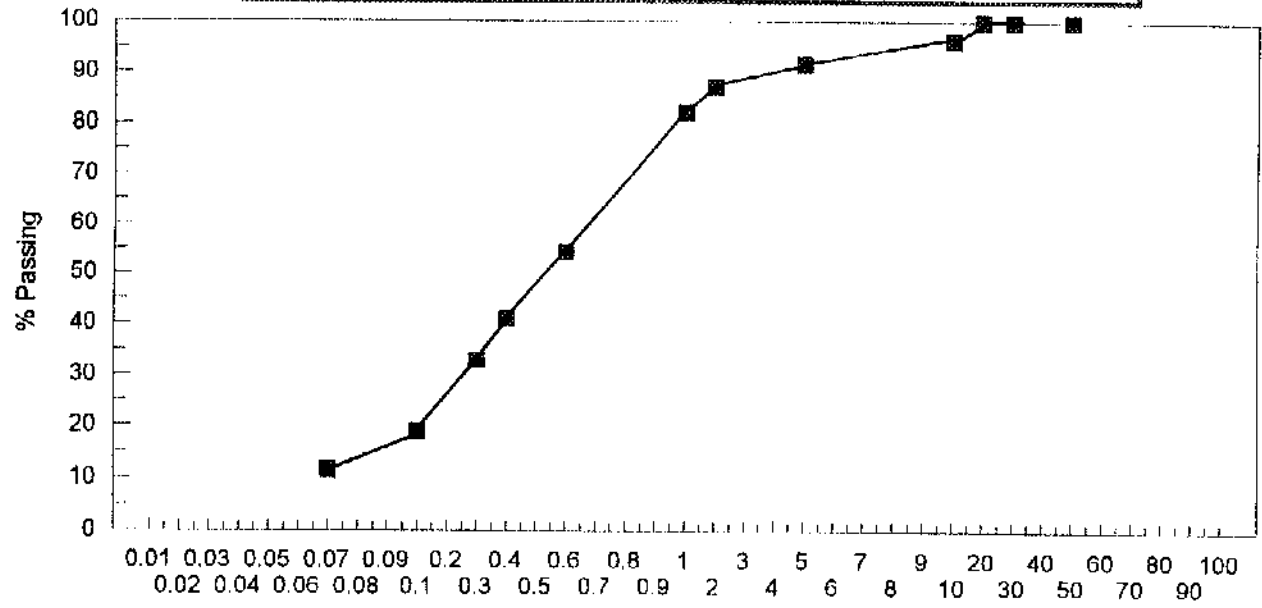
GRAIN SIZE DISTRIBUTION - SIEVE ANALYSIS

PROJECT Reconstruction of Thaajuddeen School **Date** 29 Dec 2001
LOCATION Rep. of Maldives
BORE HOLE NO. 01
DEPTH (m) 4.00 - 4.45
SERIAL NO. 03
Test Method BS 1377 75 No 2.7

Weight of the soil + pan = 100.01 g
 Weight of the pan = 6.10 g
 Weight of the soil = 93.91 g

Sieve Size/ Partical Size mm	Weight g	Retained %	Cum. Retained %	% Passing %	Remarks
50.00		0.00	0.00	100.00	
28.00		0.00	0.00	100.00	
20.00		0.00	0.00	100.00	
14.00	3.40	3.62	3.62	96.38	
10.00		0.00	3.62	96.38	
5.00	4.40	4.69	8.31	91.69	
2.00	4.31	4.59	12.90	87.10	
1.18	4.69	4.99	17.89	82.11	
0.60	26.10	27.79	45.68	54.32	
0.425	12.62	13.44	59.12	40.88	
0.300	7.61	8.10	67.22	32.78	
0.150	13.20	14.06	81.28	18.72	
0.075	6.83	7.27	88.55	11.45	

PARTICLE SIZE DISTRIBUTION CURVE



GROUND ENGINEERING CONSULTANTS (PVT) LTD.

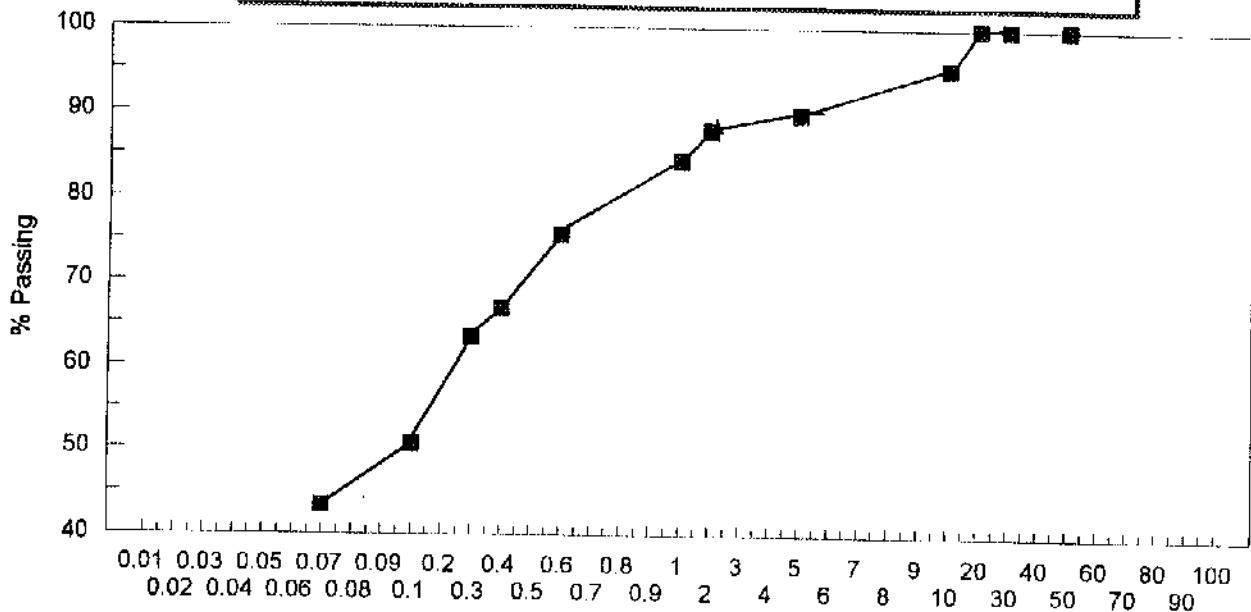
GRAIN SIZE DISTRIBUTION - SIEVE ANALYSIS

PROJECT Reconstruction of Thaajuddeen School **Date** 03 Jan 2002
LOCATION Rep. of Maldives
BORE HOLE NO. 01
DEPTH (m) 11.00 - 11.45
SERIAL NO. 04
Test Method BS 1377 75 No 2.7

Weight of the soil + pan = 65.71 g
 Weight of the pan = 6.20 g
 Weight of the soil = 59.51 g

Sieve Size/ Partical Size mm	Weight g	Retained %	Cum. Retained %	% Passing %	Remarks
50.00		0.00	0.00	100.00	
28.00		0.00	0.00	100.00	
20.00		0.00	0.00	100.00	
14.00		0.00	0.00	100.00	
10.00	2.81	4.72	4.72	95.28	
5.00	3.30	5.55	10.27	89.73	
2.00	1.11	1.87	12.13	87.87	
1.18	2.12	3.56	15.69	84.31	
0.60	5.20	8.74	24.43	75.57	
0.425	5.22	8.77	33.20	66.80	
0.300	2.01	3.38	36.58	63.42	
0.150	7.65	12.85	49.44	50.56	
0.075	4.33	7.28	56.71	43.29	

PARTICLE SIZE DISTRIBUTION CURVE



GROUND ENGINEERING CONSULTANTS (PVT) LTD.

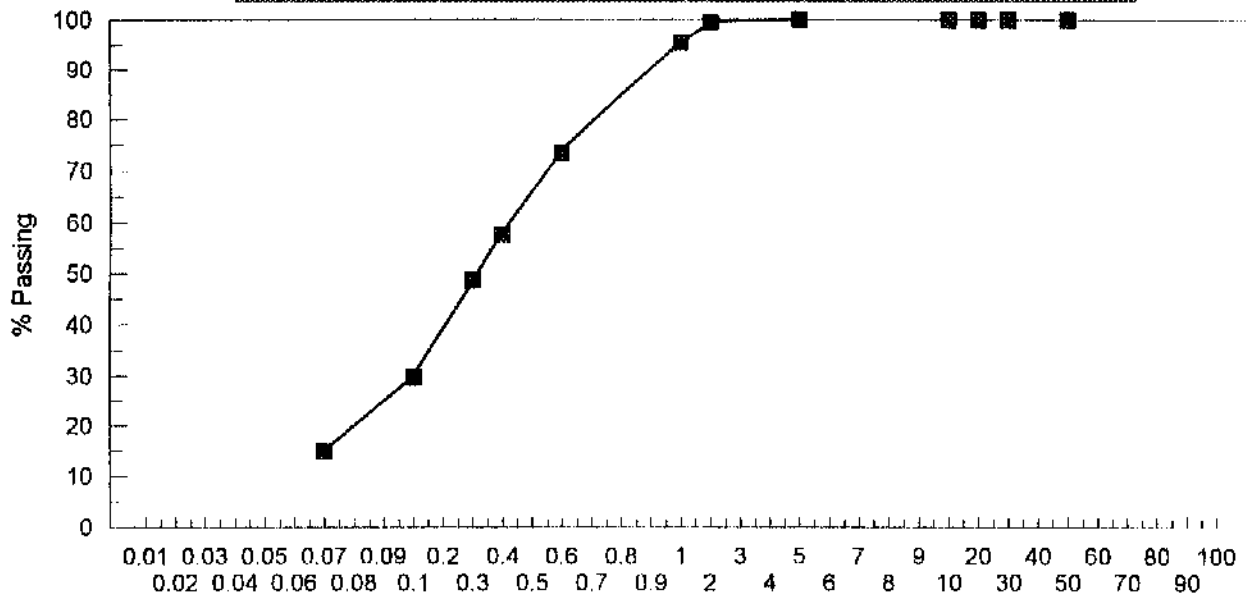
GRAIN SIZE DISTRIBUTION - SIEVE ANALYSIS

PROJECT Reconstruction of Thaajuddeen School **Date** 31 Dec 2001
LOCATION Rep. of Maldives
BORE HOLE NO. 01
DEPTH (m) 7.00 - 7.45
SERIAL NO. 05
Test Method BS 1377 75 No 2.7

Weight of the soil + pan = 158.40 g
 Weight of the pan = 8.88 g
 Weight of the soil = 149.52 g

Sieve Size/ Partical Size mm	Weight g	Retained %	Cum. Retained %	% Passing %	Remarks
50.00		0.00	0.00	100.00	
28.00		0.00	0.00	100.00	
20.00		0.00	0.00	100.00	
14.00		0.00	0.00	100.00	
10.00		0.00	0.00	100.00	
5.00		0.00	0.00	100.00	
2.00	0.82	0.55	0.55	99.45	
1.18	5.92	3.96	4.51	95.49	
0.60	33.02	22.08	26.59	73.41	
0.425	23.72	15.86	42.46	57.54	
0.300	13.22	8.84	51.30	48.70	
0.150	28.32	18.94	70.24	29.76	
0.075	22.22	14.86	85.10	14.90	

PARTICLE SIZE DISTRIBUTION CURVE



GROUND ENGINEERING CONSULTANTS (PVT) LTD.

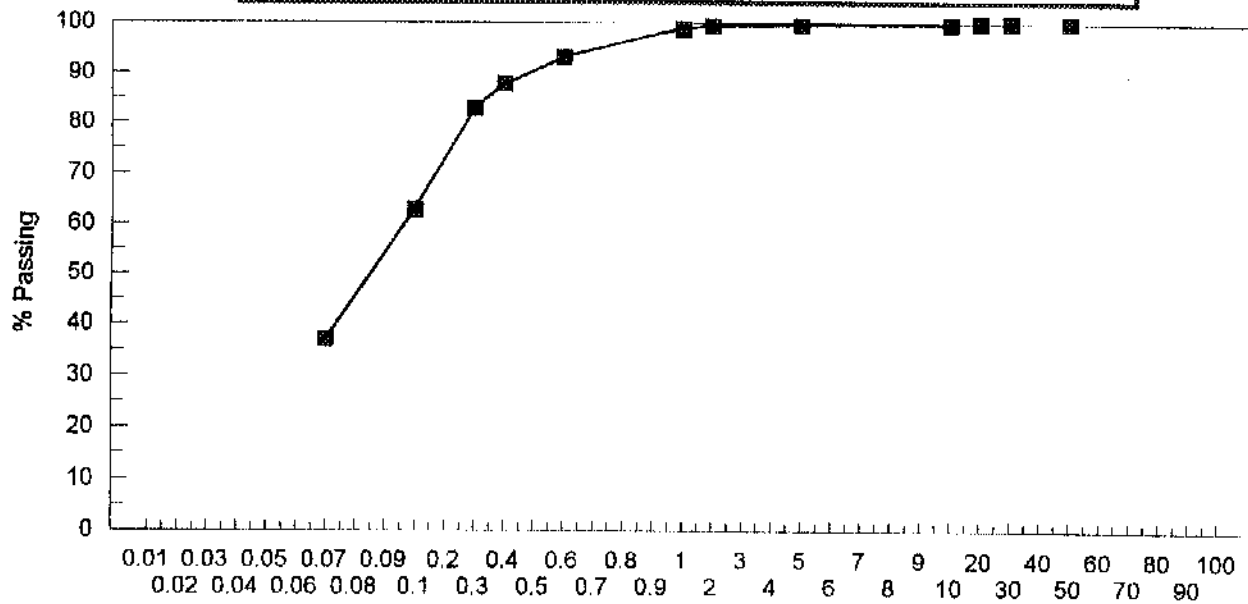
GRAIN SIZE DISTRIBUTION - SIEVE ANALYSIS

PROJECT Reconstruction of Thaajuddeen School **Date** 31 Dec 2001
LOCATION Rep. of Maldives
BORE HOLE NO. 01
DEPTH (m) 9.00 - 9.45
SERIAL NO. 06
Test Method BS 1377 75 No 2.7

Weight of the soil + pan = 184.31 g
 Weight of the pan = 6.20 g
 Weight of the soil = 178.11 g

Sieve Size/ Partical Size mm	Weight g	Retained %	Cum. Retained %	% Passing %	Remarks
50.00		0.00	0.00	100.00	
28.00		0.00	0.00	100.00	
20.00		0.00	0.00	100.00	
14.00		0.00	0.00	100.00	
10.00	0.61	0.34	0.34	99.66	
5.00	0.30	0.17	0.51	99.49	
2.00	0.21	0.12	0.63	99.37	
1.18	1.01	0.57	1.20	98.80	
0.60	9.90	5.56	6.75	93.25	
0.425	9.52	5.35	12.10	87.90	
0.300	9.11	5.11	17.21	82.79	
0.150	35.71	20.05	37.26	62.74	
0.075	45.91	25.78	63.04	36.96	

PARTICLE SIZE DISTRIBUTION CURVE



GROUND ENGINEERING CONSULTANTS (PVT) LTD.

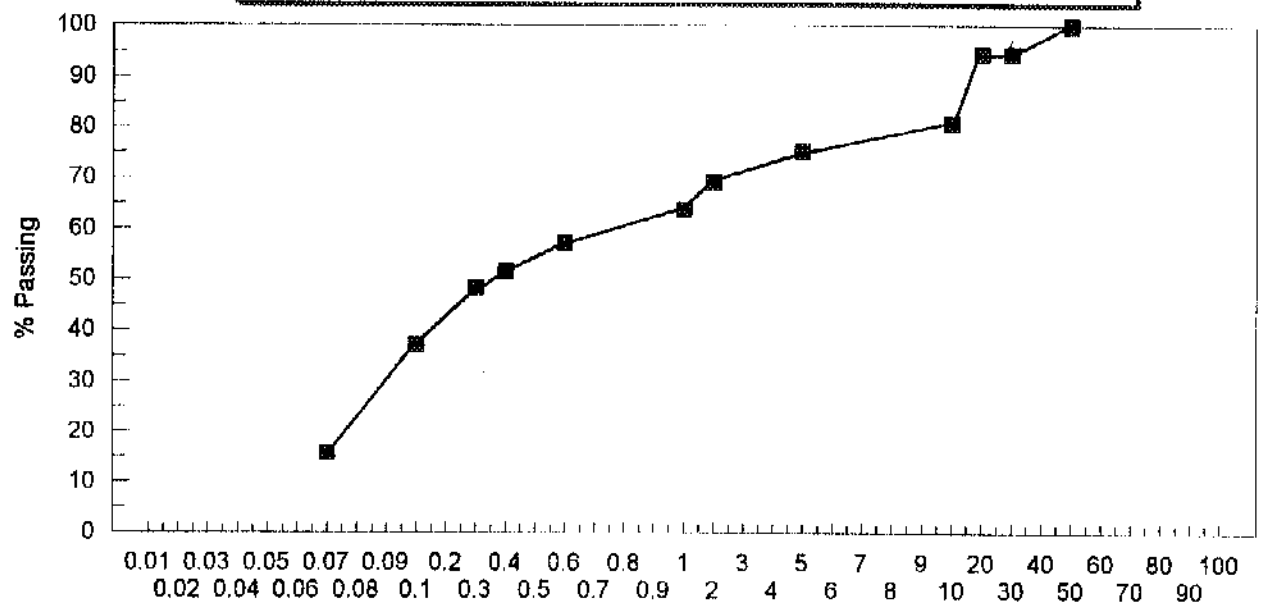
GRAIN SIZE DISTRIBUTION - SIEVE ANALYSIS

PROJECT Reconstruction of Thaajuddeen School **Date** 31 Dec 2001
LOCATION Rep. of Maldives
BORE HOLE NO. 01
DEPTH (m) 10.00 - 10.45
SERIAL NO. 07
Test Method BS 1377 75 No 2.7

Weight of the soil + pan = 210.70 g
 Weight of the pan = 10.90 g
 Weight of the soil = 199.80 g

Sieve Size/ Partical Size mm	Weight g	Retained %	Cum. Retained %	% Passing %	Remarks
50.00		0.00	0.00	100.00	
28.00	11.01	5.51	5.51	94.49	
20.00		0.00	5.51	94.49	
14.00		0.00	5.51	94.49	
10.00	27.10	13.56	19.07	80.93	
5.00	11.20	5.61	24.68	75.32	
2.00	12.11	6.06	30.74	69.26	
1.18	11.11	5.56	36.30	63.70	
0.60	13.10	6.56	42.86	57.14	
0.425	10.82	5.42	48.27	51.73	
0.300	6.90	3.45	51.73	48.27	
0.150	22.20	11.11	62.84	37.16	
0.075	43.00	21.52	84.36	15.64	

PARTICLE SIZE DISTRIBUTION CURVE



GROUND ENGINEERING CONSULTANTS (PVT) LTD.

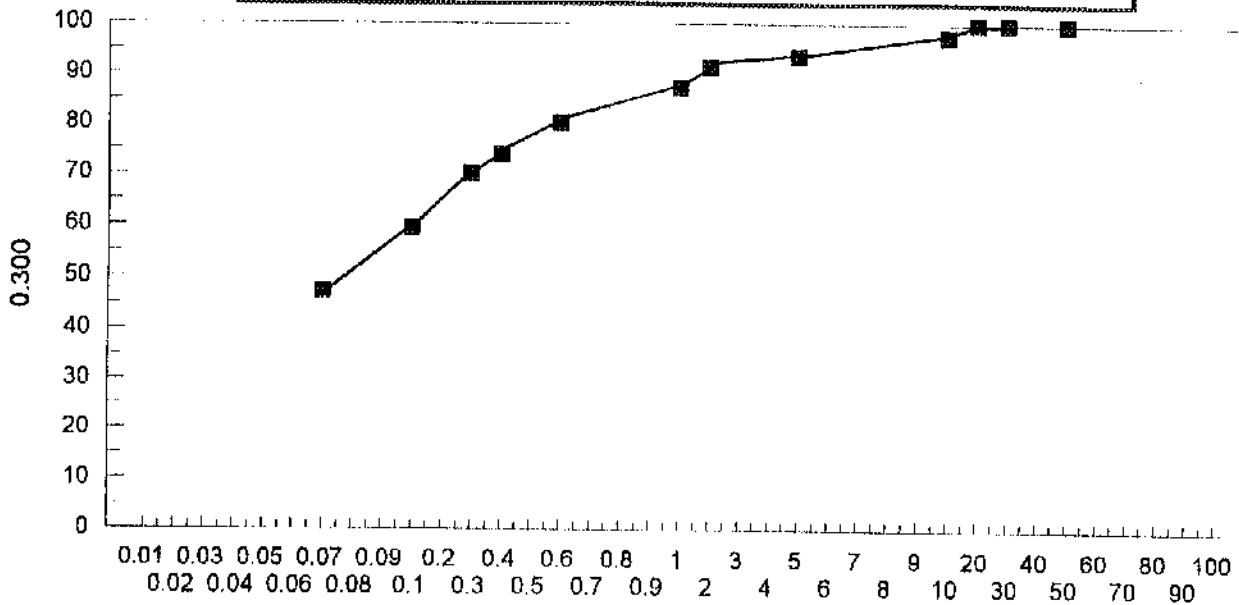
GRAIN SIZE DISTRIBUTION - SIEVE ANALYSIS

PROJECT Reconstruction of Thaajuddeen School **Date** 31 Dec 2001
LOCATION Rep. of Maldives
BORE HOLE NO. 02
DEPTH (m) 10.00 - 10.45
SERIAL NO. 14
Test Method BS 1377 75 No 2.7

Weight of the soil + pan = 211.90 g
 Weight of the pan = 6.10 g
 Weight of the soil = 205.80 g

Sieve Size/ Partical Size mm	Weight g	Retained %	Cum. Retained %	% Passing %	Remarks
50.00		0.00	0.00	100.00	
28.00		0.00	0.00	100.00	
20.00		0.00	0.00	100.00	
14.00		0.00	0.00	100.00	
10.00	5.11	2.48	2.48	97.52	
5.00	7.80	3.79	6.27	93.73	
2.00	4.71	2.29	8.56	91.44	
1.18	8.51	4.14	12.70	87.30	
0.60	14.42	7.01	19.70	80.30	
0.425	13.11	6.37	26.07	73.93	
0.300	7.82	3.80	29.87	70.13	
0.150	22.20	10.79	40.66	59.34	
0.075	24.51	11.91	52.57	47.43	

PARTICLE SIZE DISTRIBUTION CURVE



GROUND ENGINEERING CONSULTANTS (PVT) LTD.

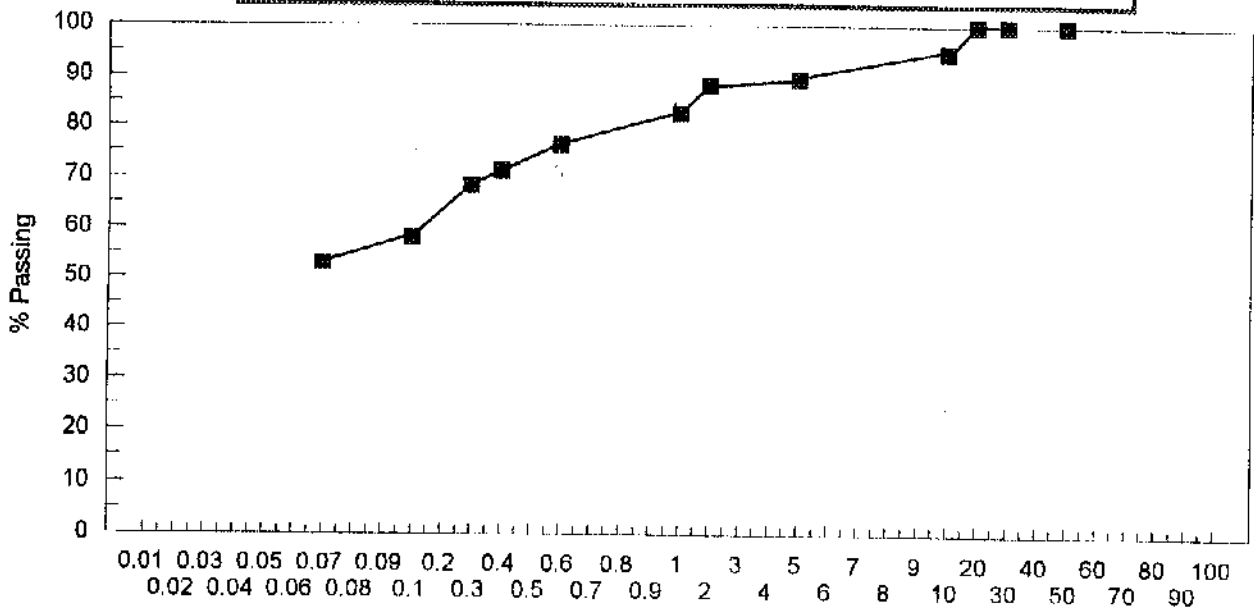
GRAIN SIZE DISTRIBUTION - SIEVE ANALYSIS

PROJECT Reconstruction of Thaaajuddeen School **Date** 31 Dec 2001
LOCATION Rep. of Maldives
BORE HOLE NO. 04
DEPTH (m) 9.00 - 9.45
SERIAL NO. 15
Test Method BS 1377 75 No 2.7

Weight of the soil + pan = 109.51 g
 Weight of the pan = 6.00 g
 Weight of the soil = 103.51 g

Sieve Size/ Partical Size mm	Weight g	Retained %	Cum. Retained %	% Passing %	Remarks
50.00		0.00	0.00	100.00	
28.00		0.00	0.00	100.00	
20.00		0.00	0.00	100.00	
14.00		0.00	0.00	100.00	
10.00	5.32	5.14	5.14	94.86	
5.00	5.52	5.33	10.47	89.53	
2.00	1.41	1.36	11.83	88.17	
1.18	5.71	5.52	17.35	82.65	
0.60	6.52	6.30	23.65	76.35	
0.425	5.31	5.13	28.78	71.22	
0.300	3.01	2.91	31.69	68.31	
0.150	10.63	10.27	41.96	58.04	
0.075	5.30	5.12	47.08	52.92	

PARTICLE SIZE DISTRIBUTION CURVE



GROUND ENGINEERING CONSULTANTS (PVT) LTD.

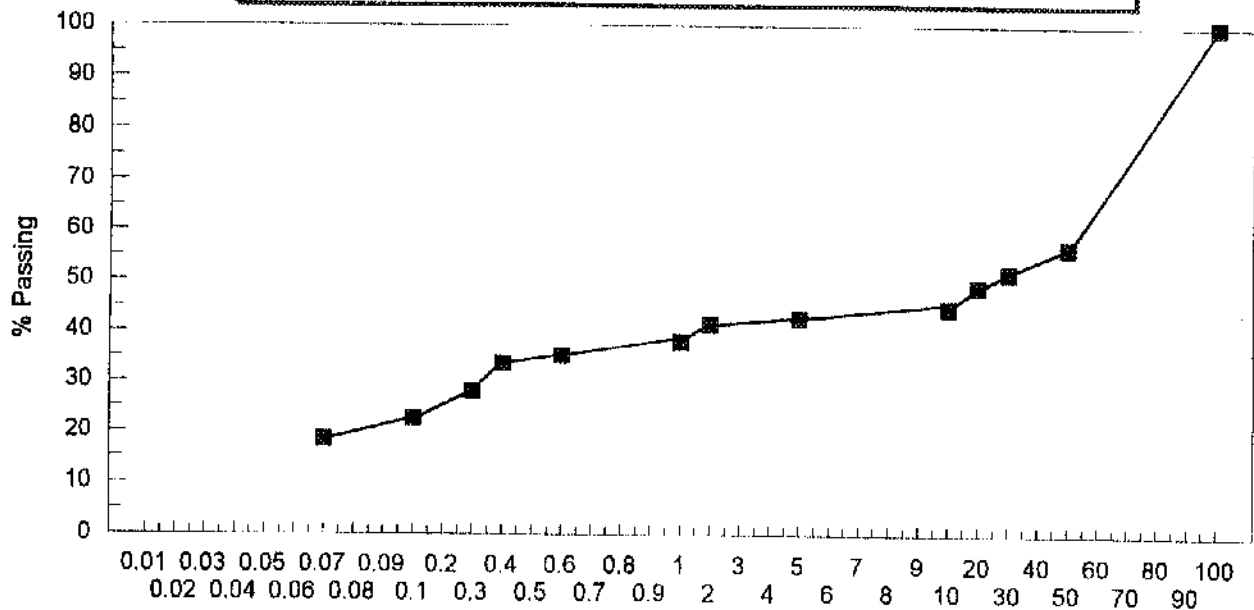
GRAIN SIZE DISTRIBUTION - SIEVE ANALYSIS

PROJECT Reconstruction of Thaaajuddeen School **Date** 31 Dec 2001
LOCATION Rep. of Maldives
BORE HOLE NO. 04
DEPTH (m) 10.00 - 10.45
SERIAL NO. 16
Test Method BS 1377 75 No 2.7

Weight of the soil +pan = 144.40 g
 Weight of the pan = 6.00 g
 Weight of the soil = 138.40 g

Sieve Size/ Partical Size mm	Weight g	Retained %	Cum. Retained %	% Passing %	Remarks
50.00	60.22	43.51	43.51	56.49	
28.00	6.71	4.85	48.36	51.64	
20.00	3.70	2.67	51.03	48.97	
14.00		0.00	51.03	48.97	
10.00	5.82	4.21	55.24	44.76	
5.00	2.81	2.03	57.27	42.73	
2.00	1.71	1.24	58.50	41.50	
1.18	4.83	3.49	61.99	38.01	
0.60	4.06	2.93	64.93	35.07	
0.425	2.11	1.52	66.45	33.55	
0.300	7.64	5.52	71.97	28.03	
0.150	7.62	5.51	77.48	22.52	
0.075	5.83	4.21	81.69	18.31	

PARTICLE SIZE DISTRIBUTION CURVE



GROUND ENGINEERING CONSULTANTS (PVT) LTD.

NATURAL MOISTURE CONTENT DETERMINATION

PROJECT : Reconstruction of Thaajuddeen School

DATE : 02/01/2002

CLIENT : Mohri Architect & Associates Inc.

LOCATION : Rep. of Maldives

CONTRACTOR

TEST METHOD : BS 1377 : 1975 2.2.1

Bore hole number		0 1		0 1		0 1	
Depth	m	1.00 - 1.45		3.00 - 3.45		4.00 - 4.45	
Sample number		0 1		0 2		0 3	
Weight of the can	g	10.54	10.60	10.40	10.60	10.70	10.50
Weight of the can + wet Soil	g	91.01	72.40	92.41	90.30	108.81	77.62
Weight of the can + dry soil	g	73.41	58.92	74.80	73.22	89.42	64.41
Moisture content	%	27.99	27.90	27.34	27.28	24.63	24.50
Average moisture content	%	27.95		27.31		24.57	

Bore hole number		0 1		0 1		0 1	
Depth	m	7.00 - 7.45		9.00 - 9.45		10.00 - 10.45	
Sample number		0 5		0 6		0 7	
Weight of the can	g	10.53	8.88	6.20	6.10	10.90	6.10
Weight of the can + wet Soil	g	85.80	71.57	124.92	109.70	152.22	99.33
Weight of the can + dry soil	g	70.81	59.26	105.61	93.30	128.38	83.72
Moisture content	%	24.87	24.43	19.42	18.81	20.29	20.11
Average moisture content	%	24.65		19.12		20.20	

Bore hole number		0 1		0 2		0 2	
Depth	m	11.00 - 11.45		1.00 - 1.45		5.00 - 5.45	
Sample number		0 4		0 9		1 0	
Weight of the can	g	10.54	10.50	8.40	10.50	8.72	8.20
Weight of the can + wet Soil	g	80.97	60.31	197.41	217.93	211.62	157.45
Weight of the can + dry soil	g	63.45	47.81	168.30	185.72	177.00	129.61
Moisture content	%	33.11	33.50	18.21	18.38	20.57	22.93
Average moisture content	%	33.31		18.29		21.75	

Tested by : B.S.Yapa

Checked by : S.K.Jayawardana

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

NATURAL MOISTURE CONTENT DETERMINATION

PROJECT : Reconstruction of Thaaajuddeen School

DATE : 02/01/2002

CLIENT : Mohri Architect & Associates Inc.

LOCATION : Rep. of Maldives

CONTRACTOR

TEST METHOD : BS 1377 : 1975 2.2.1

Bore hole number		0 2	0 2	0 2
Depth	m	7.00 - 7.45	9.00 - 9.45	10.00 - 10.45
Sample number		1 1	1 2	1 4
Weight of the can	g	7.80 7.70	8.20 8.80	6.00 8.90
Weight of the can + wet Soil	g	153.31 158.20	150.72 107.73	152.71 89.15
Weight of the can + dry soil	g	122.31 125.40	130.85 94.30	130.24 76.58
Moisture content	%	27.07 27.87	16.20 15.71	18.09 18.57
Average moisture content	%	27.47	15.95	18.33

Bore hole number		0 3	0 4	0 4
Depth	m	3.00 - 3.45	5.00 - 5.45	9.00 - 9.45
Sample number		1 8	1 7	1 5
Weight of the can	g	10.60 10.54	10.50 10.40	10.40 10.60
Weight of the can + wet Soil	g	55.20 65.31	73.21 107.98	84.63 76.82
Weight of the can + dry soil	g	46.31 54.31	59.91 87.88	70.82 64.01
Moisture content	%	24.89 25.13	26.92 25.94	22.86 23.98
Average moisture content	%	25.01	26.43	23.42

Bore hole number		0 4		
Depth	m	10.00 - 10.45		
Sample number		1 6		
Weight of the can	g	6.00 6.00		
Weight of the can + wet Soil	g	91.30 109.33		
Weight of the can + dry soil	g	76.30 91.01		
Moisture content	%	21.34 21.55		
Average moisture content	%	21.44		

Tested by : B.S.Yapa

Checked by : S.K.Jayawardana



ANALYSIS OF A SPECIMEN OF SOIL

Report No. SS 38424

Client : Ground Engineering Consultants (Pvt.) Ltd.,
No. 24, Station Road,
Wattala.

Specimen : Received a specimen of soil from the client along with the client's
letter dated 31st of December, 2001. The specimen was labeled
as follows :

" B11 No. -03
(3.0 - 3-45)
Male
Sample No. -17

Service Required : 1. Sulphate Content
2. Chloride Content

Method of Testing : 1. Total sulphate content was determined according to the
methods given in BS 1377 : 1975, British Standard,
Methods of Test for Soils for Civil Engineering
purposes.
2. Total Chloride Content was determined according to the
method given in ASTM Standard - Volume 04.08, Soil
and Rock ; Building Stones.

<u>Results</u>	<u>Constituent</u>	<u>Specimen</u> (% by wt.)
	SO ₃	0.51
	Cl	N. D

S. T. C. O.

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Sath Jayatileka
MANAGER/METALS & MINERALS GROUP,
MATERIALS TECHNOLOGY DIVISION.

Manjula
.....
Miss. Manjula Warshahennadi
TECHNICAL ASSISTANT

15th January, 2002



ANALYSIS OF A SPECIMEN OF WATER

Report No. SS 38464

Client : Ground Engineering Consultants (Pvt.) Ltd.,
No. 24, Station Road,
Wattala.

Specimen : Received a specimen of water from the client along with the
client's letter dated 31st of December, 2001. The specimen
was labeled as follows :

“ Sample No : 18
Bore Hole No. 04
Male “

Service Required : 1. Sulphate Content
2. Chloride Content

Method of Testing : Determination of Chloride Ion Content and sulphate content
were carried out according to the methods given in ASTM
Standard, Volume 11.01, Water (1).

<u>Results</u>	<u>Constituent</u>	<u>Specimen (mg/l)</u>
	SO ₃	290.35
	Cl	2343

SJ
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Sath Jayatileka
MANAGER / METALS & MINERALS GROUP,
MATERIALS TECHNOLOGY DIVISION.

Manjula
.....
Miss. Manjula Warshahemadi
TECHNICAL ASSISTANT

15th January, 2002.

ANNEXURE E

Drillers' Field Records

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

Geotechnical Engineering consultants

DRILLERS DAILY RECORD

PROJECT : Reconstruction of Thaajuddeen School **DATE** : 19.12.2001
LOCATION : Play ground of Thaajuddeen School **DRILLER** : H.M. Weera
BH NO. : BH 01
TIME COMMENCED : 0630 Hrs **GWL** :

Depth (m)	Wash out	Description	Remarks	SPT				
				15 cm	10 cm	10 cm	10 cm	N
0.00 0.25		Top soil with vegetable matters. Dirty brownish gray silty sand.	Hand dugged					
1.00	Light brown, 100% recovery	Ligh to dark gray coloured silty sand with materials used for reclamation. Filling material contains domestic waste, building debris, and pieces of wood	Dry blocking was used for sampling Penetration rate is high	4	2	3	3	7
2.00	Grayish milky white, 100% recovery	The filled layer finished at 2.10m Dark gray silty sand.	Dry blocking was used for sampling Penetration rate is comparatively low	4	3	3	4	10
3.00	Brownish milky white 100% recovery	Light brown silty sand wit some fines	Dry blocking was used for sampling Penetration rate is comparatively low	7	8	4	4	16
4.00	Brownish milky white 100% recovery	Light brown silty sand wit some fines Layer changed at 4.00m	Dry blocking was used for sampling Penetration rate is comparatively high	5	4	4	3	11
5.00	Brownish milky white 100% recovery	Light brown silty sand with some fines	Dry blocking was used for sampling Penetration rate is same as earlier	3	3	4	4	11
6.00	- do -	- do -	- do -	4	4	3	3	10
7.00	- do -	- do - The fines content increases with the depth	Dry blocking was used for sampling Penetration rate is lower than earlier	7	7	6	6	19
8.00	- do -	The layer changed at 7.90m Light brown sandy silt	Dry blocking was used for sampling Penetration rate is lower than earlier	10	7	8	9	24

TIME STOPPED: 1900Hrs

WEATHRE : Cloudy and drizzling from time to time

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

Geotechnical Engineering consultants

DRILLERS DAILY RECORD

PROJECT : Reconstruction of Thaajuddeen School

DATE : 19.12.2001

LOCATION : Play ground of Thaajuddeen School

DRILLER : H.M. Weera

BH NO. : BH 01

TIME COMMENCED :

GWL : 0.76m below EGL

Depth (m)	Wash out	Description	Remarks	SPT				
				15 cm	10 cm	10 cm	10 cm	N
8.00	Brownish milky white 100% recovery	Light brown silty sand	Dry blocking was used for sampling Penetration rate is same as earlier					
9.00				11	8	9	9	26
10.00	- do -	- do -	Dry blocking was used for sampling Penetration rate is same as earlier	6	9	9	9	27
11.00	Grayish milky white 100% recover	Layer changed at 11.25m Blackish clayey sand	Dry blocking was used for sampling Penetration rate is same as earlier	6	8	10	10	28
11.65	Blackish brown 100% recovery	Blackish clayey sand Hard layer is encountered at 11.66m	Dry blocking was used for sampling Penetration rate is same as earlier	35	15 / 04 cm			> 50
12.00	Grayish milky white 100% recovery	Coral rock pieces	Diamond coring has been used for drilling No core has come out But wash out came with rock pieces	50 / 06 cm				> 50
13.00	- do -	- do -	- do -	50 / 08 cm				> 50
14.00	- do -	- do -	- do -	32	18 / 03 cm			> 50
14.65	- do -	- do -	- do - Bore hole terminated	28	22 / 06 cm			> 50

TIME STOPPED : 1930Hrs

WEATHRE : Cloudy and drizzling from time to time

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

Geotechnical Engineering consultants

DRILLERS DAILY RECORD

PROJECT : Reconstruction of Thaaajuddeen School **DATE** : 20.12.2001
LOCATION : Play ground of Thaaajuddeen School **DRILLER** : H.M. Weera
BH NO. : BH 02
TIME COMMENCED : 0630 Hrs **GWL** :

Depth (m)	Wash out	Description	Remarks	SPT				
				15 cm	10 cm	10 cm	10 cm	N
0.00	NA	Brownish gray silty sand with vegetable matters	Hand dugged					
0.30		Top soil						
1.00	Grayish white 100% recovery	Gray gravelly sand with some cobbles	Dry blocking was used for sampling Penetration rate is considerably low	15	12	10	7	29
2.00	Brownish white 100% recovery	- do - Layer has changed at 2.10m Sand with pieces of some coral and sea shells	Dry blocking was used for sampling Penetration rate is comparatively high	4	3	3	4	10
3.00	- do -	Brownish white sand with pieces of some coral and sea shells	- do -	3	4	2	5	11
4.00	- do -	Brownish white sand with pieces of some coral and sea shells	- do -	5	4	4	3	11
5.00	- do -	Brownish white sand with pieces of some coral and sea shells	- do -	4	4	3	5	12
6.00	- do -	Brownish white sand with pieces of some coral and sea shells	- do -	4	4	3	4	11
7.00	- do -	Brownish white sand with pieces of some coral and sea shells	- do -	6	6	5	4	15
8.00	Whitish brown 100% recovery	Whitish brown sand with pieces of some coral and sea shells	- do -	6	3	3	3	09

TIME STOPPED: 1900Hrs

WEATHER : Sunny and Highly humid

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

Geotechnical Engineering consultants

DRILLERS DAILY RECORD

PROJECT : Reconstruction of Thaajuddeen School

DATE : 21.12.2001

LOCATION : Play ground of Thaajuddeen School

DRILLER : H.M. Weera

BH NO. : BH 02

TIME COMMENCED : 0630 Hrs

GWL : 0.84m below EGL

Depth (m)	Wash out	Description	Remarks	SPT				
				15 cm	10 cm	10 cm	10 cm	N
8.00	Milky white Color of washout changed to gray at 8.50m to 8.75m	Grayish milky white silty sand with pieces of coral.	Dry blocking was used for sampling Penetration rate is comparatively low					
9.00	100% recovery			6	3	3	5	11
10.00	Milky white 100% recovery	Grayish milky white sandy silt Very fine sand with considerable amount of silt	Dry blocking was used for sampling Penetration rate is comparatively low	6	5	4	5	14
10.45			Bore hole terminated					

TIME STOPPED: 1000Hrs

WEATHER : Sunny and Highly humid

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

Geotechnical Engineering consultants

DRILLERS DAILY RECORD

PROJECT : Reconstruction of Thaajuddeen School

DATE : 21.12.2001

LOCATION : Play ground of Thaajuddeen School

DRILLER : H.M. Weera

BH NO. : BH 03

TIME COMMENCED : 1300 Hrs

GWL :

Depth (m)	Wash out	Description	Remarks	SPT				
				15 cm	10 cm	10 cm	10 cm	N
0.00 0.10	NA	Brownish gray silty sand with vegetable matters Top soil	Hand dugged					
1.00	Grayish milky white 100% recovery	Grayish white coarse sand with some gravel and pebbles	Dry blocking was used for sampling Penetration rate is low	15	7	5	5	17
2.00	Grayish milky white 100% recovery	Grayish white coarse sand with some gravel and pebbles Layer changed at 2.30m	Dry blocking was used for sampling Penetration rate is extremely high	5	2	01 / 20 cm	-	03
3.00	Brownish milky white 100% recovery	Grayish white coarse sand with some gravel and pebbles	Dry blocking was used for sampling Penetration rate is same as earlier	2	1	2	2	05
4.00	Brownish milky white 100% recovery	Grayish white coarse sand with some gravel and pebbles	Dry blocking was used for sampling Penetration rate is comparatively low	20	12	7	3	22
5.00	Brownish milky white 100% recovery	Grayish white coarse sand with some gravel, and pebbles Layer changed at 5.00m	Dry blocking was used for sampling Penetration rate is same as earlier	7	8	6	4	18
6.00	Brownish milky white 100% recovery	Brownish white sand with pieces of coral rock	Dry blocking was used for sampling Penetration rate is comparatively high	12	3	2	3	08
7.00	Grayish milky white 100% recovery	- do -	Dry blocking was used for sampling Penetration rate is comparatively low	17	9	2	2	13

TIME STOPPED: 1500Hrs

WEATHER : Sunny and Highly humid

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

Geotechnical Engineering consultants

DRILLERS DAILY RECORD

PROJECT : Reconstruction of Thaajuddeen School **DATE** : 21.12.2001
LOCATION : Play ground of Thaajuddeen School **DRILLER** : H.M. Weera
BH NO. : BH 03
TIME COMMENCED : 1500 Hrs **GWL** : 0.63m below EGL

Depth (m)	Wash out	Description	Remarks	SPT				
				15 cm	10 cm	10 cm	10 cm	N
7.00	Grayish milky white 100% recovery	Brownish white sand with pieces of coral rock	Dry blocking was used for sampling Penetration rate is same as earlier					
8.00		Layer changed at 8.15m Grayish white fine sand		5	3	3	5	11
9.00	Grayish milky white 100% recovery	Grayish white fine sand with pieces of sea shells	Dry blocking was used for sampling Penetration rate is same as earlier	10	4	3	4	11
10.00	- do -	- do -		- do -	11	5	6	5
11.00	- do -	- do -	- do -	13	23	27		> 50
11.25			Bore hole terminated					

TIME STOPPED: 1900Hrs
WEATHER : Sunny and Highly humid

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

Geotechnical Engineering consultants

DRILLERS DAILY RECORD

PROJECT : Reconstruction of Thaajuddeen School **DATE** : 22.12.2001
LOCATION : Play ground of Thaajuddeen School **DRILLER** : H.M. Weera
BH NO. : BH 04
TIME COMMENCED : 0600 Hrs **GWL** :

Depth (m)	Wash out	Description	Remarks	SPT				
				15 cm	10 cm	10 cm	10 cm	N
0.00	NA	Dark gray silty sand with vegetable matters	Hand dugged					
0.30		Top soil						
1.00	Dark gray to black 100% recovery	Ligth to dark gray coloured silty sand with materials used for reclamation. Filling material contains domestic waste, building debris, pieces of wood and ashes of burnt material	Dry blocking was used for sampling Penetration rate is high	3	2	2	3	07
2.00	- do -	- do -	- do -	3	2	2	2	06
3.00	- do - Grayish white	- do - Layer changed at 3.25m Brownish gray sand with gravel and pieces of sea shells	- do -	4	2	2	1	05
4.00	Grayish milky white 100% recovery	Brownish gray sand with gravel and pieces of sea shells	Dry blocking was used for sampling Penetration rate is extremely high	7	2	1	1	03
5.00	Grayish milky white 100% recovery	Brownish gray sand with gravel and pieces of sea shells	Dry blocking was used for sampling Penetration rate is same as earlier up to 5.30m and there onward it was comparatively low	8	3	2	6	11
6.00	Brownish milky white 100% recovery	Brownish gray sand with gravel and pieces of sea shells	Dry blocking was used for sampling Penetration rate is comparatively low	15	10	9	9	28
7.00	- do -	- do -	Dry blocking was used for sampling Penetration rate is comparatively high	6	7	8	3	18

WEATHER : Sunny and Highly humid

GROUND ENGINEERING CONSULTANTS (PVT) LTD.

Geotechnical Engineering consultants

DRILLERS DAILY RECORD

PROJECT : Reconstruction of Thaajuddeen School **DATE** : 22.12.2001
LOCATION : Play ground of Thaajuddeen School **DRILLER** : H.M. Weera
BH NO. : BH 04
TIME COMMENCED : 0600 Hrs **GWL** : 0.65m below EEGL

Depth (m)	Wash out	Description	Remarks	SPT					
				15 cm	10 cm	10 cm	10 cm	N	
7.00	Brownish milky white 100% recovery	Brownish gray sand with gravel and pieces of sea shells There could be a cavity from 8.05m to 9.10m.	Dry blocking was used for sampling Penetration rate is extremely high SPT conducted at 8.00m, and it freely dropped to 8.62m. Again SPT was conducted at 8.62m and it freely dropped to 9.10.	1 / 62 cm					< 01
9.10		SPT conducted again		1	1	1 / 20 cm	-		02
10.00	Grayish milky white 100% recovery	Grayish sandy silt with gravel and pieces of sea shells	Dry blocking was used for sampling Penetration rate is comparatively high	9	3	1	2		06
11.00	Grayish milky white 100% recovery	Grayish sandy silt with gravel and pieces of sea shells Layer changed at 11.00 to coral rock	Dry blocking was used for sampling Penetration rate is extremely low	13	30	20 / 09 cm	-		> 50
11.55	Milky white 100% recovery	Highly weathered coral rock	Dry blocking was used for sampling Penetration rate is extremely low	> 50 / 0 cm					> 50
11.55			Bore hole terminated						

STOPPED AT : 1945 Hrs
WEATHER : Sunny and Highly humid

ANNEXURE F

Photographs



PLATE 01

**Making preparation
for drilling BH 01**



PLATE 02

**Carrying out SPT in
BH 01**



PLATE 03

**Obtaining a SPT
sample from BH 01**



PLATE 04

**Drilling in progress
at BH 01**



PLATE 05

**Making preparation
for drilling at BH 02**



PLATE 06

**Drilling in progress
at BH 02**



PLATE 07

**Sample obtained from
BH 02**



PLATE 08

**Making Preparation for
drilling at BH 03**



PLATE 09

**Conducting SPT
in BH 03**



PLATE 10

**Drilling in progress
at BH 03**



PLATE 11

**Sample obtained
from BH 03**



PLATE 12

**Moving equipment from
BH 03 & BH 04**



PLATE 13

**Making preparation
for drilling at BH 04**



PLATE 14

**Drilling in progress
at BH 04**



PLATE 15

**Conducting SPT
in BH 04**



PLATE 16

**Sample obtained
from BH 04**



PLATE 17

Site reinstated



PLATE 18

Site reinstated