5. References

No.	Title	Publisher/ Author	Year
1	Bidding Document for Post Conflict Emergency Rehabilitation Project, Procurement of Works	Ministry of Finance, Government of Solomon Islands	2004
2	Technical Specifications and Drawings for Marine Infrastructure Development Plan (Phase 1)	Ministry of Infrastructure Development	2004
3	Technical Specifications and Drawings for Marine Infrastructure Development Plan (Phase 2)	Ministry of Infrastructure Development	2005
4	Ships Registration in the Solomon Islands	Ministry of Infrastructure Development , Marine Division	2006
5	Aerial Photograph (Auki Bay)	Dept. of Lands and Survey	2006
6	Cadastral map (Auki)	Dept. of Lands and Survey	2005
7	Solomon Islands Cyclone Tracks (1966- 1988)	Dept. of Lands and Survey	1988
8	Bathymetric Plan (Auki Bay)	Dept. of Lands and Survey	1974
9	Coordinates List (Auki)	Lands and Survey Service, Malaita	1966
10	Earthquake Epicenter Distribution in the Solomon Islands	Ministry of Natural Resources	
11	Meteorological Data	Solomon Is. Meteorological Service	2007
12	Market bylaw	Honiara Municipal Office	1966
13	Household Income & Expenditure 2005/06	Ministry of Finance	2006

6. Results of the Natural Condition Survey

6-1. Results of Survey of Degradation of the Existing Jetty

6-2. Results of Survey of Natural Conditions

6-2-1. Map of Survey Points of Natural Conditions

6-2-2. Topographic Survey Map

6-2-3. Geotechnical Survey Results

6-2-4. Hydrological Regime Survey Results

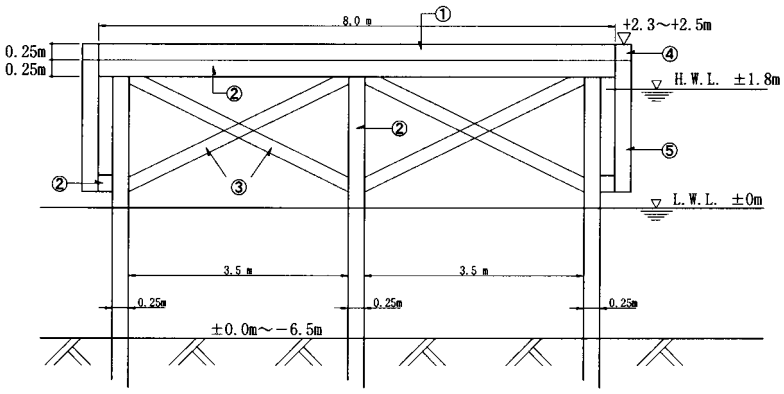
6-2-5. Water tests results

Results of Survey of Degradation of the Existing Auki Jetty

- The existing jetty was inspected for degradation, by visual inspection, percussion testing, etc.
- Degradation of the superstructure is severe. In particular, in the concrete of the access bridge, in the parts indicated with red lines in Attachment A the reinforcement is exposed, and spalling and loss of concrete due to corrosion is severe, corresponding to category V, the worst category for degree of degradation. It is necessary to urgently repair or rebuild it.
  (Attachment A: Results of inspection of degradation of the existing jetty access bridge concrete)
- Detailed inspection and repair of the substructure is necessary, the degree of degradation corresponds to category II to III (inspection and repair where necessary).
- As a result, the superstructure needs total renovation, and although the danger of collapse of the substructure is small, taking into account that it is nearly 50 years since it was constructed, it cannot be expected to last long. Therefore, it is considered that the jetty should be newly rebuilt.

(1) Structure of the existing jetty

- As was also reported in the preliminary study, the jetty was constructed in the 1960s, and thereafter about 1990 repair of the reinforced concrete access bridge was carried out.
- The structure of the existing jetty is shown in Fig. 1.



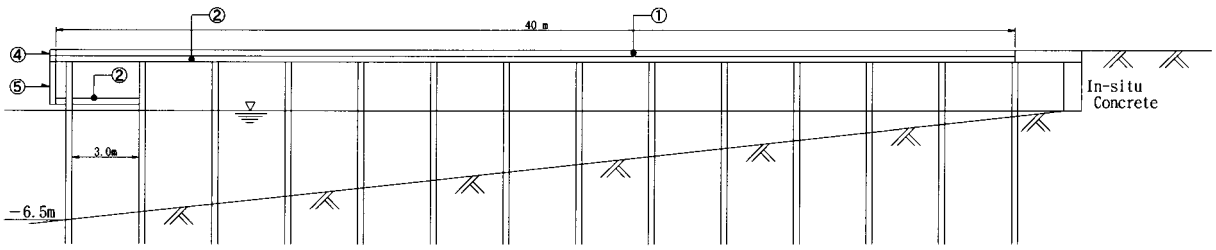


Fig. 1 Structure of the existing jetty

- The width is 8m, and the crown height is about +2.7m. The substructure consists of H-section steel piles (H-250x250x15x18mm) driven at a spacing of 3.5m, connected together with welded L-shaped bracing members.
- The jetty was constructed in the 1960s nearly 50 years ago, so the steel members have corrosion corresponding to this number of years. Based on the methods of construction at that time, it is considered that the members have been designed so that the required steel member thickness can be ensured after the passage of time, by providing a corrosion allowance.

(2) Inspection for degradation

The steel H-section piles, and the top and bottom surfaces of the reinforced concrete access bridge were inspected for degradation.

The current degree of degradation and safety was determined by visual inspection, percussion inspection for concrete strength and materials, inspection of steel members, etc, taking into consideration safety for use in the future.

The inspection for degree of degradation was carried out in accordance with “Corrosion Prevention of Port and Harbor Steel Structures: Improvement Manual”, published by the Coastal Development Institute of Technology, June 2004. This manual provides the following inspection items for jetty type mooring structures, as well as the following criteria for the degree of degradation of jetty superstructures.

Table 1 Inspection items for jetty type mooring structures

Degradation to be inspected	Position	Inspection items
Corrosion of piles	Piles	Corrosion status, pile thickness
Cracking of the superstructure	Superstructure	Status of cracking (spalling, damage)
Damage or settling of the access bridge	Access bridge	Settling, movement, damage

Source: “Corrosion Prevention of Port and Harbor Steel Structures: Improvement Manual”, published by the Coastal Development Institute of Technology, June 1999.

Table 2 Criteria for determining the degree of degradation of jetty superstructures

Degree of degradation Member/item	0	I	II	III	IV	V
Corrosion of reinforcement	None	Points of corrosion are visible on the surface of the concrete	Rust stains are visible in places	There are many rust stains	There are many areas where there is swelling due to corrosion	There are very many areas where there is swelling due to corrosion
Cracking	None	Cracking visible in places	Many cracks	Many cracks (including some cracks with widths of several mm or more)	Many cracks with widths of several mm or more	
Spalling of cover concrete	None	None	Swelling visible in places	Spalling visible in places	A lot of spalling	Very significant spalling
	↓		↓		↓	
Survey by inspection Determination of what is required	No need for survey or repair (continuing inspection)		Survey and repair as necessary		Repair required	

(3) Visual inspection survey

Visual inspection for degradation was carried out for both facilities. At each location, corrosion of the reinforcement or steel piles, and cracking and spalling of the covering concrete was evaluated.

<Substructure>

- The degradation of the H-shaped steel piles of the substructure (H-250x250x15x18mm) is not such that there is any immediate danger for use. However, deterioration corresponding to the age of the structure has been confirmed. A heavy duty coating using tar epoxy paint has been applied, however it has all peeled off. Swelling due to corrosion has been seen in many places, and in several locations holes have formed in the webs of the H-section steel due to corrosion. The state of the piles under water was inspected using an underwater video camera. However, there were many oysters and other organisms adhering to the piles, but as far as could be determined visually, there was no damage to the H-section steel piles.
- A heavy duty coating using tar epoxy paint has been applied to the L-shaped steel braces (L-130x75mm), however it has all peeled off, and swelling due to corrosion has been seen in many places. Breakage or pitting corrosion has not been observed.

<Superstructure>

- The access bridge of the superstructure consists of precast reinforced concrete slabs (3m

long x 60 to 70cm wide x 25cm thick) laid side by side. The reinforcement of the reinforced concrete slabs are arranged at 150 to 200mm pitch, and the reinforcement size is estimated to be D16 bars arranged in the long direction, and D12 bars arranged in the short direction.

- The reinforced concrete access bridge of the superstructure has already degraded to the point that discussion of repair method is unnecessary.
- In particular, in the bottom of the access bridge, out of a total of 154 blocks excluding the end span which was repaired in the 1990s, there is concrete spalling due to the explosive fracture in 141 blocks (= 91.6%), so it is judged to have the worst degree of degradation. On the top surface of the access bridge, reinforcement is exposed in 124 blocks out of 154 (= 80.5%), and wear has progressed due to abrasion. In particular, in the center of the part of the jetty used most for loading ships, reinforcement is already exposed near the joint with the land portion.

  (* Attachment A: Results of inspection of degradation of the existing jetty access bridge concrete)
- In other locations throughout the superstructure, damage to members, unevenness due to wear, and cracking can be seen. Focusing on the surface of the concrete, in the parts where limestone aggregates have been used, the aggregates have also been abraded together with the surrounding mortar. This indicates that the abrasion strength of the locally produced limestone aggregates is insufficient.
- Carbonation tests were carried out using phenolphthalein. The results showed that the bottom surface of the concrete part of the jetty, which must retain its original alkalinity, has been carbonated significantly.
- Cracking that would indicate alkali aggregate reaction has not been seen.
- The reinforcement covering (the distance from the surface of the concrete to the reinforcement) to the bottom of the slabs is about 5cm. This is somewhat smaller than the criterion for covering required for modern maritime structures (7cm). However, insufficient covering due to incorrect positioning of the reinforcement during construction, or incorrect arrangement, has not been seen.

(4) Concrete percussion inspection

- The integrity of existing concrete was inferred by manually impacting the concrete with a hammer or similar, and noting the reflected sound. Also, the compressive strength of existing concrete was estimated using a Schmidt hammer.
- On the bottom surface of the access bridge, covering concrete has either spalled off or is hanging off on all areas apart from at the end portion.
- At 14 locations on the precast concrete access bridge on the jetty, Schmidt hammer tests were carried out. At each location 9 tests are carried out, and the average value was obtained. The

estimated compressive strength is an average 31.6 N/mm2 (maximum 43.5 N/mm2, minimum 21.1 N/mm2), which are virtually the correct values.(* These are test values for parts considered to be sound, parts in which the concrete was clearly swollen or spalling were excluded.)
(Attachment B: Estimated compressive strength of the existing jetty superstructure concrete access bridge, using a Schmidt Hammer)

Photograph 1 State of deterioration of the existing jetty

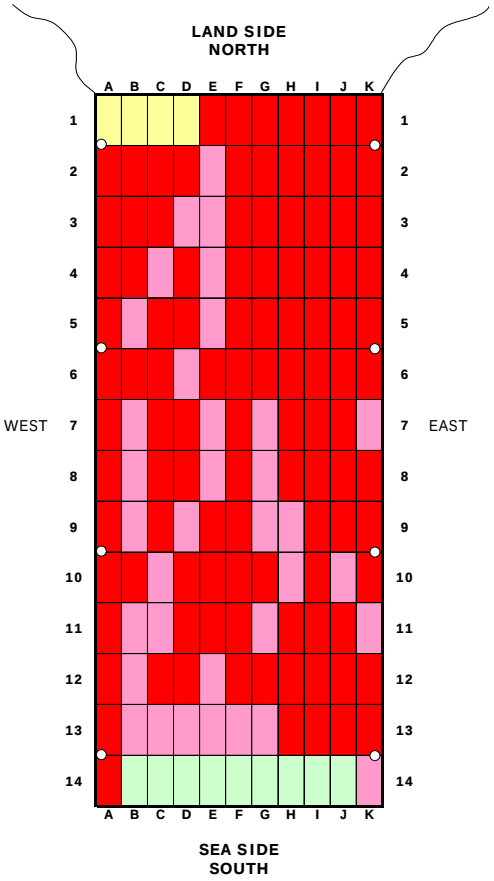
Attachment A: Results of inspection of degradation of the existing jetty access bridge concrete

Deterioration Grade of Existing Auki Jetty

Date: **Feb.15-18, 2007**

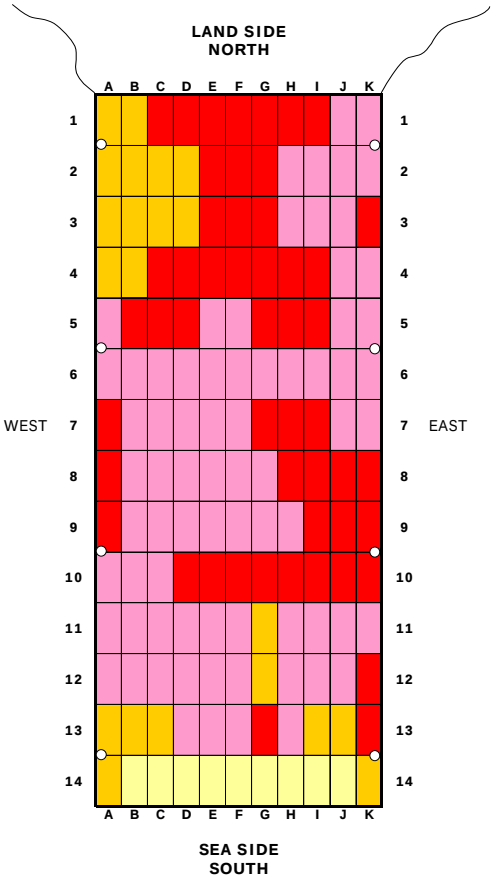
Inspector: **T. Inki, T.Ogawa / Fisheries Engineering Co., Ltd.**

BOTTOM

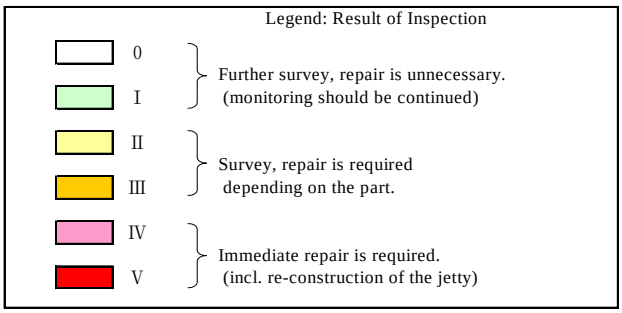


0 ～ I degree	5.8%
II ～III degree	2.6%
IV～ V degree	91.6%

UPPER



0 ～ I degree	0.0%
II ～III degree	19.5%
IV～ V degree	80.5%



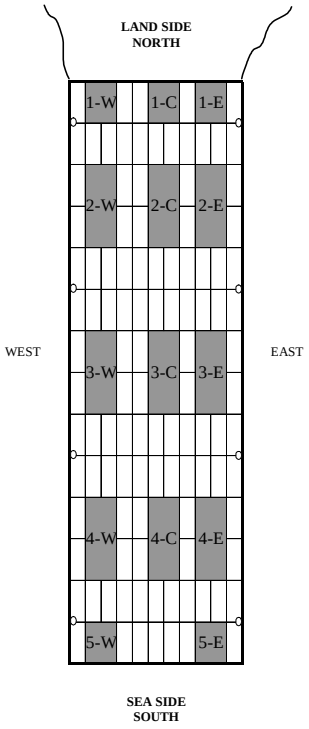
Attachment B: Estimated compressive strength of the existing jetty superstructure concrete access bridge, using a Schmidt Hammer

Schmidt-Hammer Test Result for Existing Auki Jetty Deck Slab Concrete

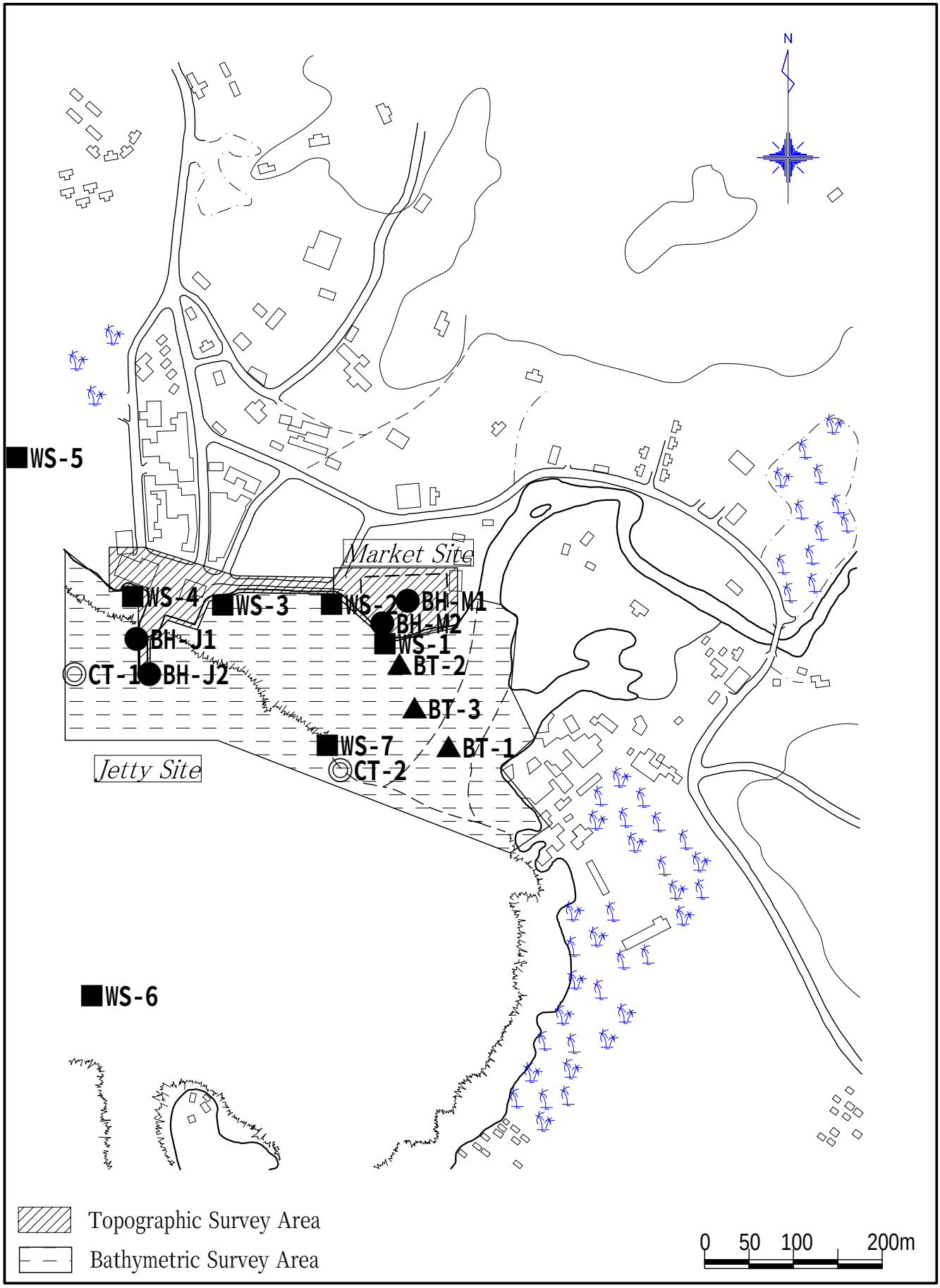
Date: **Feb.11, 2007**

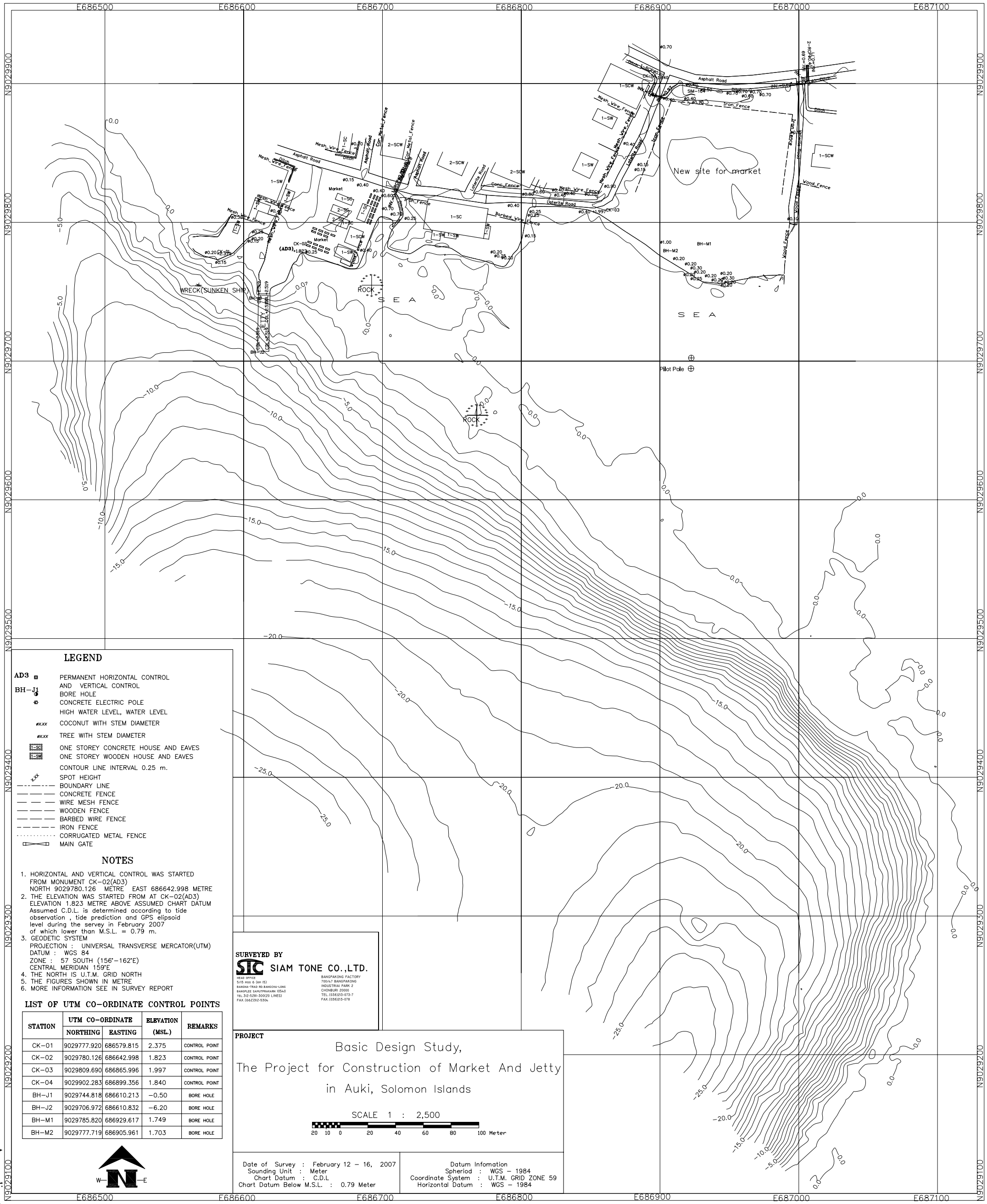
Inspector: **T. Inki, T.Ogawa / Fisheries Engineering Co., Ltd.**

	Reading Value										Strength (Cylinder)
Location	1	2	3	4	5	6	7	8	9	Average	N/mm2
1-E	32	32	32	30	33	27	23	29	26	29	21.1
1-C	42	32	33	34	32	33	43	33	28	34	28.2
1-W	40	32	35	34	35	39	37	42	44	38	32.6
2-E	44	47	50	43	44	47	43	45	45	45	43.5
2-C	30	38	35	32	37	31	30	40	30	34	27.1
2-W	44	40	43	42	44	42	44	42	44	43	39.9
3-E	32	40	28	40	30	32	31	40	32	34	27.4
3-C	40	41	32	39	43	38	41	35	35	38	33.5
3-W	33	33	38	33	40	40	38	35	37	36	30.9
4-E	45	49	46	32	39	42	46	42	41	42	39.4
4-C	38	32	42	27	33	40	26	39	34	35	28.4
4-W	33	33	38	33	40	40	38	35	37	36	30.9
5-W	32	35	30	36	34	37	34	30	33	33	26.8
5-E	33	40	40	32	38	46	38	34	38	38	32.7
										Avg.	31.6
										Max.	43.5
										Min.	21.1



TEST LOCATION


N
WS-5
Market Site
WS-4
WS-3
WS-2
BH-M1
BH-M2
WS-1
BH-J1
BT-2
CT-1
BH-J2
BT-3
WS-7
BT-1
Jetty Site
CT-2
WS-6
Topographic Survey Area
Bathymetric Survey Area
0 50 100 200m
BH Location of Borehole
BT Sampling Point of Bottom materials
CT Hydrological regime Survey
WS Sampling Point of Water Test



LEGEND

AD3	PERMANENT HORIZONTAL CONTROL AND VERTICAL CONTROL
BH−J1	BORE HOLE
	CONCRETE ELECTRIC POLE
	HIGH WATER LEVEL, WATER LEVEL
ø*x.xx*	COCONUT WITH STEM DIAMETER
ø*x.xx*	TREE WITH STEM DIAMETER
1−SC	ONE STOREY CONCRETE HOUSE AND EAVES
1−SW	ONE STOREY WOODEN HOUSE AND EAVES
	CONTOUR LINE INTERVAL 0.25 m.
x.xx	SPOT HEIGHT
	BOUNDARY LINE
	CONCRETE FENCE
	WIRE MESH FENCE
	WOODEN FENCE
	BARBED WIRE FENCE
	IRON FENCE
	CORRUGATED METAL FENCE
	MAIN GATE

NOTES

1. HORIZONTAL AND VERTICAL CONTROL WAS STARTED FROM MONUMENT CK−02(AD3)
   NORTH 9029780.126 METRE EAST 686642.998 METRE
2. THE ELEVATION WAS STARTED FROM AT CK−02(AD3)
   ELEVATION 1.823 METRE ABOVE ASSUMED CHART DATUM
   Assumed C.D.L. is determined according to tide observation , tide prediction and GPS elipsoid level during the servey in February 2007 of which lower than M.S.L. = 0.79 m.
3. GEODETIC SYSTEM
   PROJECTION : UNIVERSAL TRANSVERSE MERCATOR(UTM)
   DATUM : WGS 84
   ZONE : 57 SOUTH (156°−162°E)
   CENTRAL MERIDIAN 159°E
4. THE NORTH IS U.T.M. GRID NORTH
5. THE FIGURES SHOWN IN METRE
6. MORE INFORMATION SEE IN SURVEY REPORT

LIST OF UTM CO−ORDINATE CONTROL POINTS

STATION	UTM CO−ORDINATE		ELEVATION (MSL.)	REMARKS
	NORTHING	EASTING		
CK−01	9029777.920	686579.815	2.375	CONTROL POINT
CK−02	9029780.126	686642.998	1.823	CONTROL POINT
CK−03	9029809.690	686865.996	1.997	CONTROL POINT
CK−04	9029902.283	686899.356	1.840	CONTROL POINT
BH−J1	9029744.818	686610.213	−0.50	BORE HOLE
BH−J2	9029706.972	686610.832	−6.20	BORE HOLE
BH−M1	9029785.820	686929.617	1.749	BORE HOLE
BH−M2	9029777.719	686905.961	1.703	BORE HOLE

W — N — E

SURVEYED BY
SIAM TONE CO.,LTD.
HEAD OFFICE
5/15 Moo 6 (KM 15)
BANGNA-TRAD RD BANGCHA-LONG
BANGPLEE SAMUTPRAKARN 10540
TEL. 312-5281-300(20 LINES)
FAX. (662)312-5304
BANGPAKONG FACTORY
700/47 BANGPAKONG
INDUSTRIAL PARK 2
CHONBURI 20000
TEL. (038)213-073-7
FAX. (038)213-078

PROJECT

Basic Design Study,

The Project for Construction of Market And Jetty in Auki, Solomon Islands

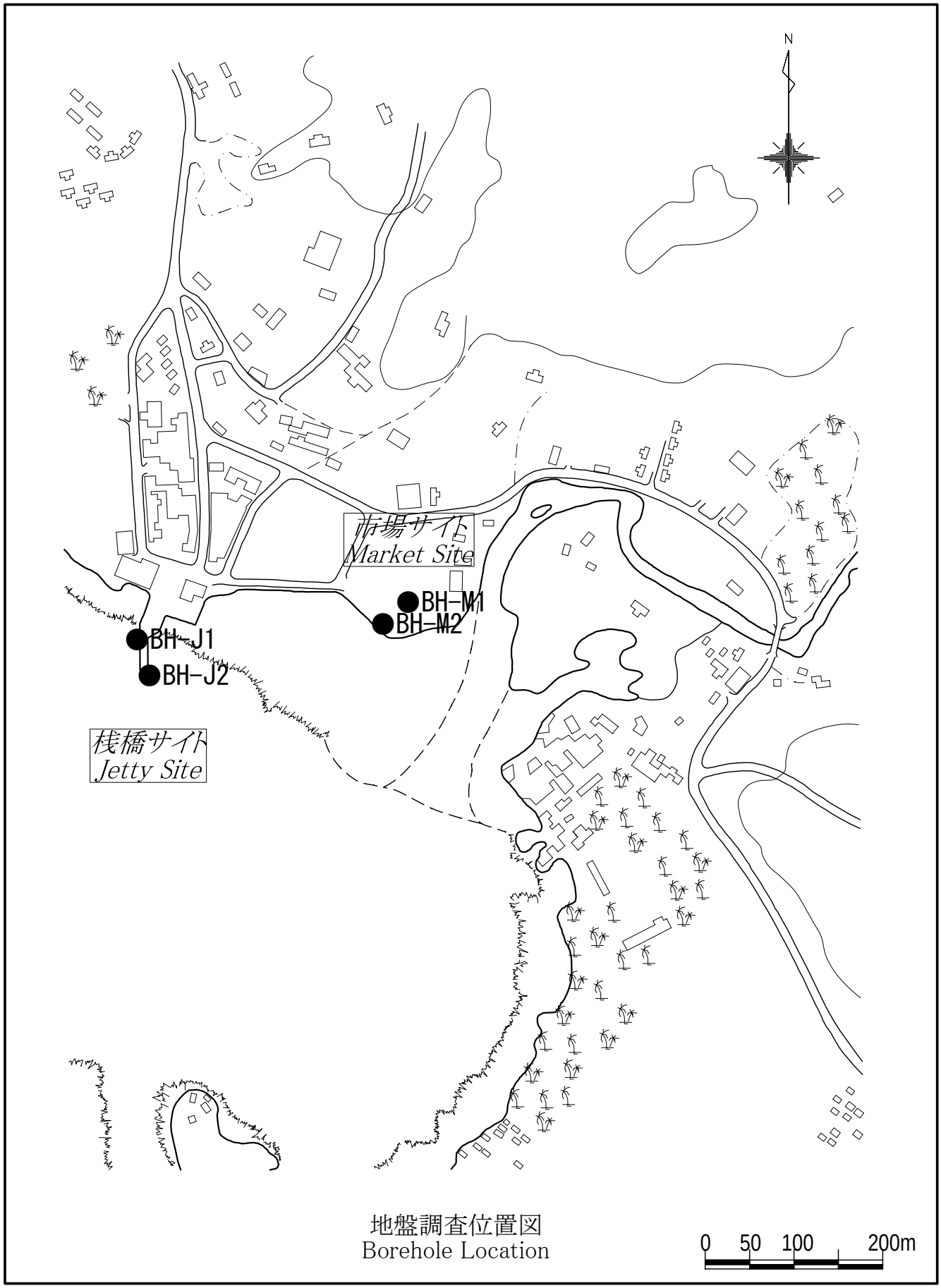
SCALE 1 : 2,500

20 10 0 20 40 60 80 100 Meter

Date of Survey : February 12 − 16, 2007
Sounding Unit : Meter
Chart Datum : C.D.L
Chart Datum Below M.S.L. : 0.79 Meter

Datum Infomation
Spheriod : WGS − 1984
Coordinate System : U.T.M. GRID ZONE 59
Horizontal Datum : WGS − 1984

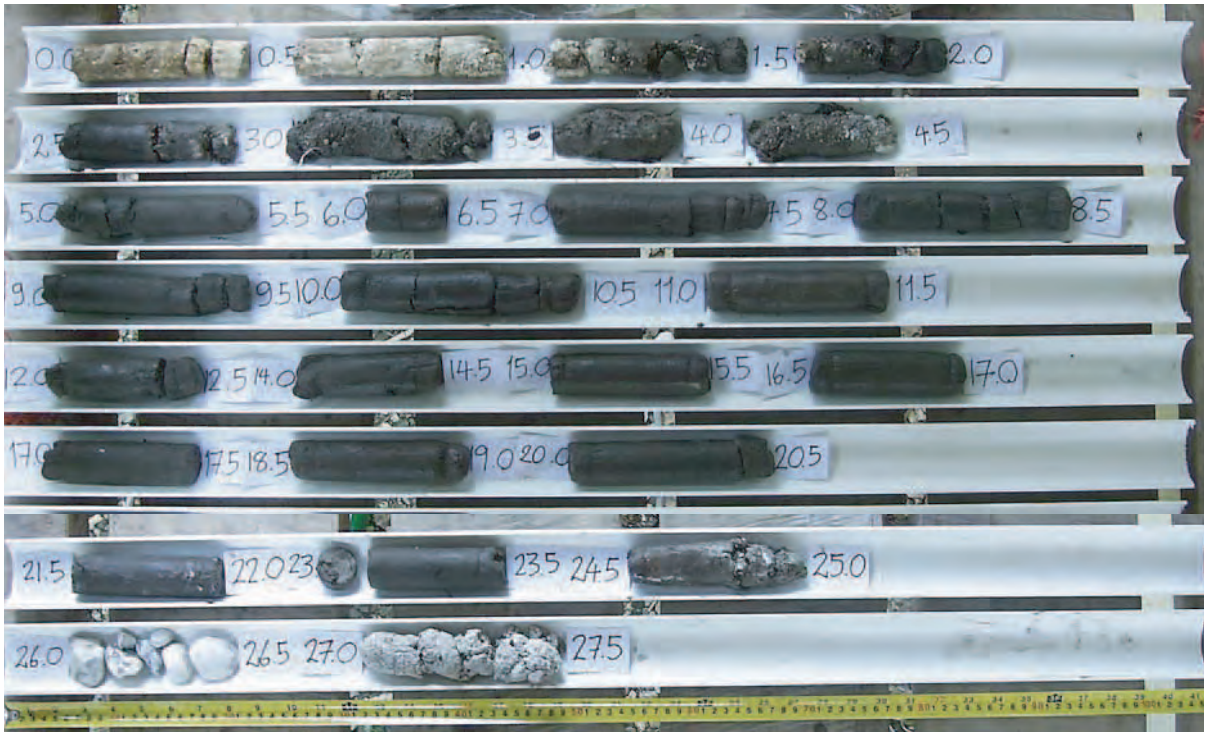
The Project for Construction of Market and Jetty in Auki, Solomon Islands Geotechnical Survey Result



地盤調査位置図
Borehole Location

BH-J1, 26.0 m depth, Sea Water Depth 2.1 m, Feb 14-18, 07

BH-J2, 23.0 m depth, Sea Water Depth 6.5 m, Feb 19-20, 07



BH-M1, 27.5 m depth, Water Level -1.05 m, Feb 11-14, 07

BH-M2, 27.5 m depth, Water Level -1.10 m, Feb 21-23, 07

Borehole No.BH-J1

(Jetty Site / Foot of the Existing Jetty)

BH-J1 (1/1)

SIAM TONE CO., LTD.

BORING LOG

BORING NO. BH-J1

SHEET 1 OF 1

PROJECT: Basic Design, Auki New Market and Jetty Renovation

LOCATION: West Side of Jetty at Shoreline Abutment

CLIENT: Fisheries Engineering Co., Ltd.

Coordinates: N: 9029744.82 E: 686610.21

Ground Elevation (m-CDL): -2.1 m

Max.Drilling Depth: 26.00 m

Seawater Depth: 2.10 m

Starting Date: 14/2/2007

Finishing Date: 18/2/2007

DEPTH (m.)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)	Total Unit Weight (Ton/m^3) 1.6 1.8 2.0	Plastic Limit / Natural Water Content / Liquid Limit (%) 30 60 90 120	Unconfined Compressive Strength (Ton/m^2) 2 4 6	SPT Blow Count (Blow/ft) 10 20 30 40
1		0.0-4.0 m, BACKFILL, no sample retreived, probably wash out materials from backfilled stone at shoreline abutment and backfilled river gravel at shoreline							
2									7
			Sample Loss						
3									
4		4.0-7.0 m, SP, silty SAND, silt-very fine sand, with<10% clay, poorly graded, loose, non-plasticity, greenish brown	SS	2	45				7
5			SS	3	45				5
6			SS	4	45				6
7		7.0-15.5 m, CL, silty CLAY, with 30% silt , soft, low-medium plasticity, blackish brown	SS	5	45				4
8									
9			SS	6	45				4
10			SS	7	45				5
11									
12			SS	8	45				5
13			SS	9	45				5
14									
15			UD	1	100				
16		15.5-17.5 m, SP, SAND with gravel and clay, poorly graded, silt-fine grained subangular sand, with 20% fine gravel of subangular reef limestone and shell with max ~1 cm ϕ and 10% clay, loose-medium dense, very low-non-plasticity, greenish brown	SS	10	45				4
17			Sample Loss						2
18		17.5-21.0 m, SW, SAND with gravel and clay, well graded,medium-coarse grained subangular sand , with 30% fine gravel of subangular reef limestone and shell with max ~3 cm ϕ and <10% clay, dense, non-plasticity, coarser down depth, greenish brown	SS	11	45				3
19			SS	12	45				9
20			Sample Loss						11
21			SS	13	45				5
		21.0-24.5 m, CL, silty CLAY, with 30% silt , soft, medium plasticity, blackish brown	SS	14	45				4
22									
23			SS	15	45				9
24									
25		24.5-26.0 m, REEF LIMESTONE, hard but brittle, pale yellowish white, moderately-highly weathered, can not acchieved by rock coring, when SPT - crushed rock sample obtained	SS	16	45				42

Table 3 Summary of Soil Properties Test Results

Borehole No.	sample No.	Depth (m)		Water Content (%)	Total Unit Weight (ton/m^3)	Liquid Limit, LL (%)	Plasticity Index, PI (%)	Specific Gravity, Gs	Grain Size Analysis (%)					Undrained Shear Strength, c_u (ton/m^2)	Modulus @50% Stress, E50	Colour	USCS	Soil Description
									Gravel	Sand			Silt+Clay					
		From	To							Coarse	Medium	Fine						
BH-J1	SS-3	5.00	5.45	63.9	-	NP	NP	2.59	0	0	2	34	63			Greenish Brown	-	Sandy SILT
BH-J1	SS-7	10.00	10.45	65.9	1.59	NP	NP	2.61	0	0	1	14	84			Blackish Brown	-	SILT with sand
BH-J1	UD-1	14.50	15.50	48.6	1.69	NP	NP	2.66	0	1	8	20	71	4.6	238	Blackish Brown	-	SILT with sand
BH-J1	SS-10	15.50	15.95	39.1	-	NP	NP	2.70	22	9	12	14	42			Greenish Brown	SM	Silty SAND with gravel
BH-J1	UD-2	16.00	17.00	46.8	1.69	61.3	23.5	2.70	1	0	1	5	93	4.6	294	Greenish Brown	MH	SILT with sand
BH-J1	SS-12	18.50	18.95	24.9	-	NP	NP	2.69	46	18	10	5	20			Greenish Brown	GM	Silty GRAVEL with sand
BH-J1	SS-15	23.00	23.45	38.1	1.77	44.7	17.4	2.62	0	0	0	9	91			Blackish Brown	MH	SILT

Note : UD denotes Shelby Tube Sample, D denotes Split Spoon Sample and NP denotes Nonplastic

*** denotes insufficient soil for testing**

SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty Shoreline Abutment	BH-J1	SS-3	5.00-5.45	Sandy SILT	63.9	-	NP	NP	NP	2.59	0	0	2	34	63

UNIT WEIGHT DETERMINATION

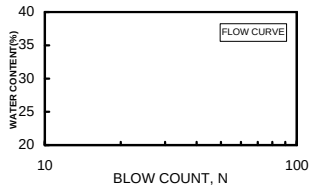
Sample Height (cm)	
Sample Diameter (cm)	
Wt. of Tube (g)	
Wt. of Wet Soil +Tube (g)	
Total Unit Weight (g/cc)	
Dry Unit Weight (g/cc)	

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.19	19.57
Wt. of Wet Soil + Can (g)	116.25	78.08
Wt. of Dry Soil + Can (g)	78.61	55.16
Water Content, w_c (%)	**63.3**	**64.4**

ATTERBERG LIMITS

w_p		w_l			



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	G
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	33.06
Temperature (deg. C)	21.8
Wt. of Water+Soil+Flask (g)	681.21
Wt. of Water + Flask (g)	660.88
Specific Gravity, Gs	**2.59**

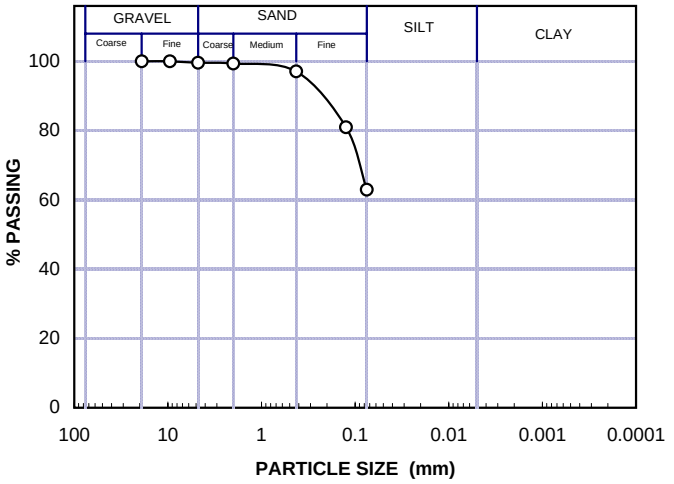
WET SIEVE ANALYSIS

Wt. of Dry Soil (g)		23.69
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.10	**99.6**
2.00	0.05	**99.4**
0.425	0.54	**97.1**
0.125	3.82	**81.0**
0.075	4.27	**62.9**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)									
Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty Shoreline Abutment	BH-J1	SS-7	10.00-10.45	SILT with sand	65.9	1.59	NP	NP	NP	2.61	0	0	1	14	84

UNIT WEIGHT DETERMINATION

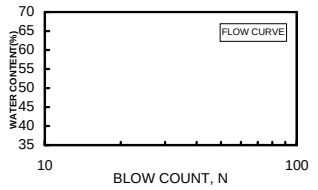
Sample Height (cm)	6.72
Sample Diameter (cm)	3.51
Wt. of Tube (g)	19.20
Wt. of Wet Soil +Tube (g)	122.79
Total Unit Weight (g/cc)	**1.59**
Dry Unit Weight (g/cc)	**0.96**

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.20	19.23
Wt. of Wet Soil + Can (g)	122.79	105.21
Wt. of Dry Soil + Can (g)	81.93	70.81
Water Content, w_c (%)	**65.1**	**66.7**

ATTERBERG LIMITS

w_p		w_l			



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	C
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	51.43
Temperature (deg. C)	21.8
Wt. of Water+Soil+Flask (g)	696.70
Wt. of Water + Flask (g)	664.96
Specific Gravity, Gs	**2.61**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 27.36

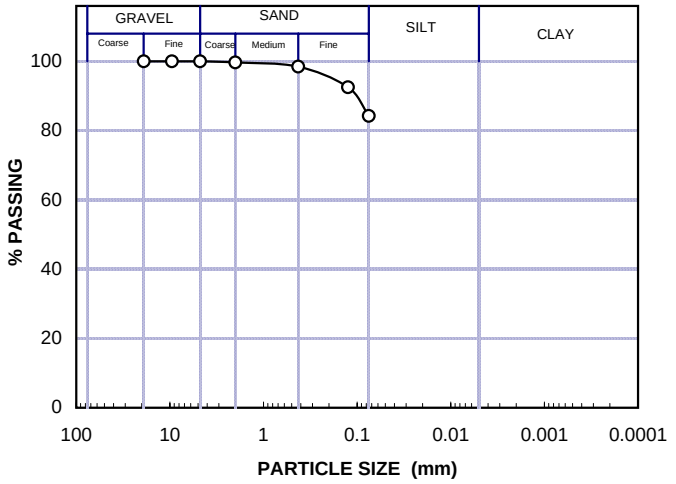
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.08	**99.7**
0.425	0.34	**98.5**
0.125	1.62	**92.5**
0.075	2.27	**84.2**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty Shoreline Abutment	BH-J1	UD-1	14.50-15.50	SILT with sand	48.6	1.69	NP	NP	NP	2.66	0	1	8	20	71

UNIT WEIGHT DETERMINATION

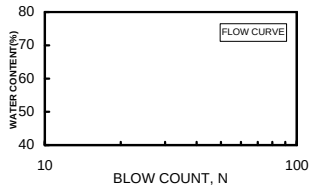
Sample Height (cm)	7.10
Sample Diameter (cm)	3.53
Wt. of Tube (g)	19.23
Wt. of Wet Soil +Tube (g)	136.91
Total Unit Weight (g/cc)	**1.69**
Dry Unit Weight (g/cc)	**1.14**

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.23	19.28
Wt. of Wet Soil + Can (g)	136.91	135.09
Wt. of Dry Soil + Can (g)	98.49	97.12
Water Content, w_c (%)	**48.5**	**48.8**

ATTERBERG LIMITS

w_p		w_l			



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	G
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	133.32
Temperature (deg. C)	20.5
Wt. of Water+Soil+Flask (g)	744.47
Wt. of Water + Flask (g)	661.11
Specific Gravity, Gs	**2.66**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

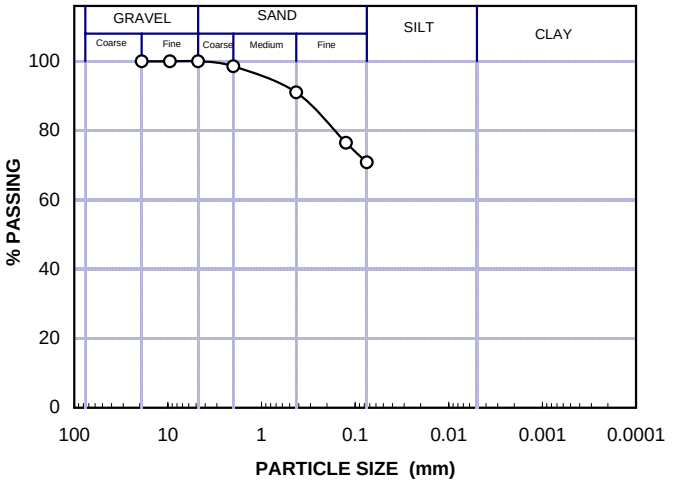
Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 128.90

Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	1.85	**98.6**
0.425	9.69	**91.0**
0.125	18.78	**76.5**
0.075	7.23	**70.9**

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

CONSOLIDATION TEST

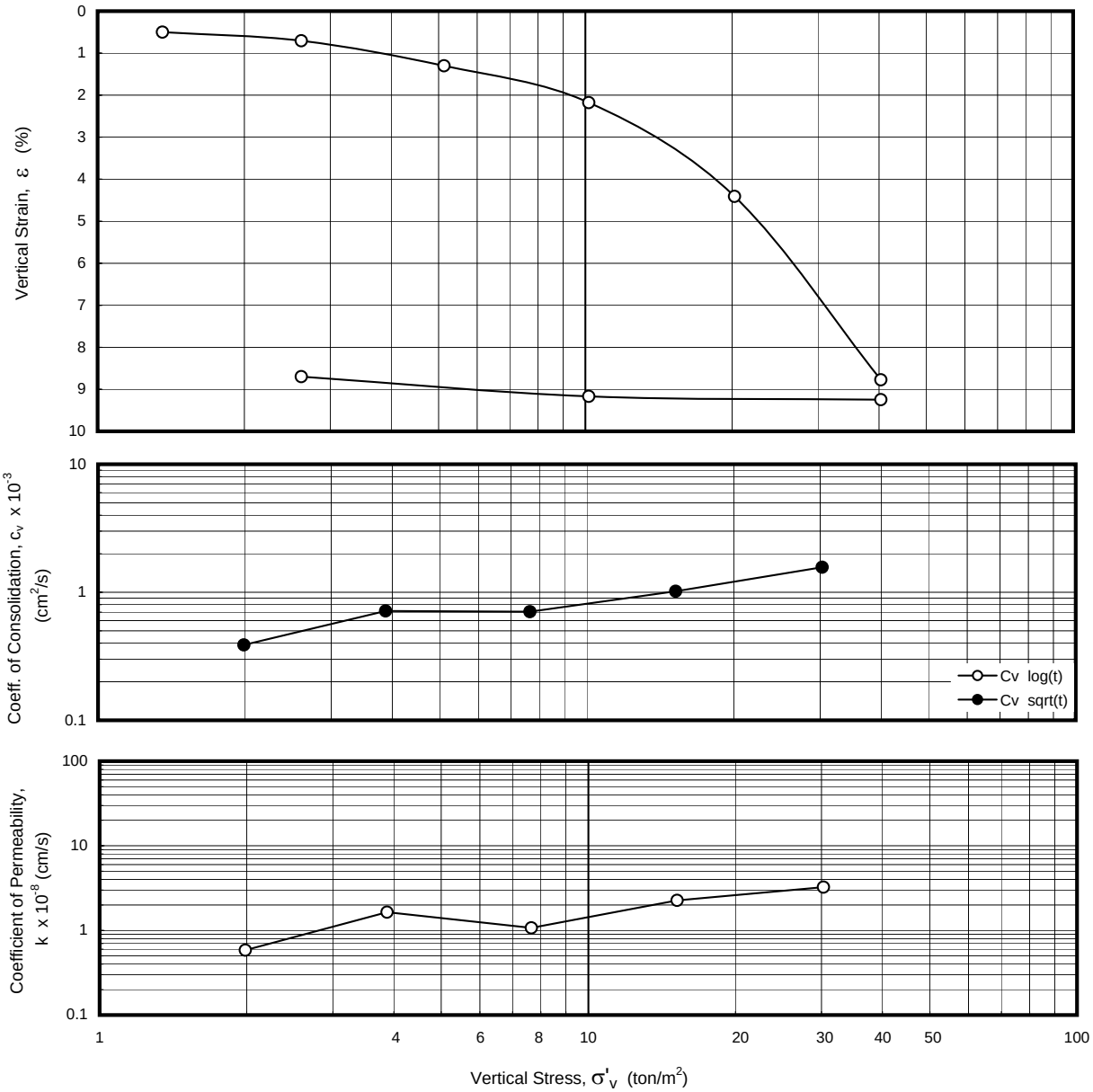
Project: New Auki Market & Jetty Renovation Location: W of Jetty @ Shoreline Tested by: MAAG

Borehole: BH-J1 Sample No: UD-1 Depth (m.): 14.50 - 15.50

Soil Description:	SILT with sand				
Water Content, w_n	51.7	%	Liquid Limit, LL	NP	%
Initial Void Ratio, e_0	1.400		Plasticity Index, PI	NP	%
Total Unit Weight, γ_t	1.68	ton/m^3	Height of Solid, H_s	0.833	cm.
Specific Gravity, G_s	2.66		Preconsolidation Pressure, $\sigma_{c'}$	14.3	ton/m^2

Vertical Stress (ton/m^2)	Vertical Strain ε_{100} (%)	Vertical Strain ε_f (%)	Void ratio e_{100}	Void ratio e_f	Time t_{90} (min.)	Time t_{50} (min.)	Coefficient of Consolidation c_v x 10^{-3} (cm^2/sec) sqrt(t)	log(t)	Average	Permea. k x 10^{-8} (cm/sec)	Compres. Ratio CR
1.4	0.5	0.6	1.388	1.387							
2.6	0.7	0.8	1.383	1.380	36.0	10.0	0.4	0.3	0.4	0.6	0.007
5.1	1.3	1.3	1.369	1.368	19.4	4.8	0.7	0.7	0.7	1.6	0.020
10.2	2.2	2.3	1.348	1.345	19.4	6.0	0.7	0.5	0.6	1.1	0.030
20.2	4.4	4.8	1.294	1.285	13.0	3.0	1.0	1.0	1.0	2.3	0.075
40.4	8.8	9.2	1.189	1.178	7.8	2.0	1.6	1.4	1.5	3.2	0.145
10.2	9.2	9.1	1.180	1.182							-0.007
2.6	8.7	8.6	1.191	1.194							0.008

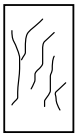
Note: Compression Ratio = $\frac{\Delta\varepsilon}{\log(\sigma_2/\sigma_1)}$

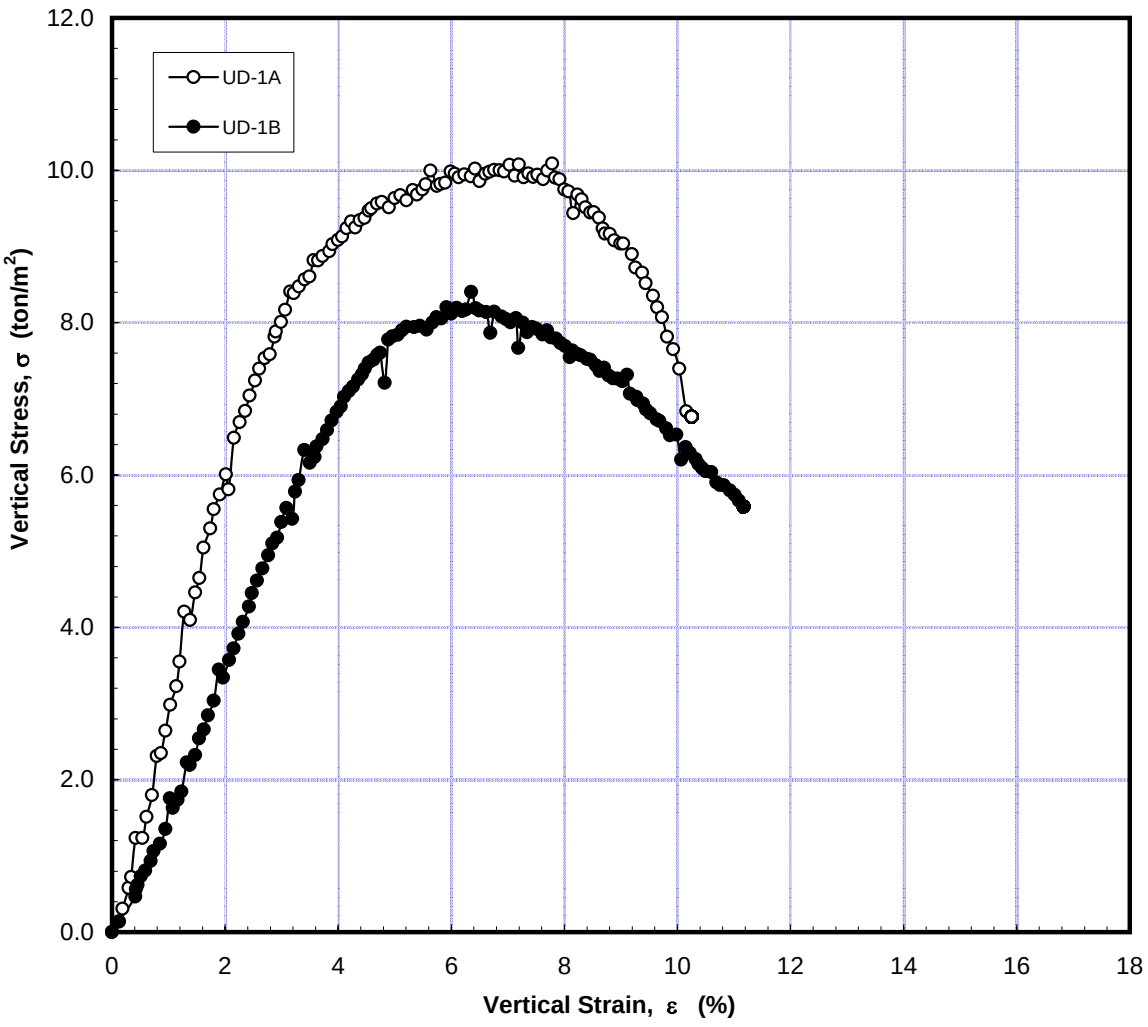


SIAM TONE

UNCONFINED COMPRESSION TEST

Project	New Auki Market and Jetty Renovation			Borehole No :	BH-J1
Location:	Jetty Shoreline Abutment			Sample No :	UD-1
Tested by:	MAAG	Date :	Mar 2007	Depth (m) :	14.50-15.50

Test Summary			
Soil Description:	SILT with sand		
Test No.	UD-1A	UD-1B	
Water Content, w_n	51.4	47.7	%
Total Unit Weight, γ_t	1.63	1.66	ton/m^3
Unconfined Compressive Strength, q_u	10.1	8.4	ton/m^2
Undrained Shear Strength, c_u	5.0	4.2	ton/m^2
Strain at Failure, ε_f	7.8	6.4	%
Modulus at 50% Stress Level, E_{50}	301	176	ton/m^2
Failure Mode			



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty Shoreline Abutment	BH-J1	SS-10	15.50-15.95	Silty SAND with gravel (SM)	39.1	-	NP	NP	NP	2.70	22	9	12	14	42

UNIT WEIGHT DETERMINATION

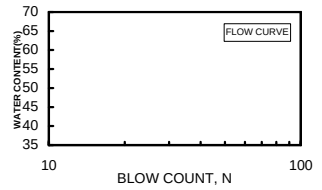
Sample Height (cm)	
Sample Diameter (cm)	
Wt. of Tube (g)	
Wt. of Wet Soil +Tube (g)	
Total Unit Weight (g/cc)	
Dry Unit Weight (g/cc)	

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.62	19.14
Wt. of Wet Soil + Can (g)	115.99	157.71
Wt. of Dry Soil + Can (g)	89.21	118.25
Water Content, w_c (%)	**38.5**	**39.8**

ATTERBERG LIMITS

	w_p		w_l			
Test Condition/Blows	Test 1	Test 2				
Wt. of Can (g)						
Wt. of Wet Soil + Can (g)						
Wt. of Dry Soil + Can (g)						
Water Content, w_c (%)						



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	D
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	90.59
Temperature (deg. C)	21.3
Wt. of Water+Soil+Flask (g)	719.02
Wt. of Water + Flask (g)	661.87
Specific Gravity, Gs	**2.70**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g): 35.49

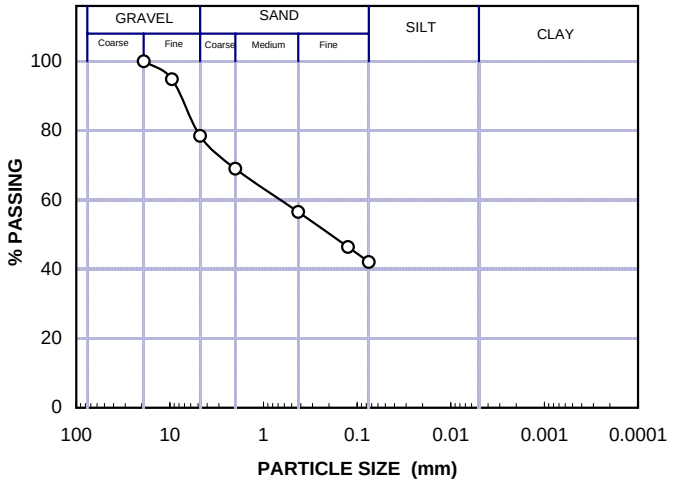
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	1.83	**94.8**
4.75	5.81	**78.5**
2.00	3.36	**69.0**
0.425	4.43	**56.5**
0.125	3.60	**46.4**
0.075	1.53	**42.1**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g):

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty Shoreline Abutment	BH-J1	UD-2	16.00-17.00	SILT (MH)	46.8	1.69	61.3	37.8	23.5	2.70	1	0	1	5	93

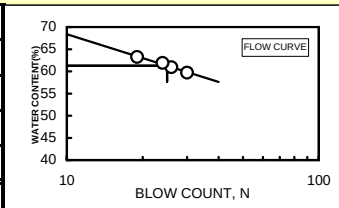
UNIT WEIGHT DETERMINATION

Sample Height (cm)	7.14
Sample Diameter (cm)	3.48
Wt. of Tube (g)	15.68
Wt. of Wet Soil +Tube (g)	130.58
Total Unit Weight (g/cc)	**1.69**
Dry Unit Weight (g/cc)	**1.15**

WATER CONTENT

	w_c		w_p		w_l			
Test Condition/Blows	A	B	Test 1	Test 2	30	26	24	19
Wt. of Can (g)	15.68	19.14	14.22	14.58	27.46	28.51	30.39	27.50
Wt. of Wet Soil + Can (g)	130.58	157.71	24.35	25.13	32.35	33.39	35.27	32.17
Wt. of Dry Soil + Can (g)	90.42	118.25	21.50	22.31	30.53	31.54	33.41	30.36
Water Content, w_c (%)	**53.7**	**39.8**	39.27	36.35	59.70	60.94	61.92	63.23

ATTERBERG LIMITS



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	C
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	118.23
Temperature (deg. C)	22.5
Wt. of Water+Soil+Flask (g)	739.30
Wt. of Water + Flask (g)	664.83
Specific Gravity, Gs	**2.70**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 74.74

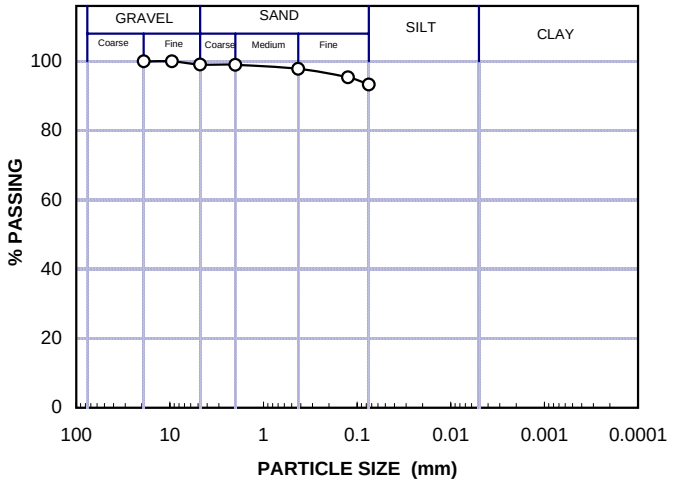
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.70	**99.1**
2.00	0.06	**99.0**
0.425	0.85	**97.8**
0.125	1.85	**95.4**
0.075	1.53	**93.3**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

CONSOLIDATION TEST

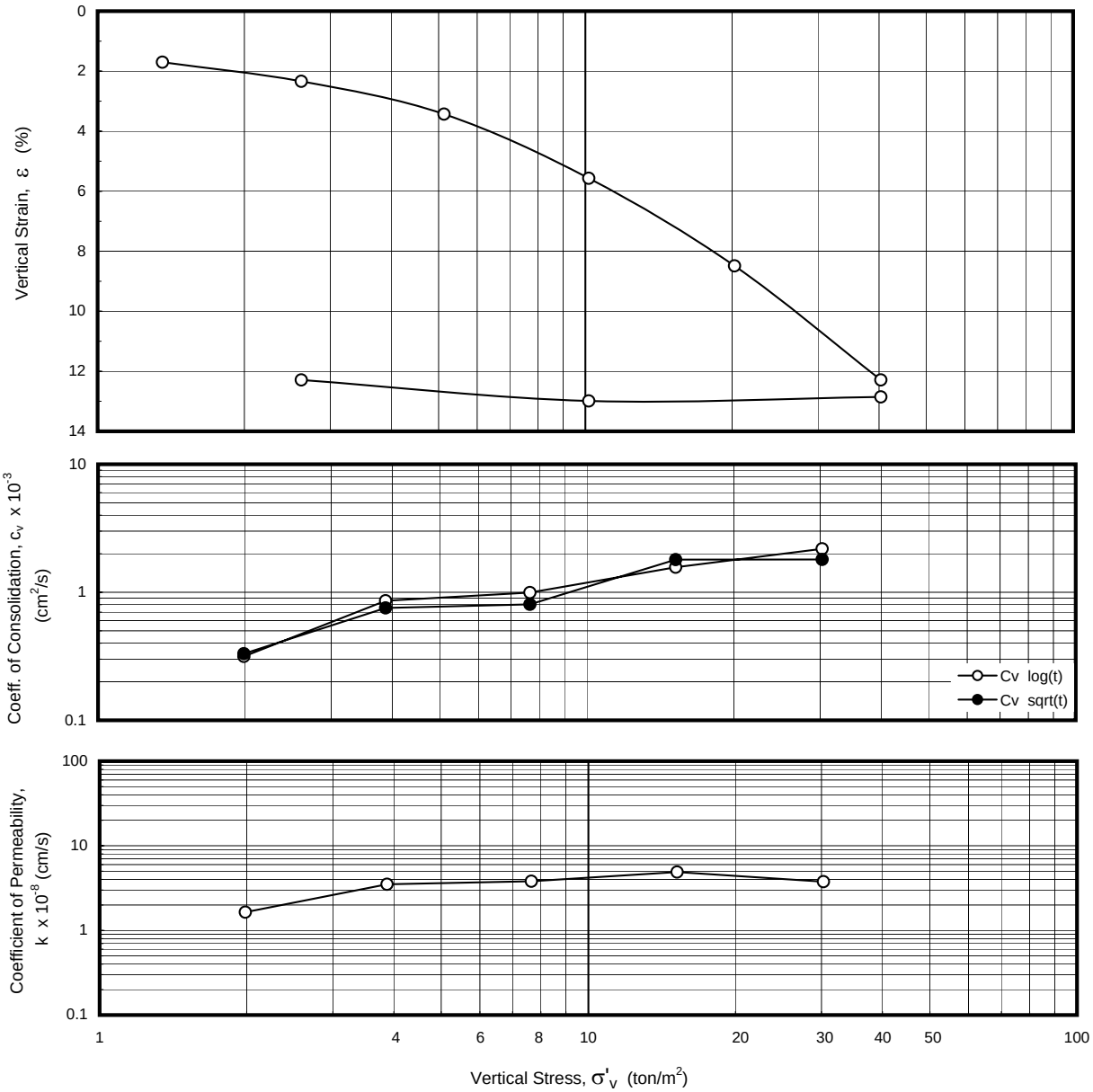
Project: New Auki Market & Jetty Renovation Location: Jetty Abutment Tested by: MAAG

Borehole: BH-J1 Sample No: UD-2 Depth (m.): 16.00 - 17.00

Soil Description:			SILT with sand			
Water Content, w_n	49.1	%	Liquid Limit, LL	61.27	%	
Initial Void Ratio, e_0	1.401		Plasticity Index, PI	23.46	%	
Total Unit Weight, γ_t	1.68	ton/m^3	Height of Solid, H_s	0.833	cm.	
Specific Gravity, G_s	2.70		Preconsolidation Pressure, $\sigma_{c'}$	10.3	ton/m^2	

Vertical Stress (ton/m^2)	Vertical Strain ε_{100} (%)	Vertical Strain ε_f (%)	Void ratio e_{100}	Void ratio e_f	Time t_{90} (min.)	Time t_{50} (min.)	Coefficient of Consolidation c_v x 10^{-3} (cm^2/sec) sqrt(t)	log(t)	Average	Permea. k x 10^{-8} (cm/sec)	Compres. Ratio CR
1.4	1.7	1.7	1.360	1.359							
2.6	2.3	2.5	1.344	1.340	41.0	10.0	0.3	0.3	0.3	1.6	0.022
5.1	3.4	3.7	1.318	1.312	17.6	3.6	0.8	0.9	0.8	3.5	0.037
10.2	5.6	5.9	1.267	1.258	16.0	3.0	0.8	1.0	0.9	3.8	0.072
20.2	8.5	9.0	1.197	1.185	6.8	1.8	1.8	1.6	1.7	4.9	0.098
40.4	12.3	12.9	1.106	1.092	6.3	1.2	1.8	2.2	2.0	3.8	0.127
10.2	13.0	12.7	1.089	1.096							-0.012
2.6	12.3	12.2	1.106	1.107							0.012

Note: Compression Ratio = $\frac{\Delta\varepsilon}{\log(\sigma_2/\sigma_1)}$

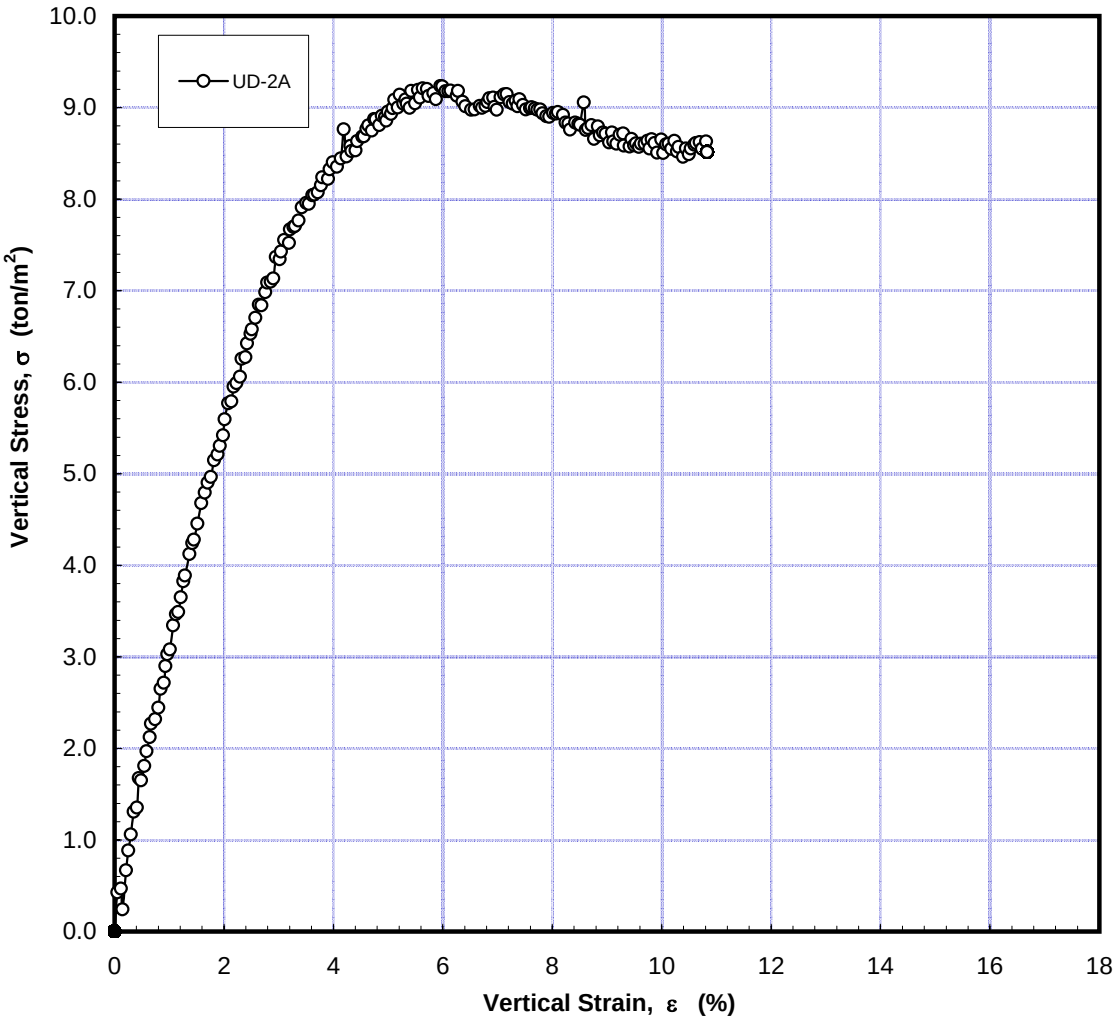


SIAM TONE

UNCONFINED COMPRESSION TEST

Project	New Auki Market and Jetty Renovation			Borehole No :	BH-J1
Location:	Jetty End (Offshore Side)			Sample No :	UD-2
Tested by:	MAAG	Date :	Mar 2007	Depth (m) :	16.00-17.00

Test Summary			
Soil Description:	SILT with sand		
Test No.	UD-2A	UD-2B	
Water Content, w_n	67.6	Insufficient Soil for Testing	%
Total Unit Weight, γ_t	1.69		ton/m^3
Unconfined Compressive Strength, q_u	9.2		ton/m^2
Undrained Shear Strength, c_u	4.6		ton/m^2
Strain at Failure, ε_f	6.0		%
Modulus at 50% Stress Level, E_{50}	294		ton/m^2
Failure Mode			



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty Shoreline Abutment	BH-J1	SS-12	18.50-18.95	Silty GRAVEL with sand (GM)	24.9	-	NP	NP	NP	2.69	46	18	10	5	20

UNIT WEIGHT DETERMINATION

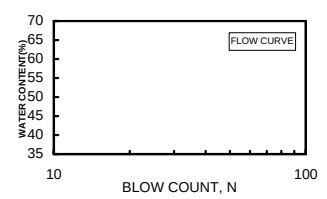
Sample Height (cm)	
Sample Diameter (cm)	
Wt. of Tube (g)	
Wt. of Wet Soil +Tube (g)	
Total Unit Weight (g/cc)	
Dry Unit Weight (g/cc)	

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	18.62	19.45
Wt. of Wet Soil + Can (g)	101.88	100.66
Wt. of Dry Soil + Can (g)	86.45	83.36
Water Content, w_c (%)	**22.7**	**27.1**

ATTERBERG LIMITS

w_p		w_l			
Test 1	Test 2				



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	E
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	84.60
Temperature (deg. C)	21.2
Wt. of Water+Soil+Flask (g)	717.28
Wt. of Water + Flask (g)	664.09
Specific Gravity, Gs	**2.69**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 53.64

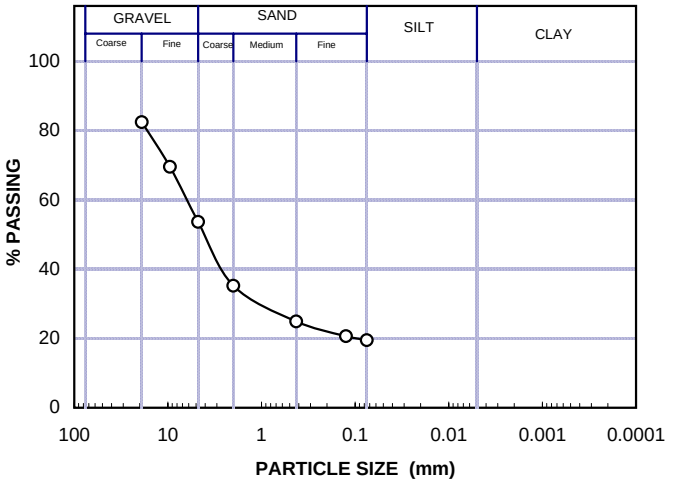
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	9.42	**82.4**
9.5	6.91	**69.6**
4.75	8.54	**53.6**
2.00	9.89	**35.2**
0.425	5.53	**24.9**
0.125	2.27	**20.7**
0.075	0.62	**19.5**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty Shoreline Abutment	BH-J1	SS-15	23.00-23.45	SILT (MH)	38.1	1.77	44.7	27.4	17.4	2.62	0	0	0	9	91

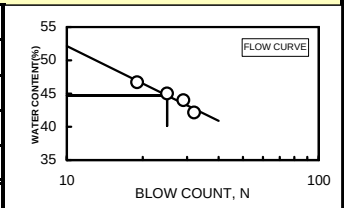
UNIT WEIGHT DETERMINATION

Sample Height (cm)	6.78
Sample Diameter (cm)	3.40
Wt. of Tube (g)	14.46
Wt. of Wet Soil +Tube (g)	123.51
Total Unit Weight (g/cc)	**1.77**
Dry Unit Weight (g/cc)	**1.28**

WATER CONTENT

	w_c		w_p		w_l			
Test Condition/Blows	A	B	Test 1	Test 2	32	29	25	19
Wt. of Can (g)	14.46	18.66	11.02	14.02	28.28	28.14	27.47	26.95
Wt. of Wet Soil + Can (g)	123.51	141.56	21.17	24.43	33.58	33.40	31.14	32.10
Wt. of Dry Soil + Can (g)	94.02	107.03	19.01	22.18	32.01	31.79	30.00	30.46
Water Content, w_c (%)	**37.1**	**39.1**	27.16	27.54	42.14	44.01	45.00	46.70

ATTERBERG LIMITS



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	G
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	98.87
Temperature (deg. C)	20.8
Wt. of Water+Soil+Flask (g)	722.21
Wt. of Water + Flask (g)	661.06
Specific Gravity, Gs	**2.62**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 35.50

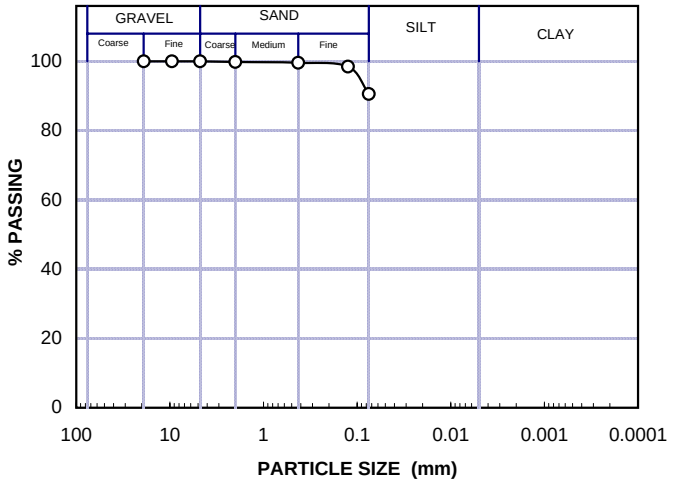
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.06	**99.8**
0.425	0.09	**99.6**
0.125	0.38	**98.5**
0.075	2.81	**90.6**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



Borehole No.BH-J2

(Jetty Site / Existing Jetty Head)

BH-J2 (1/1)

SIAM TONE CO., LTD.

BORING LOG

BORING NO. BH-J2

SHEET 1 OF 1

PROJECT: Basic Design, Auki New Market and Jetty Renovation

LOCATION: Jetty End (Offshore Side)

CLIENT: Fisheries Engineering Co., Ltd.

Coordinates: N: 9029706.97 E: 686610.83

Ground Elevation (m-CDL): -6.5 m

Max.Drilling Depth: 23.00 m

Seawater Depth: 6.50 m

Starting Date: 19/2/2007

Finishing Date: 20/2/2007

DEPTH (m.)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)	Total Unit Weight (Ton/m^3)	Plastic Limit / Natural Water Content / Liquid Limit (%)	Unconfined Compressive Strength (Ton/m^2)	SPT Blow Count (Blow/ft)
						1.6 1.8 2.0	30 60 90 120	2 4 6	10 20 30 40
1		0.0-3.0 m, BACKFILL, no sample retreived, probably wash out materials from backfilled stone at shoreline abutment							
2									
3		3.0-7.5 m, CL, silty-sandy CLAY, with 30% silt-fine sand, and some very minor random shell and coral reef of fine gravel sized with max ~2 mm, soft, low plasticity, blackish brown	SS	1	45				2
4									
5			SS	2	45				3
6			SS	3	45				2
7									
8		7.5-15.0 m, CL, silty CLAY, with 20% silt , soft, medium plasticity, blackish brown	SS	4	45				4
9			SS	5	45				2
10									
11			SS	6	45				4
			UD	1	100				
12			SS	7	45				6
13									
14			SS	8	45				6
15		15.0-19.0 m, CL, silty-sandy CLAY with gravel, with 30% silt-sand, majority sand of fine-coarse grained, subangular-subround, with <10% fine gravel of reef limestone and shell, max ~ 3 cm ϕ, soft, low-medium plasticity, greenish brown	SS	9	45				3
16			UD	2	100				
17			SS	10	45				3
18									
19			SS	11	45				2
		19.0-21.5 m, CL, silty CLAY, with 20% silt, soft, medium plasticity, blackish brown							
20			SS	12	45				4 6 7
21			SS	13	45				9
		21.5-23.0 m, CL (?), silty CLAY, should be the same formation as 19.0-21.5 m	RC		Loss				
22			RC		Loss				
		End of Borehole @ 23.0 m	RC		Loss				
23		Since 23.0 m, REEF LIMESTONE as sensed by driller, unfortunately ran out of driiling rod							

Table 3 Summary of Soil Properties Test Results

Borehole No.	sample No.	Depth (m)		Water Content (%)	Total Unit Weight (ton/m^3)	Liquid Limit, LL (%)	Plasticity Index, PI (%)	Specific Gravity, Gs	Grain Size Analysis (%)					Undrained Shear Strength, c_u (ton/m^2)	Modulus @50% Stress, E50	Colour	USCS	Soil Description
									Gravel	Sand			Silt+Clay					
		From	To							Coarse	Medium	Fine						
BH-J2	SS-1	3.00	3.45	75.7	-	NP	NP	2.56	0	0	3	24	73			Blackish Brown	-	SILT with sand
BH-J2	SS-4	7.50	7.95	63.3	1.50	NP	NP	2.56	1	0	3	11	85			Blackish Brown	-	SILT with sand
BH-J2	UD-1	11.00	12.00	59.8	1.58	76.9	33.6	2.60	0	0	1	7	91	3.7	144	Greenish Brown	MH	SILT
BH-J2	SS-11	18.50	18.95	57.1	-	53.2	20.0	2.59	0	1	5	11	83			Greenish Brown	MH	SILT with sand
BH-J2	SS-13	21.00	21.45	50.5	1.49	55.4	19.8	2.62	0	0	0	2	97			Blackish Brown	MH	SILT

Note : UD denotes Shelby Tube Sample, D denotes Split Spoon Sample and NP denotes Nonplastic

*** denotes insufficient soil for testing**

SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty End (Offshore Side)	BH-J2	SS-1	3.00-3.45	SILT with sand	75.7	-	NP	NP	NP	2.56	0	0	3	24	73

UNIT WEIGHT DETERMINATION

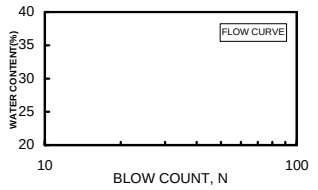
Sample Height (cm)	
Sample Diameter (cm)	
Wt. of Tube (g)	
Wt. of Wet Soil +Tube (g)	
Total Unit Weight (g/cc)	
Dry Unit Weight (g/cc)	

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.68	20.19
Wt. of Wet Soil + Can (g)	102.95	102.32
Wt. of Dry Soil + Can (g)	66.94	67.06
Water Content, w_c (%)	**76.2**	**75.2**

ATTERBERG LIMITS

w_p		w_l			



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	D
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	32.07
Temperature (deg. C)	22.0
Wt. of Water+Soil+Flask (g)	681.28
Wt. of Water + Flask (g)	661.73
Specific Gravity, Gs	**2.56**

WET SIEVE ANALYSIS

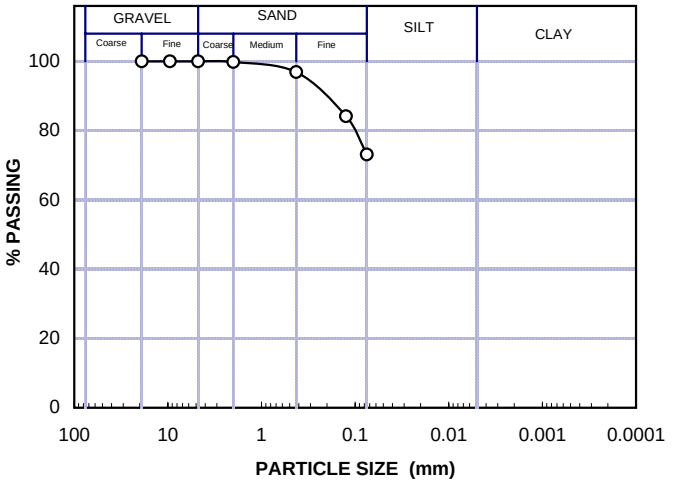
Wt. of Dry Soil (g)		22.63
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.04	**99.8**
0.425	0.66	**96.9**
0.125	2.88	**84.2**
0.075	2.50	**73.1**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty End (Offshore Side)	BH-J2	SS-2	7.50-7.95	SILT with sand	63.3	1.50	NP	NP	NP	2.56	1	0	3	11	85

UNIT WEIGHT DETERMINATION

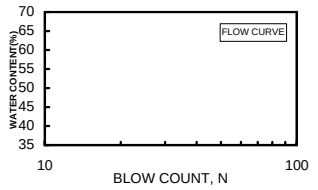
Sample Height (cm)	6.85
Sample Diameter (cm)	3.53
Wt. of Tube (g)	18.21
Wt. of Wet Soil +Tube (g)	119.02
Total Unit Weight (g/cc)	**1.50**
Dry Unit Weight (g/cc)	**0.92**

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	18.21	19.49
Wt. of Wet Soil + Can (g)	119.02	114.65
Wt. of Dry Soil + Can (g)	80.59	77.16
Water Content, w_c (%)	**61.6**	**65.0**

ATTERBERG LIMITS

w_p		w_l			



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	E
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	58.76
Temperature (deg. C)	21.8
Wt. of Water+Soil+Flask (g)	699.86
Wt. of Water + Flask (g)	663.97
Specific Gravity, Gs	**2.56**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

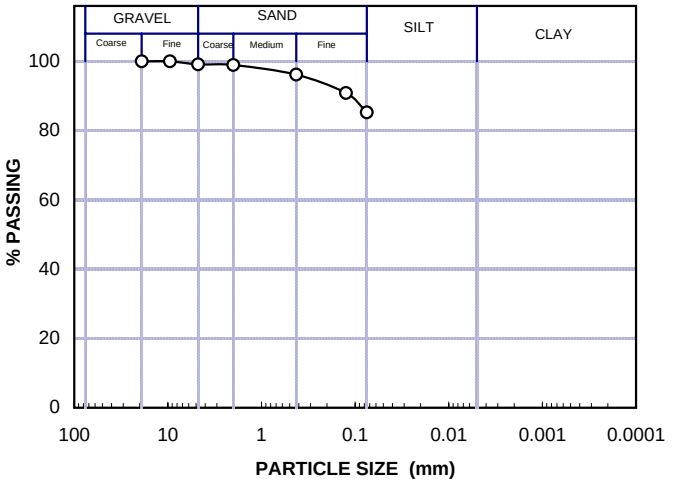
Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 34.47

Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.30	**99.1**
2.00	0.07	**98.9**
0.425	0.95	**96.2**
0.125	1.83	**90.9**
0.075	1.93	**85.3**

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty End (Offshore Side)	BH-J2	UD-1	11.00-12.00	SILT (MH)	59.8	1.58	76.9	43.3	33.6	2.60	0	0	1	7	91

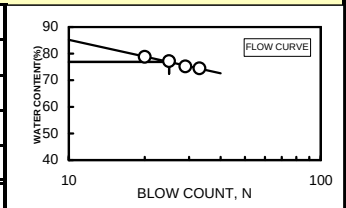
UNIT WEIGHT DETERMINATION

Sample Height (cm)	7.10
Sample Diameter (cm)	3.53
Wt. of Tube (g)	17.71
Wt. of Wet Soil +Tube (g)	127.34
Total Unit Weight (g/cc)	**1.58**
Dry Unit Weight (g/cc)	**0.99**

WATER CONTENT

	w_c		w_p		w_l			
Test Condition/Blows	A	B	Test 1	Test 2	33	29	25	20
Wt. of Can (g)	17.71	16.09	14.21	14.62	24.54	27.53	27.70	27.54
Wt. of Wet Soil + Can (g)	127.34	124.98	24.22	25.21	29.02	31.86	32.47	32.05
Wt. of Dry Soil + Can (g)	86.45	84.07	21.21	22.00	27.11	30.00	30.39	30.06
Water Content, w_c (%)	**59.5**	**60.2**	42.98	43.59	74.46	75.18	77.19	78.82

ATTERBERG LIMITS



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	D
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	104.27
Temperature (deg. C)	22.9
Wt. of Water+Soil+Flask (g)	725.84
Wt. of Water + Flask (g)	661.55
Specific Gravity, Gs	**2.60**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 68.71

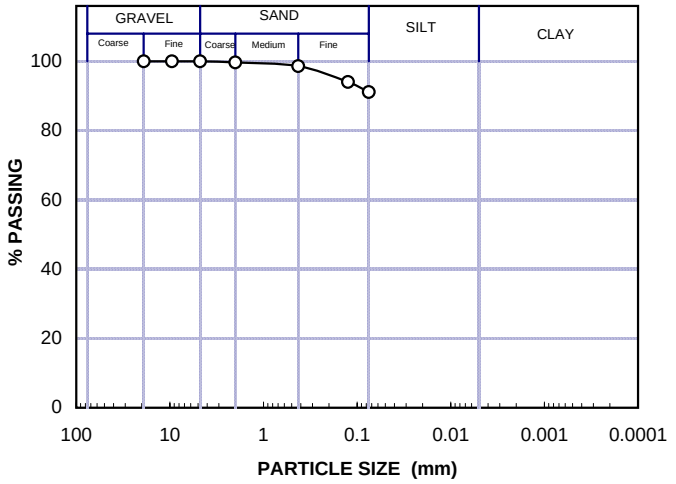
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.20	**99.7**
0.425	0.75	**98.6**
0.125	3.13	**94.1**
0.075	2.00	**91.2**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

CONSOLIDATION TEST

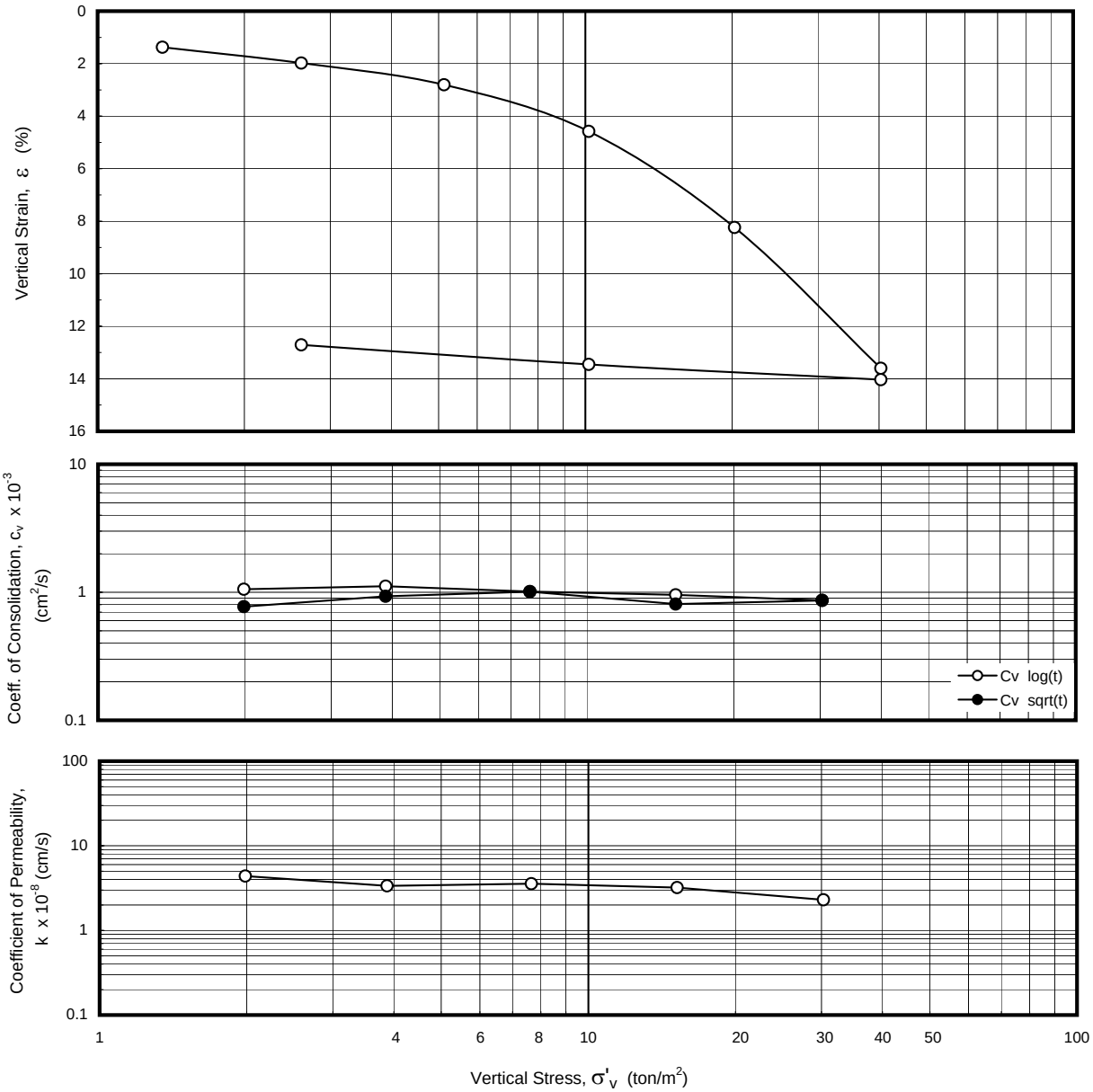
Project: New Auki Market & Jetty Renovation Location: Jetty End Tested by: MAAG

Borehole: BH-J2 Sample No: UD-1 Depth (m.): 11.00 - 12.00

Soil Description:			SILT		
Water Content, w_n	61.6	%	Liquid Limit, LL	76.88	%
Initial Void Ratio, e_0	1.675		Plasticity Index, PI	33.59	%
Total Unit Weight, γ_t	1.57	ton/m^3	Height of Solid, H_s	0.748	cm.
Specific Gravity, G_s	2.60		Preconsolidation Pressure, $\sigma_{c'}$	14.7	ton/m^2

Vertical Stress (ton/m^2)	Vertical Strain ε_{100} (%)	Vertical Strain ε_f (%)	Void ratio e_{100}	Void ratio e_f	Time t_{90} (min.)	Time t_{50} (min.)	Coefficient of Consolidation c_v x 10^{-3} (cm^2/sec) sqrt(t)	log(t)	Average	Permea. k x 10^{-8} (cm/sec)	Compres. Ratio CR
1.4	1.4	1.7	1.638	1.630							
2.6	2.0	2.2	1.622	1.616	17.6	3.0	0.8	1.1	0.9	4.4	0.021
5.1	2.8	3.0	1.599	1.595	14.4	2.8	0.9	1.1	1.0	3.4	0.028
10.2	4.6	5.1	1.552	1.538	13.0	3.0	1.0	1.0	1.0	3.6	0.060
20.2	8.2	8.6	1.454	1.444	15.2	3.0	0.8	1.0	0.9	3.2	0.123
40.4	13.6	14.0	1.311	1.299	13.0	3.0	0.9	0.9	0.9	2.3	0.179
10.2	13.5	13.4	1.315	1.315							0.002
2.6	12.7	12.5	1.335	1.341							0.013

Note: Compression Ratio = $\frac{\Delta\varepsilon}{\log(\sigma_2/\sigma_1)}$

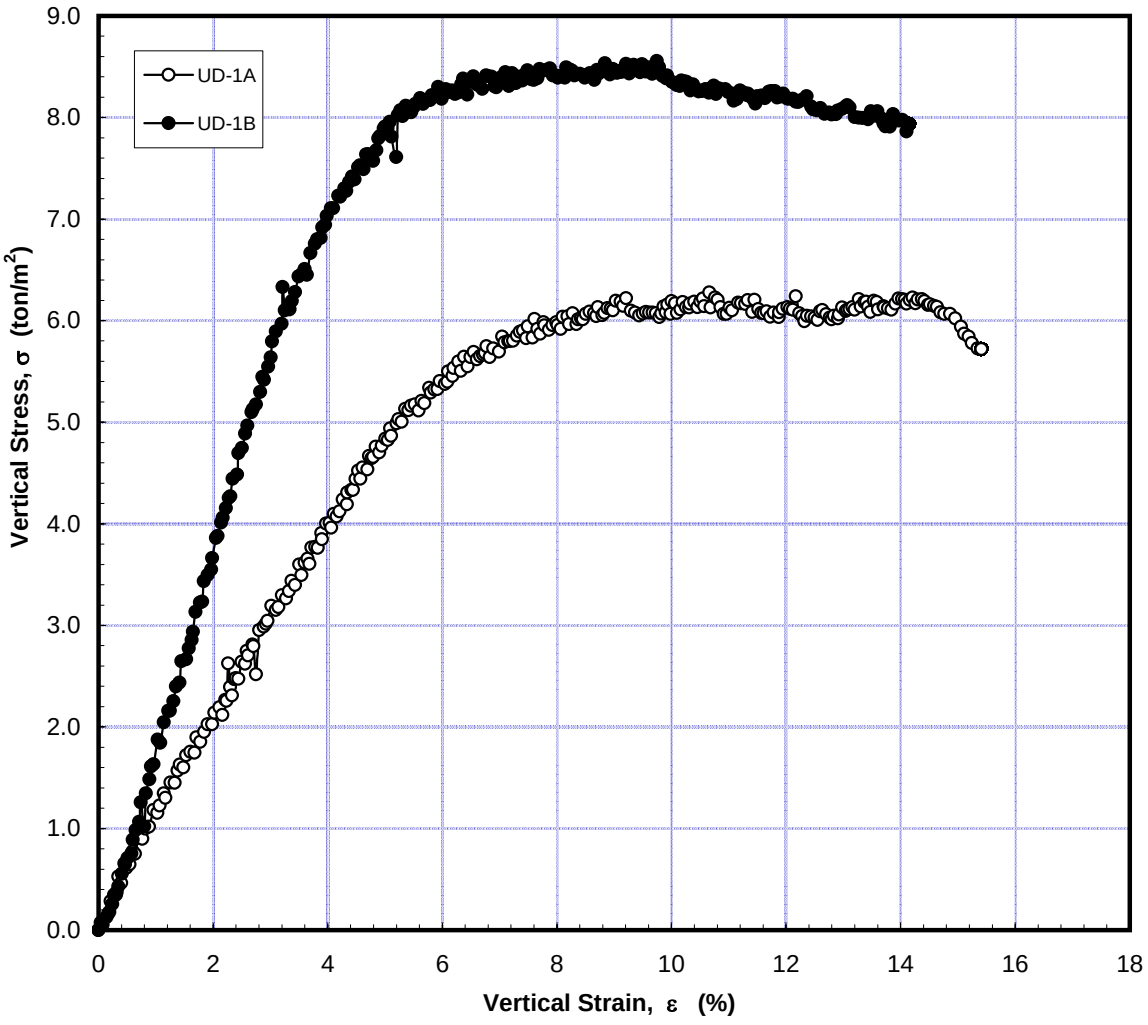


SIAM TONE

UNCONFINED COMPRESSION TEST

Project	New Auki Market and Jetty Renovation			Borehole No :	BH-J2
Location:	Jetty End (Offshore Side)			Sample No :	UD-1
Tested by:	MAAG	Date :	Mar 2007	Depth (m) :	11.00-12.00

Test Summary			
Soil Description:	SILT		
Test No.	UD-1A	UD-1B	
Water Content, w_n	59.5	60.2	%
Total Unit Weight, γ_t	1.61	1.62	ton/m^3
Unconfined Compressive Strength, q_u	6.3	8.6	ton/m^2
Undrained Shear Strength, c_u	3.1	4.3	ton/m^2
Strain at Failure, ε_f	10.7	9.7	%
Modulus at 50% Stress Level, E_{50}	103	185	ton/m^2
Failure Mode			



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty End (Offshore Side)	BH-J2	SS-11	18.50-18.95	SILT with sand (MH)	57.1	-	53.2	33.3	20.0	2.59	0	1	5	11	83

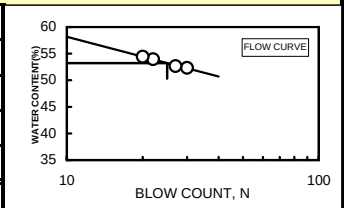
UNIT WEIGHT DETERMINATION

Sample Height (cm)	
Sample Diameter (cm)	
Wt. of Tube (g)	
Wt. of Wet Soil +Tube (g)	
Total Unit Weight (g/cc)	
Dry Unit Weight (g/cc)	

WATER CONTENT

	w_c		w_p		w_l			
Test Condition/Blows	A	B	Test 1	Test 2	30	27	22	20
Wt. of Can (g)	18.80	19.82	14.27	13.87	24.71	24.96	27.35	27.58
Wt. of Wet Soil + Can (g)	147.29	158.37	24.93	23.91	28.92	29.70	31.85	32.47
Wt. of Dry Soil + Can (g)	100.97	107.63	22.25	21.42	27.48	28.06	30.27	30.75
Water Content, w_c (%)	**56.4**	**57.8**	33.55	32.98	52.33	52.67	53.95	54.44

ATTERBERG LIMITS



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	G
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	80.31
Temperature (deg. C)	22.0
Wt. of Water+Soil+Flask (g)	710.26
Wt. of Water + Flask (g)	660.85
Specific Gravity, Gs	**2.59**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 30.47

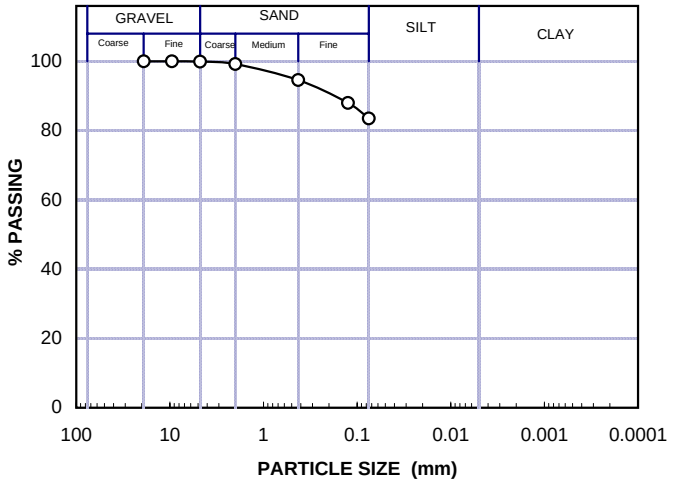
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.03	**99.9**
2.00	0.20	**99.2**
0.425	1.41	**94.6**
0.125	2.02	**88.0**
0.075	1.37	**83.5**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Jetty End (Offshore Side)	BH-J2	SS-13	21.00-21.45	SILT (MH)	50.5	1.49	55.4	35.6	19.8	2.62	0	0	0	2	97

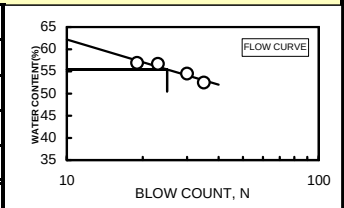
UNIT WEIGHT DETERMINATION

Sample Height (cm)	6.87
Sample Diameter (cm)	3.52
Wt. of Tube (g)	19.25
Wt. of Wet Soil +Tube (g)	119.01
Total Unit Weight (g/cc)	**1.49**
Dry Unit Weight (g/cc)	**0.99**

WATER CONTENT

	w_c		w_p		w_l			
Test Condition/Blows	A	B	Test 1	Test 2	35	30	23	19
Wt. of Can (g)	19.25	18.97	11.22	14.21	27.37	24.69	28.83	27.37
Wt. of Wet Soil + Can (g)	119.01	128.57	21.89	24.27	32.14	28.32	32.94	31.71
Wt. of Dry Soil + Can (g)	85.39	91.94	19.07	21.65	30.50	27.04	31.45	30.14
Water Content, w_c (%)	**50.8**	**50.2**	35.96	35.25	52.48	54.49	56.70	56.92

ATTERBERG LIMITS



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	C
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	95.04
Temperature (deg. C)	22.8
Wt. of Water+Soil+Flask (g)	723.59
Wt. of Water + Flask (g)	664.77
Specific Gravity, Gs	**2.62**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 30.60

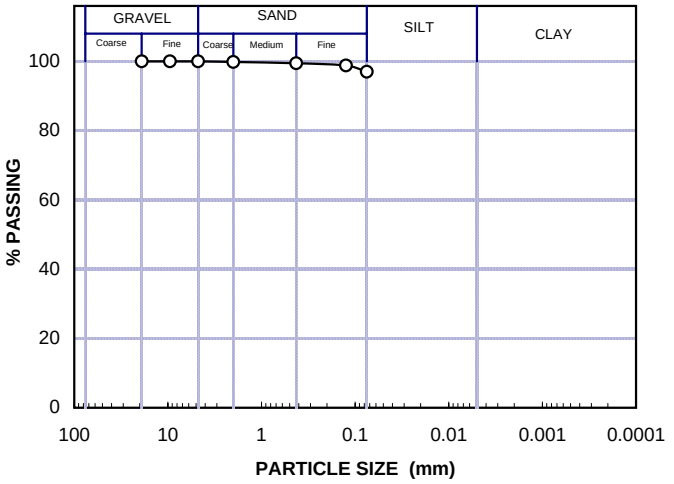
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.05	**99.8**
0.425	0.11	**99.5**
0.125	0.21	**98.8**
0.075	0.55	**97.0**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



Borehole No.BH-M1

Market Site / Center)

SIAM TONE CO., LTD.

BORING LOG

BORING NO. BH-M1

SHEET 1 OF 2

PROJECT: Basic Design, Auki New Market and Jetty Renovation

LOCATION: Center of New Auki Market Site

CLIENT: Fisheries Engineering Co., Ltd.

Coordinates: N: 9029785.820 E: 686929.617

Ground Elevation (m-MSL): 1.894 m

Max.Drilling Depth: 27.50 m

Water Level: -1.050 m

Starting Date: 11/2/2007

Finishing Date: 14/102/07

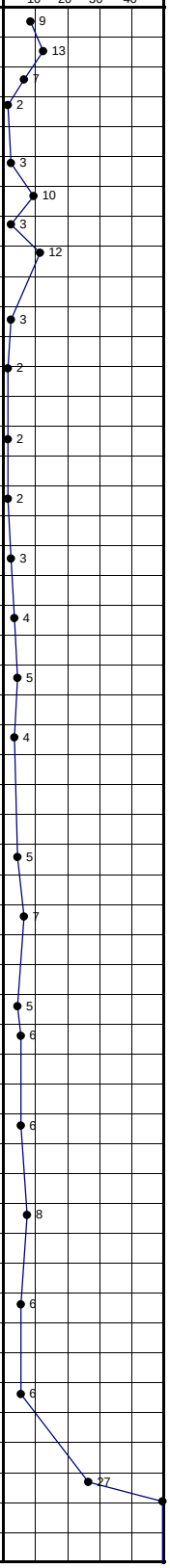
DEPTH (m.)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)
1		0.0-1.05 m, BACKFILL, crushed/compacted gravel-cobble sized reef limestone with max ~ 6 cm ϕ, hard but brittle, dense, brown at ground then pale white	SS	1	45
			SS	2	45
		1.05-3.0 m, CL, silty CLAY, with 10% fine gravel sized, angular, and well graded coral reef with max ~ 2-3 mm and 20% silt, soft, low-medium plasticity, blackish brown	SS	3	40
2			SS	4	25
			SS	5	20
3		3.0-5.0 m, SC, clayey SAND, with 30% clay and 10% fine gravel sized, angular, and well graded coral reef with max ~ 2-4 mm, subangular-angular coarse grained sand, loose, non-plasticity, blackish brown	SS	6	30
4			SS	7	25
			SS	8	20
5		5.0-24.0 m, CL, silty CLAY, with 20% silt and some very minor random shell and coral reef of fine gravel sized with max ~2 mm, soft, medium plasticity, blackish brown	SS	9	45
6			SS	10	8
7			SS	11	45
8			SS	12	45
9			SS	13	45
10			SS	14	45
11			SS	15	45
12			SS	16	45
13			UD	1	100
14			SS	17	45
15			SS	18	45
16					
17			SS	19	45
			SS	20	45
18					
19			SS	21	45
20			SS	22	45
21					
22			SS	23	45
23		24.0-24.7 m, CL, silty-sandy CLAY, with 30% silt-fine grained angular sand and little fine gravel sized reef limestone with max ~2-3 mm, soft, low-medium plasticity, blackish brown	SS	24	45
24					
25		24.7-27.5 m, REEF LIMESTONE, hard but brittle, pale white with some random gray banded of neighbor rock (?), moderately-highly weathered, can not achieved by rock coring, when SPT - crushed rock sample obtained	SS	25	30

Total Unit Weight (Ton/m^3): 1.6 1.8 2.0

Plastic Limit — Natural Water Content — Liquid Limit (%): 30 60 90 120

Unconfined Compressive Strength (Ton/m^2): 2 4 6

SPT Blow Count (Blow/ft): 10 20 30 40



BH-M1 (2/2)

SIAM TONE CO., LTD.

BORING LOG

BORING NO. BH-M1

SHEET 2 OF 2

PROJECT: Basic Design, Auki New Market and Jetty Renovation

LOCATION: Center of New Auki Market Site

CLIENT: Fisheries Engineering Co., Ltd.

Coordinates: N: 9029785.820 E: 686929.617

Ground Elevation (m-MSL): 1.894 m

Max.Drilling Depth: 27.50 m

Water Level: -1.050 m

Starting Date: 11/2/2007

Finishing Date: 14/102/07

DEPTH (m.)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)	Total Unit Weight (Ton/m^3) 1.6 1.8 2.0	Plastic Limit / Natural Water Content / Liquid Limit (%) 30 60 90 120	Specific Gravity 2.4 2.6 2.8	SPT Blow Count (Blow/ft) 10 20 30 40
26		24.7-27.5 m, REEF LIMESTONE, hard but brittle, pale white with some random gray banded of neighbor rock (?), moderately-highly weathered, can not acchieved by rock coring, when SPT - crushed rock sample obtained	RC	1	20				50
27			SS	26	45				50
		End of Borehole @ 27.5 m							

Table 3 Summary of Soil Properties Test Results

Borehole No.	sample No.	Depth (m)		Water Content (%)	Total Unit Weight (ton/m^3)	Liquid Limit, LL (%)	Plasticity Index, PI (%)	Specific Gravity, Gs	Grain Size Analysis (%)					Undrained Shear Strength, c_u (ton/m^2)	Modulus @50% Stress, E50	Colour	USCS	Soil Description
									Gravel	Sand			Silt+Clay					
		From	To							Coarse	Medium	Fine						
BH-M1	SS-4	1.50	1.95	73.9	1.51	NP	NP	2.52	11	10	20	14	45			Blackish Brown	SM	Silty SAND
BH-M1	SS-7	3.50	3.90	30.5	-	NP	NP	2.53	49	16	14	7	14			Blackish Brown	GM	Silty GRAVEL with sand
BH-M1	SS-11	7.00	7.45	66.7	1.58	NP	NP	2.63	0	0	1	13	86			Blackish Brown	ML	SILT with sand
BH-M1	UD-1	13.00	14.00	69.7	1.57	48.1	10.5	2.61	11	1	1	6	82	7.2	386	Blackish Brown	ML	SILT with gravel and sand
BH-M1	SS-22	20.00	20.45	66.2	-	NP	NP	2.51	0	2	2	23	73			Blackish Brown	-	SILT with sand
BH-M1	SS-24	23.00	23.41	65.4	1.52	55.4	17.5	2.55	0	0	1	5	94			Blackish Brown	MH	SILT

Note : UD denotes Shelby Tube Sample, D denotes Split Spoon Sample and NP denotes Nonplastic

*** denotes insufficient soil for testing**

SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovaation	Center of New Market	BH-M1	SS-4	1.50-1.95	Silty SAND (SM)	73.9	1.51	NP	NP	NP	2.52	11	10	20	14	45

UNIT WEIGHT DETERMINATION

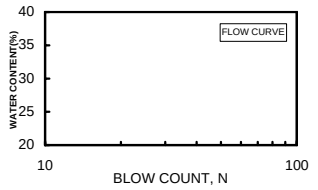
Sample Height (cm)	5.17
Sample Diameter (cm)	3.53
Wt. of Tube (g)	19.15
Wt. of Wet Soil +Tube (g)	95.37
Total Unit Weight (g/cc)	**1.51**
Dry Unit Weight (g/cc)	**0.87**

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.15	18.79
Wt. of Wet Soil + Can (g)	95.37	90.00
Wt. of Dry Soil + Can (g)	62.53	60.15
Water Content, w_c (%)	**75.7**	**72.2**

ATTERBERG LIMITS

w_p		w_l			



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	C
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	42.28
Temperature (deg. C)	20.8
Wt. of Water+Soil+Flask (g)	690.70
Wt. of Water + Flask (g)	665.15
Specific Gravity, Gs	**2.52**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 42.35

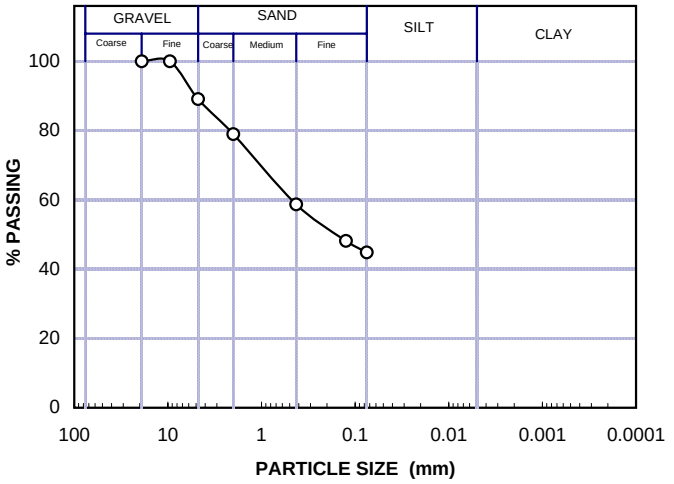
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	4.61	**89.1**
2.00	4.30	**79.0**
0.425	8.59	**58.7**
0.125	4.46	**48.1**
0.075	1.40	**44.8**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovaation	Center of New Market	BH-M1	SS-7	3.50-3.90	Silty GRAVEL with sand (GM)	30.5	-	NP	NP	NP	2.53	49	16	14	7	14

UNIT WEIGHT DETERMINATION

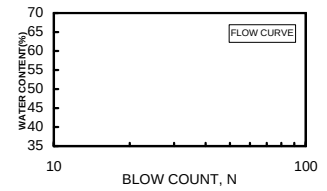
Sample Height (cm)	
Sample Diameter (cm)	
Wt. of Tube (g)	
Wt. of Wet Soil +Tube (g)	
Total Unit Weight (g/cc)	
Dry Unit Weight (g/cc)	

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.91	19.75
Wt. of Wet Soil + Can (g)	91.66	101.37
Wt. of Dry Soil + Can (g)	75.60	81.53
Water Content, w_c (%)	**28.8**	**32.1**

ATTERBERG LIMITS

w_p		w_l			



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	D
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	61.27
Temperature (deg. C)	17.5
Wt. of Water+Soil+Flask (g)	699.67
Wt. of Water + Flask (g)	662.63
Specific Gravity, Gs	**2.53**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 55.70

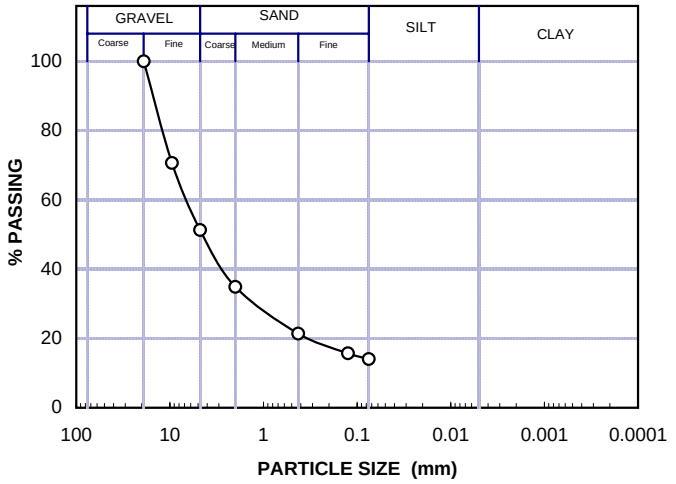
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	16.35	**70.6**
4.75	10.77	**51.3**
2.00	9.14	**34.9**
0.425	7.52	**21.4**
0.125	3.16	**15.7**
0.075	0.94	**14.0**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovaation	Center of New Market	BH-M1	SS-11	7.00-7.45	SILT with sand (ML)	66.7	1.58	NP	NP	NP	2.63	0	0	1	13	86

UNIT WEIGHT DETERMINATION

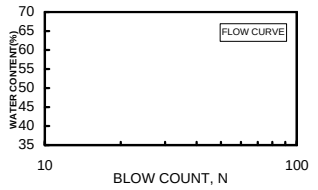
Sample Height (cm)	6.73
Sample Diameter (cm)	3.41
Wt. of Tube (g)	19.42
Wt. of Wet Soil +Tube (g)	116.71
Total Unit Weight (g/cc)	**1.58**
Dry Unit Weight (g/cc)	**0.95**

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.42	19.30
Wt. of Wet Soil + Can (g)	116.71	91.50
Wt. of Dry Soil + Can (g)	77.98	62.45
Water Content, w_c (%)	**66.1**	**67.3**

ATTERBERG LIMITS

	w_p		w_l			



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	C
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	103.29
Temperature (deg. C)	23.1
Wt. of Water+Soil+Flask (g)	728.78
Wt. of Water + Flask (g)	664.71
Specific Gravity, Gs	**2.63**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 34.74

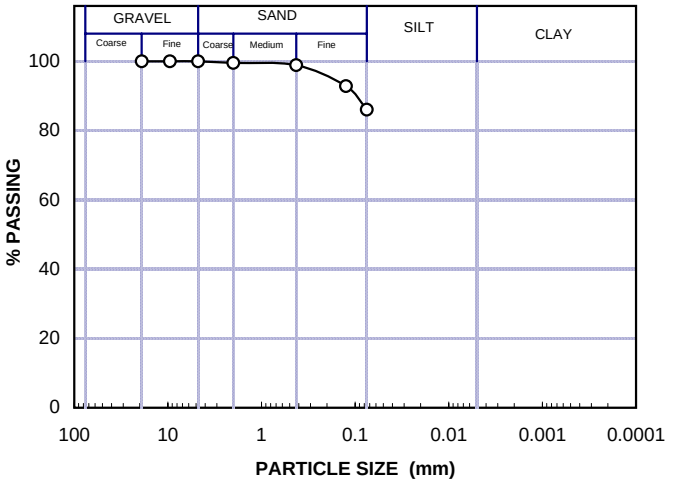
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.16	**99.5**
0.425	0.22	**98.9**
0.125	2.10	**92.9**
0.075	2.37	**86.0**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovaation	Center of New Market	BH-M1	UD-1	13.00-14.00	SILT with gravel and sand (ML)	69.7	1.57	48.1	37.6	10.5	2.61	11	1	1	6	82

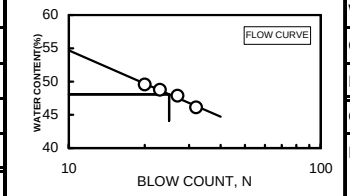
UNIT WEIGHT DETERMINATION

Sample Height (cm)	7.10
Sample Diameter (cm)	3.53
Wt. of Tube (g)	18.22
Wt. of Wet Soil +Tube (g)	127.56
Total Unit Weight (g/cc)	**1.57**
Dry Unit Weight (g/cc)	**0.93**

WATER CONTENT

	w_c		w_p		w_l			
Test Condition/Blows	A	B	Tesr 1	Test 2	32	27	23	20
Wt. of Can (g)	18.22	19.48	14.23	14.23	20.64	20.66	26.03	21.79
Wt. of Wet Soil + Can (g)	127.56	120.71	24.30	24.30	25.35	25.74	31.28	26.22
Wt. of Dry Soil + Can (g)	82.44	79.35	21.55	21.55	23.86	24.10	29.56	24.75
Water Content, w_c (%)	**70.3**	**69.1**	37.57	37.57	46.11	47.86	48.75	49.54

ATTERBERG LIMITS



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	E
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	109.39
Temperature (deg. C)	21.2
Wt. of Water+Soil+Flask (g)	731.68
Wt. of Water + Flask (g)	664.09
Specific Gravity, Gs	**2.61**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 101.22

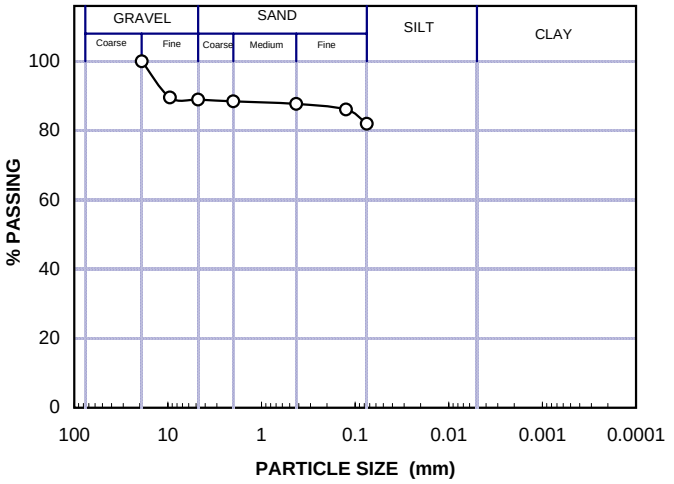
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	10.54	**89.6**
4.75	0.64	**89.0**
2.00	0.51	**88.5**
0.425	0.74	**87.7**
0.125	1.66	**86.1**
0.075	4.13	**82.0**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

CONSOLIDATION TEST

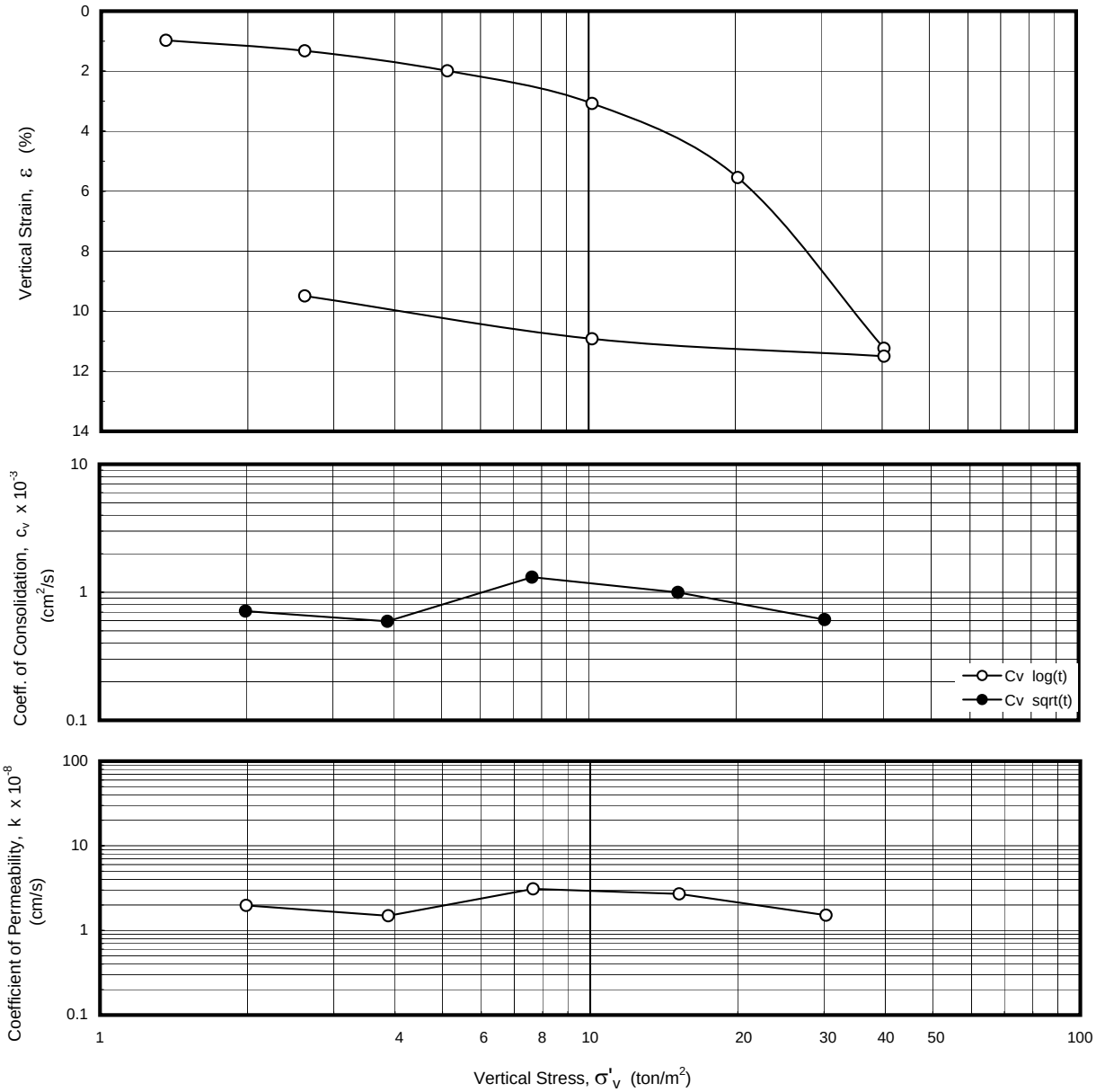
Project: New Auki Market & Jetty Renovation Location: Center of New Market Tested by: MAAG

Borehole: BH-M1 Sample No: UD-1 Depth (m.): 13.00 - 14.00

Soil Description:	SILT with gravel and sand				
Water Content, w_n	68.8	%	Liquid Limit, LL	48.1	%
Initial Void Ratio, e_0	1.886		Plasticity Index, PI	10.5	%
Total Unit Weight, γ_t	1.53	ton/m^3	Height of Solid, H_s	0.693	cm.
Specific Gravity, G_s	2.61		Preconsolidation Pressure, $\sigma_{c'}$	17.8	ton/m^2

Vertical Stress (ton/m^2)	Vertical Strain ε_{100} (%)	Vertical Strain ε_f (%)	Void ratio e_{100}	Void ratio e_f	Time t_{90} (min.)	Time t_{50} (min.)	Coefficient of Consolidation c_v x 10^{-3} (cm^2/sec) sqrt(t)	log(t)	Average	Permea. k x 10^{-8} (cm/sec)	Compres. Ratio CR
1.4	1.0	1.1	1.858	1.855							
2.6	1.3	1.3	1.848	1.847	19.4	4.5	0.7	0.7	0.7	2.0	0.012
5.1	2.0	2.0	1.829	1.828	23.0	6.0	0.6	0.5	0.6	1.5	0.023
10.2	3.1	3.3	1.797	1.791	10.2	2.0	1.3	1.6	1.4	3.1	0.037
20.2	5.5	5.6	1.726	1.723	13.0	2.5	1.0	1.2	1.1	2.7	0.083
40.4	11.2	11.5	1.562	1.554	19.4	6.0	0.6	0.5	0.5	1.5	0.190
10.2	10.9	10.7	1.571	1.576							0.005
2.6	9.5	9.4	1.612	1.616							0.024

Note: Compression Ratio = $\frac{\Delta\varepsilon}{\log(\sigma_2/\sigma_1)}$



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%)			Silt+Clay (%)
													Coarse	Medium	Fine	
New Auki Market & Jetty Renovaation	Center of New Market	BH-M1	SS-22	20.00-20.45	SILT with sand (ML)	66.2	-	NP	NP	NP	2.51	0	2	2	23	73

UNIT WEIGHT DETERMINATION

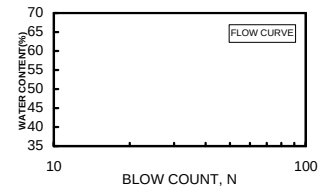
Sample Height (cm)	
Sample Diameter (cm)	
Wt. of Tube (g)	
Wt. of Wet Soil +Tube (g)	
Total Unit Weight (g/cc)	
Dry Unit Weight (g/cc)	

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.90	19.66
Wt. of Wet Soil + Can (g)	150.27	135.31
Wt. of Dry Soil + Can (g)	97.85	89.65
Water Content, w_c (%)	**67.2**	**65.2**

ATTERBERG LIMITS

w_p		w_l			



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	D
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	113.54
Temperature (deg. C)	19.5
Wt. of Water+Soil+Flask (g)	730.65
Wt. of Water + Flask (g)	662.23
Specific Gravity, Gs	**2.51**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 29.83

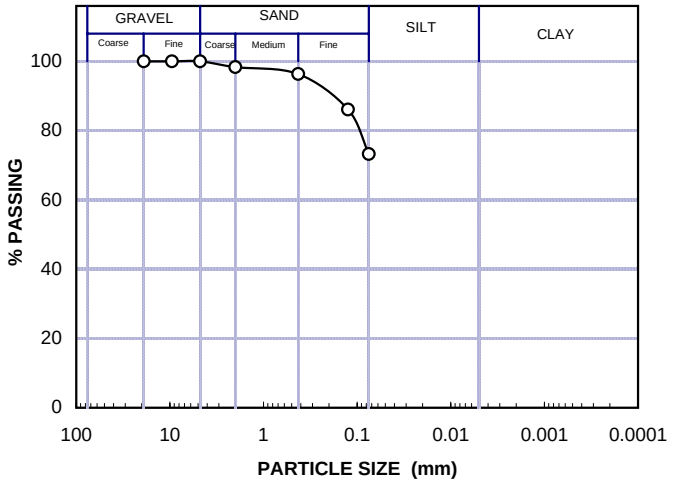
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.49	**98.4**
0.425	0.60	**96.3**
0.125	3.06	**86.1**
0.075	3.83	**73.2**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovaation	Center of New Market	BH-M1	SS-24	23.00-23.41	SILT (ML)	65.4	1.52	55.4	37.9	17.5	2.55	0	0	1	5	94

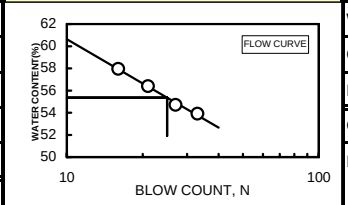
UNIT WEIGHT DETERMINATION

Sample Height (cm)	6.76
Sample Diameter (cm)	3.50
Wt. of Tube (g)	19.18
Wt. of Wet Soil +Tube (g)	118.31
Total Unit Weight (g/cc)	**1.52**
Dry Unit Weight (g/cc)	**0.92**

WATER CONTENT

	w_c		w_p		w_l			
Test Condition/Blows	A	B	Tesr 1	Test 2	33	27	21	16
Wt. of Can (g)	19.18	19.79	10.46	11.04	21.07	20.69	20.75	20.87
Wt. of Wet Soil + Can (g)	118.31	111.05	23.08	23.51	25.71	24.73	25.36	25.49
Wt. of Dry Soil + Can (g)	78.96	75.14	19.55	20.14	24.09	23.30	23.70	23.80
Water Content, w_c (%)	**65.8**	**64.9**	38.76	37.03	53.91	54.71	56.39	57.96

ATTERBERG LIMITS



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	E
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	73.01
Temperature (deg. C)	21.6
Wt. of Water+Soil+Flask (g)	708.40
Wt. of Water + Flask (g)	664.01
Specific Gravity, Gs	**2.55**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 24.20

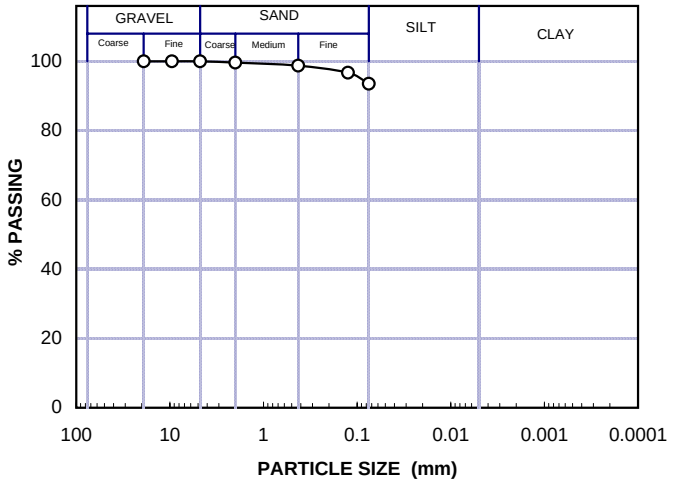
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.09	**99.6**
0.425	0.21	**98.8**
0.125	0.49	**96.7**
0.075	0.77	**93.6**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



Borehole No.BH-M2

(Market Site / Near Shoreline)

BH-M2 (1/2)

SIAM TONE CO., LTD.

BORING LOG

BORING NO. BH-M2

SHEET 1 OF 2

PROJECT: Basic Design, Auki New Market and Jetty Renovation

LOCATION: Shoreline of New Auki Market Site

CLIENT: Fisheries Engineering Co., Ltd.

Coordinates: N: 9029777.179 E: 686905.961

Ground Elevation (m-MSL): 1.860 m

Max.Drilling Depth: 30.00 m

Water Level: -1.100 m

Starting Date: 21/2/2007

Finishing Date: 23/102/07

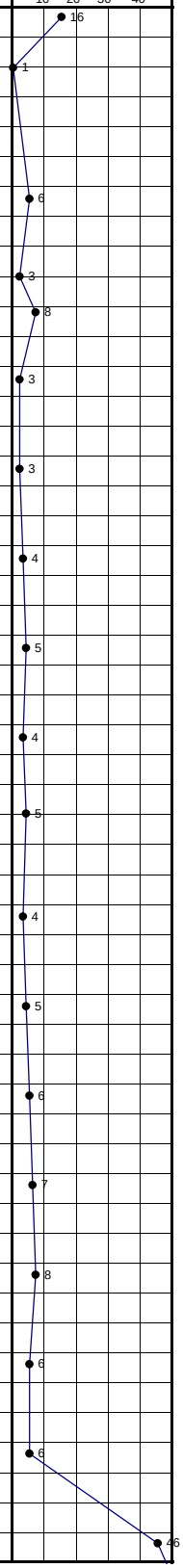
DEPTH (m.)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)
0		0.0-1.0 m, BACKFILL, crushed/compacted gravel-cobble sized reef limestone with max ~ 4 cm ϕ, hard but brittle, dense, brown at ground then pale white	SS	1	30
			Sample Loss		
1		1.0-5.0 m, SP, SAND with gravel, poorly graded and coarse grained sand, angular, loose, non-plasticity, dak brown, with 20% fine gravel size of white backfilled reef limestone,subangular, with max ~ 3 cm ϕ			
2					
3			SS	2	30
4					
			Sample Loss		
5		5.0-25.5 m, CL, silty CLAY, with 30% silt, soft, medium plasticity, blzckish brown	SS	3	20
6			SS	4	45
7					
8			SS	5	45
9			SS	6	45
10					
11			SS	7	45
12			SS	8	45
13					
			Sample Loss		
14			UD	1	100
15			SS	9	45
16					
17			SS	10	45
18			SS	11	45
19					
20			SS	12	45
21			SS	13	45
22					
23			SS	14	45
24					
			Sample Loss		
25					
		25.5-27.5 m, REEF LIMESTONE (details on next page)	SS	15	45

Total Unit Weight (Ton/m^3): 1.6 1.8 2.0

Plastic Limit — Natural Water Content — Liquid Limit (%): 30 60 90 120

Unconfined Compressive Strength (Ton/m^2): 2 4 6

SPT Blow Count (Blow/ft): 10 20 30 40



BH-M2 (2/2)

SIAM TONE CO., LTD.

BORING LOG

BORING NO. BH-M2

SHEET 2 OF 2

PROJECT: Basic Design, Auki New Market and Jetty Renovation

LOCATION: Shoreline of New Auki Market Site

CLIENT: Fisheries Engineering Co., Ltd.

Coordinates: N: 9029777.179 E: 686905.961

Ground Elevation (m-MSL): 1.860 m

Max.Drilling Depth: 30.00 m

Water Level: -1.100 m

Starting Date: 21/2/2007

Finishing Date: 23/102/07

DEPTH (m.)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLING METHOD	SAMPLE NO.	RECOVERY (cm)	Total Unit Weight (Ton/m^3) 1.6 1.8 2.0	Plastic Limit / Natural Water Content / Liquid Limit (%) 30 60 90 120	Specific Gravity 2.4 2.6 2.8	SPT Blow Count (Blow/ft) 10 20 30 40
26		25.5-27.5 m, REEF LIMESTONE, hard but brittle, pale white, moderately-highly weathered, can not acchieved by rock coring, when SPT - crushed rock sample obtained	SS	15	45				
27			SS	16	10				50
28		27.5-28.5 m, SP, SAND, poorly graded, fine grained, subround, loose-medium dense, non-plasticity, pale brown	MUD	1	None				
29		28.5-30.0 m, REEF LIMESTONE, hard but brittle, pale white, moderately-highly weathered, can not acchieved by rock coring, when SPT - crushed rock sample obtained	RC	1	Loss				
30		End of Borehole @ 30.0 m							

Table 3 Summary of Soil Properties Test Results

Borehole No.	sample No.	Depth (m)		Water Content (%)	Total Unit Weight (ton/m^3)	Liquid Limit, LL (%)	Plasticity Index, PI (%)	Specific Gravity, Gs	Grain Size Analysis (%)					Undrained Shear Strength, c_u (ton/m^2)	Modulus @50% Stress, E50	Colour	USCS	Soil Description
									Gravel	Sand			Silt+Clay					
		From	To							Coarse	Medium	Fine						
BH-M2	SS-2	3.00	3.45	30.3	-	NP	NP	2.65	42	7	38	3	9			Dark Brown	SW-SM	Well graded SAND with silt and gravel
BH-M2	SS-3	5.00	5.45	54.6	-	NP	NP	2.56	0	0	1	35	64			Blackish Brown	-	Sandy SILT
BH-M2	SS-6	9.00	9.45	67.4	1.59	NP	NP	2.56	0	0	0	8	91			Blackish Brown	-	SILT
BH-M2	UD-1	14.00	15.00	64.3	1.57	87.1	46.7	2.55	5	1	1	6	87	9.3	437	Blackish Brown	MH	SILT
BH-M2	SS-11	18.00	18.45	69.2	-	60.1	23.3	2.54	0	0	1	9	90			Blackish Brown	MH	SILT
BH-M2	SS-14	22.50	22.95	67.0	-	NP	NP	2.54	0	0	2	16	82			Blackish Brown	-	SILT with sand
BH-M2	Mud-1			34.6	-	NP	NP	2.67	0	0	1	70	30			Pale Brown	SM	Silty SAND

Note : UD denotes Shelby Tube Sample, D denotes Split Spoon Sample and NP denotes Nonplastic

*** denotes insufficient soil for testing**

SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%)			Silt+Clay (%)
													Coarse	Medium	Fine	
New Auki Market & Jetty Renovation	Shoreline of New Market	BH-M2	SS-2	3.00-3.45	Well graded SAND with silt and gravel	30.3	-	NP	NP	NP	2.65	42	7	38	3	9

UNIT WEIGHT DETERMINATION

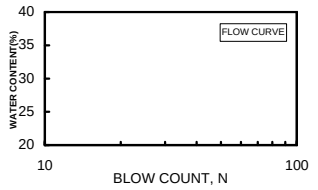
Sample Height (cm)	
Sample Diameter (cm)	
Wt. of Tube (g)	
Wt. of Wet Soil +Tube (g)	
Total Unit Weight (g/cc)	
Dry Unit Weight (g/cc)	

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.17	19.72
Wt. of Wet Soil + Can (g)	112.45	108.32
Wt. of Dry Soil + Can (g)	92.02	86.53
Water Content, w_c (%)	**28.0**	**32.6**

ATTERBERG LIMITS

w_p		w_l			



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	C
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	72.48
Temperature (deg. C)	21.2
Wt. of Water+Soil+Flask (g)	710.29
Wt. of Water + Flask (g)	665.08
Specific Gravity, Gs	**2.65**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 47.13

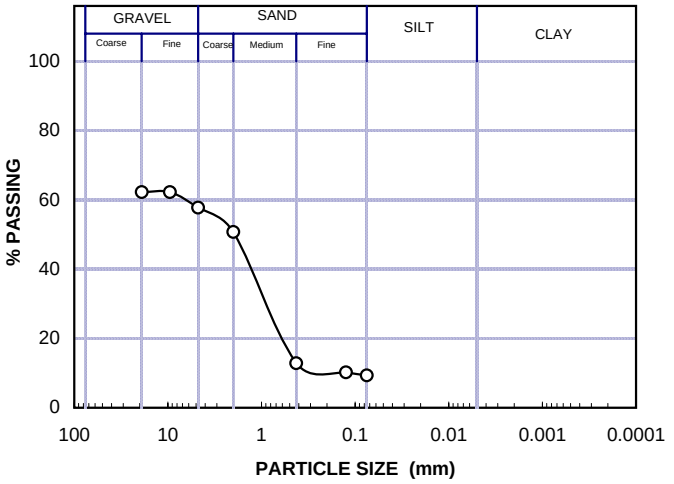
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	17.78	**62.3**
9.5	0.00	**62.3**
4.75	2.12	**57.8**
2.00	3.32	**50.7**
0.425	17.86	**12.8**
0.125	1.24	**10.2**
0.075	0.40	**9.4**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Shoreline of New Market	BH-M2	SS-3	5.00-5.45	Sandy SILT	54.6	-	NP	NP	NP	2.56	0	0	1	35	64

UNIT WEIGHT DETERMINATION

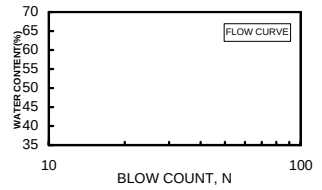
Sample Height (cm)	
Sample Diameter (cm)	
Wt. of Tube (g)	
Wt. of Wet Soil +Tube (g)	
Total Unit Weight (g/cc)	
Dry Unit Weight (g/cc)	

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.37	19.05
Wt. of Wet Soil + Can (g)	102.28	91.43
Wt. of Dry Soil + Can (g)	73.57	65.38
Water Content, w_c (%)	**53.0**	**56.2**

ATTERBERG LIMITS

w_p		w_l			



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	D
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	41.76
Temperature (deg. C)	22.0
Wt. of Water+Soil+Flask (g)	687.20
Wt. of Water + Flask (g)	661.73
Specific Gravity, Gs	**2.56**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 33.65

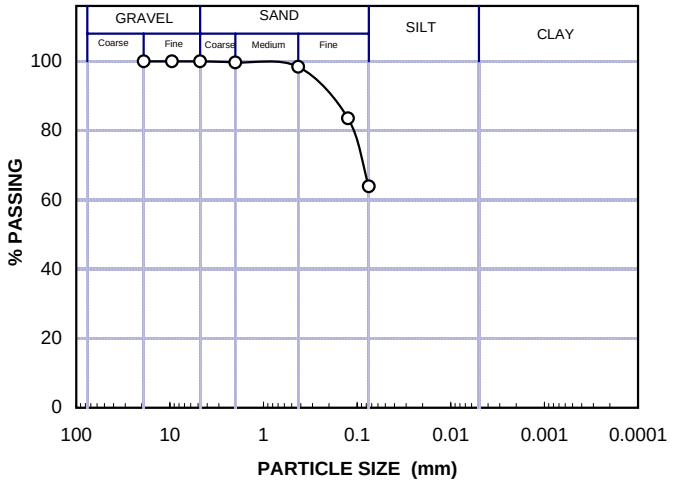
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.11	**99.7**
0.425	0.41	**98.5**
0.125	5.01	**83.6**
0.075	6.61	**63.9**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Shoreline of New Market	BH-M2	SS-6	9.00-9.45	SILT	67.4	1.59	NP	NP	NP	2.56	0	0	0	8	91

UNIT WEIGHT DETERMINATION

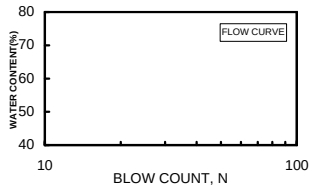
Sample Height (cm)	6.80
Sample Diameter (cm)	3.48
Wt. of Tube (g)	18.99
Wt. of Wet Soil +Tube (g)	122.03
Total Unit Weight (g/cc)	**1.59**
Dry Unit Weight (g/cc)	**0.95**

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	18.99	19.18
Wt. of Wet Soil + Can (g)	122.03	106.12
Wt. of Dry Soil + Can (g)	80.41	71.20
Water Content, w_c (%)	**67.8**	**67.1**

ATTERBERG LIMITS

	w_p		w_l			
Test Condition/Blows	Test 1	Test 2				
Wt. of Can (g)						
Wt. of Wet Soil + Can (g)						
Wt. of Dry Soil + Can (g)						
Water Content, w_c (%)						



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	E
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	61.53
Temperature (deg. C)	21.7
Wt. of Water+Soil+Flask (g)	701.57
Wt. of Water + Flask (g)	663.99
Specific Gravity, Gs	**2.56**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 30.47

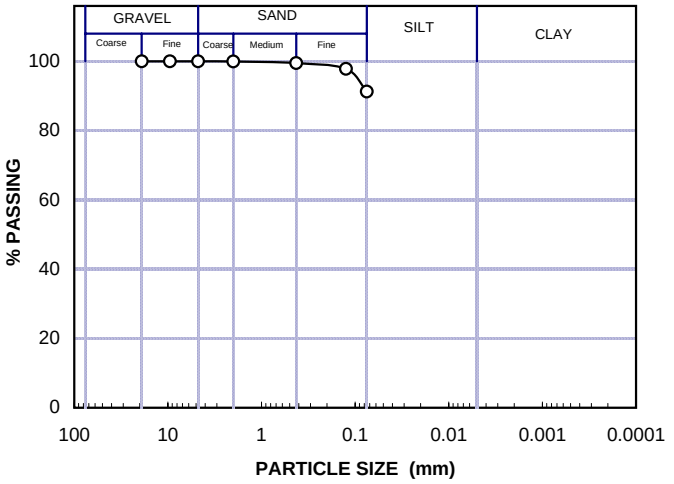
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.01	**100.0**
0.425	0.14	**99.5**
0.125	0.51	**97.8**
0.075	2.00	**91.3**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Shoreline of New Market	BH-M2	UD-1	14.00-15.00	SILT (MH)	64.3	1.57	87.1	40.4	46.7	2.55	5	1	1	6	87

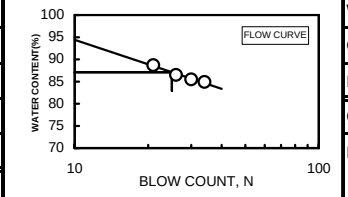
UNIT WEIGHT DETERMINATION

Sample Height (cm)	7.07
Sample Diameter (cm)	3.42
Wt. of Tube (g)	17.43
Wt. of Wet Soil +Tube (g)	119.77
Total Unit Weight (g/cc)	**1.57**
Dry Unit Weight (g/cc)	**0.96**

WATER CONTENT

	w_c		w_p		w_l			
Test Condition/Blows	A	B	Test 1	Test 2	34	30	26	21
Wt. of Can (g)	17.43	15.86	10.94	10.20	32.58	30.51	27.62	27.47
Wt. of Wet Soil + Can (g)	119.77	123.83	21.22	24.26	36.87	34.69	32.21	31.89
Wt. of Dry Soil + Can (g)	78.81	82.58	18.21	20.30	34.90	32.76	30.08	29.81
Water Content, w_c (%)	**66.7**	**61.8**	41.51	39.21	84.91	85.49	86.49	88.71

ATTERBERG LIMITS



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	E
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	104.78
Temperature (deg. C)	22.0
Wt. of Water+Soil+Flask (g)	727.72
Wt. of Water + Flask (g)	663.93
Specific Gravity, Gs	**2.55**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 61.40

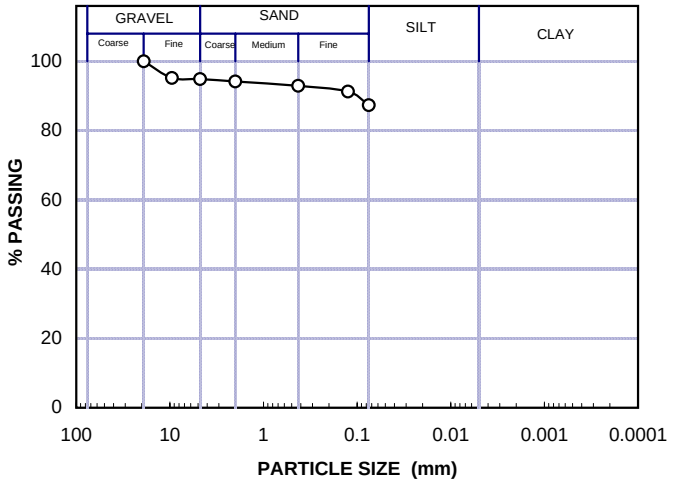
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	2.94	**95.2**
4.75	0.19	**94.9**
2.00	0.43	**94.2**
0.425	0.78	**92.9**
0.125	1.01	**91.3**
0.075	2.42	**87.3**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



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CONSOLIDATION TEST

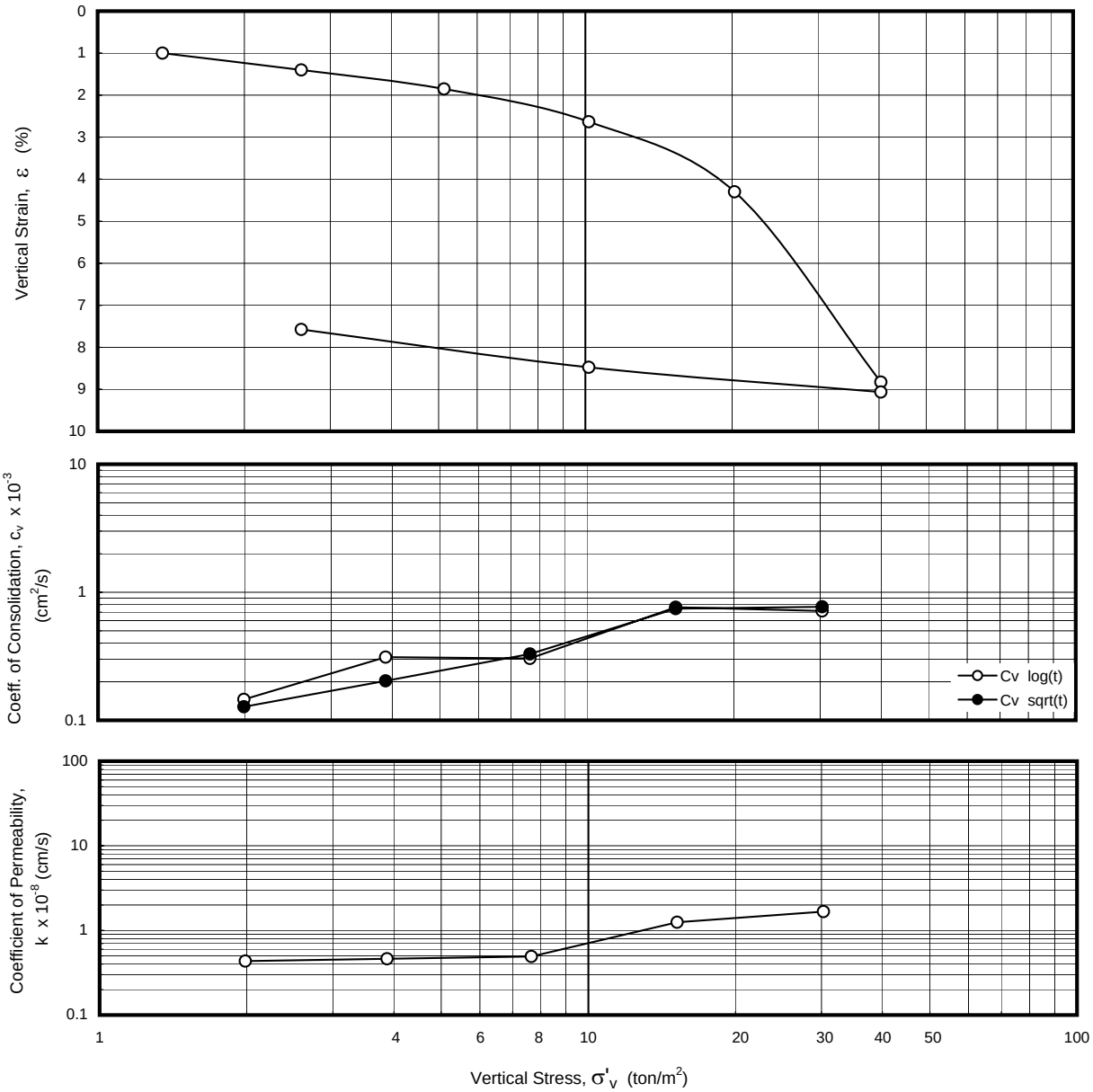
Project: New Auki Market & Jetty Renovation Location: Shoreline of New Market Tested by: MAAG

Borehole: BH-M2 Sample No: UD-1 Depth (m.): 14.00 - 15.00

Soil Description:			SILT		
Water Content, w_n	65.1	%	Liquid Limit, LL	87.11	%
Initial Void Ratio, e_0	1.722		Plasticity Index, PI	46.75	%
Total Unit Weight, γ_t	1.55	ton/m^3	Height of Solid, H_s	0.735	cm.
Specific Gravity, G_s	2.55		Preconsolidation Pressure, $\sigma_{c'}$	20.0	ton/m^2

Vertical Stress (ton/m^2)	Vertical Strain ε_{100} (%)	Vertical Strain ε_f (%)	Void ratio e_{100}	Void ratio e_f	Time t_{90} (min.)	Time t_{50} (min.)	Coefficient of Consolidation c_v x 10^{-3} (cm^2/sec) sqrt(t)	log(t)	Average	Permea. k x 10^{-8} (cm/sec)	Compres. Ratio CR
1.4	1.0	1.1	1.695	1.692							
2.6	1.4	1.5	1.684	1.681	108.2	22.0	0.1	0.1	0.1	0.4	0.014
5.1	1.9	1.9	1.671	1.670	67.2	10.2	0.2	0.3	0.3	0.5	0.015
10.2	2.6	2.8	1.650	1.646	41.0	10.3	0.3	0.3	0.3	0.5	0.026
20.2	4.3	4.5	1.605	1.600	17.6	4.0	0.7	0.8	0.8	1.2	0.056
40.4	8.8	9.1	1.481	1.475	16.0	4.0	0.8	0.7	0.7	1.7	0.151
10.2	8.5	8.4	1.491	1.493							0.006
2.6	7.6	7.5	1.516	1.516							0.015

Note: Compression Ratio = $\frac{\Delta\varepsilon}{\log(\sigma_2/\sigma_1)}$



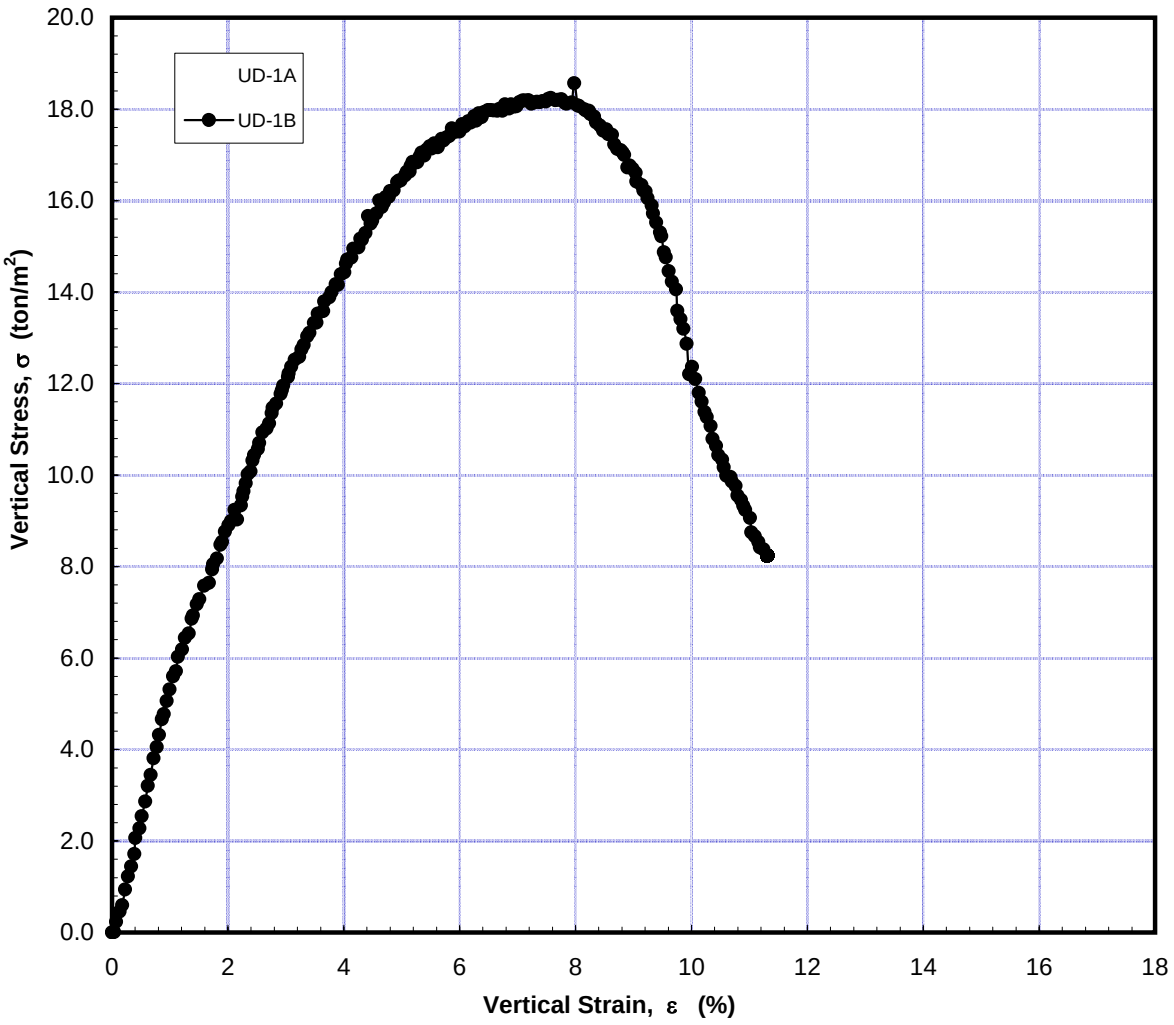
SIAM TONE

UNCONFINED COMPRESSION TEST

Project	New Auki Market and Jetty Renovation			Borehole No :	BH-M2
Location:	Shoreline of New Market			Sample No :	UD-1
Tested by:	MAAG	Date :	Mar 2007	Depth (m) :	14.00-15.00

Test Summary			
Soil Description:	SILT		
Test No.	UD-1A	UD-1B	
Water Content, w_n	66.7	61.8	%
Total Unit Weight, γ_t	1.51	1.59	ton/m^3
Unconfined Compressive Strength, q_u	Disturbed*	18.6	ton/m^2
Undrained Shear Strength, c_u		9.3	ton/m^2
Strain at Failure, ε_f		8.0	%
Modulus at 50% Stress Level, E_{50}		437	ton/m^2
Failure Mode			

Note: * insufficient soil for retest



SIAM TONE CO., LTD.

LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%) Coarse	Sand (%) Medium	Sand (%) Fine	Silt+Clay (%)
New Auki Market & Jetty Renovation	Shoreline of New Market	BH-M2	SS-11	18.00-18.45	SILT (MH)	69.2	-	60.1	36.8	23.3	2.54	0	0	1	9	90

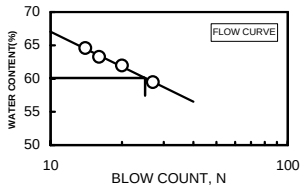
UNIT WEIGHT DETERMINATION

Sample Height (cm)	
Sample Diameter (cm)	
Wt. of Tube (g)	
Wt. of Wet Soil +Tube (g)	
Total Unit Weight (g/cc)	
Dry Unit Weight (g/cc)	

WATER CONTENT

	w_c		w_p		w_l			
Test Condition/Blows	A	B	Test 1	Test 2	27	20	16	14
Wt. of Can (g)	19.60	19.16	14.54	14.38	28.93	27.82	25.72	20.82
Wt. of Wet Soil + Can (g)	97.45	85.27	24.81	24.47	40.53	31.79	30.78	24.90
Wt. of Dry Soil + Can (g)	65.69	58.15	22.03	21.78	36.21	30.27	28.82	23.30
Water Content, w_c (%)	**68.9**	**69.6**	37.23	36.33	59.45	61.97	63.27	64.58

ATTERBERG LIMITS



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	G
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	42.33
Temperature (deg. C)	22.0
Wt. of Water+Soil+Flask (g)	686.52
Wt. of Water + Flask (g)	660.85
Specific Gravity, Gs	**2.54**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 29.96

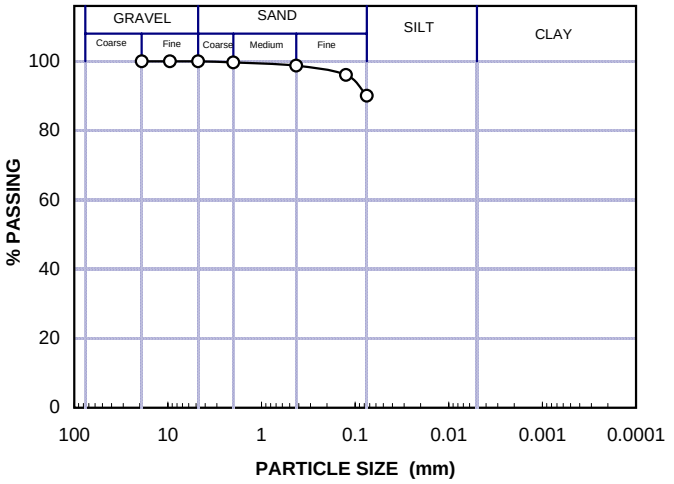
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.10	**99.7**
0.425	0.27	**98.8**
0.125	0.80	**96.1**
0.075	1.80	**90.1**

HYDROMETER ANALYSIS (GRAIN SIZE)

Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

GRAIN SIZE DISTRIBUTION



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LABORATORY TESTING

SUMMARY OF LABORATORY TESTS

Project	Location	Borehole No.	Sample No.	Depth (m)	Soil Description	Water Content (%)	Total Unit Weight (t/m^3)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Specific Gravity	Gravel (%)	Sand (%)			Silt+Clay (%)
													Coarse	Medium	Fine	
New Auki Market & Jetty Renovation	Shoreline of New Market	BH-M2	SS-14	22.50-22.95	SILT with sand	67.0	-	NP	NP	NP	2.54	0	0	2	16	82

UNIT WEIGHT DETERMINATION

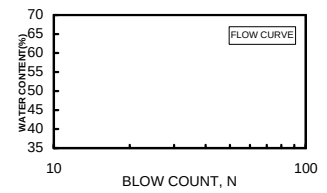
Sample Height (cm)	
Sample Diameter (cm)	
Wt. of Tube (g)	
Wt. of Wet Soil +Tube (g)	
Total Unit Weight (g/cc)	
Dry Unit Weight (g/cc)	

WATER CONTENT

	w_c	
Test Condition/Blows	A	B
Wt. of Can (g)	19.53	19.68
Wt. of Wet Soil + Can (g)	111.93	100.61
Wt. of Dry Soil + Can (g)	75.20	67.87
Water Content, w_c (%)	**66.0**	**67.9**

ATTERBERG LIMITS

w_p		w_l			
Test 1	Test 2				



ORGANIC CONTENT

Wt. of Dish (g)	
Oven-Dried soil + Dish (g)	
Fired Soil + Dish (g)	
Organic Content, (%)	

Note: Fired Soil at 440 deg. C to burn off organic matters

SPECIFIC GRAVITY

Flask No.	C
Wt. of Tin (g)	
Wt. of Tin + Dry Soil (g)	37.42
Temperature (deg. C)	21.0
Wt. of Water+Soil+Flask (g)	687.82
Wt. of Water + Flask (g)	665.12
Specific Gravity, Gs	**2.54**

WET SIEVE ANALYSIS

Wt. of Dry Soil (g) 33.97

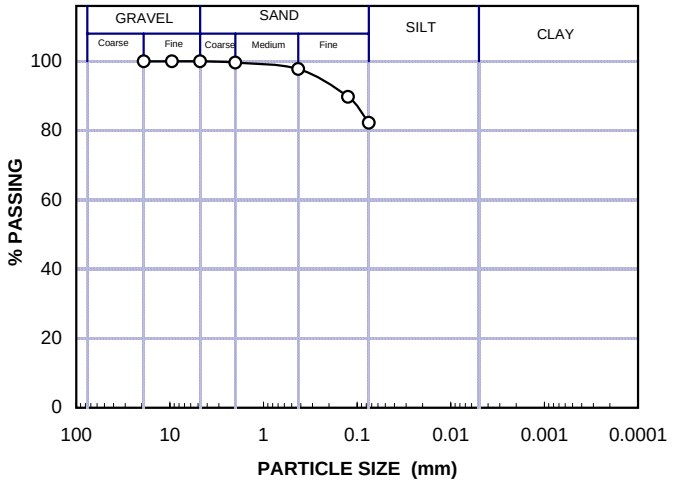
Particle Size (mm)	Soil Retained (g)	% Passing
19.0	0.00	**100.0**
9.5	0.00	**100.0**
4.75	0.00	**100.0**
2.00	0.13	**99.6**
0.425	0.62	**97.8**
0.125	2.73	**89.8**
0.075	2.54	**82.3**

HYDROMETER ANALYSIS (GRAIN SIZE)

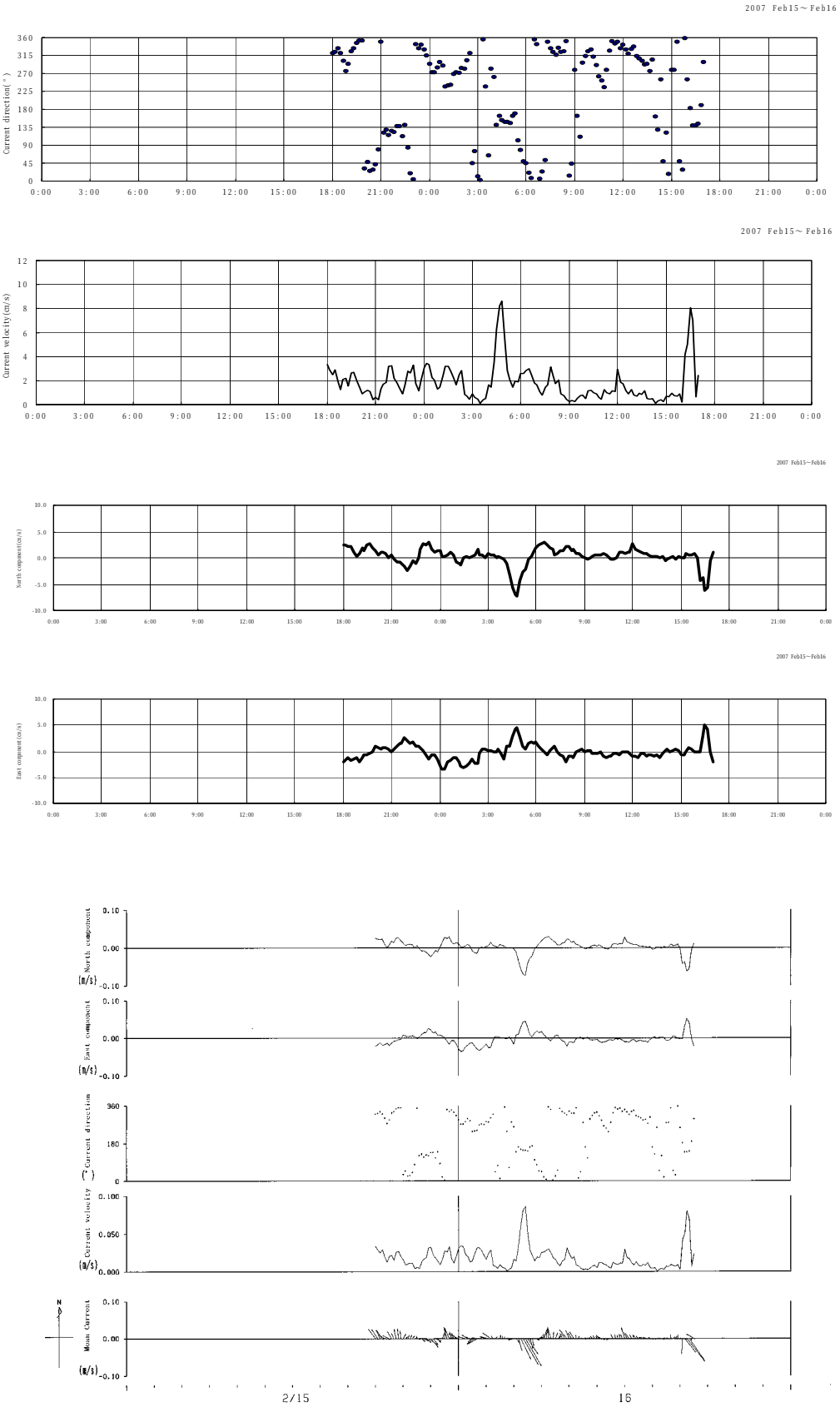
Wt. of Dry Soil (g)

Elapsed Time (min)	R= 1000(r-1)	R_w= 1000(r_w-1)	Temp (C)	G_w (g/cc)	M (gs/cm^2)	Z_r (cm)	Diameter D (mm)	% Finer

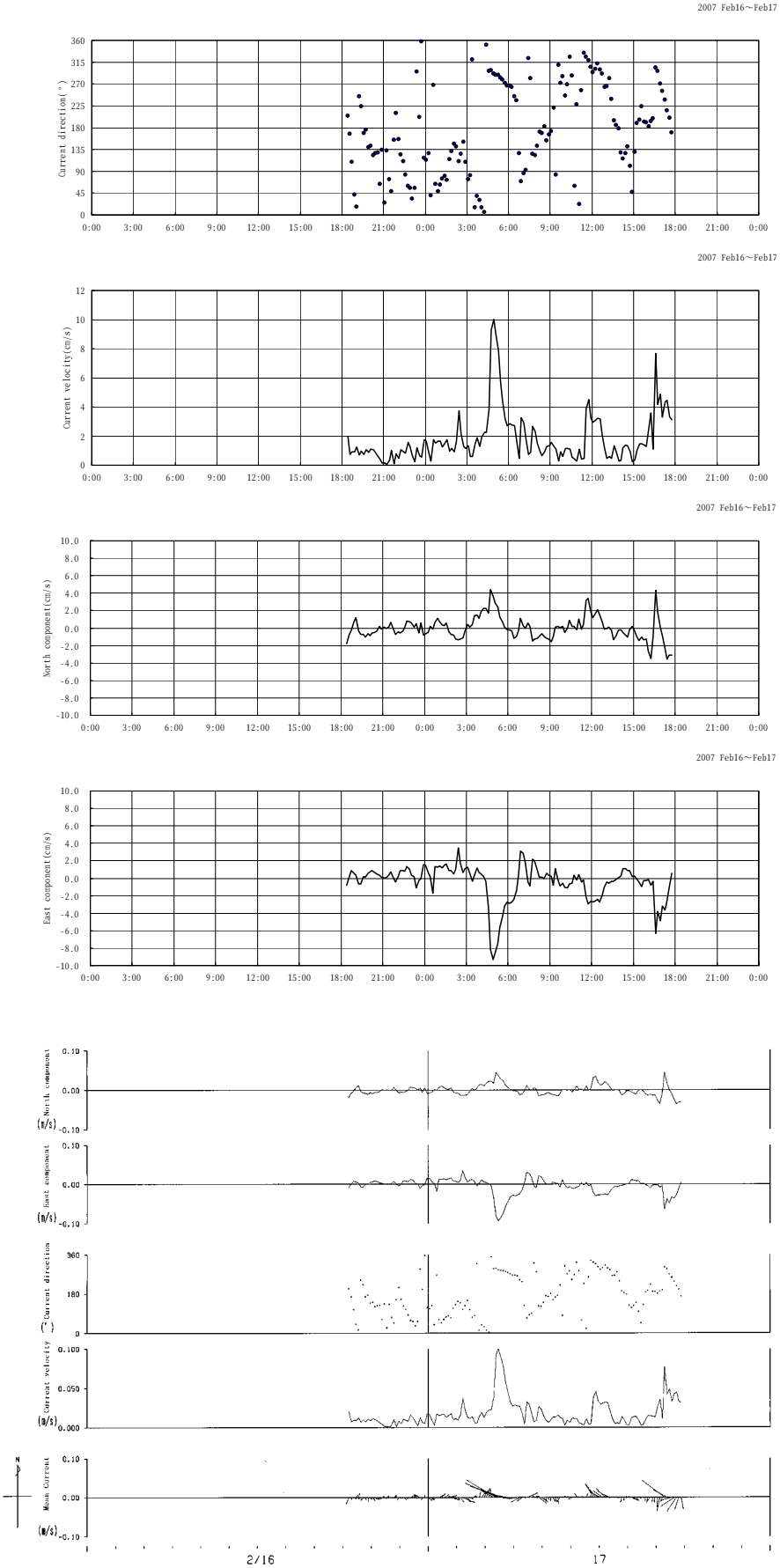
GRAIN SIZE DISTRIBUTION



CT-1: Upper Stratum 18h00m 15.02.2007～18h00m 16.02.2007



CT-2: Medium Stratum 18h00m 16.02.2007～18h00m 17.02.2007



Testing Item : Temperature, pH, COD (Chemical Oxygen Demand), Coliform

Methodology : Temperature : Digital thermometer

pH : Digital pH meter

COD : PAC conventional test

Coliform : SanColi conventional test paper

Results: **< 1st @ Low Tide >**

Sampling Day : Feb. 13. 2007 at Low Tide

Sampling Stations : 4 stations (WS-1～WS-4)

*See Annex 5-2-1 Natural Condition Survey Area and Station.

Table-1: Test Results of 1st Samples

Item / Sample	Temp. (℃)	pH	COD (mg/L)	Coliform (MPN/100ml)
WS-1	29.5	7.7	13.0	14.0×10^2
WS-2	29.5	7.7	50.0	10.0×10^2
WS-3	29.5	7.7	13.0	30.0×10^2
WS-4	29.5	7.7	10.0	11.0×10^2

< 2nd @ High Tide >

Sampling Day : Feb. 16. 2007 at High Tide

Sampling Stations : 7 stations (WS-1～WS-7)

*See Annex 5-2-1 Natural Condition Survey Area and Station.

Table-2: Test Results of 2nd Samples

Item / Sample	Temp. (℃)	pH	COD (mg/L)	Coliform (MPN/100ml)
WS-1	31.5	8.0	5.0	10.0×10^2
WS-2	31.5	8.1	5.0	5.0×10^2
WS-3	31.5	7.8	10.0	4.0×10^2
WS-4	31.5	7.9	5.0	12.0×10^2
WS-5	31.5	7.8	10.0	8.0×10^2
WS-6	31.5	8.0	5.0	4.0×10^2
WS-7	30.5	7.9	5.0	$13.\times10^2$

Table-3: Allowable Limit for Water Quality according to Japanese Relevant Standards

Item / Sample	pH	COD	Coliform
1) Basic Environment Low Water Quality Standard for Public water Environment Conservation (Type C)	7.0 ≦ ≦ 8.3	≦ 8mg／L	—
2) Water Works Low Water Quality Standard	—	—	Not detected