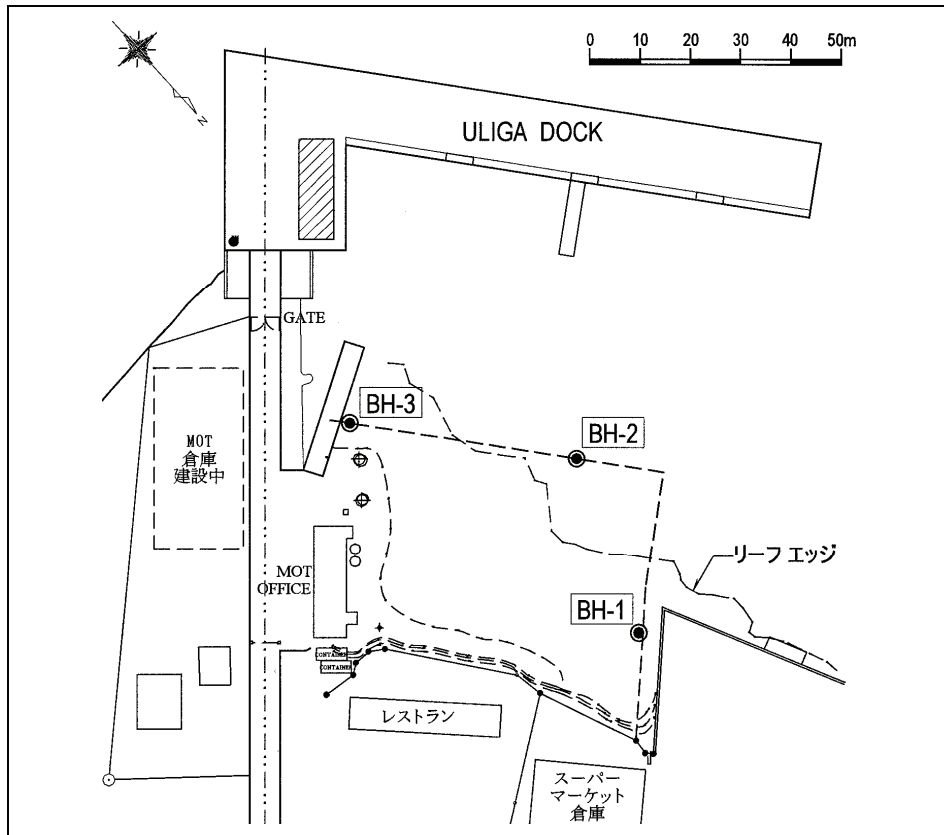


8-2 地盤調査結果



ボーリング位置図

BORING NO. 1									
Notes:									
<input type="checkbox"/> Undisturbed Sample SPT = Standard Penetration Test DATE July 26, 2008 <input type="checkbox"/> Disturbed/Bulk Sample based on 63.5 kgs (140 lbs) EQUIPMENT Skid-Mounted Portable Auger <input type="checkbox"/> No Recovery free falling 76 cm (30 in.)/blow ELEVATION									
DEPTH (FT.)	DEPTH (M)	DESCRIPTION	GRAPHIC LOG	SAMPLE TYPE	DRILL RATE (cm/min)	SPT (blows/30 cm)	MOISTURE CONTENT, %	DRY DENSITY, g/cc	LABORATORY TESTS
0	0	Water depth at 13 cm above sea floor, 3:15 pm, 7/26/08							
1	1	LIGHT BROWN-WHITE CORAL GRAVEL AND COBBLES (GP) - hard, saturated				15/0			
2	2	LIGHT BROWN-WHITE SILTY SAND (SM) - medium dense, saturated				21			
3	3								
4	4	light grey-white, dense from 3.5 m, with shell fragments				34			SA
5	5								
6	6	medium dense from 5.5 m				29			SA
7	7	LIGHT GREY-WHITE SILTY SANDY GRAVEL (GM) - medium dense, saturated, with some cobbles				25	24.0	1.47	SA Gs=2.675
8	8	LIGHT GREY-WHITE SILTY GRAVELLY SAND (SM) - loose, saturated				6			
9	9	Encountered cavity from 9.1 m - 9.6 m				7			SA Gs=2.730
10	10								
35	35								

LOG OF BORING 1
Fish Market Center
Majuro Atoll
The Marshall Island

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Material Testing Engineers

Job No. 358.03 Date 08/26/08

PLATE 2

BORING NO. 1									
Notes:									
<input type="checkbox"/> Undisturbed Sample SPT = Standard Penetration Test DATE July 26, 2008 <input type="checkbox"/> Disturbed/Bulk Sample based on 63.5 kgs (140 lbs) EQUIPMENT Skid-Mounted Portable Auger <input type="checkbox"/> No Recovery free falling 76 cm (30 in.)/blow ELEVATION									
DEPTH (FT.)	DEPTH (M)	DESCRIPTION	GRAPHIC LOG	SAMPLE TYPE	DRILL RATE (cm/min)	SPT (blows/30 cm)	MOISTURE CONTENT, %	DRY DENSITY, g/cc	LABORATORY TESTS
11	11	LIGHT BROWN-WHITE SANDY CORAL FINGERS (GP) - medium dense, saturated				7	28.7		Gs=2.579
12	12	(Bottom of borehole = 12.8 m)				18			

LOG OF BORING 1 (continued)

Fish Market Center
Majuro Atoll
The Marshall Island

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Material Testing Engineers

Job No. 358.03 Date 08/26/08

PLATE 2 (cont'd)

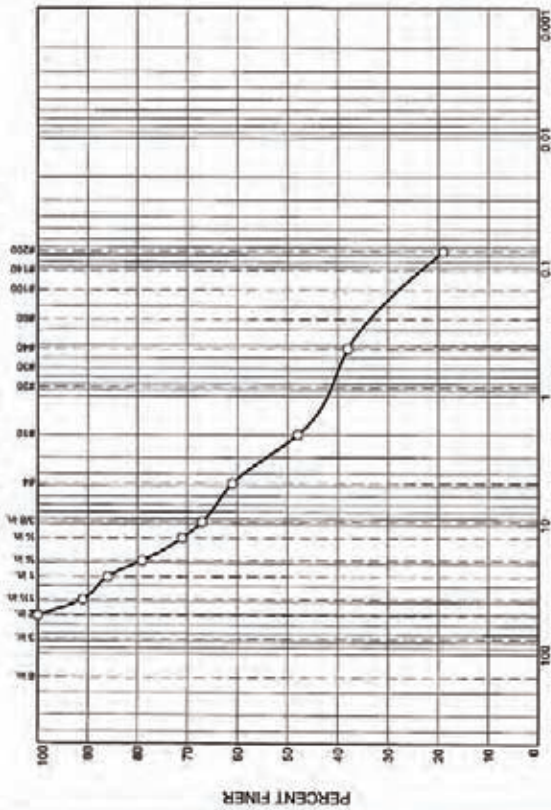
BORING NO. 2									
Notes:									
Undisturbed Sample SPT = Standard Penetration Test DATE July 29, 2008									
Disturbed/Blank Sample based on 63.5 kgs (140 lbs) EQUIPMENT Skid-Mounted Portable Auger									
No Recovery free falling 76 cm (30 in.)/blow ELEVATION									
DEPTH (FT.)	DEPTH (M)	DESCRIPTION	GRAINED LOG	CLAYLINE TYPE	DRILL RATE (min/ft)	SPT (blows/30 cm)	MOISTURE CONTENT, %	DRY DENSITY, g/cc	LABORATORY TESTS
35	11	(Bottom of borehole at 11.3 m)				20			
GEO-ENGINEERING & TESTING, INC. Geotechnical & Material Testing Engineers									
LOG OF BORING 2 (continued) Fish Market Center Majuro Atoll The Marshall Island									
Job No. 358.03 Date 08/26/08									
PLATE 3 (cont'd)									

BORING NO. 2									
Notes:									
Undisturbed Sample SPT = Standard Penetration Test DATE July 29, 2008									
Disturbed/Blank Sample based on 63.5 kgs (140 lbs) EQUIPMENT Skid-Mounted Portable Auger									
No Recovery free falling 76 cm (30 in.)/blow ELEVATION									
DEPTH (FT.)	DEPTH (M)	DESCRIPTION	GRAINED LOG	CLAYLINE TYPE	DRILL RATE (min/ft)	SPT (blows/30 cm)	MOISTURE CONTENT, %	DRY DENSITY, g/cc	LABORATORY TESTS
0	0	(water depth at 0.8 m, 4300 psi, 07/30/08 above sea bed)							
5	1	LIGHT BROWN-WHITE SILTY SAND (SM) - medium dense, saturated light grey-white, loose, with coral cobbles from 0.8 m				5			
10	2	light brown-white, medium dense, with shell fragments from 2.2 m				14			Gs=2.651
15	4					28			
20	5	LIGHT GREY-WHITE CORAL FINGERS AND COBBLES (GP) - hard, saturated				100			
25	6					58/15			
30	8	LIGHT GREY-WHITE SILTY GRAVELLY SAND (SM) - very dense, saturated medium dense from 8.8 m				56	28.0	1.54	SA Gs=2.713
35	10					20			Gs=2.631
GEO-ENGINEERING & TESTING, INC. Geotechnical & Material Testing Engineers									
LOG OF BORING 2 Fish Market Center Majuro Atoll The Marshall Island									
Job No. 358.03 Date 08/26/08									
PLATE 3									

BORING NO. 3									
Notes: <input type="checkbox"/> Undisturbed Sample SPT = Standard Penetration Test DATE July 29, 2008 <input type="checkbox"/> Disturbed/Bulk Sample based on 63.5 kgs (140 lbs) EQUIPMENT Skid-Mounted Portable Auger <input type="checkbox"/> No Recovery free falling 76 cm (30 in.)/blow ELEVATION --									
DEPTH (FT.)	DEPTH (M.)	DESCRIPTION	GRAPHIC LOG	SOIL TYPE	DRILL RATE (feet/min)	SPT (blows/30 cm)	MOISTURE CONTENT, %	DRY DENSITY, g/cc	LABORATORY TESTS
0	0								
1	1	(Water depth at 5.5 cm, 2:00 pm, 07/24/08) LIGHT BROWN-WHITE SANDY CORAL GRAVEL AND COBBLES (GP) - loose to medium dense, saturated, with boulders, concrete fragments, rebars on surface				19			
2	2	(Note: Lost drilling water circulation at 1.7 m - 1.8 m)							
3	3					55/6			SA
4	4	loose from 4.2 m				49			SA
5	5	medium dense from 5.1 m				23			
6	6					24			
7	7					22			
8	8								
9	9								
10	10					17			Gs=2.357
Bottom of hole at 10.7 m									
GEO-ENGINEERING & TESTING, INC. Geotechnical & Material Testing Engineers Fish Market Center Majuro Atoll The Marshall Island									
Job No. 358.03 Date 08/26/08									

MAJOR DIVISIONS			SYMBOL	TYPICAL NAMES
GRAVELS <small>MORE THAN HALF COARSE FRACTIONS LARGER THAN NO. 10 SIEVE</small>	LEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRAINED GRAVELS, SAND MIXTURES	
	POORLY GRAINED GRAVELS, SAND MIXTURES	GP	POORLY GRAINED GRAVELS, SAND MIXTURES	
	SANDS WITH OVER 10% FINES	GM	SILTY GRAVELS, POORLY GRAINED GRAVELS	
	CLAYS WITH OVER 10% FINES	GC	CLAYEY GRAVELS, POORLY GRAINED GRAVELS - SANDS - CLAY MIXTURES	
SANDS <small>MUCH THINNER THAN COARSE FRACTIONS SMALLER THAN NO. 10 SIEVE</small>	LEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRAINED SANDS, GRAVELLY SANDS	
	SANDS WITH OVER 10% FINES	SP	POORLY GRAINED SANDS, GRAVELLY SANDS	
	SANDS WITH OVER 10% FINES	SM	SILTY SANDS, POORLY GRAINED SANDS - SILT MIXTURES	
FINE GRAINED SOILS <small>MORE THAN HALF IS SMALLER THAN # 20 SIEVE</small>	SILTS AND CLAYS <small>LIQUID LIMIT LESS THAN 19</small>	ML	CLAYEY SANDS, POORLY GRAINED SAND - CLAY MIXTURES	
		CL	CLAYS WITH SLIGHT PLASTICITY	
	SILTS AND CLAYS <small>LIQUID LIMIT GREATER THAN 19</small>	OL	ORGANIC SILTS AND VERY FINE GRAINED TOP SOILS WITH SLIGHT PLASTICITY OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
		MH	INORGANIC SILTS, MICROCLAYS OR BENTONITIC SILTY SANDS OR SILTY SOILS, ELASTIC SILTS OF LOW PLASTICITY	
HIGHLY ORGANIC SOILS	CH	ORGANIC SILTS AND CLAYS		
	OH	ORGANIC SILTS, MICROCLAYS OR BENTONITIC SILTY SANDS OR SILTY SOILS, ELASTIC SILTS OF HIGH PLASTICITY		
	PH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
UNIFIED SOIL CLASSIFICATION SYSTEM KEY TO TEST DATA SA = Sieve Analysis Consol = Consolidation <input checked="" type="checkbox"/> = Bulk Sample <input type="checkbox"/> = "Undisturbed" Sample				
GEO-ENGINEERING & TESTING, INC. Geotechnical & Material Testing Engineers Fish Market Center MAJURO ATOLL				SOIL CLASSIFICATION CHART AND KEY TO TEST DATA FISH MARKET CENTER MAJURO ATOLL
Job No. 358.03 Appr. LIS/ Date: 09/1/08				PLATE 5

Particle Size Distribution Report



%	% Gravel			% Sand			% Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Silt	Clay	Total
0	21	18	39	13	10	19	19	19	38

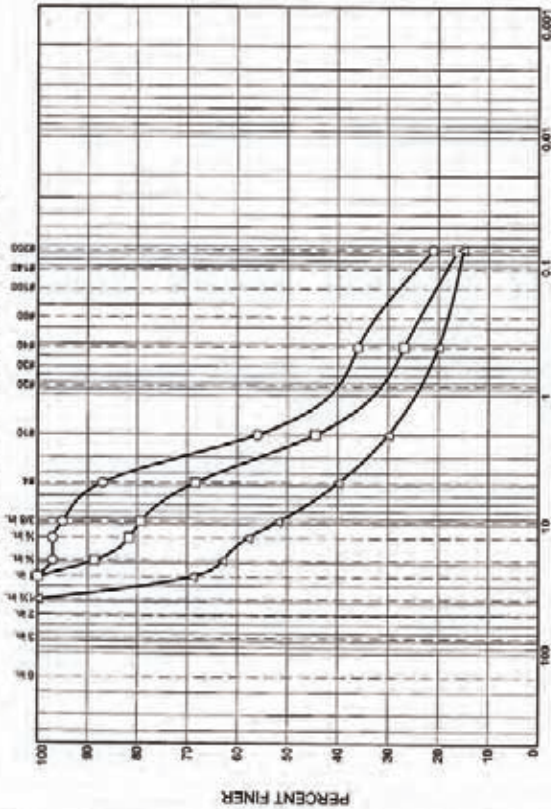
SOIL DATA				
SYMBOL	SOURCE	DEPTH (ft.)	Material Description	AASHTO
0	1	5.2 m	LIGHT GREY-WHITE SILTY SAND	SM

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Materials Testing Engineers

Client: Fisheries Engineering Company, Ltd.
Project: Fish Market Center
Majuro Atoll

Project No.: 358.03

Particle Size Distribution Report



%	% Gravel			% Sand			% Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Silt	Clay	Total
0	3	10	13	31	20	15	21	21	42
0	11	21	32	24	17	11	16	16	32
0	37	23	60	10	10	5	15	15	25

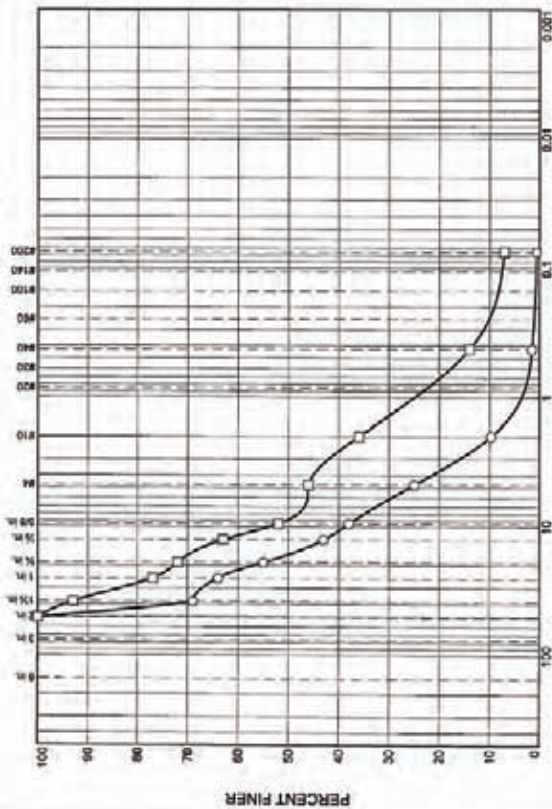
SOIL DATA				
SYMBOL	SOURCE	DEPTH (ft.)	Material Description	AASHTO
0	1	9.1 m	LIGHT GREY-WHITE SILTY GRAVELLY SAND	SM
0	1	3.8 m	LIGHT GREY-WHITE SILTY SAND	SM
Δ	1	6.8 m	LIGHT GREY-WHITE SILTY SANDY GRAVEL	GM

GEO-ENGINEERING & TESTING, INC.
Geotechnical & Materials Testing Engineers

Client: Fisheries Engineering Company, Ltd.
Project: Fish Market Center
Majuro Atoll

Project No.: 358.03

Particle Size Distribution Report



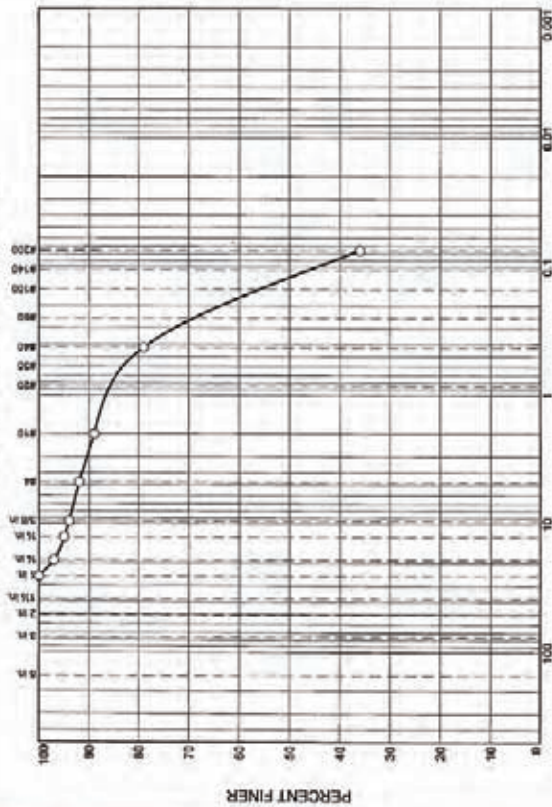
% +3"		% Gravel					% Sand					% Fines		
Symbol	Source	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay						
○	3	45	30	15	8	1	1	7						
□	3	28	26	10	22	7								

SOIL DATA			Material Description		AASHTO
Symbol	Source	DEPTH (ft.)			
○	3	4.2m	LIGHT BROWN-WHITE SANDY CORAL GRAVEL AND COBBLES		GP
□	3	2.5m	LIGHT BROWN-WHITE SANDY CORAL GRAVEL AND COBBLES		GP

Client: Fisheries Engineering Company, Ltd.
 Project: Fish Market Center
 Majauro Atoll
 Project No.: 358.03

GEO-ENGINEERING & TESTING, INC.
 Geotechnical & Materials Testing Engineers

Particle Size Distribution Report

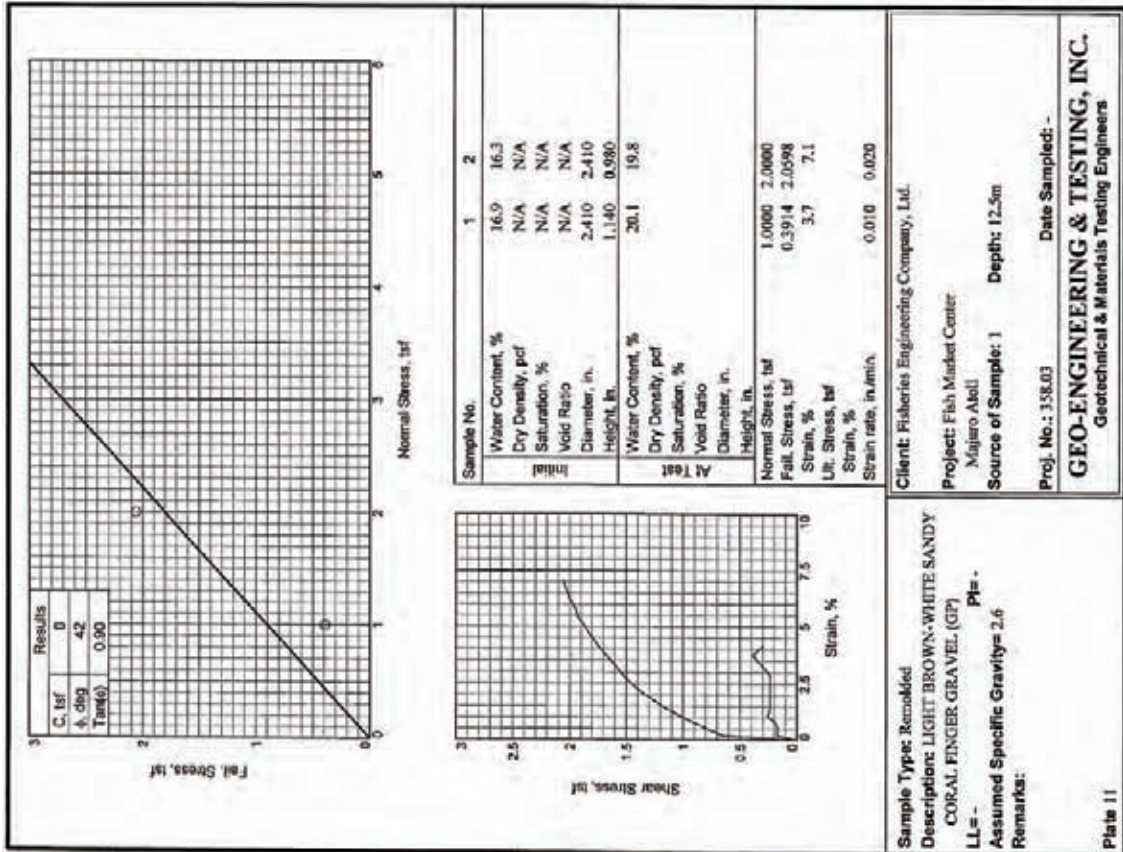


% +3"		% Gravel					% Sand					% Fines		
Symbol	Source	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay						
○	2	3	5	3	10	43	36	3						

SOIL DATA			Material Description		AASHTO
Symbol	Source	DEPTH (ft.)			
○	2	5.5m	LIGHT GREY-WHITE GRAVELLY SILTY SAND		SM

Client: Fisheries Engineering Company, Ltd.
 Project: Fish Market Center
 Majauro Atoll
 Project No.: 358.03

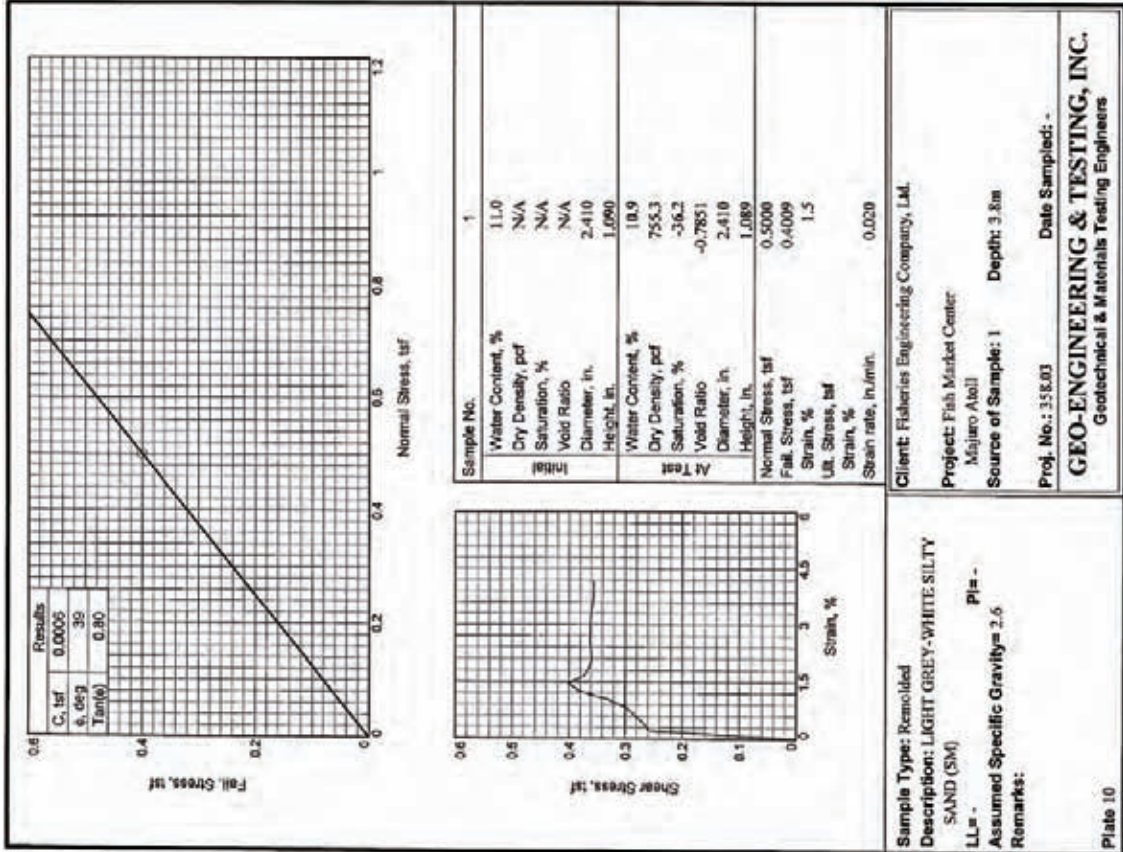
GEO-ENGINEERING & TESTING, INC.
 Geotechnical & Materials Testing Engineers



Sample Type: Remolded
Description: LIGHT BROWN-WHITE SANDY CORAL-FINGER GRAVEL (GP)
LL = -
Assumed Specific Gravity = 2.6
Remarks:

Client: Fisheries Engineering Company, Ltd.
Project: Fish Market Center
 Majaro Abell
Source of Sample: 1 **Depth:** 12.5m
Proj. No.: 358.03 **Date Sampled:** -
GEO-ENGINEERING & TESTING, INC.
 Geotechnical & Materials Testing Engineers

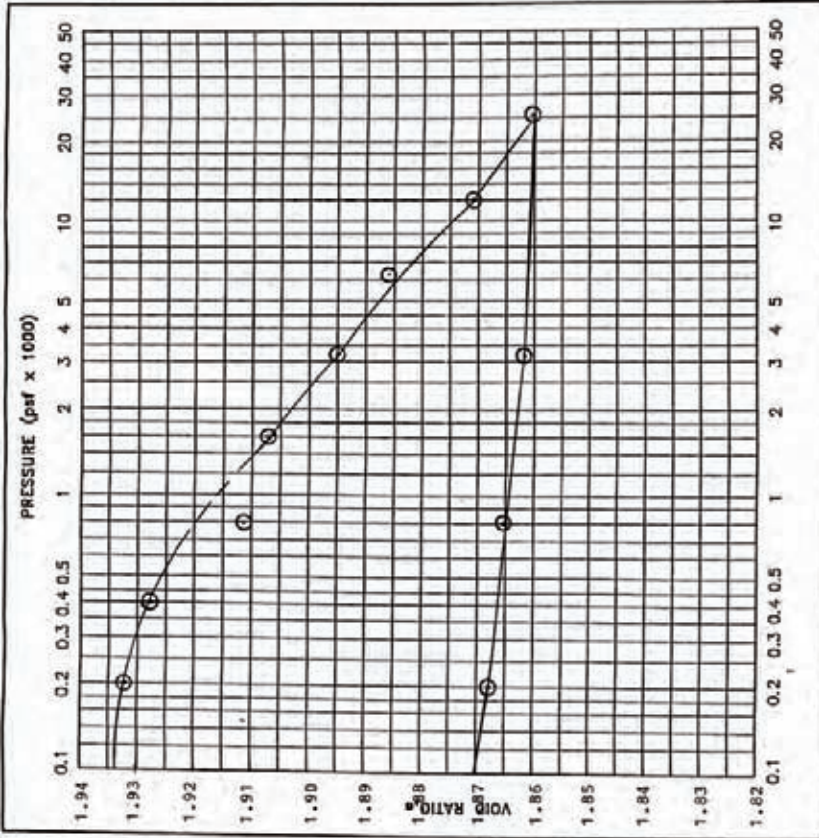
Plate 11



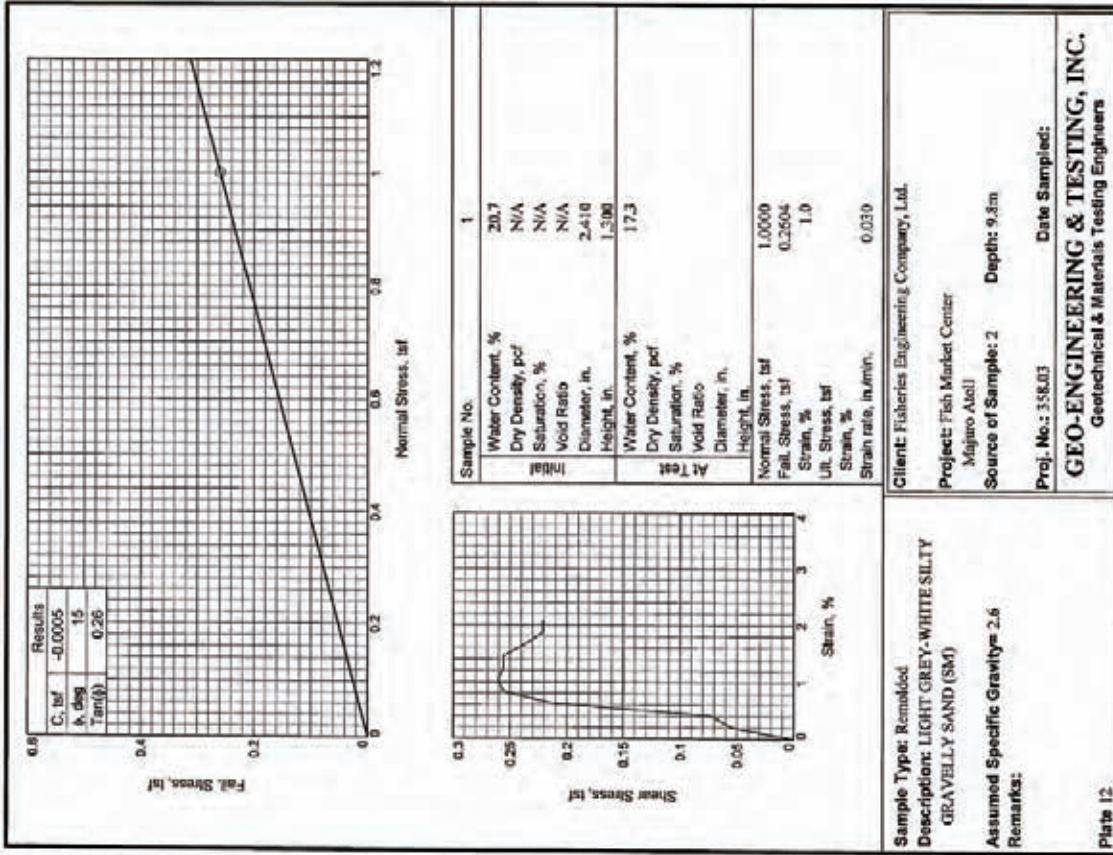
Sample Type: Remolded
Description: LIGHT GREY-WHITE SILTY SAND (SM)
LL = -
Assumed Specific Gravity = 2.6
Remarks:

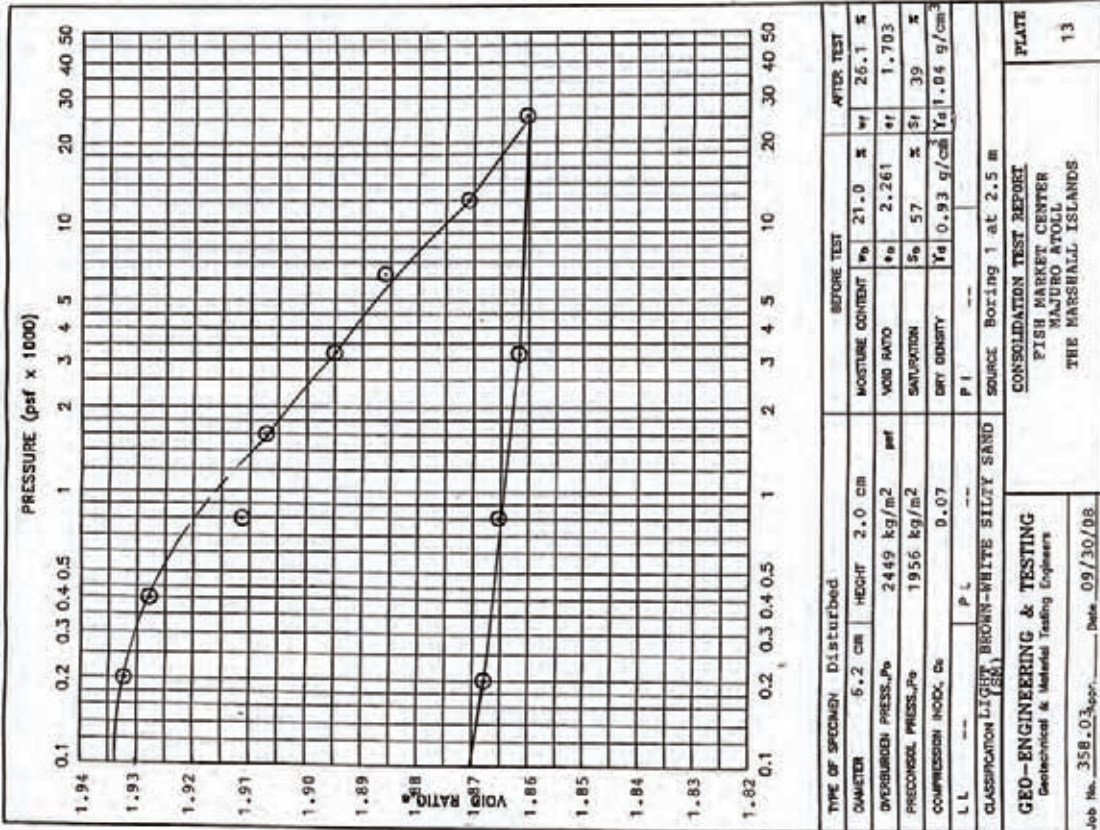
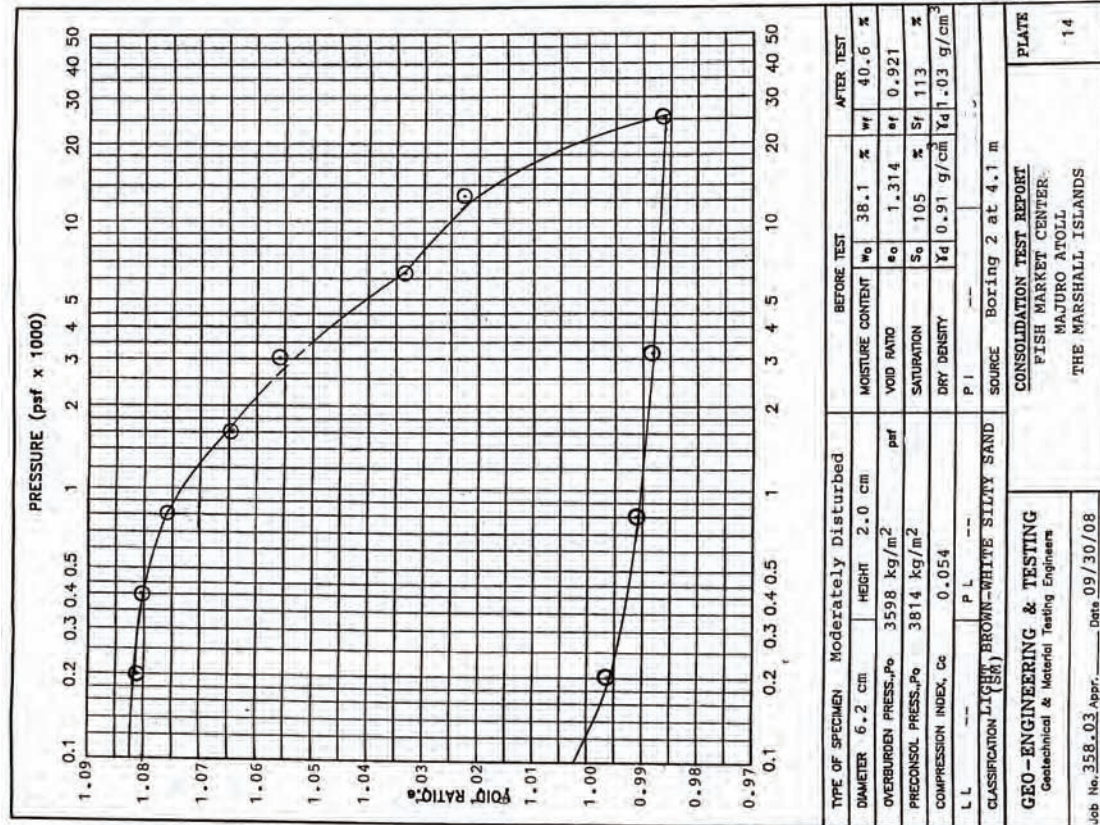
Client: Fisheries Engineering Company, Ltd.
Project: Fish Market Center
 Majaro Abell
Source of Sample: 1 **Depth:** 3.8m
Proj. No.: 358.03 **Date Sampled:** -
GEO-ENGINEERING & TESTING, INC.
 Geotechnical & Materials Testing Engineers

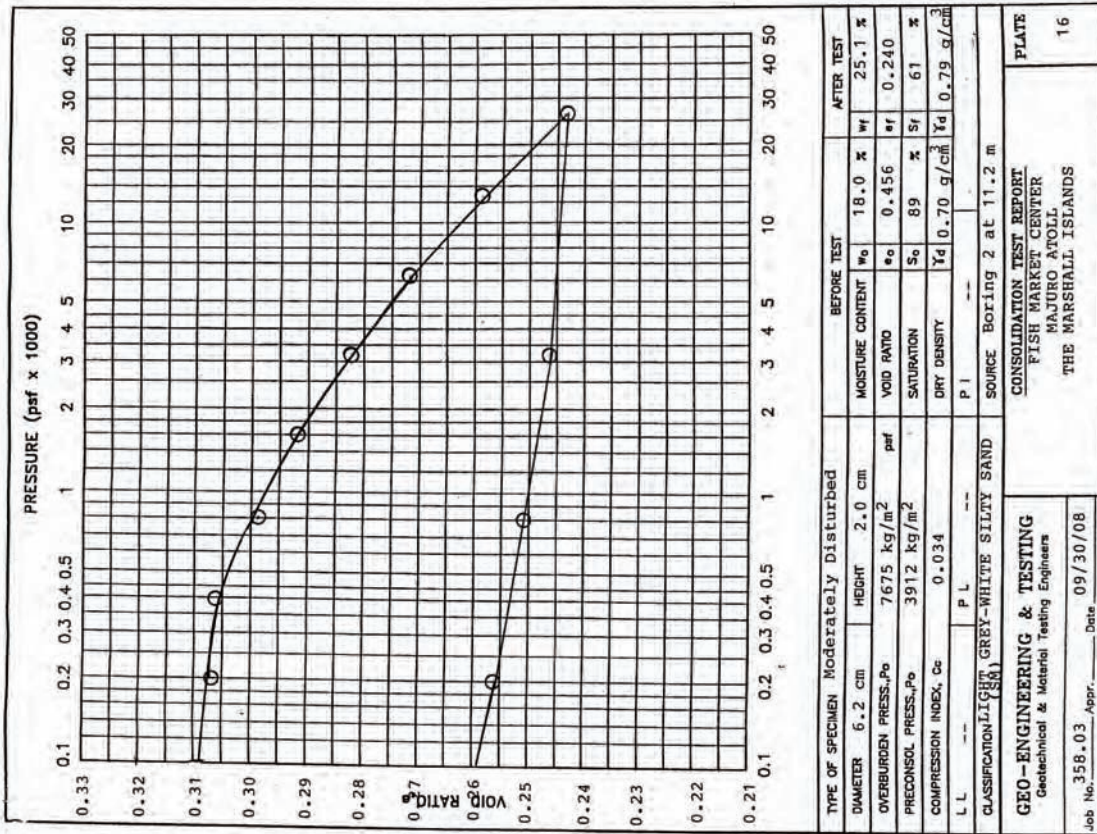
Plate 10



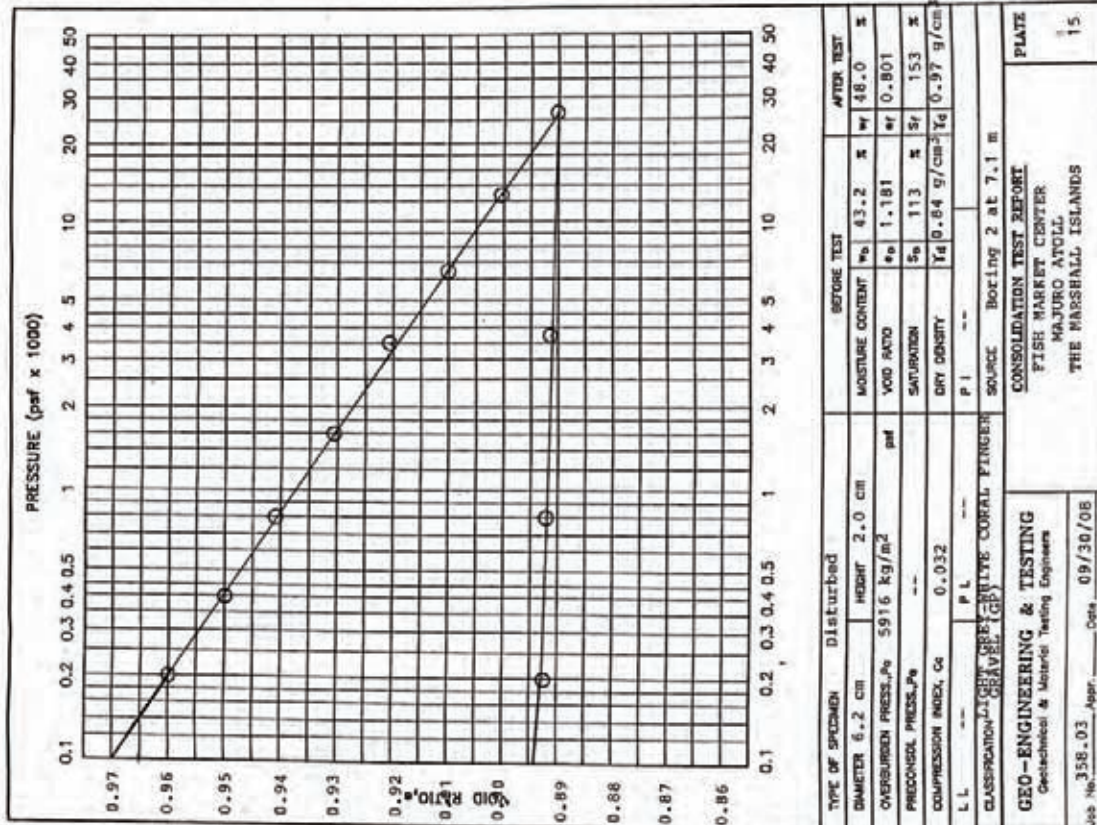
TYPE OF SPECIMEN		BEFORE TEST		AFTER TEST	
DIAMETER	6.2 cm	MOISTURE CONTENT %	21.0	w	26.1
OVERBURDEN PRESS. psf	2419 kg/m ²	VOID RATIO	e ₀ 2.261	e _f	1.703
PRECONSDL PRESS. psf	1956 kg/m ²	SATURATION	S _c 57	S _f	39
COMPRESSION INDEX, C _c	0.07	DRY DENSITY	γ _d 0.93 g/cm ³	γ _d	1.04 g/cm ³
L.L.	---	P.L.	---		
CLASSIFICATION LIGHT BROWN-WHITE SILTY SAND					
SOURCE Boring 1 at 2.5 m					
GEO-ENGINEERING & TESTING Geotechnical & Material Testing Engineers			CONSOLIDATION TEST REPORT FISH MARKET CENTER MAJURO ATOLL THE MARSHALL ISLANDS		
Job No. 356.03 _{app.} Date 09/30/08			PLATE 13		







TYPE OF SPECIMEN		BEFORE TEST		AFTER TEST	
DIAMETER	6.2 cm	HEIGHT	2.0 cm	MOISTURE CONTENT	18.0 %
OVERBURDEN PRESS., P _o	7675 kg/m ²	VOID RATIO	0.456	w _f	25.1 %
PRECONSOL. PRESS., P _o	3912 kg/m ²	SATURATION	89 %	e _r	0.240
COMPRESSION INDEX, C _c	0.034	DRY DENSITY	γ _d 0.70 g/cm ³	S _r	61 %
LL	--	PI	--	γ _d	0.79 g/cm ³
CLASSIFICATION: LIGHT GREY-WHITE SILTY SAND					
SOURCE: Boring 2 at 11.2 m					
GEO-ENGINEERING & TESTING					
Geotechnical & Material Testing Engineers					
FISH MARKET CENTER					
MAJURO ATOLL					
THE MARSHALL ISLANDS					
Job No.	358.03	Appr.	Date	09/30/08	
					PLATE
					16



TYPE OF SPECIMEN		BEFORE TEST		AFTER TEST	
DIAMETER	6.2 cm	HEIGHT	2.0 cm	MOISTURE CONTENT	43.2 %
OVERBURDEN PRESS., P _o	5916 kg/m ²	VOID RATIO	1.181	w _f	48.0 %
PRECONSOL. PRESS., P _o	--	SATURATION	113 %	e _r	0.801
COMPRESSION INDEX, C _c	0.032	DRY DENSITY	γ _d 0.84 g/cm ³	S _r	153 %
LL	--	PI	--	γ _d	0.97 g/cm ³
CLASSIFICATION: LIGHT GREY-WHITE CORAL FLINGER					
SOURCE: Boring 2 at 7.1 m					
GEO-ENGINEERING & TESTING					
Geotechnical & Material Testing Engineers					
FISH MARKET CENTER					
MAJURO ATOLL					
THE MARSHALL ISLANDS					
Job No.	358.03	Appr.	Date	09/30/08	
					PLATE
					15

SUMMARY OF LABORATORY TEST RESULTS

A. UNCONFINED COMPRESSION

Boring No.	Depth (m)	Vertical Stress (k/cm ²)	Moisture Content	Dry Density (g/cm ³)
BH-1	3.8	111	15.9%	1.94
BH-1	5.2	78	20.2%	1.84
BH-1	9.8	68	20.1%	1.59
BH-1	12.6	153	25.6%	1.63
BH-2	9.8	150	13.3%	1.75
BH-2	11.3	152	21.6%	1.69

B. SPECIFIC GRAVITY OF SOIL SOLID

Boring No.	Depth (m)	Bulk Gravity
BH-1	6.8	2.675
BH-1	9.8	2.730
BH-1	11.0	2.529
BH-2	2.4	2.651
BH-2	8.5	2.713
BH-2	9.8	2.631
BH-3	9.8	2.357

GEO-ENGINEERING & TESTING, INC. Geotechnical & Material Testing Engineers Job No. 353.03 Appr.: JUS Date: 10/10/88	SUMMARY OF LABORATORY TEST RESULTS	
	FISH MARKET CENTER MAJURO ATOLL THE MARSHALL ISLANDS	
	PLATE 17	

8-3 荒天時係船岸前面波浪推算

1. 荒天時の波浪推算 (S-M-B 法による波浪推算)

1) 推算式

S-M-B 法は、風域が移動しない場合に適用されるもので、風域内の風速、吹送時間、吹送距離から算出される。風速・吹送距離、風速・吹送時間から得られる波高・周期のいずれか小さいほうを推算値とする。

① 風速・吹送距離からの推算

$$\frac{gH_{1/3}}{U^2} = 0.30 \left(1 - \frac{1}{\left\{ 1 + 0.004 \left(\frac{gF}{U^2} \right)^{1/2} \right\}^2} \right)$$

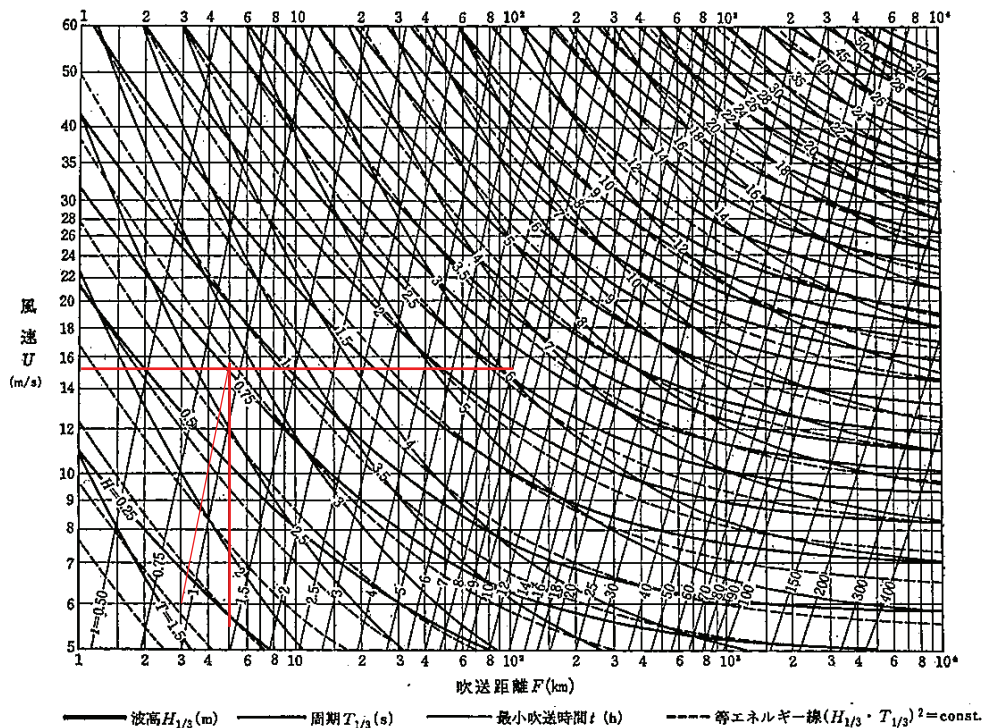
$$\frac{gT_{1/3}}{2\pi U} = 1.37 \left(1 - \frac{1}{\left\{ 1 + 0.008 \left(\frac{gF}{U^2} \right)^{1/3} \right\}^3} \right)$$

ここに、

- $H_{1/3}$; 有義波高 (m)
- $T_{1/3}$; 有義波周期 (s)
- U ; 海上10mの高さの風速 (m/s)
- F ; 吹送距離 (m)
- g ; 重力加速度 (m/s²) (9.81m/s²)

出典：“港湾の施設の技術上の基準・同解説” 平成 19 年 9 月、国土交通省港湾局監修

② 風速・吹送時間との関係



出典：“港湾の施設の技術上の基準・同解説” 平成 19 年 9 月、国土交通省港湾局監修

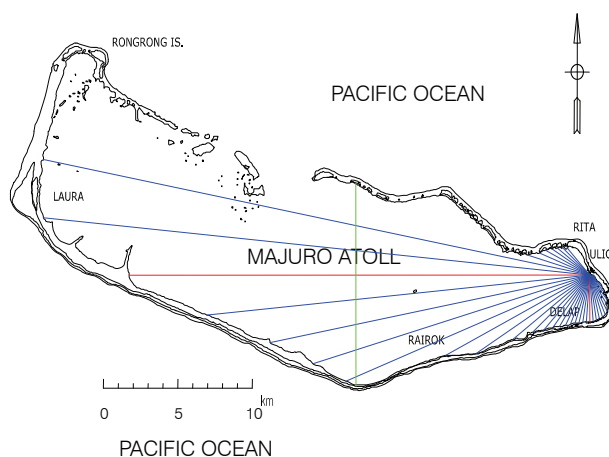
図—1 S-M-B 法による波浪予知曲線

2) 有効吹送距離

計画地点における NW 方向の有効吹送距離は、4.8km となる。(表一 1、図一 2 参照)

表一 1 計画地点における
吹送距離と有効吹送距離

θ	COS(θ)	NW	
		F (km)	F * COS ² (θ)
-45.0	0.7071	0.1	0.05
-40.0	0.7660	0.1	0.06
-35.0	0.8192	0.1	0.07
-30.0	0.8660	0.1	0.08
-25.0	0.9063	0.1	0.08
-20.0	0.9397	0.1	0.09
-15.0	0.9659	0.1	0.09
-10.0	0.9848	0.1	0.10
-5.0	0.9962	0.1	0.10
0.0	1.0000	2.1	2.12
5.0	0.9962	2.4	2.38
10.0	0.9848	2.6	2.55
15.0	0.9659	2.9	2.71
20.0	0.9397	3.3	2.91
25.0	0.9063	3.6	2.96
30.0	0.8660	4.4	3.30
35.0	0.8192	37.3	25.03
40.0	0.7660	36.9	21.65
45.0	0.7071	30.9	15.45
Σ	16.90251		81.8
FETCH (km)			4.8



図一 2 計画地点

3) S-M-B 法による波浪推算

風 速： 13 m/s (NW)

有効吹送距離： 4.8 km

最小吹送時間： 1 時間

$$H_{1/3} = 0.63\text{m}$$

$$T_{1/3} = 2.6\text{sec}$$

2. 回折反射計算 (荒天時における係船岸前面波高)

荒天時における係船岸前面波高を、次頁 図一 3 に示す。

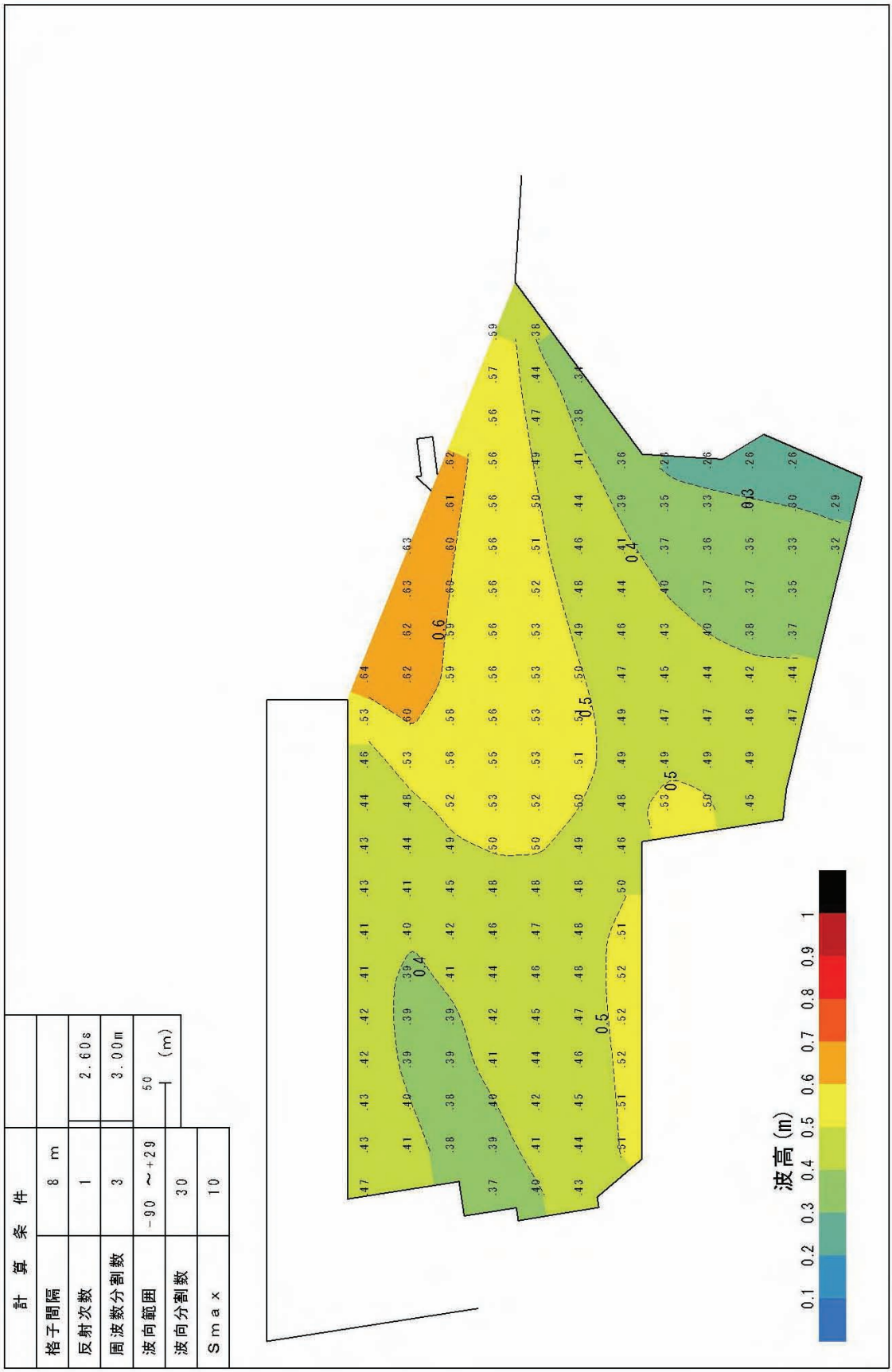


図-3 : 荒天時における係船岸前面波高