Chapter 13 Financial Analysis

13.1 Purpose of the Financial Analysis

The purpose of the financial analysis is to examine the viability of the project. (The project means the short-term development plan for the Galle port in this chapter.) When evaluating financial viability of the project, financial soundness of the executing agency of the project, viz SLPA, is assessed.

13.2 Methodology of the Financial Analysis

13.2.1 Viability of the Project

The viability of the project is analyzed using the Financial Internal Rate of Return (FIRR) by means of the discount cash flow method. The FIRR is a discount rate that makes the costs and the revenues during the project life equal, and it is calculated using the following formula:

$$\sum_{i=1}^{n} \frac{R_i - C_i}{(1+r)^{i-1}} = 0$$

n : Project life
Bi: Revenue in the i-th year
Ci: Cost in the i-th year
r : Discount rate

Here, the revenues and the costs in this analysis cover the following items:

Revenues: operating revenues by the project
Costs: investments (initial investments and re-investments)
maintenance, repair and fuel costs
personnel and administration costs

When the calculated FIRR exceeds the weighted average interest rate of the total funds for the investments of the project, the project is regarded as financially feasible.

13.2.2 Financial Soundness

The financial soundness is appraised based on its projected financial statements (Profit and Loss Statement, Cash Flow Statement and Balance sheet). The appraisal is made from the viewpoints of profitability, loan repayment capacity and operational efficiency, using the following ratios:

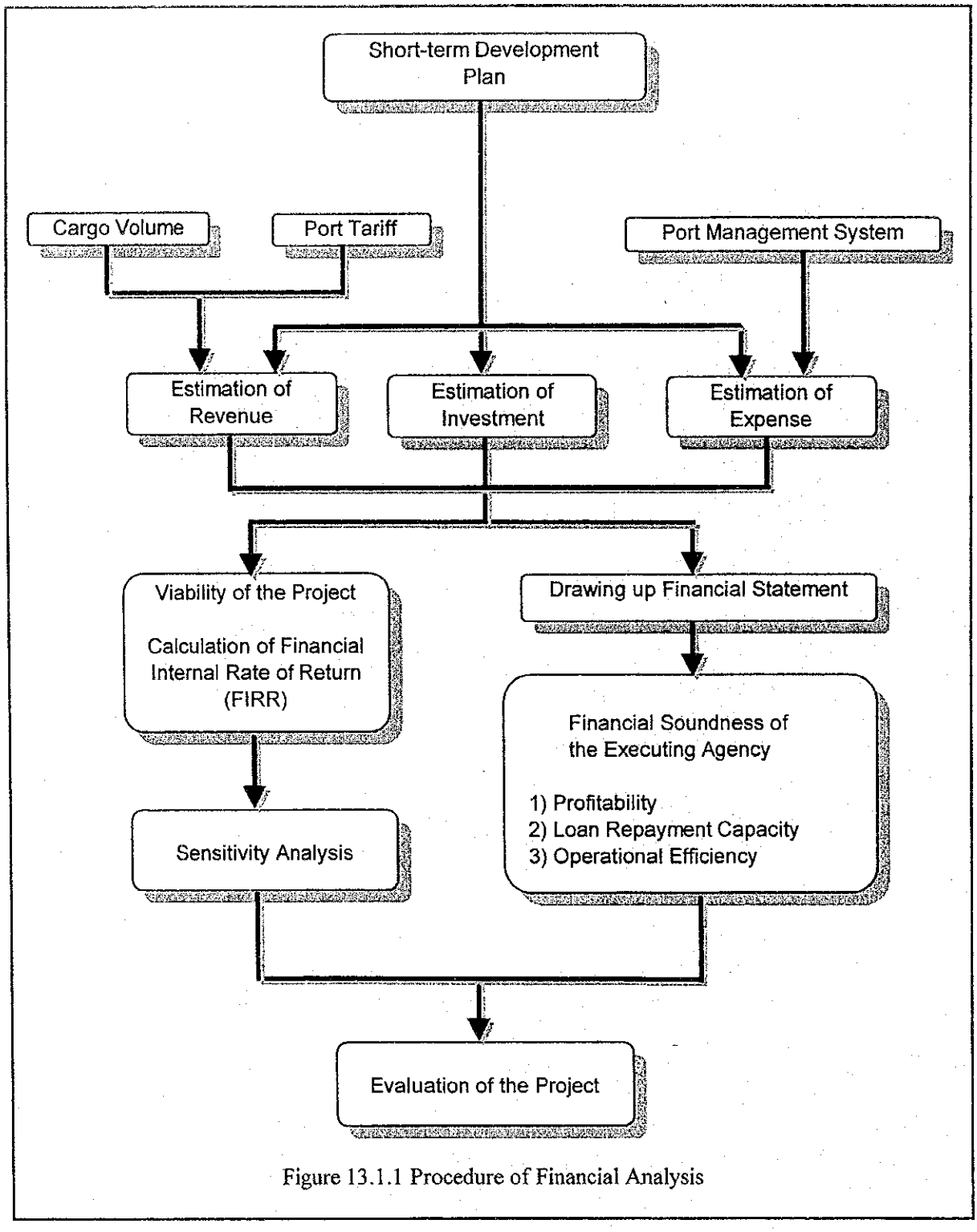


Figure 13.1.1 Procedure of Financial Analysis

(1) Profitability

Rate of Return on Net Fixed Assets:

$$\frac{\textit{Net Operating Income}}{\textit{Total Fixed Assets}} \times 100\ \%$$

This indicator shows the profitability of the investments, which are presented as net total fixed assets. It is necessary to keep the rate above the average interest rate of the funds for investments.

(2) Loan Repayment Capacity

Debt Service Coverage Ratio:

$$\frac{\textbf{\textit{Net Operating Income before Depreciation}}}{\textbf{\textit{Repayment of and interest on long-term loans}}}$$

This indicator shows whether the operating income can cover the repayment and the interest on long-term loans. The ratio must be higher than 1.0 and it is generally preferable to be higher than 1.75.

(3) Operational Efficiency

Operating Ratio:

$$\frac{\textbf{\textit{Operating Expenses}}}{\textbf{\textit{Operating Revenues}}} \times 100\ (\%)$$

The operating ratio shows the operational efficiency of the terminal management entity, namely the ratio of port revenue that is consumed by operating expenses. Generally it must be less than 70%-75%.

Working Ratio:

$$\frac{\textbf{\textit{Operating Expenses Depreciation Expenses}}}{\textbf{\textit{Operating Revenues}}} \times 100\ (\%)$$

The working ratio shows the efficiency of the routine operations of the port. Generally it must be less than 50%-60%.

13.3 Assumption for the Financial Analysis

13.3.1 Scope of the Analysis

The viability of the project was assessed, using the revenues and costs related to the project

13.3.2 Base Year

Prices as of 2000 were used in this financial analysis. Price escalation due to inflation for the future was not considered.

13.3.3 Project Life

Taking account of the conditions of the long-term loans and the service lives of the port facilities, the project life for the financial analysis was determined as 35 years including six-year construction period.

13.3.4 Cargo Handling Volume

To estimate revenues to be generated from cargo handling at the new wharf, the volumes of cargo shown in Table 13.3.1 were used (see Chapter 7).

Table 13.3.1 The Cargo Volume Forecast

(Unit: tons/TEUs)

No	Items	1st year	2nd year	3rd year	4th year	5th year	6th year
1	bagged cement	100,000	108,000	116,000	124,000	132,000	233,000
2	bagged fertilizer	119,000	121,000	123,000	125,000	127,000	139,000
3	bagged sugar	87,000	89,000	91,000	92,000	94,000	108,000
4	iron and steel	36,000	41,000	46,000	51,000	56,000	103,000
5	clinker	325,000	420,000	515,000	610,000	705,000	841,000
6	gypsum	25,000	30,000	35,000	40,000	45,000	52,000
7	maize	27,000	28,000	29,000	31,000	32,000	42,000
	general cargo total	719,000	837,000	955,000	1,073,000	1,191,000	1,518,000
8	container (TEU)	28,080	29,748	31,416	33,084	34,752	36,420

13.3.5 Revenues and Port Tariff

Revenues for the project will be generated from receiving vessels and handling cargoes charged according to the port tariff. In this financial analysis, the present Galle port tariff was adopted (see Part 1 Chapter 4.8 Table 4.8.3).

13.3.6 Fund Raising

(1) Soft Loans

It was assumed that 75% of the total project costs will be financed by soft loans in this financial analysis.

The conditions of the soft loan were assumed as follows:

-Loan period: 30 years, including a grace period of 10 years
-Interest rate: 2.2% per annum
-Repayment: fixed amount repayment of principal

(2) Domestic Funds

It was assumed that a remaining 25% of the total project costs will be raised by domestic funds.

The conditions of domestic funds were assumed as follows:

-Loan period: 10 years, including a grace period of 5 years
-Interest rate: 7.5% per annum
-Repayment: fixed amount repayment of principal

Any cash shortage should be covered by short-term loans

In this analysis, the real interest rate was estimated by deducting the inflation rate from the current nominal interest rate of 12%. Inflation rate from 1998 to 1999 was estimated as 4.5% on GNP basis.

13.3.7 Expenditure

(1) Investments

In the financial analysis, the initial investment costs of the project need to include all taxes, namely, the goods and service tax (GST) and customs duty.

The investment costs show in Table 13.3.2 were obtained by adjusting the costs shown in Part 2 Chapter 10.2 which exclude GST and custom duty.

Table 13.3.2 Adjusted Initial Investment Cost

(UNIT: 1000Rs)

Description	Quantity	Unit	1st year	2nd year	3rd year	4th year	5th year	6th year	Total
Temporary Works	1	Sum		370,509	182,723	121,815	60,908	81,773	817,728
Dredging Works	340,000	m3		93,991	238,978				332,969
Outer Breakwater	800	m		1,092,851	1,757,582	521,075			3,371,508
Inner Breakwater	350	m		264,495	1,013,899				1,278,394
Revetment (1)	500	m		315,156	420,208				735,364
Revetment (2)	350	m		141,112	188,149				329,261
Revetment (3)	170	m				168,248			168,248
Revetment (3)	300	m				296,909			296,909
Revetment (4)	1,050	m			257,350				257,350
Reclamation	3,208,000	m3			151,926	804,043	25,323		981,292
-12.0m Berth	480	m			755,716	604,573	151,143		1,511,432
Navigation Aids	1	Sum					167,332		167,332
Road Pavement	54,360	m2				33,642	218,676	16,821	269,139
Yard Pavement	256,340	m2				41,717	361,552	41,717	444,986
Administration Building	1,000	m2				10,323	53,679	10,323	74,325
Transit Shed	8,000	m2				125,080	237,652	12,508	375,240
Maintenance Shop	500	m2					27,259	3,407	30,666
Elctrical Sub-station	200	m2					10,709		10,709
Water Tower	1	Sum					16,849		16,849
Gate Office	500	m2				45,438	15,146		60,584
Utility (Electrical Work)	1	Sum				95,130	209,285	38,052	342,467
Utility (Mechanical Work)	1	Sum				10,679	23,493	4,271	38,443
Consulting Services	1	Sum	173,135	103,881	138,508	138,508	103,881	34,627	692,540
Import Tax	1	Sum		209,227					209,227
Equipment(crane)	1	Sum					490,280		490,280
Equipment(forklift, e.t.c)	1	Sum						245,140	245,140
Total			173,135	2,591,222	5,105,039	3,017,180	2,173,167	488,639	13,548,382

(2) Maintenance and Repair Costs

The annul maintenance and repair costs for the port facilities subject to depreciation were calculated according to the following conditions.

Infrastructure: 1.0% of the original construction cost.
Equipment : 4.0% of the original procurement cost.

(3) Personnel and Administration Costs

The annual personnel costs were estimated based on the required number of workers proposed in Chapter 7 and the existing scale of pay.

The annual administration costs were calculated as 20% of the total annual personnel costs. This ratio was based on the actual accounts of the SLPA.

(4) Depreciation Expenses

The annual depreciation expenses of the port facilities and equipment were calculated by the straight line method, based on the SLPA standard.

5) Taxes

Taxes to be levied for profit were income tax and deemed dividend tax.

13.4 Evaluation of the project

13.4.1 Viability

The FIRR of the project was 5.1%, exceeding the weighted average interest rate of funds of 3.5% (see Table 13.4.1).

13.4.2 Financial Soundness

The projected financial statements and financial indicators (rate of return on net fixed assets, debt service coverage ratio, operating ratio, and working ratio) with regard to the project are shown below (see Table 13.4.2).

(1) Profitability

The rate of return on net fixed assets exceeded the weighted average interest rate of funds (3.5%) in 3 years from the beginning of operation (see Table 13.4.2).

(2) Loan Repayment Capacity

Throughout the project life, the debt service coverage ratios exceeded 1.0, satisfying required criteria shown in (2) 2.2 of this chapter (see Table 13.4.2).

(3) Operational Efficiency

Both the operating ratios and the working ratios maintained positive levels (see Table 13.4.2).

13.4.3 Sensitivity Analysis

Sensitivity analysis was conducted to examine the impact of unexpected future changes such as cargo volume, construction cost, inflation or exchange rate. The following cases were envisioned.

Case 1 : The investment costs increase by 10%
Case 2 : The revenues decrease by 10%
Case 3 : The investment costs increase by 10% and the revenues decrease by 10%

The results of the sensitivity analysis were shown in Table 13.4.3. In all the cases, FIRR exceeded the weighted average interest rate of the funds (3.5%).

Table 13.4.3 Sensitivity Analysis for FIRR

Case	FIRR
Base case	5.1%
Case 1	4.4%
Case 2	4.3%
Case 3	3.6%

13.4.4 Financial soundness of the Executing Agency

Together with the above-mentioned financial analysis of the Galle port project, overall financial soundness of SLPA as the executing agency of the Gall port project was assessed to confirm the feasibility of the project. In the assessment, current financial statements, loan repayment programs and income prospects for the future were considered covering the three principal ports, namely, Colombo, Galle and Trincomalee.

13.4.5 Conclusion

Judging from the above analysis, the project is regarded as financially feasible. And the Financial soundness of executing agency, viz SLPA, is considered to be sound.

Table 13.4.1 FIRR

1 Construction Costs		Cost	1.0		
	(1) Civil		Rs	12,812,961,820	
			Rs	3,551,398,059	(Base of maintenance calculation)
	(2) Procurement		Rs	735,420,000	
	Gantry Crane			490,280,000	
	VTMS				
	WORF				
	Forklift			245,140,000	13,548,381,820 Sub-total (1)+(2)
	(3) Dredging		Rs	332,969,124	
	(4) Total		Rs	13,548,381,820	
2 Maintenance					
	(1) Civil (1%)		Rs	35,513,981	
	(2) Procurement (4%)		Rs	29,416,800	64,930,781 Sub-total (1)+(2)
	(3) Dredging		Rs	0	
3 Re-investment					
	(1) Gantry Crane		Rs	490,280,000	20 years renewal
	(2)Forklift		Rs	245,140,000	10 years renewal
	(3)Total		Rs	735,420,000	
4 Management		Number of persons	Unit	Administration cost	
	Personel	340	Rs202,000	20%	82,416,000
6 Cost and Revenue		Revenue	1.0		

Financial Analysis

(Unit : Rs)

	Year	Revenue	Total	Cost: Investment	Expenses: Maintenance Costs	Expenses: Management Costs	Expenses: Re-Investment	Total	Difference: Revenue - Cost	Net Present Volume(NPV): Revenue	Cost	Revenue - Cost
1	1		0	173,135,250				173,135,250	-173,135,250	0	173,135,250	-173,135,250
2	2		0	2,591,222,308				2,591,222,308	-2,591,222,308	0	2,465,014,421	-2,465,014,421
3	3		0	5,105,038,923				5,105,038,923	-5,105,038,923	0	4,619,858,125	-4,619,858,125
4	4		0	3,017,179,898				3,017,179,898	-3,017,179,898	0	2,597,440,315	-2,597,440,315
5	5		0	2,173,165,435				2,173,165,435	-2,173,165,435	0	1,779,721,106	-1,779,721,106
6	6		0	488,640,005				488,640,005	-488,640,005	0	380,682,552	-380,682,552
7	7	776,896,000	776,896,000		64,930,781	82,416,000		147,346,781	629,549,219	575,773,441	109,201,699	466,571,742
8	8	864,645,000	864,645,000		64,930,781	82,416,000		147,346,781	717,298,219	609,594,960	103,882,929	505,712,031
9	9	950,756,000	950,756,000		64,930,781	82,416,000		147,346,781	803,409,219	637,657,392	98,823,214	538,834,178
10	10	1,040,311,000	1,040,311,000		64,930,781	82,416,000		147,346,781	892,964,219	663,737,423	94,009,938	569,727,485
11	11	1,128,060,000	1,128,060,000		64,930,781	82,416,000		147,346,781	980,713,219	684,668,117	89,431,097	595,237,020
12	12	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	759,310,073	85,075,272	674,234,801
13	13	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	722,327,171	80,931,602	641,395,569
14	14	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	687,145,556	76,989,753	610,155,803
15	15	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	653,677,494	73,239,896	580,437,598
16	16	1,315,093,000	1,315,093,000		64,930,781	82,416,000	245,140,000	392,486,781	922,606,219	621,839,525	185,586,718	436,252,808
17	17	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	591,552,254	66,279,206	525,273,048
18	18	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	562,740,153	63,051,016	499,689,137
19	19	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	535,331,371	59,980,058	475,351,314
20	20	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	509,257,560	57,058,673	452,198,887
21	21	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	484,453,698	54,279,578	430,174,120
22	22	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	460,857,931	51,635,841	409,222,091
23	23	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	438,411,418	49,120,869	389,290,549
24	24	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	417,058,183	46,728,392	370,329,792
25	25	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	396,744,977	44,452,442	352,292,535
26	26	1,315,093,000	1,315,093,000		64,930,781	82,416,000	735,420,000	882,766,781	432,326,219	377,421,145	253,346,987	124,074,158
27	27	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	359,038,498	40,227,700	318,810,798
28	28	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	341,551,195	38,268,373	303,282,822
29	29	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	324,915,627	36,404,476	288,511,151
30	30	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	309,090,310	34,631,362	274,458,947
31	31	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	294,035,779	32,944,610	261,091,170
32	32	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	279,714,494	31,340,012	248,374,482
33	33	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	266,090,740	29,813,567	236,277,172
34	34	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	253,130,543	28,361,470	224,769,073
35	35	1,315,093,000	1,315,093,000		64,930,781	82,416,000		147,346,781	1,167,746,219	240,801,585	26,980,098	213,821,487
	Total	36,322,900,000	36,322,900,000	13,548,381,820	1,882,992,637	2,390,064,000	980,560,000	18,801,998,457	17,520,901,543	14,057,928,614	14,057,928,614	0

FIRR = 5.12% > 3.53%

Table 13.4.2 Financial Statement

Income Statement

Year	1	2	3	4	5	6	7	8	9	10	11	12	13
Revenue	0	0	0	0	0	0	776,896,000	864,645,000	950,756,000	1,040,311,000	1,128,060,000	1,315,093,000	1,315,093,000
Operating Revenue	0	0	0	0	0	0	776,896,000	864,645,000	950,756,000	1,040,311,000	1,128,060,000	1,315,093,000	1,315,093,000
Financial revenue	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating Expenses	0	0	0	0	0	0	485,699,514	485,699,514	485,699,514	485,699,514	485,699,514	436,671,514	436,671,514
Personnel & Administration	0	0	0	0	0	0	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000
Maintenance	0	0	0	0	0	0	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781
Depreciation	0	0	0	0	0	0	338,352,733	338,352,733	338,352,733	338,352,733	338,352,733	289,324,733	289,324,733
Net Operating Income	0	0	0	0	0	0	291,196,486	378,945,486	465,056,486	554,611,486	642,360,486	878,421,486	878,421,486
Interest on Long-term Loans	0	6,103,009	97,443,584	277,396,209	383,751,804	460,355,870	477,255,802	472,072,633	457,317,515	436,905,185	412,418,171	386,872,120	359,188,311
Interest on Short-term Loans	0	0	457,726	7,800,324	29,190,064	60,160,704	99,524,075	100,749,544	104,668,958	106,974,582	105,280,263	96,444,311	78,290,045
Net Surplus before Tax	0	-6,103,009	-97,901,310	-285,196,533	-412,941,868	-520,516,574	-285,583,391	-193,876,691	-96,929,987	10,731,719	124,662,052	395,105,055	440,943,130
Tax	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Surplus after Tax		-6,103,009	-97,901,310	-285,196,533	-412,941,868	-520,516,574	-285,583,391	-193,876,691	-96,929,987	10,731,719	124,662,052	395,105,055	440,943,130
Accumulated Earnings	0	-6,103,009	-104,004,319	-389,200,852	-802,142,720	-1,322,659,294	-1,608,242,685	-1,802,119,377	-1,899,049,364	-1,888,317,645	-1,763,655,594	-1,368,550,539	-927,607,409

Cash Flow

Year	1	2	3	4	5	6	7	8	9	10	11	12	13
Cash Beginning	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Inflow	173,135,000	2,597,325,009	5,209,043,319	3,406,380,852	2,975,307,720	1,815,627,669	2,120,223,252	2,260,231,110	2,377,083,764	2,444,047,837	2,413,984,140	2,358,960,265	2,262,504,277
Operating Revenue	0	0	0	0	0		776,896,000	864,645,000	950,756,000	1,040,311,000	1,128,060,000	1,315,093,000	1,315,093,000
Interest on Deposit	0	0	0	0	0	0	0	0	0	0	0	0	0
Short-term Loans	0	6,103,009	104,004,319	389,200,852	802,142,720	1,326,987,669	1,343,327,252	1,395,586,110	1,426,327,764	1,403,736,837	1,285,924,140	1,043,867,265	947,411,277
Long-term Loans	173,135,000	2,591,222,000	5,105,039,000	3,017,180,000	2,173,165,000	488,640,000	0	0	0	0	0	0	0
Cash Outflow	173,135,000	2,597,325,009	5,209,043,319	3,406,380,852	2,975,307,720	1,815,627,669	2,120,223,252	2,260,231,110	2,377,083,764	2,444,047,837	2,413,984,140	2,358,960,265	2,262,504,277
Investment	173,135,000	2,591,222,000	5,105,039,000	3,017,180,000	2,173,165,000	488,640,000	0	0	0	0	0	0	0
Personnel & Administration	0	0	0	0	0	0	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000
Maintenance	0	0	0	0	0	0	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781
Repayment of principal (long	0	0	0	0	0	4,328,375	69,108,925	196,734,900	272,164,400	326,493,525	345,202,088	442,372,913	633,811,875
Interest on Long-term Loans	0	6,103,009	97,443,584	277,396,209	383,751,804	460,355,870	477,255,802	472,072,633	457,317,515	436,905,185	412,418,171	386,872,120	359,188,311
Repayment of principal (Shor	0	0	6,103,009	104,004,319	389,200,852	802,142,720	1,326,987,669	1,343,327,252	1,395,586,110	1,426,327,764	1,403,736,837	1,285,924,140	1,043,867,265
Interest on Short-term Loans	0	0	457,726	7,800,324	29,190,064	60,160,704	99,524,075	100,749,544	104,668,958	106,974,582	105,280,263	96,444,311	78,290,045
Tax	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Balance	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Ending	0	0	0	0	0	0	0	0	0	0	0	0	0

Balance Sheet

Year	1	2	3	4	5	6	7	8	9	10	11	12	13
Current Assets	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash & Deposit	0	0	0	0	0	0	0	0	0	0	0	0	0
Fixed Assets	173,135,000	2,764,357,000	7,869,396,000	10,886,576,000	13,059,741,000	13,548,381,000	13,210,028,267	12,871,675,533	12,533,322,800	12,194,970,067	11,856,617,333	11,567,292,600	11,277,967,867
Total Assets	173,135,000	2,764,357,000	7,869,396,000	10,886,576,000	13,059,741,000	13,548,381,000	13,210,028,267	12,871,675,533	12,533,322,800	12,194,970,067	11,856,617,333	11,567,292,600	11,277,967,867
Liabilities	173,135,000	2,770,460,009	7,973,400,319	11,275,776,852	13,861,883,720	14,871,040,294	14,818,270,952	14,673,794,910	14,432,372,164	14,083,287,712	13,620,272,927	12,935,843,139	12,205,575,276
Short-term Loans	0	6,103,009	104,004,319	389,200,852	802,142,720	1,326,987,669	1,343,327,252	1,395,586,110	1,426,327,764	1,403,736,837	1,285,924,140	1,043,867,265	947,411,277
Long-term Loans	173,135,000	2,764,357,000	7,869,396,000	10,886,576,000	13,059,741,000	13,544,052,625	13,474,943,700	13,278,208,800	13,006,044,400	12,679,550,875	12,334,348,787	11,891,975,874	11,258,163,999
Net Worth	0	-6,103,009	-104,004,319	-389,200,852	-802,142,720	-1,322,659,294	-1,608,242,685	-1,802,119,377	-1,899,049,364	-1,888,317,645	-1,763,655,594	-1,368,550,539	-927,607,409
Total Liabilities & Net Worth	173,135,000	2,764,357,000	7,869,396,000	10,886,576,000	13,059,741,000	13,548,381,000	13,210,028,267	12,871,675,533	12,533,322,800	12,194,970,067	11,856,617,333	11,567,292,600	11,277,967,867

Financial Indicators

	1	2	3	4	5	6	7	8	9	10	11	12	13
Rate of Return Fixed Assets							2.2%	2.9%	3.7%	4.5%	5.4%	7.6%	7.8%
Debt Service Coverage Ratio							1.15	1.07	1.10	1.17	1.29	1.41	1.18
Operating Ratio							62.5%	56.2%	51.1%	46.7%	43.1%	33.2%	33.2%
Working Ratio							19.0%	17.0%	15.5%	14.2%	13.1%	11.2%	11.2%

Table 13.4.2 Financial Statement

Income Statement

Year	14	15	16	17	18	19	20	21	22	23	24	25	26
Revenue	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,321,992,086	1,331,460,335	1,341,589,507	1,352,473,536
Operating Revenue	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000
Financial revenue	0	0	0	0	0	0	0	0	0	6,899,086	16,367,335	26,496,507	37,380,536
Operating Expenses	436,671,514	436,671,514	436,671,514	485,699,514	485,699,514	444,842,848	444,842,848	444,842,848	395,814,848	395,814,848	395,814,848	395,814,848	395,814,848
Personnel & Administration	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000
Maintenance	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781
Depreciation	289,324,733	289,324,733	289,324,733	338,352,733	338,352,733	297,496,067	297,496,067	297,496,067	248,468,067	248,468,067	248,468,067	248,468,067	248,468,067
Net Operating Income	878,421,486	878,421,486	878,421,486	829,393,486	829,393,486	870,250,152	870,250,152	870,250,152	919,278,152	926,177,238	935,645,488	945,774,660	956,658,688
Interest on Long-term Loans	327,292,845	292,908,206	256,730,705	220,474,704	189,077,245	167,251,734	151,083,435	138,989,821	127,812,406	116,634,992	105,457,578	94,280,163	83,102,749
Interest on Short-term Loans	71,055,846	69,372,741	71,096,581	89,671,569	83,676,440	65,304,918	38,261,407	3,902,325	0	0	0	0	0
Net Surplus before Tax	480,072,795	516,140,539	550,594,200	519,247,213	556,639,801	637,693,500	680,905,310	727,358,006	791,465,746	809,542,246	830,187,910	851,494,497	873,555,939
Tax	0	0	0	0	0	0	0	372,770,978	405,626,195	414,890,401	425,471,304	436,390,929	447,697,419
Net Surplus after Tax	480,072,795	516,140,539	550,594,200	519,247,213	556,639,801	637,693,500	680,905,310	354,587,028	385,839,551	394,651,845	404,716,606	415,103,567	425,858,520
Accumulated Earnings	-447,534,614	68,605,924	619,200,124	1,138,447,337	1,695,087,137	2,332,780,638	3,013,685,948	3,368,272,976	3,754,112,528	4,148,764,372	4,553,480,979	4,968,584,546	5,394,443,066

Cash Flow

Year	14	15	16	17	18	19	20	21	22	23	24	25	26
Cash Beginning	0	0	0	0	0	0	0	0	91,987,809	218,231,139	353,286,762	498,407,147	653,914,493
Cash Inflow	2,240,062,874	2,263,047,415	2,510,713,920	2,430,778,862	2,185,825,241	1,825,245,087	1,367,123,998	1,315,093,000	1,315,093,000	1,321,992,086	1,331,460,335	1,341,589,507	1,352,473,536
Operating Revenue	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000
Interest on Deposit	0	0	0	0	0	0	0	0	0	6,899,086	16,367,335	26,496,507	37,380,536
Short-term Loans	924,969,874	947,954,415	1,195,620,920	1,115,685,862	870,732,241	510,152,087	52,030,998	0	0	0	0	0	0
Long-term Loans	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Outflow	2,240,062,874	2,263,047,415	2,510,713,920	2,430,778,862	2,185,825,241	1,825,245,087	1,367,123,998	1,223,105,191	1,188,849,670	1,186,936,462	1,186,339,951	1,186,082,161	1,921,631,237
Investment	0	0	245,140,000		0	0	0	0	0	0	0	0	735,420,000
Personnel & Administration	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000
Maintenance	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781
Repayment of principal (long	746,956,125	828,449,813	842,445,438	777,664,888	650,038,913	574,609,413	520,280,288	508,064,288	508,064,288	508,064,288	508,064,288	508,064,288	508,064,288
Interest on Long-term Loans	327,292,845	292,908,206	256,730,705	220,474,704	189,077,245	167,251,734	151,083,435	138,989,821	127,812,406	116,634,992	105,457,578	94,280,163	83,102,749
Repayment of principal (Shor	947,411,277	924,969,874	947,954,415	1,195,620,920	1,115,685,862	870,732,241	510,152,087	52,030,998	0	0	0	0	0
Interest on Short-term Loans	71,055,846	69,372,741	71,096,581	89,671,569	83,676,440	65,304,918	38,261,407	3,902,325	0	0	0	0	0
Tax	0	0	0	0	0	0	0	372,770,978	405,626,195	414,890,401	425,471,304	436,390,929	447,697,419
Cash Balance	0	0	0	0	0	0	0	91,987,809	126,243,330	135,055,624	145,120,385	155,507,346	-569,157,701
Cash Ending	0	0	0	0	0	0	0	91,987,809	218,231,139	353,286,762	498,407,147	653,914,493	84,756,792

Balance Sheet

Year	14	15	16	17	18	19	20	21	22	23	24	25	26
Current Assets	0	0	0	0	0	0	0	91,987,809	218,231,139	353,286,762	498,407,147	653,914,493	84,756,792
Cash & Deposit	0	0	0	0	0	0	0	91,987,809	218,231,139	353,286,762	498,407,147	653,914,493	84,756,792
Fixed Assets	10,988,643,134	10,699,318,400	10,655,133,667	10,316,780,934	9,978,428,200	9,680,932,134	9,383,436,067	9,085,940,000	8,837,471,934	8,589,003,867	8,340,535,801	8,092,067,734	8,579,019,667
Total Assets	10,988,643,134	10,699,318,400	10,655,133,667	10,316,780,934	9,978,428,200	9,680,932,134	9,383,436,067	9,177,927,809	9,055,703,073	8,942,290,629	8,838,942,948	8,745,982,227	8,663,776,459
Liabilities	11,436,177,748	10,630,712,476	10,035,933,543	9,178,333,597	8,283,341,063	7,348,151,496	6,369,750,119	5,809,654,833	5,301,590,545	4,793,526,257	4,285,461,969	3,777,397,681	3,269,333,393
Short-term Loans	924,969,874	947,954,415	1,195,620,920	1,115,685,862	870,732,241	510,152,087	52,030,998	0	0	0	0	0	0
Long-term Loans	10,511,207,874	9,682,758,061	8,840,312,623	8,062,647,735	7,412,608,822	6,837,999,409	6,317,719,121	5,809,654,833	5,301,590,545	4,793,526,257	4,285,461,969	3,777,397,681	3,269,333,393
Net Worth	-447,534,614	68,605,924	619,200,124	1,138,447,337	1,695,087,137	2,332,780,638	3,013,685,948	3,368,272,976	3,754,112,528	4,148,764,372	4,553,480,979	4,968,584,546	5,394,443,066
Total Liabilities & Net Worth	10,988,643,134	10,699,318,400	10,655,133,667	10,316,780,934	9,978,428,200	9,680,932,134	9,383,436,067	9,177,927,809	9,055,703,073	8,942,290,629	8,838,942,948	8,745,982,227	8,663,776,459

Financial Indicators

	14	15	16	17	18	19	20	21	22	23	24	25	26
Rate of Return Fixed Assets	8.0%	8.2%	8.2%	8.0%	8.3%	9.0%	9.3%	9.6%	10.4%	10.8%	11.2%	11.7%	11.2%
Debt Service Coverage Ratio	1.09	1.04	1.06	1.17	1.39	1.57	1.74	1.80	1.84	1.88	1.93	1.98	2.04
Operating Ratio	33.2%	33.2%	33.2%	36.9%	36.9%	33.8%	33.8%	33.8%	30.1%	30.1%	30.1%	30.1%	30.1%
Working Ratio	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%

Table 13.4.2 Financial Statement

(Unit:Rs)

Income Statement

Year	27	28	29	30	31	32	33	34	35
Revenue	1,364,136,587	1,321,449,759	1,338,209,478	1,353,817,134	1,370,446,241	1,388,054,678	1,407,166,732	1,432,729,345	1,473,673,955
Operating Revenue	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000
Financial revenue	49,043,587	6,356,759	23,116,478	38,724,134	55,353,241	72,961,678	92,073,732	117,636,345	158,580,955
Operating Expenses	485,699,514	485,699,514	485,699,514	485,699,514	485,699,514	436,671,514	436,671,514	436,671,514	436,671,514
Personnel & Administration	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000
Maintenance	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781
Depreciation	338,352,733	338,352,733	338,352,733	338,352,733	338,352,733	289,324,733	289,324,733	289,324,733	289,324,733
Net Operating Income	878,437,073	835,750,245	852,509,964	868,117,620	884,746,727	951,383,164	970,495,218	996,057,831	1,037,002,441
Interest on Long-term Loans	71,925,335	60,747,920	49,570,506	38,393,092	27,215,678	16,181,100	7,284,280	2,599,117	403,128
Interest on Short-term Loans	0	0	0	0	0	0	0	0	0
Net Surplus before Tax	806,511,738	775,002,325	802,939,458	829,724,528	857,531,049	935,202,064	963,210,938	993,458,714	1,036,599,313
Tax	413,337,266	397,188,692	411,506,472	425,233,820	439,484,663	479,291,058	493,645,606	509,147,591	531,257,148
Net Surplus after Tax	393,174,472	377,813,633	391,432,986	404,490,707	418,046,386	455,911,006	469,565,332	484,311,123	505,342,165
Accumulated Earnings	5,787,617,538	6,165,431,172	6,556,864,157	6,961,354,865	7,379,401,251	7,835,312,257	8,304,877,589	8,789,188,713	9,294,530,877

Cash Flow

Year	27	28	29	30	31	32	33	34	35
Cash Beginning	84,756,792	308,219,709	516,321,788	738,043,219	972,822,372	1,227,649,766	1,568,484,606	2,114,412,733	2,788,230,902
Cash Inflow	1,364,136,587	1,321,449,759	1,338,209,478	1,353,817,134	1,370,446,241	1,388,054,678	1,407,166,732	1,432,729,345	1,473,673,955
Operating Revenue	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000	1,315,093,000
Interest on Deposit	49,043,587	6,356,759	23,116,478	38,724,134	55,353,241	72,961,678	92,073,732	117,636,345	158,580,955
Short-term Loans	0	0	0	0	0	0	0	0	0
Long-term Loans	0	0	0	0	0	0	0	0	0
Cash Outflow	1,140,673,670	1,113,347,681	1,116,488,047	1,119,037,981	1,115,618,847	1,047,219,839	861,238,605	758,911,177	697,331,047
Investment		0	0	0	0	0	0	0	0
Personnel & Administration	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000	82,416,000
Maintenance	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781	64,930,781
Repayment of principal (long	508,064,288	508,064,288	508,064,288	508,064,288	501,571,725	404,400,900	212,961,938	99,817,688	18,323,990
Interest on Long-term Loans	71,925,335	60,747,920	49,570,506	38,393,092	27,215,678	16,181,100	7,284,280	2,599,117	403,128
Repayment of principal (Shor	0	0	0	0	0	0	0	0	0
Interest on Short-term Loans	0	0	0	0	0	0	0	0	0
Tax	413,337,266	397,188,692	411,506,472	425,233,820	439,484,663	479,291,058	493,645,606	509,147,591	531,257,148
Cash Balance	223,462,917	208,102,079	221,721,431	234,779,153	254,827,395	340,834,839	545,928,128	673,818,168	776,342,908
Cash Ending	308,219,709	516,321,788	738,043,219	972,822,372	1,227,649,766	1,568,484,606	2,114,412,733	2,788,230,902	3,564,573,810

Balance Sheet

Year	27	28	29	30	31	32	33	34	35
Current Assets	308,219,709	516,321,788	738,043,219	972,822,372	1,227,649,766	1,568,484,606	2,114,412,733	2,788,230,902	3,564,573,810
Cash & Deposit	308,219,709	516,321,788	738,043,219	972,822,372	1,227,649,766	1,568,484,606	2,114,412,733	2,788,230,902	3,564,573,810
Fixed Assets	8,240,666,934	7,902,314,201	7,563,961,467	7,225,608,734	6,887,256,001	6,597,931,267	6,308,606,534	6,019,281,801	5,729,957,068
Total Assets	8,548,886,643	8,418,635,989	8,302,004,686	8,198,431,106	8,114,905,767	8,166,415,873	8,423,019,267	8,807,512,703	9,294,530,877
Liabilities	2,761,269,105	2,253,204,817	1,745,140,529	1,237,076,241	735,504,516	331,103,616	118,141,678	18,323,990	0
Short-term Loans	0	0	0	0	0	0	0	0	0
Long-term Loans	2,761,269,105	2,253,204,817	1,745,140,529	1,237,076,241	735,504,516	331,103,616	118,141,678	18,323,990	0
Net Worth	5,787,617,538	6,165,431,172	6,556,864,157	6,961,354,865	7,379,401,251	7,835,312,257	8,304,877,589	8,789,188,713	9,294,530,877
Total Liabilities & Net Worth	8,548,886,643	8,418,635,989	8,302,004,686	8,198,431,106	8,114,905,767	8,166,415,873	8,423,019,267	8,807,512,703	9,294,530,877

Financial Indicators

	27	28	29	30	31	32	33	34	35
Rate of Return Fixed Assets	10.7%	10.6%	11.3%	12.0%	12.8%	14.4%	15.4%	16.5%	18.1%
Debt Service Coverage Ratio	2.10	2.06	2.14	2.21	2.31	2.95	5.72	12.55	70.82
Operating Ratio	36.9%	36.9%	36.9%	36.9%	36.9%	33.2%	33.2%	33.2%	33.2%
Working Ratio	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%	11.2%

Chapter 14 Environmental Impact Assessment

14.1 Introduction

Preliminary Environmental Study has been carried out in view of assessing the environmental issues that are related with the urgent development of Port of Galle as a Regional Port. This study has been entrusted with Department of Civil Engineering, University of Moratuwa from which eight consultants on different areas of environment have worked to make this study a success. Terms of reference for the entire study have been prepared according to the JICA guideline on the preparation of Environmental Impact Assessment (EIA) in the Harbour sector.

No attempt is however made to follow the local EIA guideline prepared by Central Environmental Authority as the present study follows the EIA process in accordance with JICA guidelines. Nevertheless, the report which is presented separately as a supplementary document would be a valuable source for subsequent EIA to be carried out in accordance with Sri Lankan regulations.

Four different, distinct harbour configurations have been considered for the entire study and the best possible alternative with minimum adverse impacts has been selected.

The study comprises the comprehensive assessment of existing environment, anticipated significant impacts and their mitigation measures for significant impacts and monitoring plan. The following sections elucidate the aforesaid information respectively.

14.2 Existing Environment

Major environmental components in the project area in relation to the project activities are briefly discussed in this section. The total environment is split into two major segments, namely natural and social respectively. Natural environment includes water and sediment quality, air quality and noise level, flora and fauna whilst the social environment encompasses built environment, heritage buildings, marine archaeology, tourism, income of the people, population, fisheries, recreation activities and transport etc.

Water quality of the Galle bay, recreational areas and the present port has been checked in view of understanding the degree of pollution. Chemical analysis for ordinary water quality parameters has been performed and results manifested that no area is significantly polluted. Similarly, sediment quality has also been analyzed for heavy metals and organo-chlorides and the results revealed no significant contamination. Further no point source is found emitting pollutants significantly into the Galle bay.

Noise levels within the port area are found to be less than those of outside, hence no threat to the neighbouring areas. Similarly, air pollutant levels are too found to be less compared with ambient levels stipulated in the SL regulation.

The availability of construction material such as sand and metal from quarries has been looked into. Source of offshore sand has been already identified with Geological Survey and Mines Bureau and the area is already demarcated. Ample quantities are found to be available in this area. Potential quarry sites for metal have also been identified and enough quantities could be obtained from such quarry sites.

The available sewage, drainage and other wastewater systems have been identified Similarly, information on solid waste disposal, hazardous and ship discharges have been collected. These information suggested that proper systems are badly needed for the reduction of environmental pollution in the Galle area.

A survey on flora in the Rumassala Cliff has been undertaken. The survey showed that this area consists of species common in both lowland and dry-mix lowland evergreen forests. Few species of intermediate and dry zone forests have also been found. Further some species of mangrove and coastal vegetation were also found. Only seven endemic species normally found in the lowland wet zone have been reported. Very few medicinal plants have been found in the area. The survey on algae revealed 22 species belonging to 18 genera and 12 families.

A total of 30 coral genera were recorded and only 19.6% of live coral cover was found at Bouna Vista coral reef. A total of 45 species were recorded at present. Similarly, 52 species of fish associated with coral reef belonging to 32 genera were recorded. The most common fishes within the area were damselfishes, wrasses, surgeonfish and butterfly fish. During the study, corals or fish specific to project area were not encountered. Further three live coral samples were tested for their chemical contamination and the results manifested no contamination at all.

25 major archaeological sites have been identified in the entire Galle basin of which only one major site (site F) has been located in the project area. A suitable scale varying from 1-10 is given for each site in order to identify their significance. However, with the proposed project, no major threat on such sites is found.

Population, number of families and their houses, education levels, employment pattern and their income have been recorded. Total number of 471 fishing crafts and 2,091 fishermen have been recorded in the project area. It was found that the Dewata is more likely to be affected with the proposed project. 2 Mechanized crafts, 18 traditional crafts (Oru), and 1 beach seine craft are used by 8, 40 and 50 fishermen respectively in Dewata area. About 100 people are found to be engaged in ornamental fishing in the project area.

Total number of 52,000 visitors (on average) per year is reported to visit Galle area. Number of Yachts and structures were also recorded in the detailed report.

Infrastructure facilities that are already in existence together with road network have been studied and presented in the detailed study report. In the Galle Fort, 384 building have been identified. Of these building, about 47% used bricks, 22% corals and 28% a combination of bricks and corals respectively. About 31% of these buildings were of Dutch origin and 30% British origin. Only 39%

of the buildings were considered as modern. At present only 31% of these buildings are restored or preserved. Further, landscape of the project area is also illustrated.

14.3 Anticipated Significant Impacts

Some of the environmental elements and port activities are studied under this chapter for all 4 alternatives and their impacts are given in the Table 1.

Table 1: Degree of impact caused by all alternatives on environmental elements

Environmental Element	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Water quality of Galle Bay	L	L	L	L
Sediment quality of Galle Bay	L	L	L	L
Water quality of recreational activity area	L	L	L	L
Noise levels	L	L	L	L
Air quality	L	L	L	L
Availability of reclamation material (sea sand)	L	L	L	L
Sewage, drainage and other waste water systems	L	L	L	L
Solid waste disposal	L	L	L	L
Hazardous ship cargo during discharges	L	L	L	L
Flora of Rummassala	L	L	L	L
Coral reef and its associated fauna	M	M	M	L
Marine Archeology	L	L	L	H
Fishing Ground	L	M	M	L
Fishing activities	M	M	M	L
Tourism	L	L	L	L
Transportation of Quarry Products	M	M	M	M
Galle Fort	L	L	L	H
Overall evaluation	**Good**	**Medium**	**Medium**	**Bad**

Note: L - Low; M - Medium; H – High

In this study, impacts are graded qualitatively rather than quantitatively. Table 1 depicts three major impacts such as

(i) Coral reef and its associated fauna

(ii) Fishing in the Dewata area and

(iii) Transportation of quarry products, etc.

It is apparent with the proposed project that the coral reef is subject to more sheltered environment due to the calmness introduced by breakwaters. This might lead to poor exchange of marine water of the area inside the breakwaters depriving of food and other essentials for coral growth. Further, there could be a potential for pollution probably due to chemical contamination or accidental oil spills or ship discharges, etc. Hence, its associated fish could also be adversely affected and further, the enhanced ship movement may disturb the fish movement and their spawning activities.

With the proposed project, fishing in Dewata area could be affected in terms of restricted fishing boat movement for reasons of security and the fish catch which might be reduced. It is clear from the alternatives that the alternative 1 gives the least disturbance for the fishing ground. Even the beach seine fishing could be carried out with the alternative 1 without much hindrance.

Transport of quarry products is another significant impact which has to be dealt in detail. About 250 truckloads per-day have to be brought in during the construction period for the construction of breakwater and other structures. This could heavily impose traffic congestion particularly in the Galle – Matara Road (A2 road) causing inconvenience to public.

14.4 Mitigation Measures for Significant Impacts

Mitigation measures only for significant impacts are described here.

In the event of coral reef and its associated fauna, current velocity measurement on the coral reef is proposed and is in progress. Sedimentation rate of silt and other sediments and current velocity play a major role in the survival of corals. For this reason, it is necessary to implement measures for minimization of sedimentation over coral reef by installing silt contains particularly during construction phase. Further, phisical disturbance to ecological balance in the reef area by ship traffic should be avoided to the maximum extent possible. Care must also be taken to have oil contingency plan besides making clean-up equipment available in case of accidental oil spills. In addition to the above mitigation measures, re-plantation of corals in other suitable sites such as Galle Fort area, Unawatuna and leeward side of outer breakwater is proposed by way of additional measures.

For fishing in the Dewata area, fishermen should be either allowed to keep their activities as they are or they should be treated by the appropriate measures including relocation if their activities are not allowed due to security and other reasons. It is advisable that some possible measures should be pursued by SLPA for the policy of amicable coexistence and co-prosperity between SLPA and the fishermen who are likely to be affected by the project, and that an appropriate ad hoc

organization should be set up between both parties to discuss and decide on mutually agreeable measures for achieving the said objective. During such discussions it may be conceivable that SLPA will propose supplying those fishermen operating traditional local fishing boats with upgraded boats to enable them to operate in deeper waters outside Galle Bay for increased fish catches.

Transport of metals from quarries is another adverse impact in the project area. A large number of heavy vehicles coming in to the port through public roads would undoubtedly create traffic congestion in the roads. Conveyance of material through Galle town area must be completely stopped and instead, alternative routes should be looked for. Present status of routes must be improved whenever necessary in order to bring heavier loads in to the port. Designated site for storage of such material has to be demarcated with adequate space so that the truck waiting time could be reduced. Proper coordination with Road Development Authority is advisable in view of maintaining of improving the existing road network.

14.5 Monitoring Plan

Monitoring plan is also given here only for significant impacts. Monitoring plan is to be implemented both during construction and operation phases.

In the case of coral reef and its associated fish, diversity and abundance must be monitored. In addition coral cover must be identified from time to time. If cleanup processes are necessary, such programmes are implemented with wider participation from relevant authorities.

In the case of fisheries, records on fish catch must be collected from season to season. This would give an idea of fish abundance in the project area. Number of fishermen and their fishing techniques must also be recorded regularly. Fisherman organization is to be set up for Dewata area so that proper communication with SLPA could be channeled through it. Working – time zone for fishermen must be drafted for their movement so that they could avoid the time periods during which ships call in the proposed port.

Vehicular movement must be monitored so as to minimize the traffic congestion in public roads.

APPENDIX

Table A.3.2.1 (1) Frequency of Wind Occurrence (%)

March April

U (Knot) \ Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
0.0- 4.9	1.8	0.0	9.5	0.0	2.7	0.0	5.4	0.0	1.7	0.0	27.0	0.1	3.4	0.0	3.2	0.1	9.2	64.3
5.0- 9.9	0.1	0.0	3.8	0.0	1.5	0.0	3.6	0.2	0.4	0.2	18.9	0.0	1.7	0.0	2.4	0.0	0.0	32.7
10.0-14.9	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.1	0.0	0.3	0.0	0.0	2.8
15.0-19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
20.0-24.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.0-29.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0-34.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.0-39.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.0-44.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.0-49.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0-54.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.0-59.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.0-64.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.0-69.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	1.9	0.0	13.6	0.0	4.3	0.0	9.0	0.2	2.1	0.2	48.2	0.1	5.2	0.0	5.9	0.1	9.2	100.0

May ～ Sep.

U (Knot) \ Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
0.0- 4.9	0.3	0.0	0.8	0.0	0.2	0.0	0.6	0.0	0.1	0.0	17.3	0.0	1.5	0.0	3.8	0.0	1.0	25.7
5.0- 9.9	0.1	0.0	0.3	0.0	0.1	0.0	0.1	0.0	0.3	0.0	39.8	0.0	3.6	0.0	10.3	0.0	0.0	54.5
10.0-14.9	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9	0.0	1.0	0.0	5.3	0.0	0.0	15.3
15.0-19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.2	0.0	1.2	0.0	0.0	4.3
20.0-24.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2
25.0-29.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0-34.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.0-39.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.0-44.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.0-49.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0-54.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.0-59.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.0-64.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.0-69.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.4	0.0	1.2	0.0	0.3	0.0	0.7	0.0	0.4	0.0	69.2	0.0	6.2	0.0	20.6	0.0	1.0	100.0

Table A.3.2.1 (2) Frequency of Wind Occurrence (%)

Oct. Nov.

U (Knot) \ Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
0.0- 4.9	0.7	0.0	3.5	0.0	0.7	0.0	3.2	0.0	0.7	0.0	26.3	0.0	3.1	0.0	4.0	0.0	8.2	50.4
5.0- 9.9	0.4	0.0	0.8	0.0	0.8	0.0	0.9	0.0	0.0	0.0	29.5	0.0	4.1	0.0	5.6	0.0	0.0	42.1
10.0-14.9	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	5.1	0.0	1.2	0.0	0.8	0.0	0.0	7.3
15.0-19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
20.0-24.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.0-29.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0-34.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.0-39.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.0-44.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.0-49.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0-54.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.0-59.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.0-64.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.0-69.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	1.2	0.0	4.4	0.0	1.5	0.0	4.3	0.0	0.7	0.0	61.0	0.0	8.4	0.0	10.4	0.0	8.2	100.0

Dec. ~ Feb.

U (Knot) \ Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
0.0- 4.9	0.8	0.0	16.1	0.0	4.4	0.0	3.8	0.0	3.0	0.0	20.7	0.0	2.6	0.0	7.6	0.0	10.7	69.6
5.0- 9.9	0.2	0.0	2.6	0.0	1.3	0.0	1.2	0.0	0.9	0.0	16.5	0.0	1.3	0.0	4.6	0.0	0.0	28.6
10.0-14.9	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.7	0.0	0.0	1.7
15.0-19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2
20.0-24.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25.0-29.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0-34.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.0-39.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.0-44.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.0-49.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0-54.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.0-59.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.0-64.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.0-69.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.9	0.0	18.8	0.0	5.7	0.0	4.9	0.0	3.8	0.0	38.3	0.0	3.9	0.0	12.9	0.0	10.7	100.0

Table A.3.2.1 (3) Frequency of Wind Occurrence (%)

Annual

U (Knot) \ Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM	TOTAL
0.0- 4.9	0.7	0.0	6.5	0.0	1.8	0.0	2.6	0.0	1.2	0.0	21.3	0.0	2.3	0.0	4.7	0.0	6.0	47.2
5.0- 9.9	0.2	0.0	1.5	0.0	0.7	0.0	1.1	0.0	0.4	0.0	28.8	0.0	2.8	0.0	6.8	0.0	0.0	42.4
10.0-14.9	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	0.0	0.6	0.0	2.5	0.0	0.0	8.5
15.0-19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.1	0.0	0.5	0.0	0.0	1.9
20.0-24.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
25.0-29.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.0-34.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35.0-39.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40.0-44.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45.0-49.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.0-54.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55.0-59.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60.0-64.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65.0-69.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.9	0.0	8.2	0.0	2.5	0.0	3.7	0.0	1.6	0.0	56.6	0.0	5.8	0.0	14.5	0.0	6.0	100.0

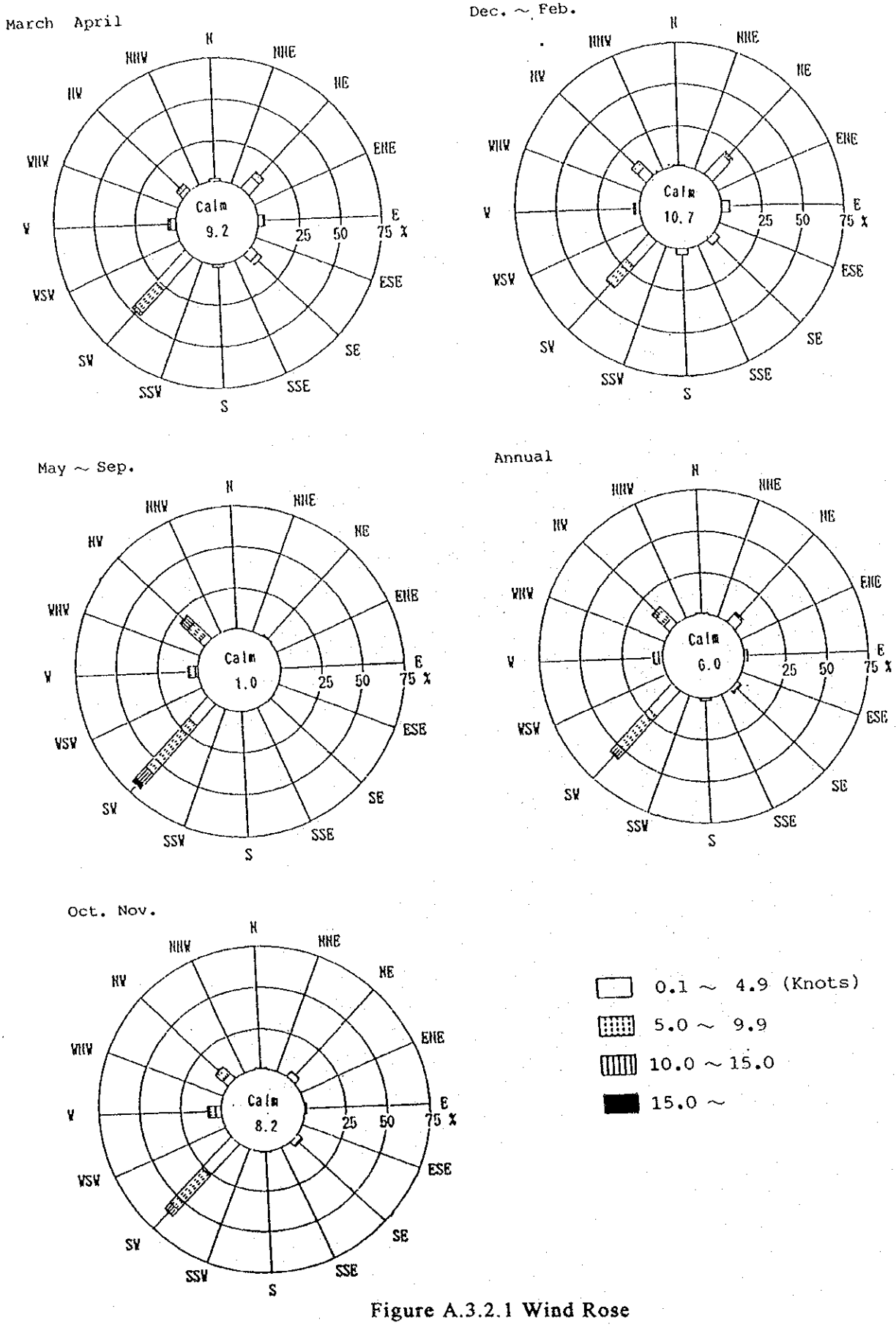


Figure A.3.2.1 Wind Rose

Table A.3.2.2 Temperature and Humidity (Jan. 1980～Dec. 1989)

MONTH	TEMPERATURE (°C)				HUMIDITY(%) MEAN	
	MAXIMUM		MINIMUM			
	MEAN	HIGHEST	MEAN	LOWEST	DAY	NIGHT
Jan.	29.1	31.8	23.2	20.5	78.2	88.6
Feb.	30.1	34.1	23.2	21.5	72.8	86.0
Mar.	30.9	35.4	24.3	20.9	73.6	87.0
Apr.	30.9	34.6	25.3	21.7	78.2	88.2
May.	30.1	32.6	25.7	22.3	81.6	88.8
Jun.	29.0	30.6	25.4	21.2	88.3	87.4
Jul.	28.6	30.4	25.1	21.7	84.2	90.2
Aug.	28.4	30.4	25.0	22.3	85.8	89.4
Sep.	28.7	30.6	24.9	21.9	82.8	88.0
Oct.	29.0	32.5	24.4	22.0	81.7	89.2
Nov.	29.4	32.8	23.5	21.3	79.2	89.4
Dec.	29.4	32.2	23.4	21.2	79.0	91.3
Total	353.6		293.4		960.4	1063.5
Mean	29.5		24.5		80.0	88.6
Max.		35.4		20.5		

Table A.3.2.3 Rainfall

YEAR		Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	ANNUAL
1980	1	125.8	4.6	63.4	175.3	102.3	126.5	61.3	148.8	416.4	244.5	286.0	253.3	2008.2
	2	7	3	7	21	14	23	19	19	18	19	19	10	179
	3	43.2	3.6	26.3	30.7	51.1	22.9	10.1	44.8	192.1	44.8	76.5	100.9	192.1
1981	1	102.0	83.2	88.7	273.0	394.0	52.8	44.5	147.9	148.0	239.9	305.9	205.8	2085.7
	2	7	8	10	15	22	11	15	17	22	16	10	10	163
	3	45.8	23.0	35.2	97.1	106.9	10.7	10.6	37.4	50.2	58.2	90.8	65.4	106.9
1982	1	17.3	1.8	151.3	421.3	322.0	235.4	191.9	158.6	174.3	218.6	577.1	87.3	2556.9
	2	3	1	14	7	17	21	20	12	23	18	25	14	175
	3	13.4	1.8	47.6	139.6	105.6	38.4	34.4	118.1	69.4	38.3	158.3	30.2	158.3
1983	1	76.4	0.6	54.5	18.7	110.1	122.6	113.5	150.7	338.0	180.2	144.6	240.0	1549.9
	2	7	1	3	3	14	17	17	22	25	16	10	14	149
	3	49.8	0.6	44.2	14.6	31.6	28.4	21.8	19.1	33.0	41.7	39.8	56.7	49.8
1984	1	212.0	102.1	60.5	304.2	466.4	208.0	149.6	18.8	208.1	98.8	310.3	106.6	2245.4
	2	16	8	7	19	20	23	19	5	11	14	20	7	169
	3	59.6	46.7	19.1	62.8	93.3	48.7	24.5	8.7	60.8	20.4	89.8	74.1	93.3
1985	1	139.4	114.0	91.7	82.1	212.5	402.2	71.6	229.3	159.2	252.9	224.1	240.7	2219.7
	2	11	9	15	13	23	24	17	23	15	16	18	15	199
	3	35.3	26.8	22.2	44.0	45.0	53.8	22.9	115.1	35.9	87.8	58.5	46.2	115.1
1986	1	63.2	60.1	151.8	148.8	224.1	79.1	31.9	90.3	122.0	225.3	313.0	186.4	1694.0
	2	9	6	17	13	13	15	13	15	20	19	21	15	176
	3	29.8	34.0	29.5	27.3	51.7	17.8	11.1	20.0	30.0	42.0	65.3	47.7	65.3
1987	1	87.7	3.7	5.1	242.6	140.6	237.2	8.1	476.9	334.1	523.5	335.3	71.7	2466.5
	2	13	3	4	15	13	18	8	26	19	24	19	8	172
	3	19.0	2.4	2.1	55.8	48.8	84.1	3.0	59.1	107.1	50.8	103.7	23.4	107.1
1988	1	92.0	114.1	225.4	222.7	228.1	328.4	224.7	301.9	249.3	60.1	260.7	83.6	2391.0
	2	8	13	13	17	21	22	23	23	17	7	0	9	173
	3	66.9	69.7	106.7	73.6	72.0	109.8	41.6	46.4	44.4	16.5	139.8	40.2	139.8
1989	1	86.7	23.0	68.6	322.1	386.1	228.7	141.1	118.9	179.2	428.9	284.0	58.0	2325.3
	2	13	4	5	17	21	14	15	14	23	16	19	7	168
	3	18.4	16.3	29.3	104.7	110.0	49.1	36.3	38.9	41.6	82.2	96.1	19.8	110.0
MEAN	1	100.2	50.7	96.1	221.1	258.6	202.1	103.8	184.2	232.9	247.1	304.1	153.3	2154.3
MEAN	2	9.4	5.6	9.5	14.0	17.8	18.8	16.6	17.8	19.3	16.5	17.9	10.9	174.1
MAX	3	66.9	69.7	106.7	139.6	106.9	109.8	41.6	118.1	192.1	87.8	158.3	100.9	192.1

Note : 1.Monthly Rainfall (mm)
2.Number of Rainy Days
3.Heaviest Rainfall (mm/day)

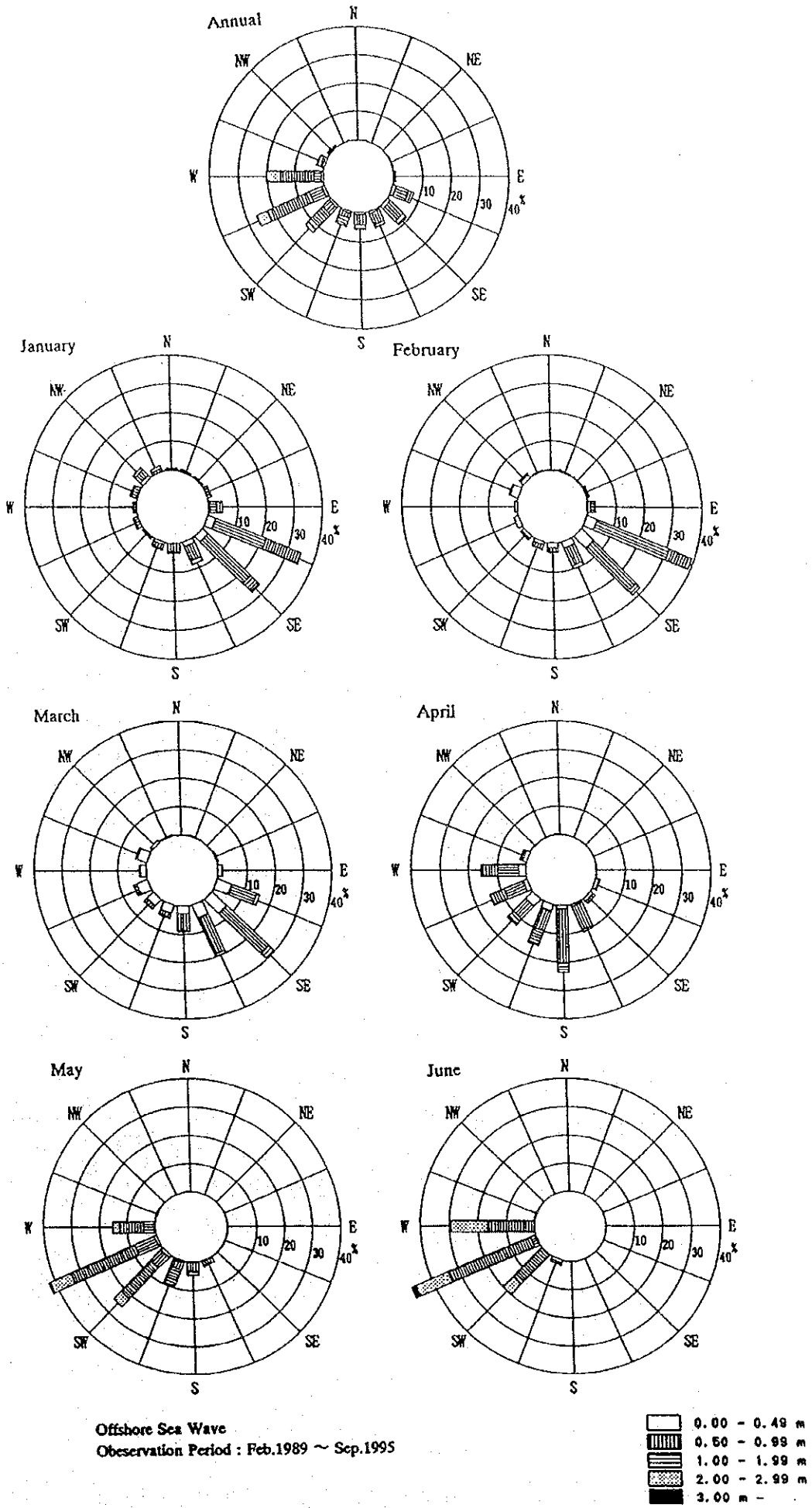


Figure A.3.3.1(1) Distribution of Significant Wave Height and Direction (Offshore Sea Wave)

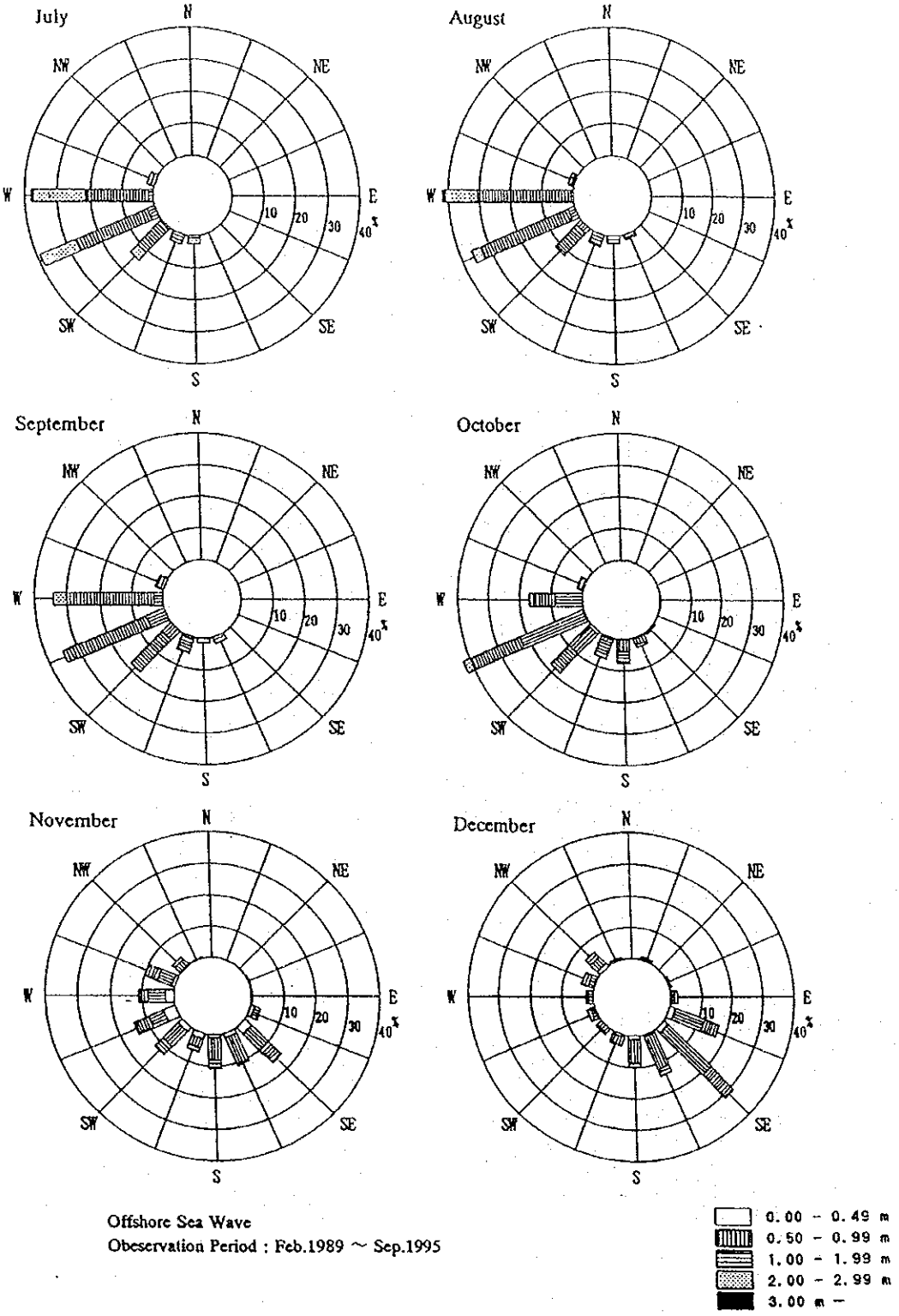


Figure A.3.3.1(2) Distribution of Significant Wave Height and Direction (Offshore Sea Wave)

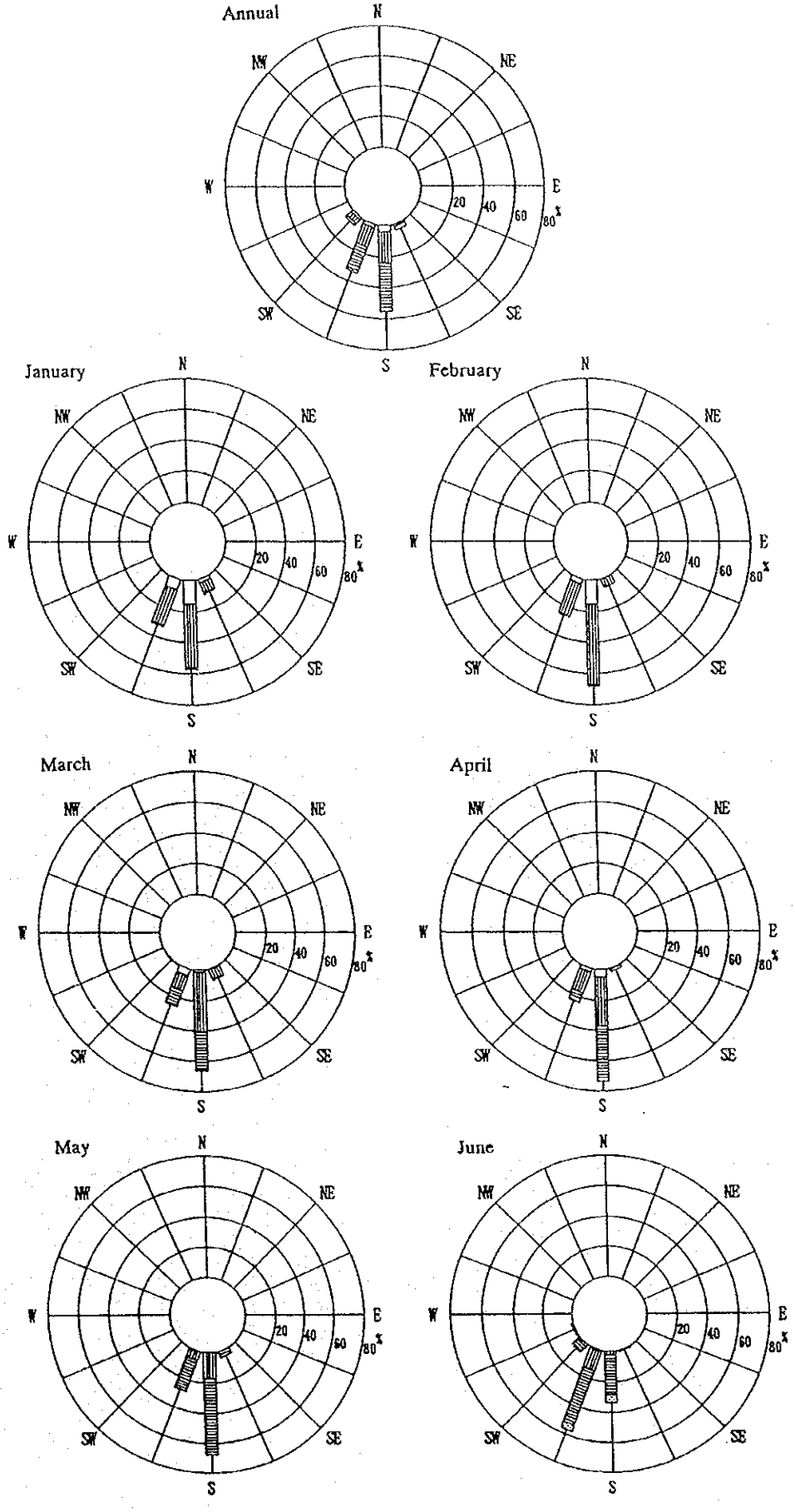


Figure A.3.3.2(1) Distribution of Significant Wave Height and Direction (Offshore Swell)

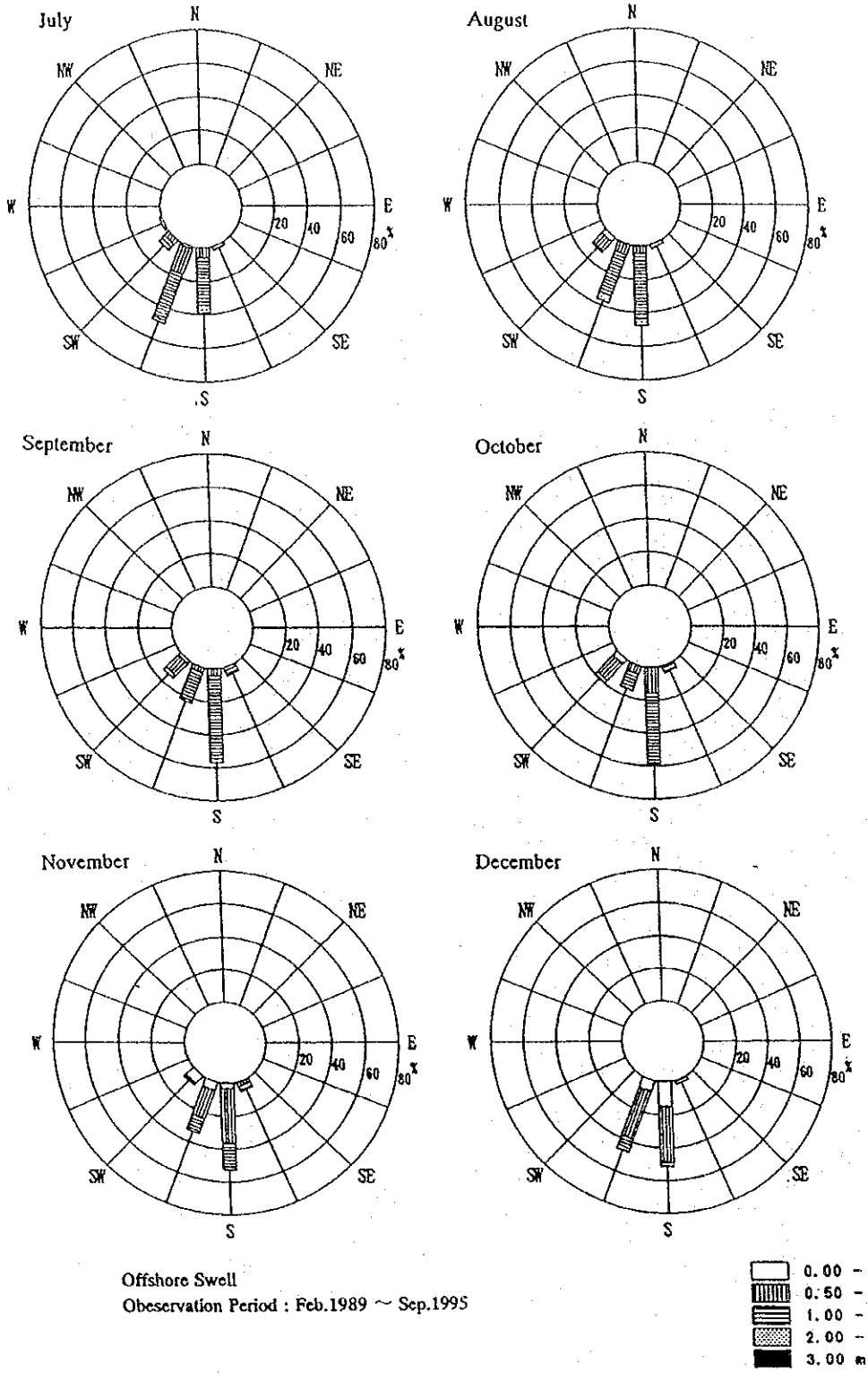


Figure A.3.3.2(2) Distribution of Significant Wave Height and Direction (Offshore Swell)

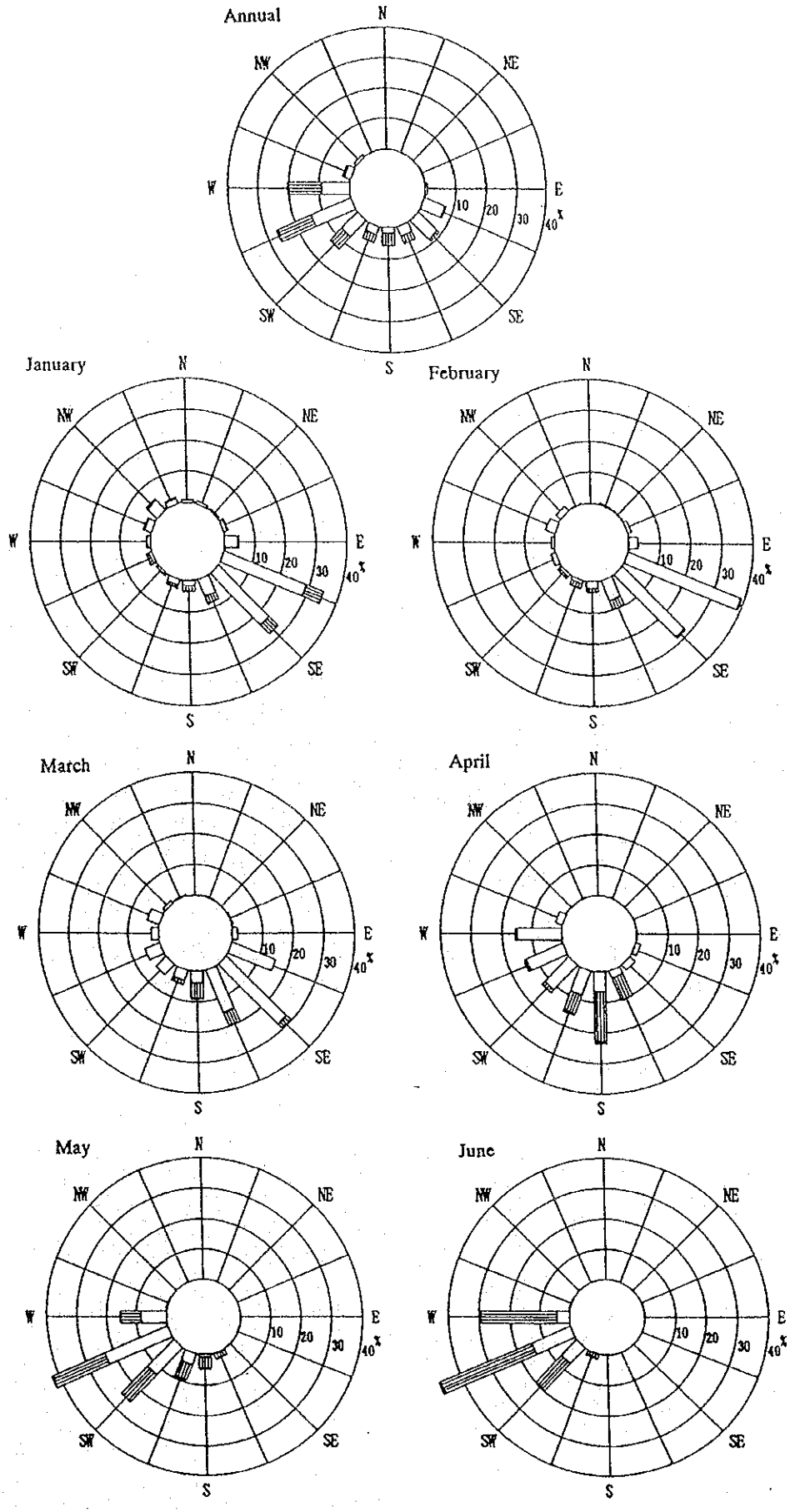


Figure A.3.3.3(1) Distribution of Significant Wave Period and Direction (Offshore Sea Wave)

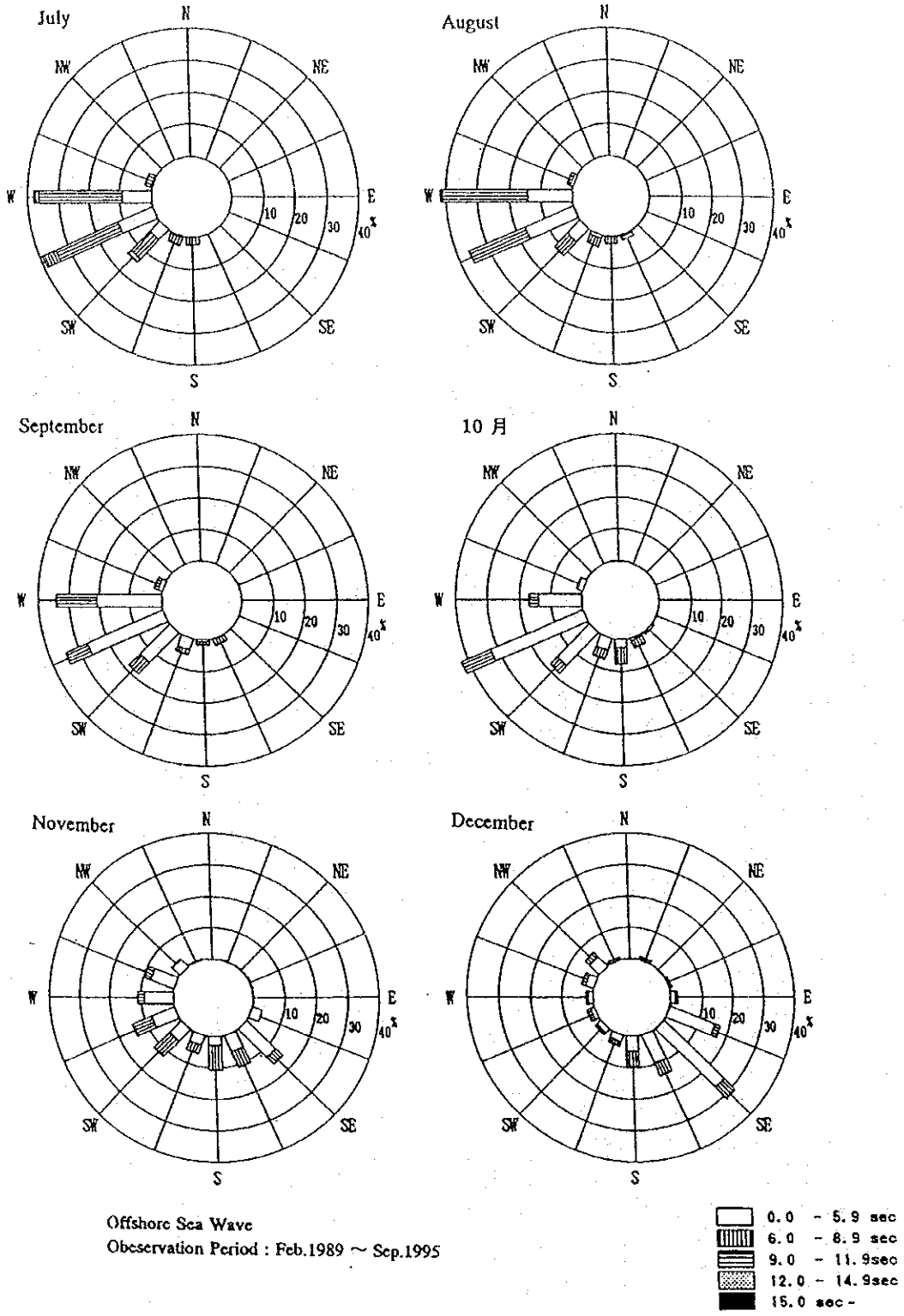


Figure A.3.3.3(2) Distribution of Significant Wave Period and Direction (Offshore Sea Wave)

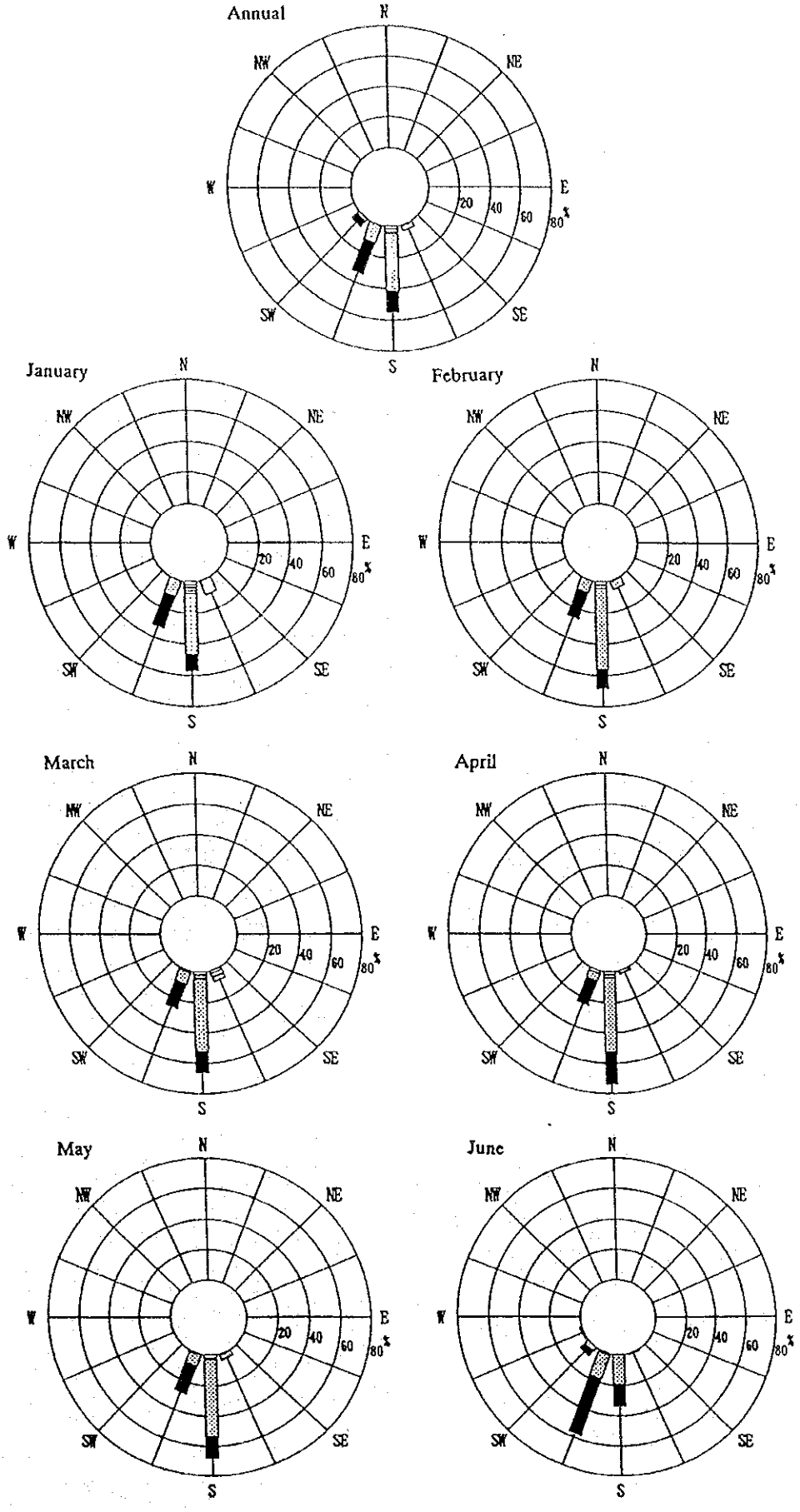


Figure A.3.3.4(1) Distribution of Significant Wave Period and Direction (Offshore Swell)

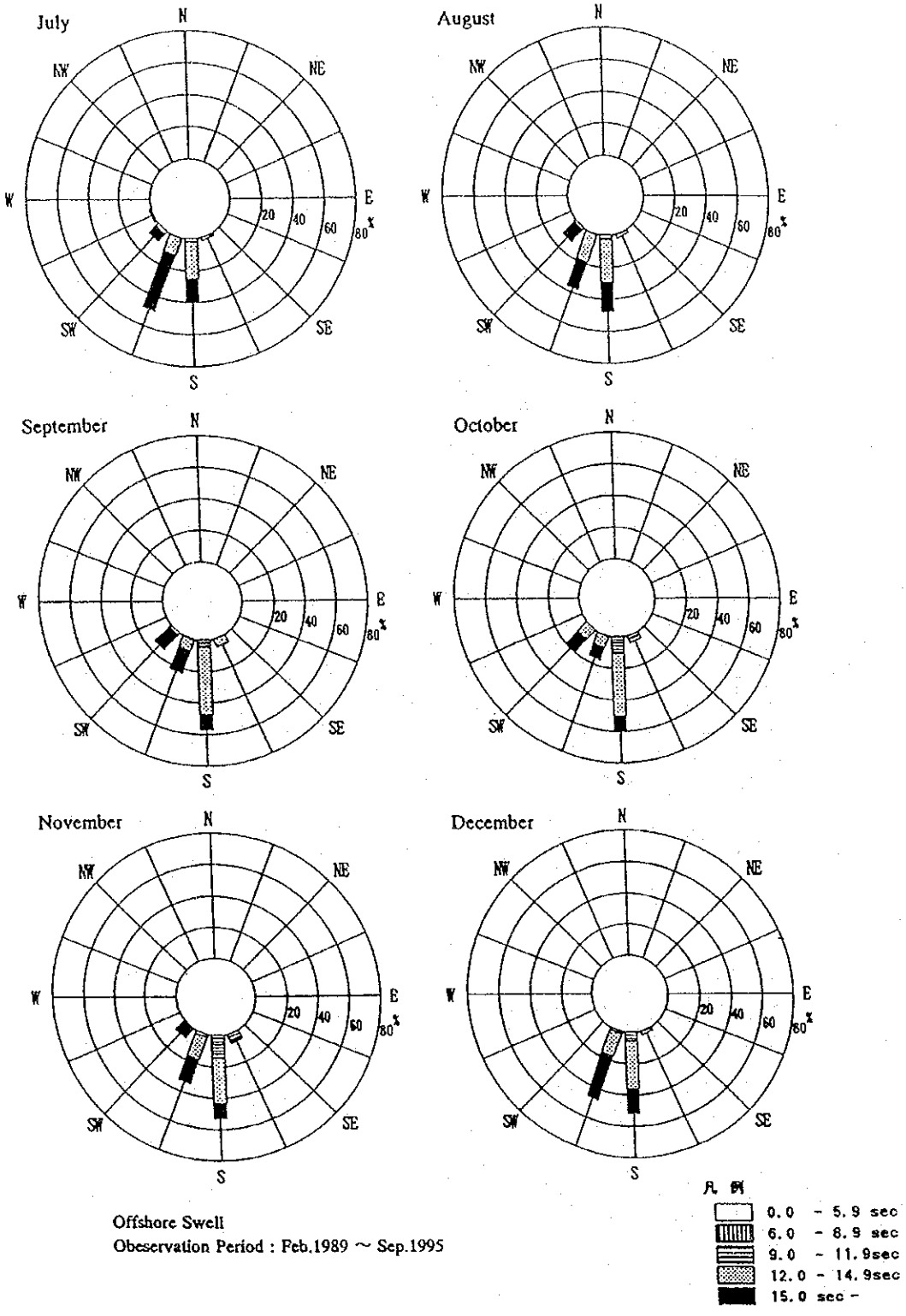


Figure A.3.3 4(2) Distribution of Significant Wave Period and Direction (Offshore Swell)

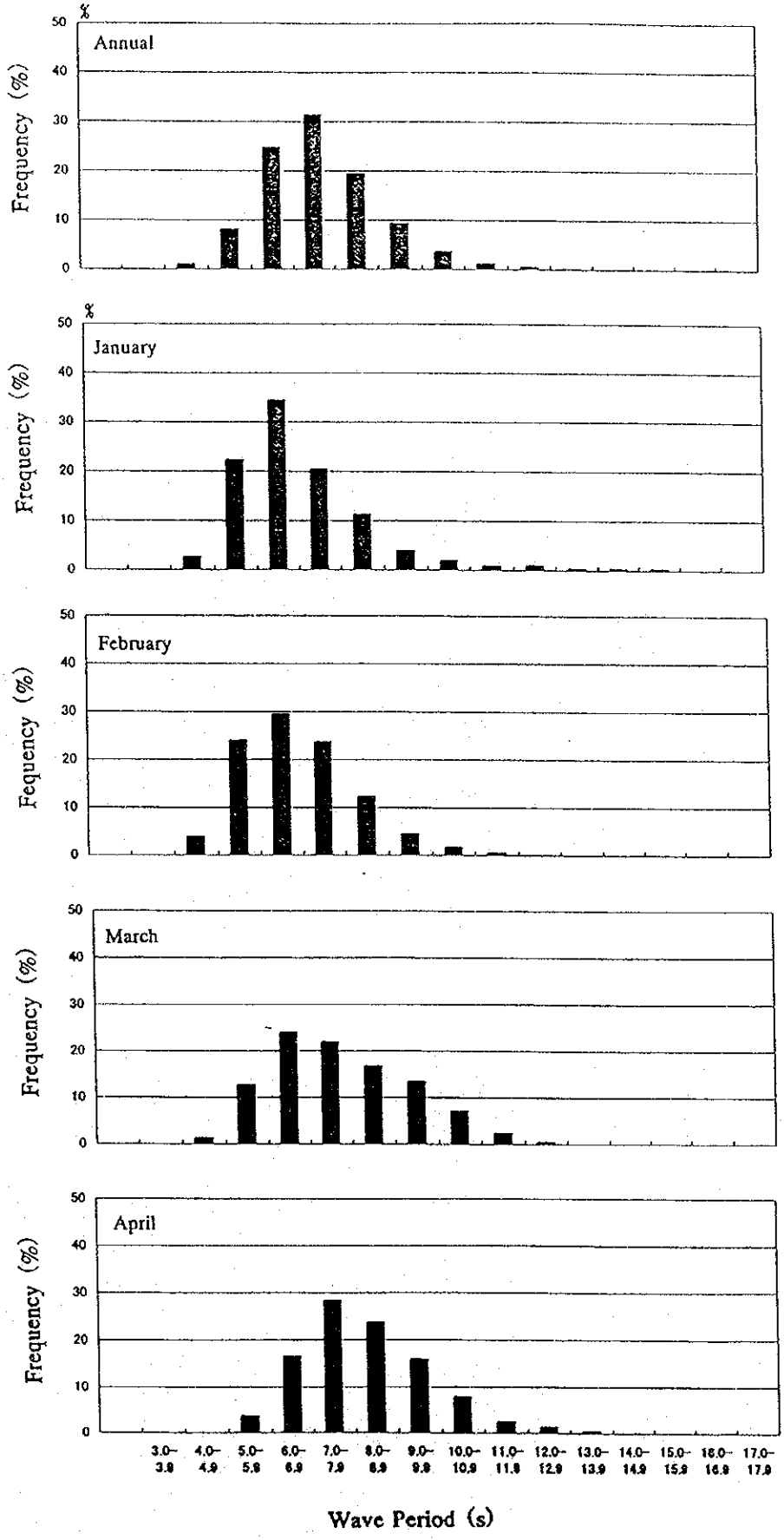


Figure A.3.3.5(1) Distribution of Significant Wave Period (Nearshore Wave)

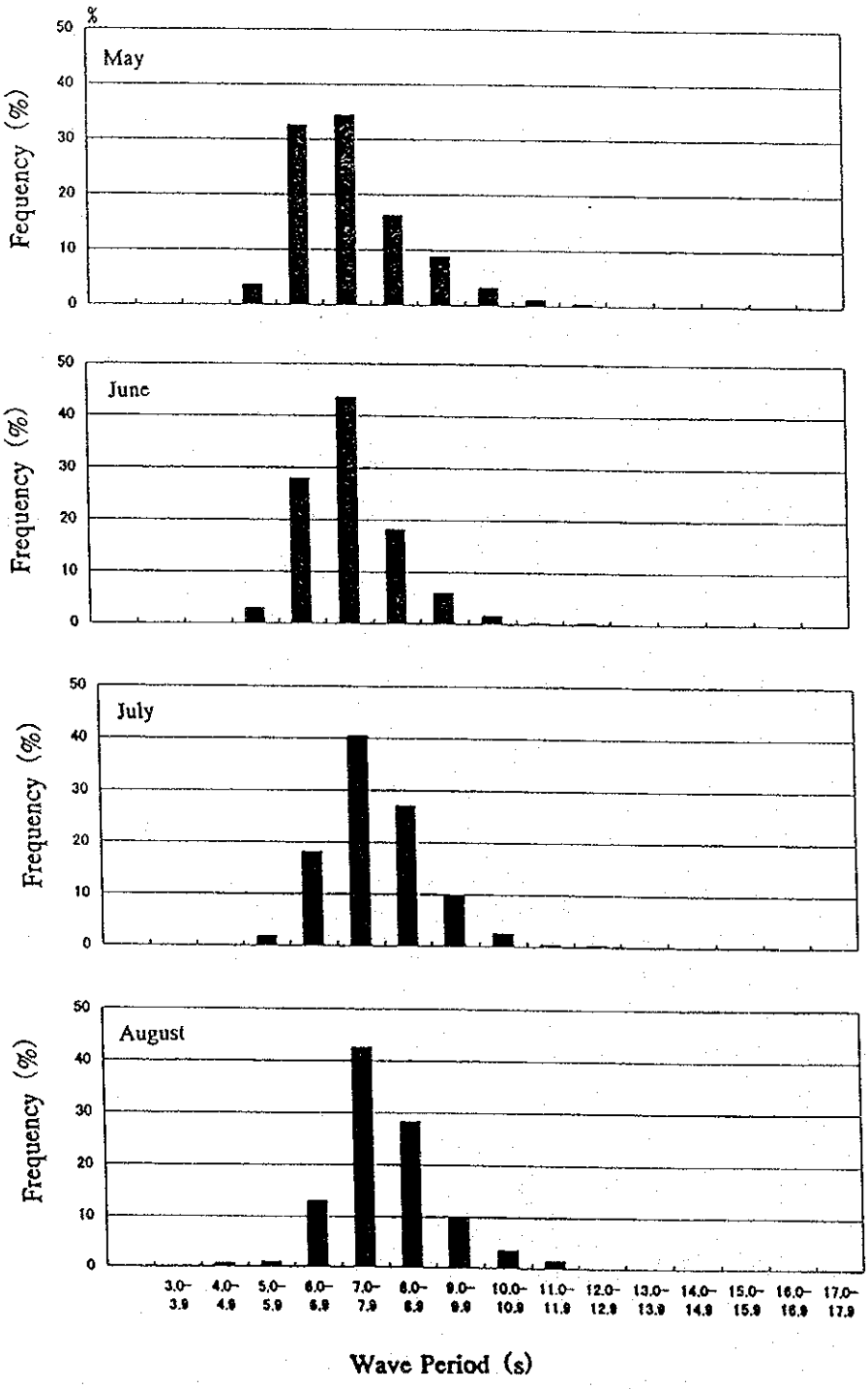


Figure A.3.3.5(2) Distribution of Significant Wave Period (Nearshore Wave)

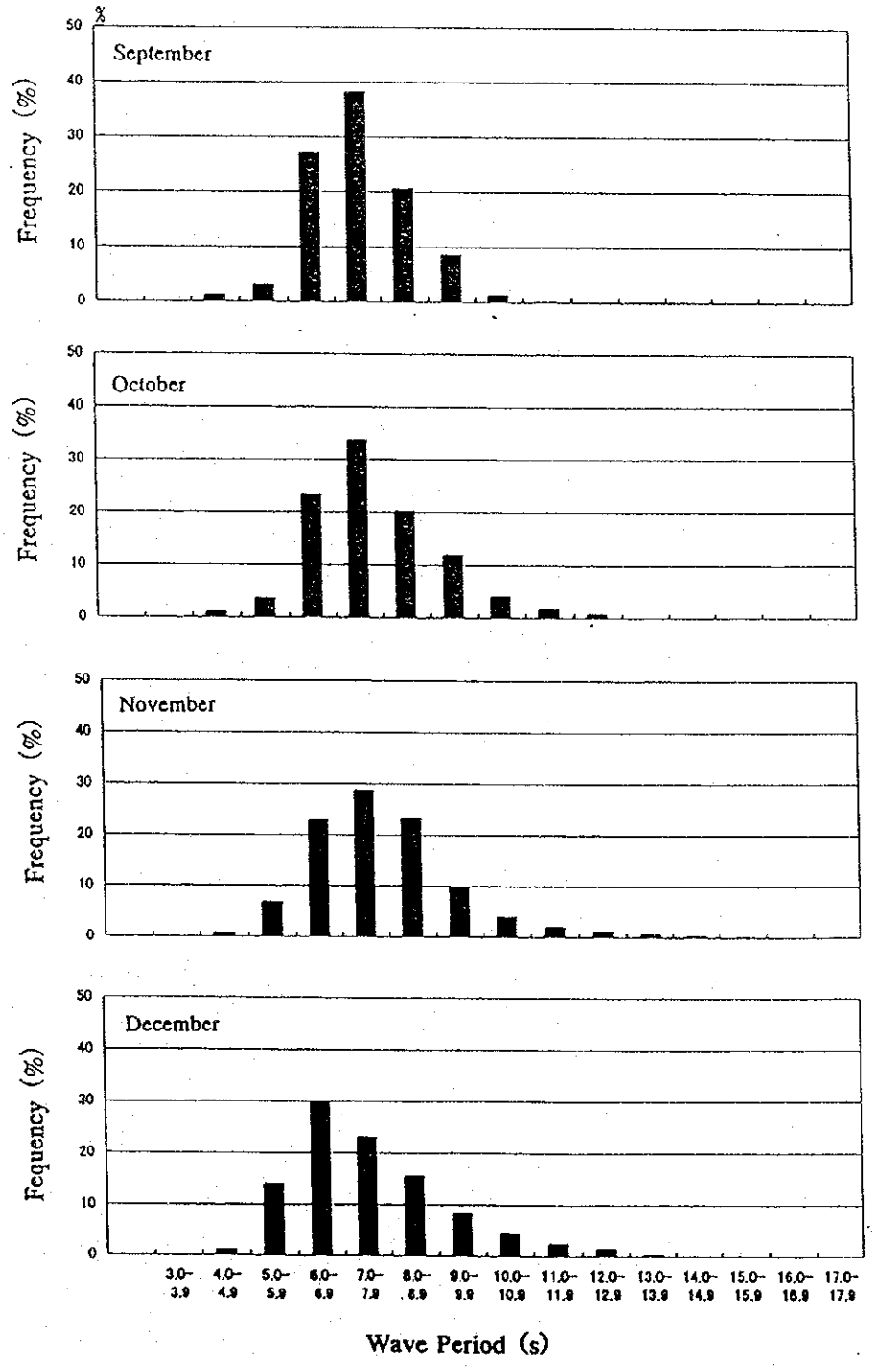


Figure A.3.3.5(3) Distribution of Significant Wave Period (Nearshore Wave)

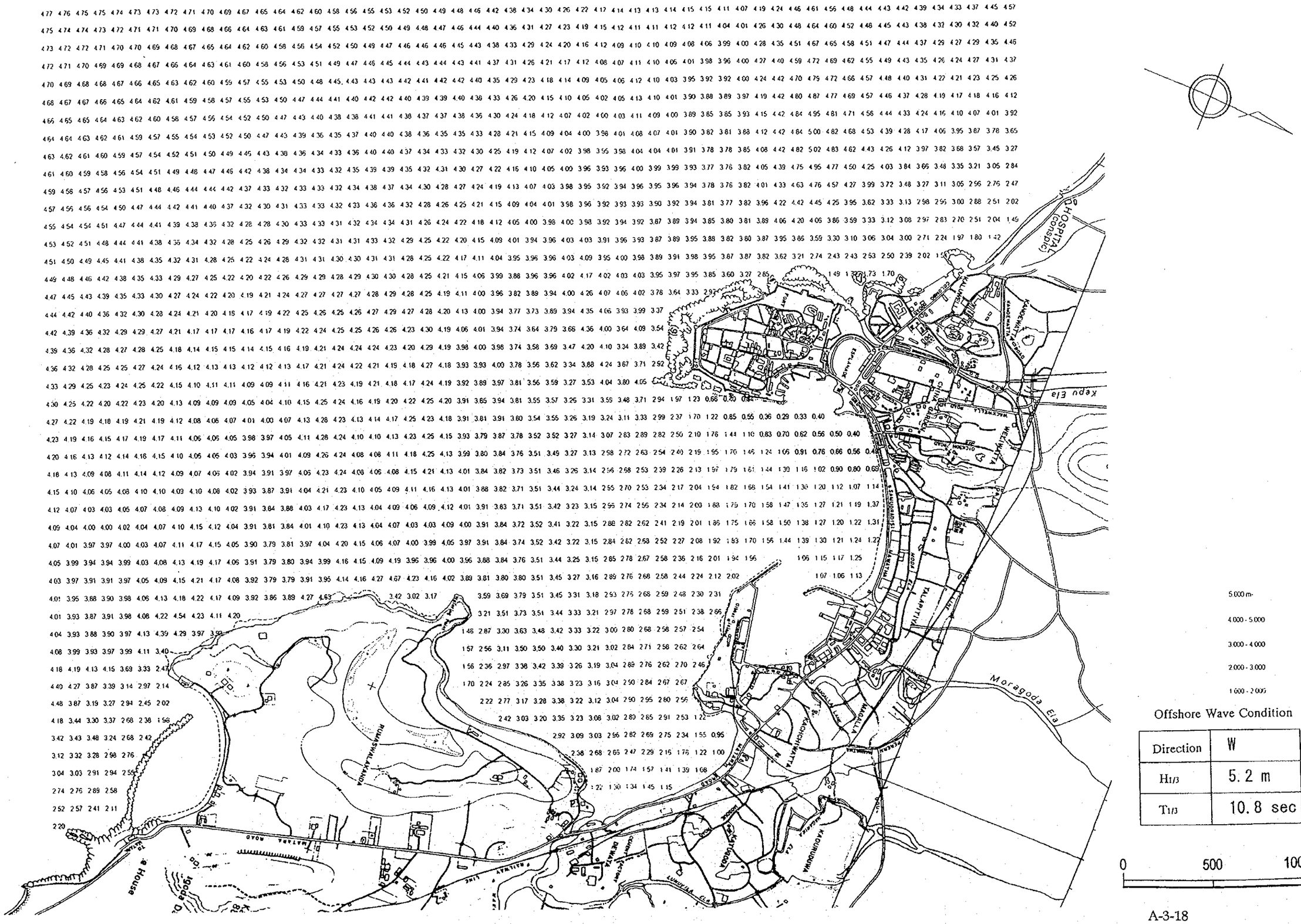


Figure A.3.3.6 Significant Wave Heights (50Year Wave, Wave Direction W)

Figure A.3.3.7 Significant Wave Heights (50Year Wave, Wave Direction SW)

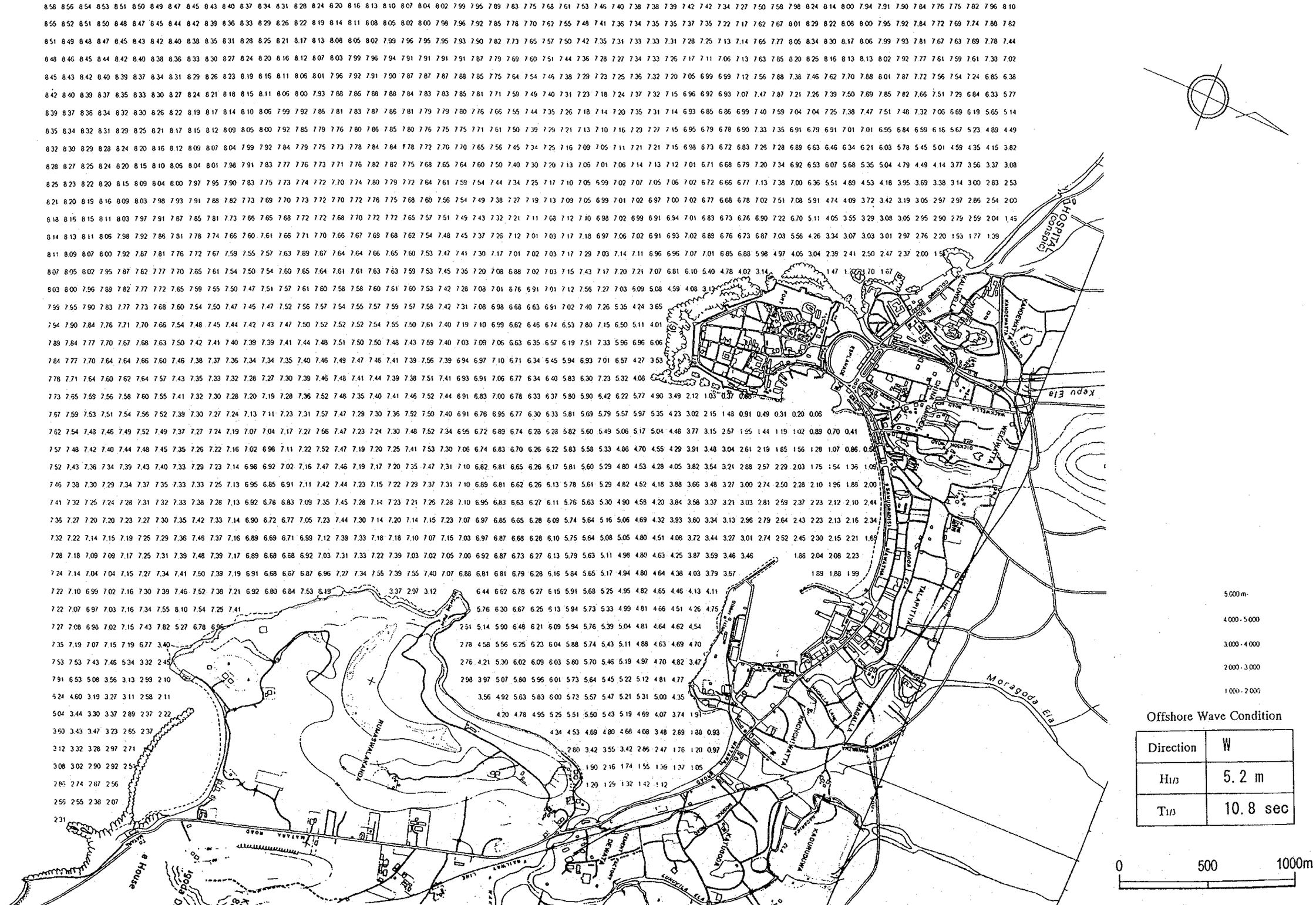


Figure A.3.3.8 Maximum Wave Heights (50Year Wave, Wave Direction W)

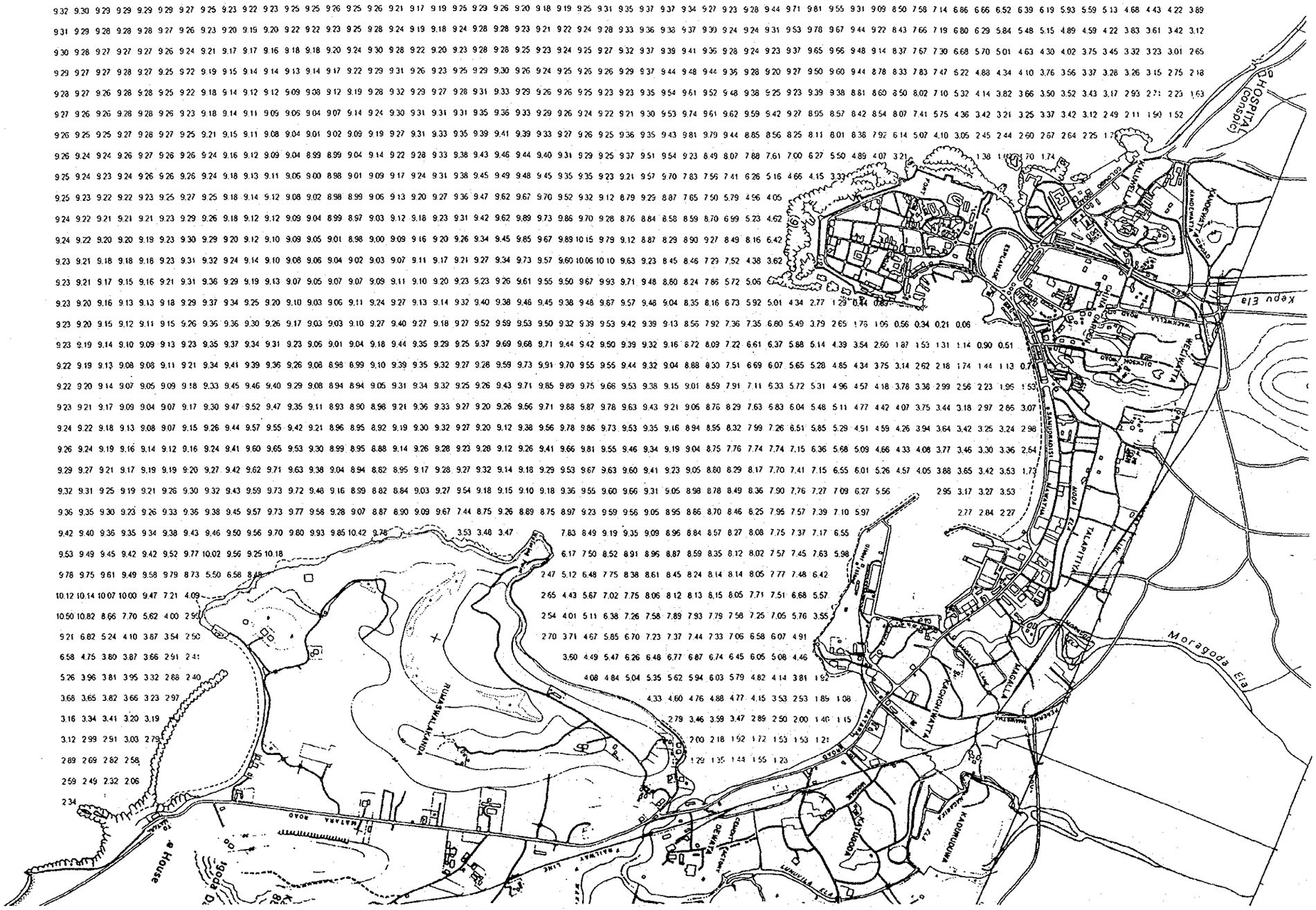
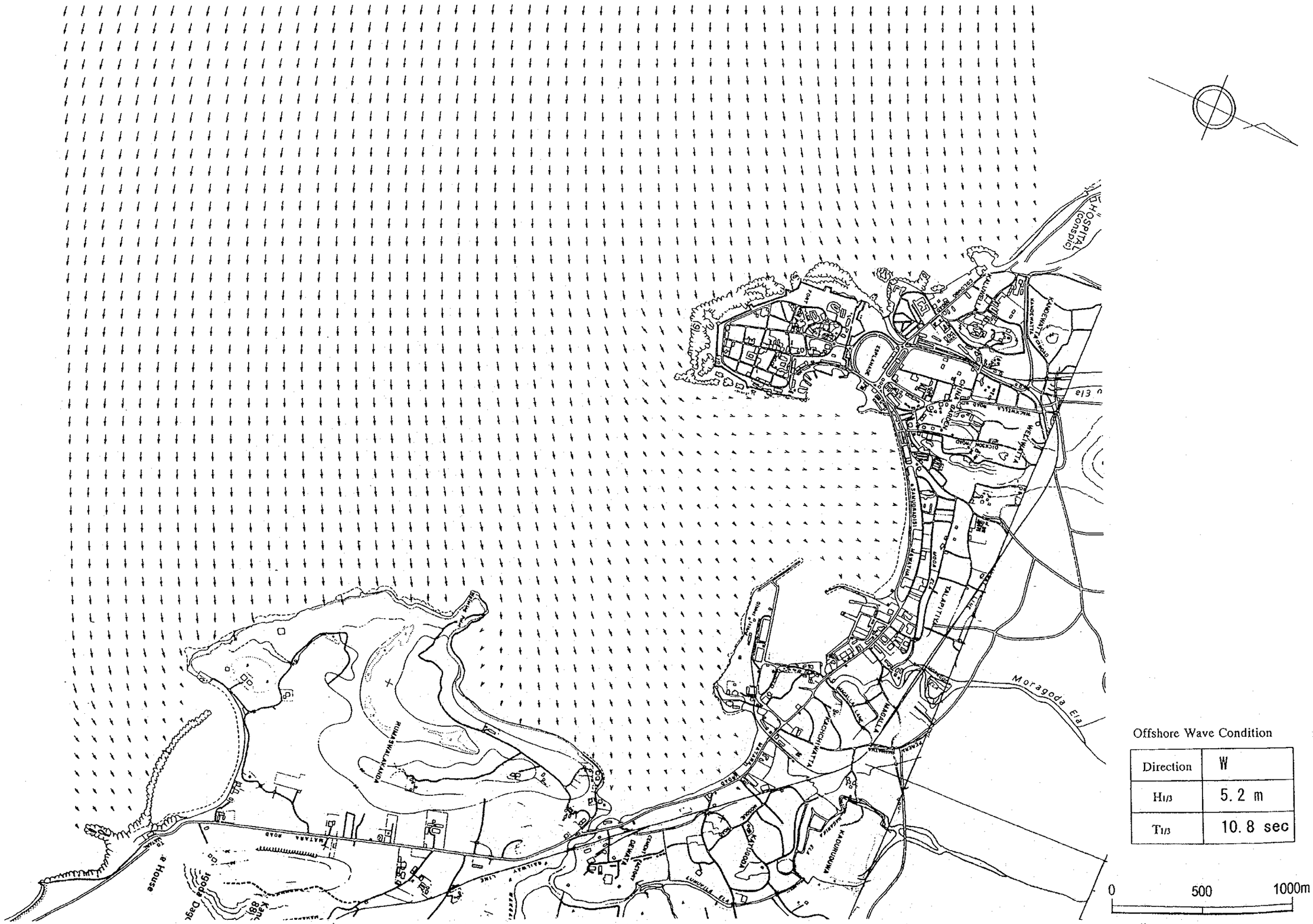


Figure A.3.3.9 Maximum Wave Heights (50Year Wave, Wave Direction SW)



Offshore Wave Condition

Direction	W
$H_{1/3}$	5.2 m
$T_{1/3}$	10.8 sec

Figure A.3.3.10 Wave Vectors (50Year Wave, Wave Direction W)

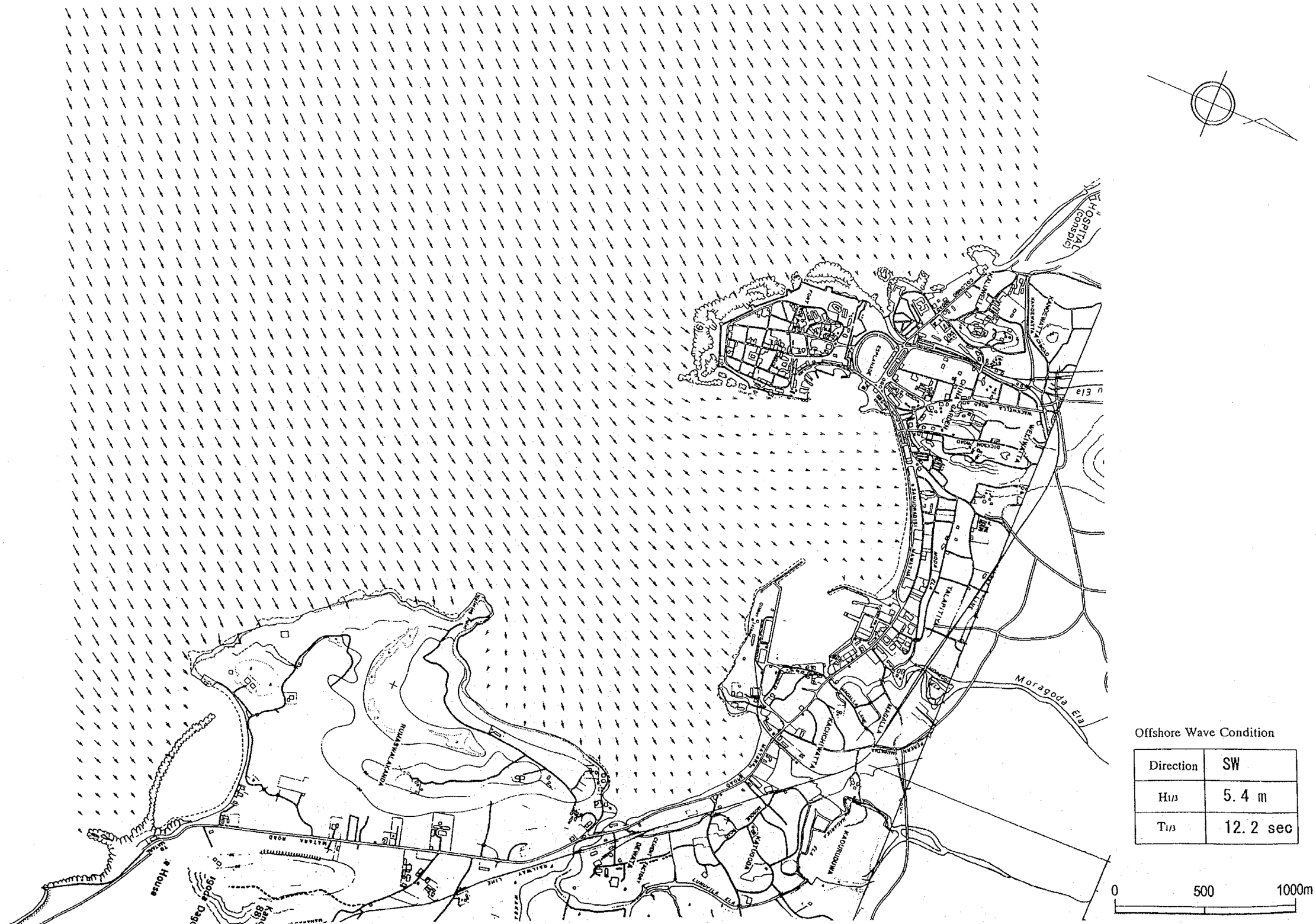


Figure A.3.3.11 Wave Vectors (50Year Wave, Wave Direction SW)

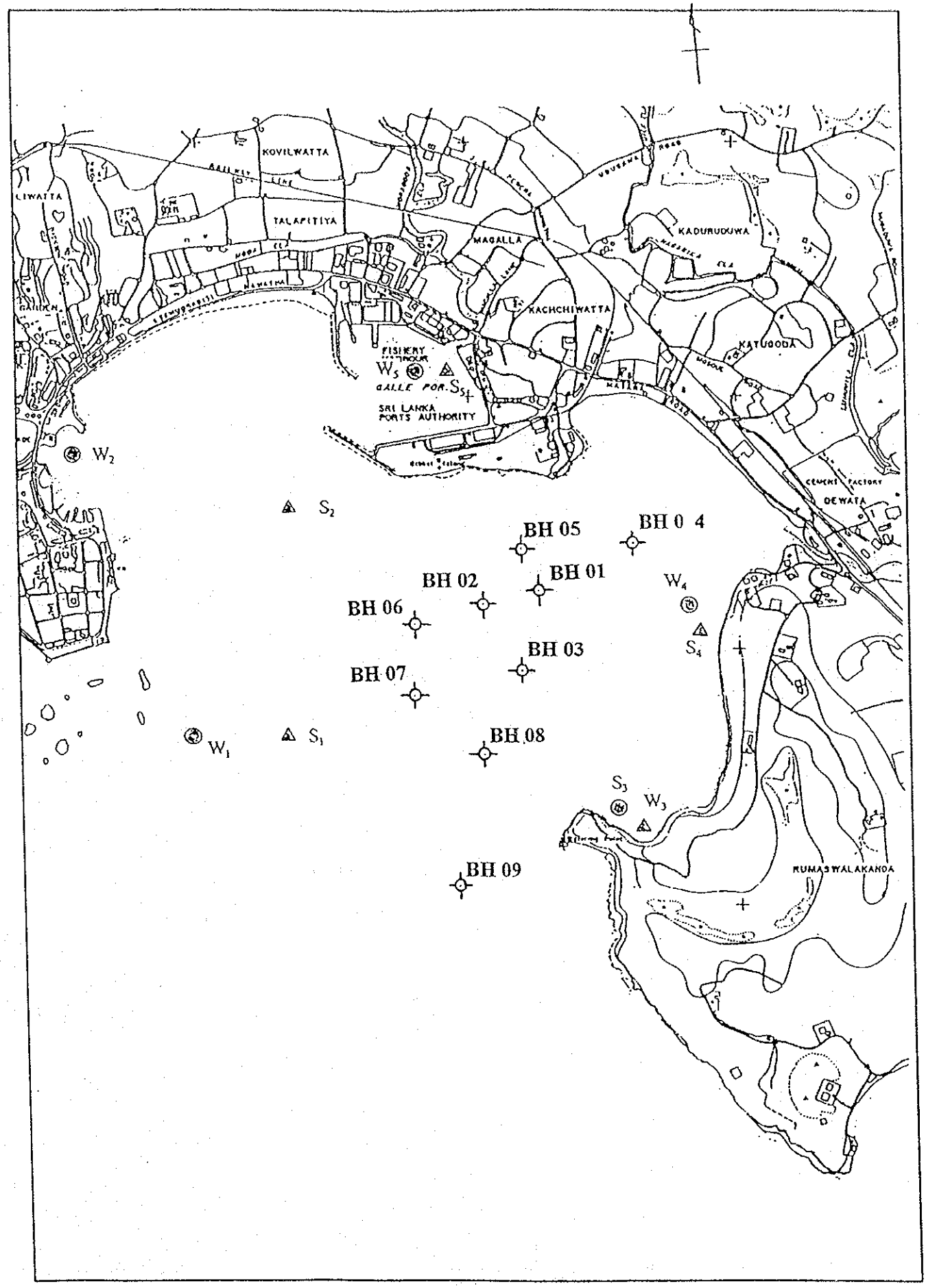


Figure A.3.4.1 (1) Boring Position

GEOLOGICAL RECORD OF BORING

Date of Drilling: 18-19/03/2000

Project : Galle Port Dervelopment Project		Angle from the vertical:	0
Bore Hole Number : BH 01	Depth of Hole (m)	12.20	
Ground Ele. (m) :	Depth to the ground water level (m)		
Dia of the hole (mm) : 100	Logged By	BSY	

Elevation (m)	Depth (m)	Thickness (m)	Field Observations: Column Section	Soil / Rock Classifn.	Colour	Description
0.00 -9.95						
0.50					Grayish brown	Very soft to medium stiff very fine sand mixed with silt, mica, sea shells and coarse sand
1.00				ML		
1.50						
2.00 -11.85	1.90	1.90				
2.50						Soft / very loose silt / very fine to coarse sand with silt mica and sea shells
3.00 -12.85	2.90	1.00		ML / SM	- do -	
3.50						
4.00					Grayish brown	very loose fine to coarse sand with around 1% plastic fines, silt and some sea shells
4.50						
5.00				SC		
5.50					Yello-wish brown	
6.00						
6.50 -16.85	6.90	4.00				
7.00						
7.50					Reddish to gray-ish brown	Very stiff moderately plastic clay mixed with some sand and gravels
8.00				CL		
8.50						
9.00 -18.85	8.90	2.00				
9.50 -19.71	9.76	0.86		SM	Grayish brown	Completely decomposed rock in the form of extremely dense silty sand mixed with mica
10.00						
10.50						
11.00						Very slightly weathered massive bed rock C/R = 40% RQD = 22%
11.50				Ch. Gn.		
12.00 -22.15	12.20	2.44				
12.50						
13.00						
13.50						
14.00						Bore hole terminated at 12.20m below the sea bed in very slightly weathered bed rock
14.50						
15.00						
15.50						
16.00						
16.50						
17.00						
17.50						
18.00						
18.50						
19.00						
19.50						
20.00						
20.50						
21.00						
21.50						
22.00						
22.50						
23.00						
23.50						

Standard Penetration Test

Depth (m)	(N)
0.90	05
1.90	04
2.90	<1
3.90	<1
6.15	<1
6.90	18
7.90	19
8.90	>50 10cm

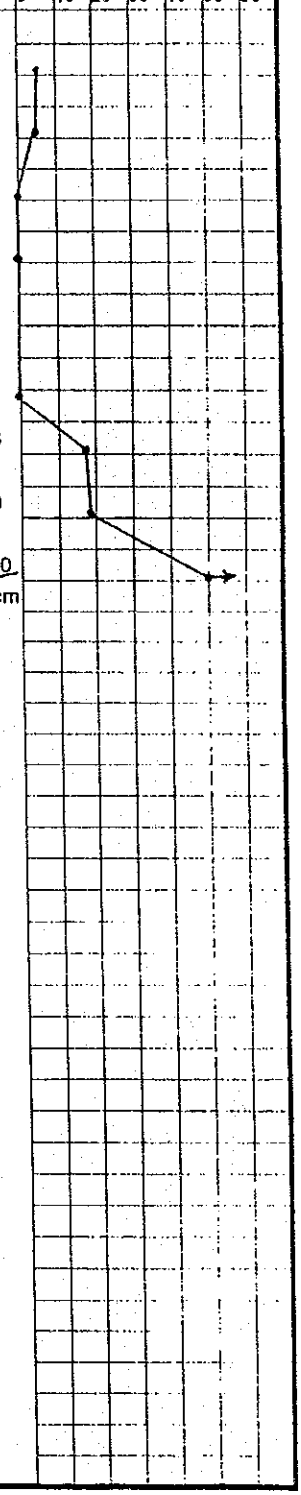


Figure A.3.4.1 (2) Borehole Log BH1

GEOLOGICAL RECORD OF BORING

			Date of Drilling: 22/3/2000
Project	: Galle Port Development Project		Angle from the vertical: 0
Bore Hole Number	: BH 02	Depth of Hole (m)	26.41
Ground Ele. (m)	:	Depth to the ground water level (m)	
Dia of the hole (mm)	: 100		
Drilled by	: GBME	Logged By	BSY

Elevation (m)	Depth (m)	Thickness (m)	Field Observations: Column Section	Soil / Rock Classifn.	Colour	Description
0.00						
-11.20	2.95	2.95		ML	Grayish brown	Very soft to soft very fine sand mixed with silt, mica and sea shells
-14.15	7.95	5.00		CL	Dark gray	Very soft slightly plastic clay
-19.15	8.95	1.00		ML	Grayish brown	Soft slightly plastic clayey silt mixed with very fine sand and mica
-20.15	9.95	1.00		CL	Dark gray	Medium stiff slightly organic smelling slightly plastic clay
-21.15	11.95	2.00		CL / ML	Yello.sh to gray brown	Completely decomposed rock inthe form of slightly plastic clay mixed with mica and silt
-23.15	14.95	3.00		ML	Whiti-sh to yellow-sh brwn	Fully decomposed rock in the form of hard to very stiff slightly plastic clyey silt mixed with mica and some sand
-26.15	16.95	2.00		ML / SM	Yellow-ish brown	Decomposed rock in the form of hard to extremely dense slightly plastic clayeye silt mixed with mica and sand
-28.15	18.95	2.00		ML	Yellow-sh to reddish brown	Decomposed rock in the form of slightly plastic clayey silt mixed with lot of mica and sand
-30.15	25.41	6.46		ML / SM	Grayish brown	Decomposed rock in the form of slightly plastic clayey silt mixed with mica and sand
-36.61	26.41	1.00		Ch. Gn.	brown	Moderately to highly weathered bed rock CR = 58% RQD = 13%
-37.61						Bore hole terminated at 26.41m below the sea bed in the moderately weathreed bed rock

Standard Penetration Test

Depth (m)	(N)
0.95	04
1.95	07
2.95	<1
3.95	<1
4.95	<1
5.95	<1
6.95	<1
7.95	04
8.95	07
9.95	12
10.95	07
11.95	31
12.95	35
13.95	29
14.95	40
15.95	>50 25cm
16.95	40
17.95	46
18.95	49
19.95	>50 22cm
20.95	>50 10cm
21.95	>50 14cm
22.95	>50 13cm
23.95	>50 14cm
24.95	>50 8cm

Figure A.3.4.1 (3) Borehole Log BH2

GEOLOGICAL RECORD OF BORING

Date of Drilling: 28-30/3/2000

Project	:	Galle Port Development Project	Angle from the vertical:	0
Bore Hole Number	:	BH 03	Depth of Hole (m)	23.80
Ground Ele. (m)	:		Depth to the ground water level (m)	
Dia of the hole (mm)	:	100		
Drilled by	:	GBME	Logged By	BSY

Elevation (m)	Depth (m)	Thickness (m)	Field Observations: Column Section	Soil / Rock Classifn.	Colour	Description	Standard Penetration Test: Depth (m)	(N)
0.00 -11.80								
0.50								
1.00					Grayish brown	Very soft top soft very fine sand mixed with silt, mica and sea shells	0.90	03
1.50				ML				
2.00							1.90	04
2.50								
3.00	-14.70	2.90	2.90				2.90	<1
3.50					Dark gray to blackish brown	Very soft slightly organic smelling slightly plastic clay with some silt and mica.		
4.00							3.90	<1
4.50				Cl				
5.00							4.90	<1
5.50								
6.00							5.90	<1
6.50								
7.00	-18.70	6.90	4.00				6.90	22
7.50				CL / ML	Grayish brown	Very stiff slightly plastic clay mixed with some very fine sand		
8.00	-19.61	7.81	0.91				7.90	04
8.50								
9.00				CL / OL	lackish brown	Soft slightly plastic organic smelling clay wit some partially decomposed organic matter	8.90	08
9.50								
10.00	-21.70	9.90	2.09				9.90	14
10.50				SP	Grayish brown	Medium dense fine to coarse poorly graded sand		
11.00	-22.70	10.90	1.00				10.90	
11.50								
12.00					Yellow-wish brown	Very dense to extremely dense well graded sand and gravel	11.90	38
12.50				SW / GW				
13.00							12.90	>50 21cm
13.50								
14.00	-25.70	13.90	3.00				13.90	43
14.50								
15.00						Completely decomposed rock in the form of Hard / very dense slightly plastic clayey silt / clayey sand mixed with mica	14.90	41
15.50					Grayish brown			
16.00				ML / SM			15.90	>50 29cm
16.50								
17.00							16.90	45
17.50								
18.00							17.90	41
18.50								
19.00	-30.70	18.90	5.00				18.90	37
19.50					Dark gray	Decomposed rock in the form of slightly plastic clayey silt mixed with considerable amount of mica		
20.00				ML			19.90	35
20.50								
21.00	-32.70	20.90	2.00				20.90	>50 8cm
21.50	-33.02	21.22	0.32	ML / SM	- do -	Decomposed rock in the form of silt / silty sand		
22.00								
22.50				Ch. Gn.	brown	Highly to moderately weathered bed rock CR = 45% RQD = 0%		
23.00								
23.50	-35.60	23.80	2.00					
24.00	Bore hole terminated at 23.8m below the sea bed in highly to moderately weathered bed rock							

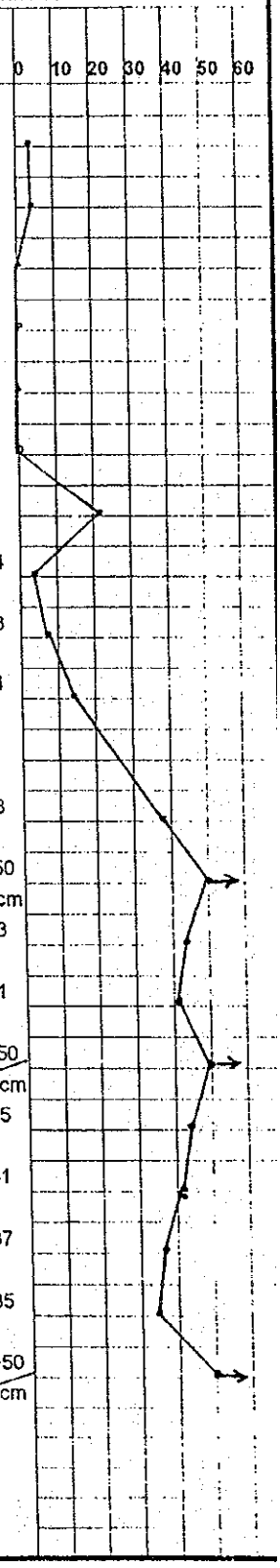


Figure A.3.4.1 (4) Borehole Log BH3

GEOLOGICAL RECORD OF BORING

		Date of Drilling:	02/04/2000
Project :	Galle Port Development Project	Angle from the vertical:	0
Bore Hole Number :	BH 04	Depth of Hole (m)	7.00
Ground Ele. (m) :		Depth to the ground water level (m)	
Dia of the hole (mm) :	100		
Drilled by :	GBME	Logged By	BSY

Elevation (m)	Depth (m)	Thickness (m)	Field Observations: Column Section	Soil / Rock Classifn.	Colour	Description
0.00						
-5.78						
0.50						
1.00				ML	Grayish brown	Very soft to medium stiff very fine sand mixed with silt, mica and sea shells
1.50						
2.00	-7.88	2.10	2.10			
2.50				SC	- do -	Very loose fine to coarse sand with small amount of plastic fines and silt
3.00						
3.50	-9.68	3.90	1.80			
4.00					Grayish brown	Completely decomposed rock in the form of dense to extremely dense silty sand
4.50				SM		
5.00						
5.50						
6.00	-11.78	6.00	2.10			
6.50				Ch. Gn.	Gray	Slightly weathered massive bed rock
7.00	-12.78	7.00	1.00			CR = 68% RQD = 39%
7.50						
8.00						
8.50						Bore hole terminated at 7.00m below the
9.00						sea bed in slightly weathered bed rock
9.50						
10.00						
10.50						
11.00						
11.50						
12.00						
12.50						
13.00						
13.50						
14.00						
14.50						
15.00						
15.50						
16.00						
16.50						
17.00						
17.50						
18.00						
18.50						
19.00						
19.50						
20.00						
20.50						
21.00						
21.50						
22.00						
22.50						
23.00						

Standard Penetration Test: Depth (m)	(N)
1.1	06
2.1	07
3.1	02
4.1	09
5.1	>50 12cm

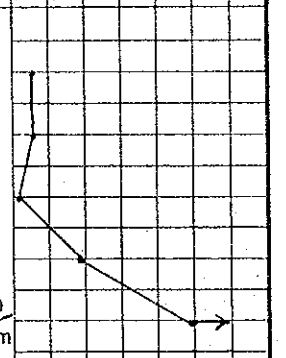


Figure A.3.4.1 (5) Borehole Log BH4

GEOLOGICAL RECORD OF BORING

Date of Drilling: 04/04/2000

Project : Galle Port Development Project

Angle from the vertical: 0

Bore Hole Number : BH 05

Depth of Hole (m) 8.85

Ground Ele. (m) :

Depth to the ground water level (m)

Dia of the hole (mm) : 100

Drilled by : GBME

Logged By BSY

%

Elevation (m)	Depth (m)	Thickness (m)	Field Observations: Column Section	Soil / Rock Classifn.	Colour	Description
0.00						
-7.40					Grayish brown	Very soft to medium stiff very fine sand mixed with silt, mica and sea shells
-8.95	1.55	1.55		ML		
				SC	- do -	Very loose fine to coarse with around 5% plastic fines, silt and some sea shells
-10.06	3.02	1.47				
				CL	Dark gray	Soft to very stiff moderately plastic clay mixed with some sand and gravels
-14.85	7.45	4.43				
				SM	Grayish brown	Completely decomposed rock in the form of extremely dense silty sand
-15.25	7.85	0.40				
				Ch. Gn.	Gray	Slightly weathered bed rock CR = 90% RQD = 68%
-16.20	8.85	1.00				
						Bore hole terminated at 8.85m below the sea bed in slightly weathered bed rock

Standard Penetration Test

Depth (m)	(N)
1.00	02
2.00	06
3.00	<1
4.00	<1
5.00	19
6.00	17
7.00	>50 16cm

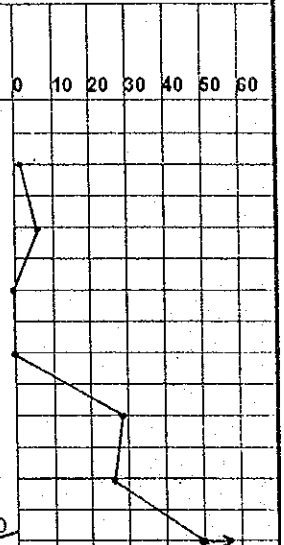


Figure A.3.4.1 (6) Borehole Log BH5

GEOLOGICAL RECORD OF BORING

			Date of Drilling: 21/04/2000
Project	: Galle Port Development Project		Angle from the vertical: 0
Bore Hole Number	: BH 06	Depth of Hole (m)	12.60
Ground Ele. (m)	:	Depth to the ground water level (m)	
Dia of the hole (mm)	: 100		
Drilled by	: GBME	Logged By	BSY

Elevation (m)	Depth (m)	Thickness (m)	Field Observations: Column Section	Soil / Rock Classifn.	Colour	Description
0.00 -12.10						
0.50						
1.00				ML	Grayish brown	Very soft to hard very fine sand mixed with silt and mica
1.50						
2.00	-13.90	1.80	1.80			
2.50				SM	- do -	Very dense very fine to medium grained sand
3.00	-14.86	2.76	0.96			
3.50						
4.00						
4.50						
5.00					Blackish brown	Very soft slightly plastic organic clay mixed with fully decomposed organic matters
5.50				OL / Pt		
6.00						
6.50						
7.00						
7.50						
8.00	-19.81	7.71	4.95			
8.50				SC	Grayish brown	Loose coarse to fine sand wih around 1% plastic fines
9.00	-20.90	8.80	1.09			
9.50				SP	- do -	Medium dense coarse to fine sand with 1% plastic fines
10.00	-21.90	9.80	1.00			
10.50						
11.00				SM	Dark gray	Completely decomposed rock in the form of very dense silty sand
11.50	-23.64	11.54	1.74			
12.00				Ch Gn	Grayish brown	Moderately weathered bed rock CR = 44% RQD = 12%
12.50	-24.70	12.60	1.06			
13.00						
13.50						
14.00						
14.50						
15.00						Bore hole terminated at 12.60m below the sea bed in moderately weathered bed rock
15.50						
16.00						
16.50						
17.00						
17.50						
18.00						
18.50						
19.00						
19.50						
20.00						
20.50						
21.00						
21.50						
22.00						
22.50						
23.00						

Standard Penetration Test

Depth (m)	(N)
0.80	>50 19cm
1.80	34
2.80	<1
3.80	<1
4.80	<1
5.80	<1
6.80	<1
7.80	06
8.80	12
9.80	34
10.80	>50 15cm

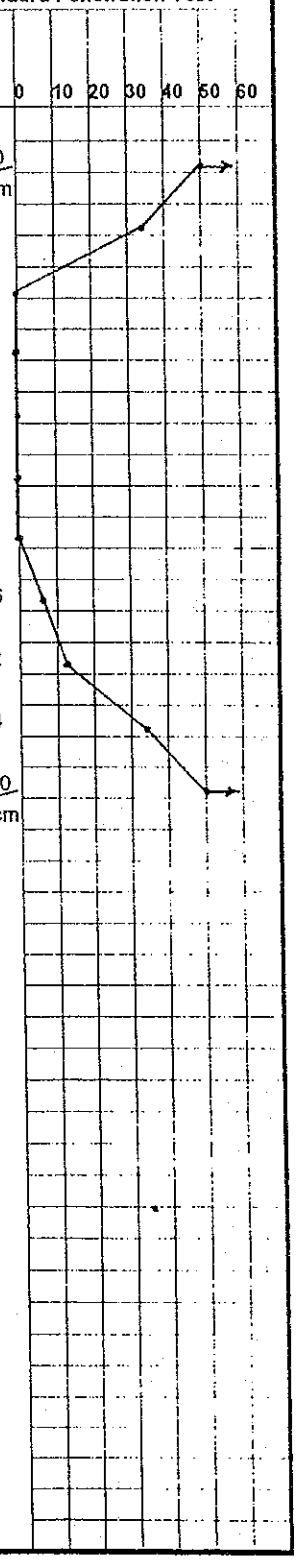


Figure A.3.4.1 (7) Borehole Log BH6