APPENDICES

Contents of Appendices

Appendix-1 Member List of the Study Team

Field Survey

Name	Assignment	Organization
Official Member		
Mr. TODA	Leader	Development Specialist, JICA
Mr. NAKAYAMA	Technical adviser	Head of Hydraulics on Fishing Port Lab., National Research Institute of Fisheries Engineering, Fisheries Agency, MOAFF
Mr. TOOYAMA	Coordinator	Second Basic Design Study Div., Grant Aid Project Study Dept., JICA
Consultant Member		
Mr. Norio TANAKA	Chief Consultant/Fishing Port Planner	Tetra Co., Ltd.
Mr. Masamichi HOTTA	Fishing/Marketing	Tetra Co., Ltd.
Mr. Kozo MATSUMURA	Port civil engineer/ Cost estimation	Tetra Co., Ltd.
Mr. Tatsuhiko TOKU	Facilities/ Equipment Planner	Tetra Co., Ltd.
Mr. Hitoshi TAKEMOTO	Site Surveyor/ Environmental Consideration	Tetra Co., Ltd.

Explanation of Draft Basic Design

Name	Assignment	Organization
Official Member		
Mr. Yoshinori UGAJIN	Leader	Deputy Director, Disaster Prevention and Coastal Protection Div., Fishing Port Dept., Fisheries Agency. MOAFF.
Consultant Member		
Mr. Norio TANAKA	Chief Consultant/Fishing Port Planner	Tetra Co., Ltd.
Mr. Masamichi HOTTA	Fishing/Marketing	Tetra Co., Ltd.
Mr. Kozo MATSUMURA	Port civil engineer/ Cost estimation	Tetra Co., Ltd.

JICA : Japan International Cooperation Agency
MOAFF :Ministry of Agriculture, Forest and Fishery

Appendix-2 Survey Schedule

Field Survey

No.	Date		Day	Itineraty	Accommodation	Activities
1	8	12	Tue	1200Tokyo(JL006)-1120N.Y.	New York	Mr. Takemoto Movement
2		13	Wed	0710N.Y.(AA811)-1408St.Lucia	Castries	Movement
3		14	Thu		Castries	Preparation work on site survey. Courtesy Call (MOALLF,)
4		15	Fri		Castries	Negotiation with a company for soil investigation
5		16	Sat	1100Tokyo(NH010)-1030N.Y	New York/Castries	Field Study at Vieux Fort(Mr.Takemoto) Official members and consultant members Movement
6		17	Sun	0735N.Y(BW427)-1200St.Lucia	Castries	Official members and consultant members Movement Field Study at Vieux Fort(Mr.Takemoto)
7		18	Mon		Castries	Courtesy Call (Ministry of Agriculture, Forestry, Fisheries and Environment, FMC etc.) Explanation of inception report Discussion with Organization concerned
8		19	Tue		Castries	Site survey
9		20	Wed		Castries	Discussion with Department of Fisheries and FMC
10		21	Thu		Castries	Discussion with Organization concerned(Draft M/D) Field Study
11		22	Fri		Castries	Signing of Minutes of Discussions/Call at MOAFFE Consultant Members continue Field Study
12		23	Sat		Castries	One Official Member leaving for Japan Data Collection, Field Study
13		24	Sun		Castries	Two Official Members leaving for Dominica, Study team meeting
14		25	Mon		Castries/V. Fort	Data Collection, Field Study
15		26	Tue		Castries/V. Fort	Data Collection, Field Study
16		27	Wed		Castries/V. Fort	Data Collection, Field Study
17		28	Thu		Castries/V. Fort	Data Collection, Field Study
18		29	Fri		Castries/V. Fort	Data Collection, Field Study
19		30	Sat		Castries/V. Fort	Data Collection, Field Study
20		31	Sun		Castries/V. Fort	Study team meeting
21	9	1	Mon		Castries/V. Fort	Data Collection, Field Study
22		2	Tue		Castries/V. Fort	Data Collection, Field Study
23		3	Wed		Castries/V. Fort	Data Collection, Field Study
24		4	Thu		Castries/V. Fort	Data Collection, Field Study
25		5	Fri		Castries/V. Fort	Data Collection, Field Study
26		6	Sat		Castries/V. Fort	Data Collection, Field Study
27		7	Sun	1625St.Lucia(BW901)	Castries/V. Fort	Study team meeting Two consultant members leaving for Port of Spain to report to Japanese Embassy
28		8	Mon		Castries/V. Fort	Data Collection, Field Study
29		9	Tue	1625St.Lucia(BW901)	V. Fort	Data Collection, Field Study Two consultant members leaving for Port of Spain to collect data.
30		10	Wed		V. Fort	Data Collection, Field Study
31		11	Thu		V. Fort	Data Collection, Field Study
32		12	Fri		V. Fort	Data Collection, Field Study
33		13	Sat	1512St.Lucia(AA1938)-2210N.Y		Last Member leaving
34		14	Sun	1330N.Y(JL005)		Movement
35		15	Mon	1610Tokyou		Movement

Explanation of Draft Basic Design

No	Date		Day	Itinerary	Accom.	Activities
1	10	25	Sat	1100Tokyo(NH010)---1030N.Y.	New York	Movement
2		26	Sun	0729N.Y.(AA699)---1500St.Lucia	Castries	Movement
3		27	Mon		Castries	Courtesy Call to organization concerned Discussion with DOF
4		28	Tue		Castries	Discussion with DOF and DOP
5		29	Wed		Castries	Discussion with DOF and DOP
6		30	Thu	1835St.Lucia(BW401)---1930Port of Spain	Port of Spain	Signing of Minutes of Discussions, Movement
7		31	Fri		Port of Spain	Reporting to Japanese Embassy in Trinidad
8	11	1	Sat	0645Port of Spain(AC965---1135Toronto	Toronto	Movement
9		2	Sun	1030Toronto(CP985)---1225Vancouver, 1345Vancouver---		Movement
10		3	Mon	1630Tokyo		Movement

MOAFFE: Ministry of Agriculture, Forestry, Fisheries and Environment

FMC: St. Lucia Fish Marketing Cooperation Ltd.

DOF: Department of Fisheries

DOP: Department of Planning

Appendix-3 List of Party Concerned in the Recipient Country

1. Government of the St. Lucia

Hon. Kenny D. Anthony	Prime Minister and Minister of Finance

1.1 Ministry of Agriculture, Forestry, Fisheries and Environment

Mr. Cassius B. Elias	Minister
Mr. Egbert Lionel	Permanent Secretary
Mr. Horace D. Walters	Chief Fisheries Officer
Mr. Alva Lynch	Principal Assistant Secretary
Mr. Rufus George	Fisheries Officer
Mr. Iwao Shindo	JICA Expert

1.2 Ministry of Planning, Development and Environment

Mr. Cletus Springer	Permanent Secretary
Mr. Christopher Cobin	Environment Officer, Environment Unit
Mr. John Calixte Jr.	Economist
Mr. Herald Nicholas	Chief Architect
Mr. Joseph Dupon	Engineer

1.3 Ministry of Communications, Works, Transport and Public Utilities

Mr. Gilbert Fontenard	Chief Engineer
Mr. Frank Flood	Laboratory Technician, Dennery

1.4. Ministry of Foreign Affairs and International Trade

Mr. Pauline Medar	Principal Assistant Secretary
Mr. Peter Lansiquot	Foreign Service Officer

1.5 St. Lucia Fish Marketing Corporation

Mr. Lucas Armstrong	Acting General Manager

1.6 St. Lucia Development Bank

Mr. Hilary L. Force	Farm Improvement Officer

1.7 St. Lucia Air & Sea Ports Authority

Mr. Angus Philogene	Chief Engineer

1.8 Organization of Eastern Caribbean States

Mr. Keith Nichols	Programme Officer

1.9 Development Control Authority

Mr. Cristopher B. Nixson	Executive Secretary

1.10 Water & Sewerage Authority

Mr. Patrick Arlain	Chief Commercial Officer
Mr. Trevern York	Operation Manager

1.11 St. Lucia Electricity Services

Mr. James

1.12 Caribbean Environmental Health Institute

Mr. Vincent D. Sweeney	Executive Director
Mr. Frank W. Ward Jr.	Scientific Services Officer

1.13 UWI Seismic Research Unit, Trinidad

Dr. Sayyadul Arafin

1.14 Goodwill Fishermen's Cooperative

Mr. Peter Francis	Manager

2. Private Sectors

Doodridge & Associates Ltd.

Mr. Cromwell R. Goodridge	Managing Director

St. Lucia Marine Terminals Limited

Mr. Vincent Hippolyte	Manager

Texaco West indies Ltd.

Leah L. Frederick	Customer Service Representative

National Contractors

Mr. Thomas Boriel

Safeway, Access & Support Systems Ltd., Trinidad

Mr. Hashim Ali	Managing Director

Francis-Lau Construction Ltd.

Mr. W. Francis-Lau	Director

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY ON THE PROJECT FOR THE CONSTRUCTION OF VIEUX FORT FISHERIES COMPLEX IN ST. LUCIA

In response to the request from the Government of St. Lucia, the Government of Japan has decided to conduct a basic design study on the project for the construction of Vieux Fort fisheries complex (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA has sent to St. Lucia a basic design study team (hereinafter referred to as "the Team"), which is headed by Mr. Atsuyoshi TODA, JICA. The Team is scheduled to stay in the country from 13 August to 13 September, 1997.

The Team held a series of discussions with the officials concerned of the Government of St. Lucia from the 18th through the 21st of August. The main point of discussions are described on the attached sheets.

Castries, 22 August, 1997

Cassius B. Elias
Minister
Ministry of Agriculture, Forestry,
Fisheries and the Environment
Government of St. Lucia

Atsuyoshi TODA
Leader
Basic Design Study Team,
JICA

ATTACHMENT

Questions Raised by the Japanese Side

1. The Japanese side raised several questions in relation to the construction of a fishing port and shore facilities at Vieux Fort.

2. One of the questions is pertaining to the location of the port site: if the Team has come up with the alternative site shifted toward the westward from a technical and topographical viewpoint, will the St. Lucian side be ready to accept the idea? The St. Lucian side responded by saying that there should be no problem except that the study should take into considerations its impact on the fishermen's quarter adjacent to the new eastern breakwater.

3. The existing roads in the town seem to be unsuitable for transport of necessary materials and rocks as it may cause nuisance to the people and in some cases even endanger their lives, stated the Japanese side. They believe that a cause way will have to be built along the shore as an access road to the site, a temporary road used for a construction phase. The St. Lucian side stated that they are prepared to make a clearance on the main road leading to the site but they will facilitate its construction if the Japanese side finds it necessary to build the access road.

4. The Japanese side asked if the St. Lucian side is going to secure a site for building a temporay office, a processing yard for steel bars, a stock yard of materials, etc. as well as a site or sites for getting materials to be used for reclamation (e.g. soil, rocks). The St. Lucian side is fully aware of the need and promised to identify such sites at the earliest time.

5. There is a need to ensure that the fishing vessels landing their catches at the present site be instructed to shift their places of landing to an appropriate place, stated the Japanese side. In reply, the St. Lucian side made it clear that they will definitely take necessary actions for the temporary relocation.

6. From an environmental point of view, will there be any problems to construct breakwaters on the reef? In reply to the question raised by the Japanese side, the St. Lucian side made an affirmative answer.

7. Both sides firmly believe in the importance of linking the project with the Vieux Fort coastal area development plan. Both sides agreed that it is of utmost importance to keep continuous dialogues with the relevant organizations, i.e., Ministry of Planning and Ministry of Agriculture, Forestry, Fisheries and the Environment.

8. The Japanese side then took up another subject, freon gas, and explained their stance on it. After the year 2,000, the use of freon gas will be prohibited for the operation of a refrigerator. It is therefore highly recommended that a refrigeration

equipment to be operated by ammonia should be used for Vieux Fort Fishery Complex. However, it is important to note that there will be a risk to use ammonia for operation of a refrigerator as it is a harmful chemical material (e.g. inhaling and physical touch will cause some danger to human body). In this respect, it is necessary to have an agreement with the Government of St. Lucia on the use of ammonia. In response to the Japanese concern, the St. Lucian side mentioned that they see no problem in reaching such an agreement.

Questions and Wishes Explained by the St. Lucian Side

9. According to the St. Lucian side, there was a problem in the design of the capacity of the Dennery port (i.e. 40 boats): the demand started to exceed the capacity soon after its completion. The St. Lucian side expressed their wish that the study fully take into account the possibility of future rise of demand at the Vieux Fort port.

10. The St. Lucian side stated the importance of evaluating different types of ice for different uses (e.g. for vessels). The Japanese side mentioned that plate ice should be the one to satisfy various uses.

11. The St. Lucian side requested that adequate consideration be given to corrosion emanating from sea blast on the port. Consequently appropriate construction materials should be used.

Explanations over the General Concept and Requested Items of the Project

12. The St. Lucian side stressed the importance of the project in the following objectives:
    1) modernization of the sector
    2) participation of young work force
    3) Vieux Fort as the core place for fisheries activities
    4) import substitution and under-utilized resources exploitation
    5) promotion of well-beings of fishermen and consumers

13. Explanations were made by the St. Lucian side on some of the requested items such as fishing gear, fish processing equipment, workshop, boat size and engine power, etc. The Japanese side also asked several questions related to waste management, fish stall, cold storage and freezer, etc.

Both sides expressed their satisfaction over the conduct and results of the meetings and appreciation for the spirit of mutual understanding and cooperation.

ANNEX I: Japan's Grant Aid System

ANNEX II: Necessary Measures to be Taken by the Government of St. Lucia

ANNEX I: JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedure

1) Japan's Grant Aid Program is executed through the following procedures.

Application	(Request made by a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan & Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid Program submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using Japanese consulting firms.

Thirdly, the Government of Japan appraises the program to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA and the results are then submitted to the Cabinet for approval.

Fourth, the program, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Government of Japan and the recipient country.

Finally, for the implementation of the program, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on the requested program (hereinafter referred to as "the Program"), is to provide a basic document necessary for the appraisal of the Program by the Government of Japan. The contents of the Study are as follows:

a) confirmation of the background, objectives and benefits of the Program and also institutional capacity of agencies concerned of the recipient country necessary for the Program's implementation;
b) evaluation of the appropriateness of the Program to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;
c) confirmation of items agreed on by both parties concerning the basic concept of the Program;

d) preparation of a basic design of the Program; and
e) estimation of costs of the Program.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid Program. The Basic Design of the Program is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Program. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Program. Therefore, the implementation of the Program is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participate the Study and prepare a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Program, JICA recommends the same consulting firm which participated in the Study to the recipient country, in order to maintain the technical consistency between the Basic Design and Detailed Design as well as to avoid any undue delay caused by the selection of a new consulting firm.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Program, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant" means the one fiscal year which the Cabinet approves the Program for. Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and final payment to them must be completed.

However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However, the prime contractors, namely consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability of Japanese taxpayers.

6) Undertakings required to the Government of the recipient country

a) to secure a lot of land necessary for the construction of the Program and to clear the site;
b) to provide facilities for distribution of electricity, water supply, drainage and other incidental facilities outside the site;
c) to ensure prompt unloading, tax exemption and customs clearance at ports of disembarkation in the recipient country and internal transportation therein of the products purchased under the Grant Aid.
d) to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts.
e) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.
f) to ensure that the facilities constructed and products purchased under the Grant Aid be maintained and used properly and effectively for the Program; and
g) to bear all the expenses other than those covered by the Grant Aid, necessary for the Program.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the

necessary staff for operation and maintenance of them as well as to bear all the expenses other than those covered by the Grant Aid.

8) "Re-export"
The products purchased under the Grant Aid shall not re-exported from the recipient country.

9) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the verified contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of recipient country or its designated authority.

ANNEX II: NECESSARY MEASURES TO BE TAKEN BY THE GOVERNMENT OF ST. LUCIA

The following necessary measures should be taken by the Government of St. Lucia on condition that the Grant Aid by the Government of Japan is extended to the Project.

1. to secure a lot of land necessary for the Project;

2. to clear and level the site for the Project prior to the commencement of the construction;

3. to provide a proper access road to the site;

4. to provide facilities for distribution of electricity, water supply, telephone trunk line, drainage and other incidental facilities outside the site;

5. to undertake incidental outdoor works, such as gardening, fencing, exterior lightning, and other incidental facilities in and around the site, if necessary;

6. to ensure prompt unloading and customs clearance of the products purchased under the Japan's Grant Aid at ports of disembarkation in St. Lucia;

7. to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in St. Lucia with respect to the supply of the products and services under the verified contracts;

8. to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into St. Lucia and stay therein for the performance of their work;

9. to bear commissions, namely advising commissions of the Authorization to Pay (A/P) and payment commissions, to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement (B/A);

10. to provide necessary permissions, licenses and other authorization for implementing the Project, if necessary;

11. to ensure that the facilities constructed and equipment purchased under the Japan's Grant Aid be maintained and used properly and effectively for the Project; and

12. to bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the Project.

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY ON
THE PROJECT FOR
CONSTRUCTION OF VIEUX FORT FISHERIES COMPLEX
IN ST. LUCIA

(Consultation on the Draft Basic Design)

The Japan International Cooperation Agency (JICA) has dispatched a basic design study team on the Project for Construction of Vieux Fort Fisheries Complex (hereinafter referred to as "the Project") to St. Lucia in August 1997. As a result of the series of discussions in St. Lucia, and technical examination of the results in Japan, JICA prepared the Draft Basic Design of the Project.

To inform the St. Lucian side with the components of the Draft Basic Design, JICA sent to St. Lucia a study team headed by Mr. Yoshinori UGAJIN, Fisheries Agency, Ministry of Agriculture, Forestry and Fisheries. The team is scheduled to stay in St. Lucia from October 26 to October 30 1997.

As a result of discussions, both sides have confirmed the main items as described on the attached sheets. The team will proceed to further work and finalize the Basic Design Study Report.

Castries, October 30, 1997

for Cassius B. Elias	宇賀神 義宣
Minister	Yoshinori UGAJIN
Ministry of Agriculture, Forestry,	Team Leader
Fisheries and the Environment	Basic Design Study Mission
Government of St. Lucia	Japan International Cooperation
	Agency

ATTACHMENT

1. Participants in the Discussions

During the team's stay in St. Lucia, Japanese and St. Lucian side had a series of discussions on the Draft Basic Design of the Project. List of participants in the discussions is shown in ANNEX I.

2. Components of the Draft Basic Design Study

The Government of St. Lucia has in principle accepted the components of the Draft Basic Design proposed by the team which are shown in ANNEX II.

3. Responsible Agency

The Department of Fisheries (DOF), the Ministry of Agriculture, Forestry, Fisheries and the Environment is responsible for the procurement and disbursement of the budget required for the construction of the project facilities and actual implementation of the Project.

4. Operation and Maintenance

The DOF will be responsible for overall conduct of the complex and day to day supervision and management of the fishing port facilities (i.e. landing wharves, breakwaters, slip way, mooring quays). The management and maintenance of cold storage and other market facilities (e.g. freezers, ice plants) will come under the responsibility of the St. Lucia Fish Marketing Corporation Limited (FMC). The Goodwill Fishermen's Cooperative (GFC) will be responsible for the management and maintenance of locker rooms, canteen and provision of services to sell fuel, fishing gear, equipment and supply water. The Vieux Fort Town Council will undertake the responsibility of the management and maintenance of fish retail shops. Therefore, four organizations will be involved in the operation and maintenance of the facilities to be established in the Fisheries Complex according to the functions to be undertaken by each organization. As regards the financial management of these facilities, a self-supporting accounting system will be adopted for each organization.

5. Items confirmed by both Japanese and St. Lucian government

1) It was confirmed between the two parties that there would not be any conflicts between the Project and the integrated rural development project currently

envisaged by the Government of St. Lucia for the Vieux Fort area. The latter is planned to develop light industries, tourism and residential areas in the vicinity of the Project site. The Ministry of Planning which is responsible for the integrated development ensured that the two projects were compatible in respect of development planning, use of land, construction of roads and the benefits that local residents would enjoy once two projects are completed. The Government of St. Lucia confirmed that the Project would be implemented without any conflicts, restrictions, interference and delays in the timetable of the implementation plan agreed between the two governments.

2) The Government of St. Lucia confirmed that precautionary actions would be taken to generate the awareness among the local residents of the need and importance of the Project and obtain their consent and understanding for the negative impacts and nuisance to their daily life, should such happen, during the construction period of the fisheries complex.

3) The Government of St. Lucia accepted the design and scale of port facilities (e.g. wharves, breakwaters, slipway) as well as fish market facilities (e.g. cold storage rooms, ice plants, freezers, retail rooms) as described in the Basic Design Study Report. Also, the Government agreed to the systems to be employed for the operation, management and maintenance of the fishery complex facilities as proposed by the above report. However, the Government commented that some modification should be given to the styles and shapes of roofs of some establishments such as the administration office and the fish market in order to create more appropriate harmonies with the surrounding traditional houses. It was, therefore, agreed that the Chief Architect of the Ministry of Planning would provide the Team with sketches of these buildings that he considers more suitable. Such modifications would be taken into account when a final design of the buildings is determined provided that there would not be any increase in component costs for construction. A similar comment was also made as to the shape of the structure of the canteen. The Government preferred to have a rectangular shape instead of the square shape as proposed by the Team. It was agreed that this matter would also be taken into account provided that the original total area of 144 square meters allocated to the canteen would be maintained.

4) With regard to the provision of fishing vessels as proposed by the Team (i.e. 5 vessels of 30 ft long and 5 outboard engines of 115 HP), the Government of St. Lucia agreed to the number and the size of vessels to be provided. However, she

wished to have two engines of 75 HP for each vessel instead of one engine of 115 HP on the ground that the installation of two smaller engines on one vessel would be safer for deep sea fishing operated in remote fishing grounds and also would save fuel cost to a greater extent since one of the engines will not be used all the time. It was agreed that this matter would be looked into after the Team returns to Tokyo.

5) The Government of St. Lucia agreed that a final decision would be made by the agencies concerned in Japan as to the types and amounts of fishing gear and materials to be provided upon examination of the existing inventories of gear and other materials and the status of effective use of equipment and materials provided by the Japanese bilateral aid programmes in the past.

6) The Government of St. Lucia agreed to provide the Team with a long and short term plans and programmes for tuna fishery development to exploit under-utilized tuna resources which are believed to exist on the eastern and western parts of the Island. Such programmes will particularly focus on research and training on deep sea tuna fishing to foster young fishermen.

6. Japan's Grant Aid System

1) The Government of St. Lucia has understood the system of the Japan's Grant Aid explained by the Team. The main feature of the system is described in ANNEX III.

2) The Government of St. Lucia will take necessary measures described in ANNEX IV for the smooth implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.

ANNEX I: LIST OF PARTICIPANTS IN THE DISCUSSIONS

1. FOR GOVERNMENT OF ST. LUCIA

Dr. Kenny D. Anthony, Prime Minister

Mr. Cletus Springer, Permanent Secretary, Ministry of Planning

Mr. Cassius Elias. Minister of Agriculture, Fisheries, Forestry and the Environment

Mr. Egbert Lionel, Permanent Secretary, Ministry of Agriculture, Fisheries, Forestry and the Environment

Mr. Horace Walters, Chief Fisheries Officer, Department of Fisheries

Mr. Alva Lynch, Principal Assistant Secretary, Ministry of Agriculture, Fisheries, Forestry and the Environment

Ms. Pauline Medar, Principal Assistant Secretary, Ministry of Foreign Affairs and International Trade

Mr. Blaize Nixson, Executive Secretary, Development control Authority

Mr. Herald Nicholas, Architect, Ministry of Planning

Mr. Lucas Armstrong, Acting General Manager, Fish Marketing Corporation

Mr. Rufus George, Fisheries Officer, Department of Fisheries.

2. FOR GOVERNMENT OF JAPAN

Mr. Yoshinori Ugajin, Fisheries Agency, Ministry of Agriculture, Forestry and Fisheries

Dr. Norio Tanaka, Tetra Corporation

Dr. Masamichi Hotta, Tetra Corporation

Mr. Kozo Matsumura, Tetra Corporation

ANNEX II: COMPONENTS OF THE DRAFT BASIC DESIGN

(1) Outline of Basic facilities

Outline of Basic facilities planned for Vieux Fort Fisheries Complex is shown in Table-1.

Table-1 Contents of Basic Facilities

Name of Facilities	Outline
Breakwater(West)	Rubble Mound Type
Breakwater(East)	Rubble Mound Type
Revetment (West)	Rubble Mound Type
Revetment (East)	Rub Sheet Pile ble Mound Type
Landing Wharf(-2m)	SteelType
Slipway	
In-port Road	Asphalt Pavement
Apron	Concrete Pavement

(2) Outline of Functional Facilities

Outline of the Functional Facilities planned for Vieux Fort Fisheries Complex is shown in Table-2.

Table-2 Contents of Functional Facilities

Name of Facilities	Outline
1. Ice Making Plant	
1.1 Ice Making Plant	4t x 2
1.2 Ice Storage	
2. Fish Handling Shed	7m x 36m
3. Administration Office Bld.	12m x 30m
4. Cold Storage Bld.	26m x 56m
4.1 Cold Storage	
4. 2 Quick Freezer	2t x 2
5. Fish Market	14m x 24m
6. Workshop, Coop Retail Shop	14m x 20m
7. Locker Room	118 rooms
8. Toilet	
9. Shower Room	7unit
10. Canteen	
11. Water Tank	
12. Sub Station	
12.1 Generator	1unit
13. Outside Lightning	

Note: The figures indicated in the above table show the approximate ones.

ANNEX III: JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedure

1) Japan's Grant Aid Program is executed through the following procedures.

Application	(Request made by a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan & Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid Program submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using Japanese consulting firms.

Thirdly, the Government of Japan appraises the program to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA and the results are then submitted to the Cabinet for approval.

Fourth, the program, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Government of Japan and the recipient country.

Finally, for the implementation of the program, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on the requested program (hereinafter referred to as "the Program"), is to provide a basic document necessary for the appraisal of the

Program by the Government of Japan. The contents of the Study are as follows:

a) confirmation of the background, objectives and benefits of the Program and also institutional capacity of agencies concerned of the recipient country necessary for the Program's implementation;
b) evaluation of the appropriateness of the Program to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;
c) confirmation of items agreed on by both parties concerning the basic concept of the Program;
d) preparation of a basic design of the Program; and
e) estimation of costs of the Program.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid Program. The Basic Design of the Program is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Program. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Program. Therefore, the implementation of the Program is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participate the Study and prepare a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Program, JICA recommends the same consulting firm which participated in the Study to the recipient country, in order to maintain the technical consistency between the Basic Design and Detailed Design as well as to avoid any undue delay caused by the selection of a new consulting firm.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Program, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3)"The period of the Grant" means the one fiscal year which the Cabinet approves the Program, for within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and final payment to them must be completed.

However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant, in principle, Japanese products and services including transport or

those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However, the prime contractors, namely consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude

contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability of Japanese taxpayers.

6) Undertakings required to the Government of the recipient country

a) to secure a lot of land necessary for the construction of the Program and to clear the site;

b) to provide facilities for distribution of electricity, water supply, drainage and other incidental facilities outside the site;

c) to ensure prompt unloading, tax exemption and customs clearance at ports of disembarkation in the recipient country and internal transportation therein of the products purchased under the Grant Aid.

d) to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts.

e) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

f) to ensure that the facilities constructed and products purchased under the Grant Aid be maintained and used properly and effectively for the Program; and

g) to bear all the expenses other than those covered by the Grant Aid, necessary for the Program.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them as well as to bear all the expenses other than those covered by the Grant Aid.

8) "Re-export"

The products purchased under the Grant Aid shall not re-exported from the recipient country.

9) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the verified contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of recipient country or its designated authority.

ANNEX IV: NECESSARY MEASURES TO BE TAKEN BY THE GOVERNMENT OF ST. LUCIA

The Government of St. Lucia will be responsible for undertaking the following measures necessary for the execution of the Project in conjunction with the provision of the Grant Aid by the Government of Japan.

1. to secure a lot/site of land necessary for the Project;

2. to clear and level the site for the Project prior to the commencement of the construction;

3. to provide a proper access road to the site;

4. to provide facilities for distribution of electricity, water supply, telephone trunk line, drainage and other incidental facilities outside the site;

5. to provide official permission for quarrying the soil to be used for the reclamation and rubble stones used for the construction of breakwaters;

6. to make arrangements, prior to the construction work of the fisheries complex, for relocation of fishermen and removal of fishing boats from the project site in order to facilitate the construction work, where necessary;

7. to undertake incidental outdoor works, such as gardening, fencing, exterior lightning, and other incidental facilities in and around the site, if necessary;

8. to ensure prompt unloading and customs clearance of the products purchased under the Japan's Grant Aid at ports of disembarkation in St. Lucia;

9. to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in St. Lucia with respect to the supply of the products and services under the verified contracts;

10. to accord Japanese nationals whose services may be required in connection with

10. to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into St. Lucia and stay therein for the performance of their work;

11 to bear commissions, namely advising commissions of the Authorization to Pay (A/P) and payment commissions, to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement (B/A);

12. to provide necessary permissions, licenses and other authorization for implementing the Project, if necessary;

13. to provide conveniences necessary for entry and stay in St. Lucia to the Japanese experts involved in the implementation of the verified contract and the work concerned with the contract;

14.to ensure that the facilities constructed and equipment purchased under the Japan's Grant Aid be maintained and used properly and effectively for the Project; and

15.to bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the Project.

Appendix-5 Cost Estimation Borne by the Recipient Country

The cost to be borne by the Government of St. Lucia is estimated to be approximately 85,000 EC$ whose details are as follows.

a)	Electricity supply:	70,000 EC$
b)	Water supply:	10,000 EC$
c)	Telephone line laying:	5,000 EC$

Appendix-6 Supplementary Data on Fisheries

Detail of Methodologies Used for Estimation of Fish Landing in St. Lucia

1) Appendix Table-A.8.1(1) and Table-A.8.1(2) show the operational rates of boats computed based on the fuel supply records. This table indicates that the rates became highest in March with an average rate of more than 50%. Appendix Table-A.8.2(1) and table-A.8.2(2) shows the daily operational rates in March, indicating the highest rate of 77%. The operational rate of fishing in the first highest 10 days in the highest was on average 70% in 1996 and 71.2% in 1997.
2) The following formula was used to calculate the production.
   75kg x (number of vessels in each place x operational rates of fishing x operational rate in each place) = catch in each place

Assuming the following:

a) Average catch in high season=75kg/boat/day:
b) Average catch in low season = 25kg/boat/day:
c) Average operational ratio in high season (Jan-June)=37.5%:
d) Average catch in low season =34.5%:
e) Operational rates in each site = the operational rate in Vieux Fort was assumed as 100 and the operational rate in each site was calculated using the following formula.

{Annual catch (DOF's statistics) ÷ number of boats at each site} ÷ {catch at Vieux Fort} ÷ the number of boats at Vieux Fort}

Table-A.6.1 Imported fish and seafood purchases by FMC

1996 January to December	Annual Purchases	
	Poundage(lb.)	Amount(EC$)
SHRIMP U. S. A	38,450	698,940
SHRIMP T&T	10,025	269,765
SHRIMP GUY.	6,750	123,500
FLYING FISH	398,120	265,560
SMOKED SALMON	4,530	74,586
BREADED CRAB BACK		37,132
SOLE		
UNCLEAN SQUID	12,540	30,346
CLEAN SQUID	5,500	27,105
SCALLOPS	12,390	210,403
OCTOPUS	4,060	21,375
IMITATION CRABMEAT	8,776	39,143
LOBSTER TAILS	2,000	75,800
SWORDFISH	3,031	30,686
GROUPER FILLETS	1,500	6,720
CHOPPED CLAMS	1,500	7,545
BREADED SHRIMP	420	1,760
CREW FISH	120	484
SNAPPER FILLETS	1,868	15,878
DOVER SOLE	520	4,461
WHOLE LOBSTER (COOKED)		
WHOLE LOBSTER (SVG)	9,492	132,885
TOTAL	521,592	5,804,729
	(235 tons)	(2.2 Million US$)

Source: FMC

Table- A.7.1 Frequency of wind occurrence

:STA 789480 | TLPL | HEWANORRA INTL AP
:LAT 13 45N :LONG 060 57W :ELEV 10(ft) 00003(m)
1 - Frequency Surface WIND DIRECTION vs SPEED (from HOURLY Obs)

ANN ALL LST

16 PT. DIR.	SPEED (KNOTS) 1 - 3	4 - 6	7-10	11-16	17-21	22-27	28-33	34-40	41-47	48-55	>=56	TOTAL PERCNT	MEAN WIND SPEED
N	*	.1	*	*	0	0	0	0	0	0	0	.1	5.8
NNE	*	.1	.1	*	0	0	0	0	*	0	*	.3	7.3
NE	.1	.6	.9	.6	.1	0	0	0	0	*	0	2.2	9.1
ENE	.1	.8	2.8	8.2	1.4	.1	0	0	0	0	0	13.4	12.5
E	.1	1.2	8.7	31.7	6.0	.2	*	*	0	*	0	47.9	13.2
ESE	.1	.7	4.9	15.9	2.8	.1	*	0	0	0	0	24.5	13.0
SE	*	.4	1.8	2.9	.3	*	0	0	0	*	0	5.4	11.4
SSE	*	.3	.9	.6	.1	*	0	*	0	0	0	2.0	9.8
S	*	.2	.4	.2	*	0	0	0	0	0	0	.9	9.0
SSW	*	.1	.1	.1	*	0	0	0	0	0	0	.2	8.8
SW	*	*	*	*	0	*	0	*	0	0	0	.1	9.9
WSW	*	*	*	*	*	0	0	0	0	0	0	.1	7.3
W	*	*	*	*	*	0	0	0	0	0	0	.1	8.0
WNW	*	*	*	*	0	0	0	0	0	0	0	*	8.6
NW	0	*	0	0	0	0	0	0	0	0	0	*	4.8
NNW	*	*	*	*	0	0	0	0	0	0	0	.1	5.7
VAR	0	0	0	0	0	0	0	0	0	0	0	0	0
CLM	0	0	0	0	0	0	0	0	0	0	0	2.5	0
ALL	.5	4.7	20.7	60.4	10.7	.4	*	*	*	*	*	100	12.4

* = PERCENT < .05
# = EXCESSIVE MISSING DATA - VALUE NOT COMPUTED

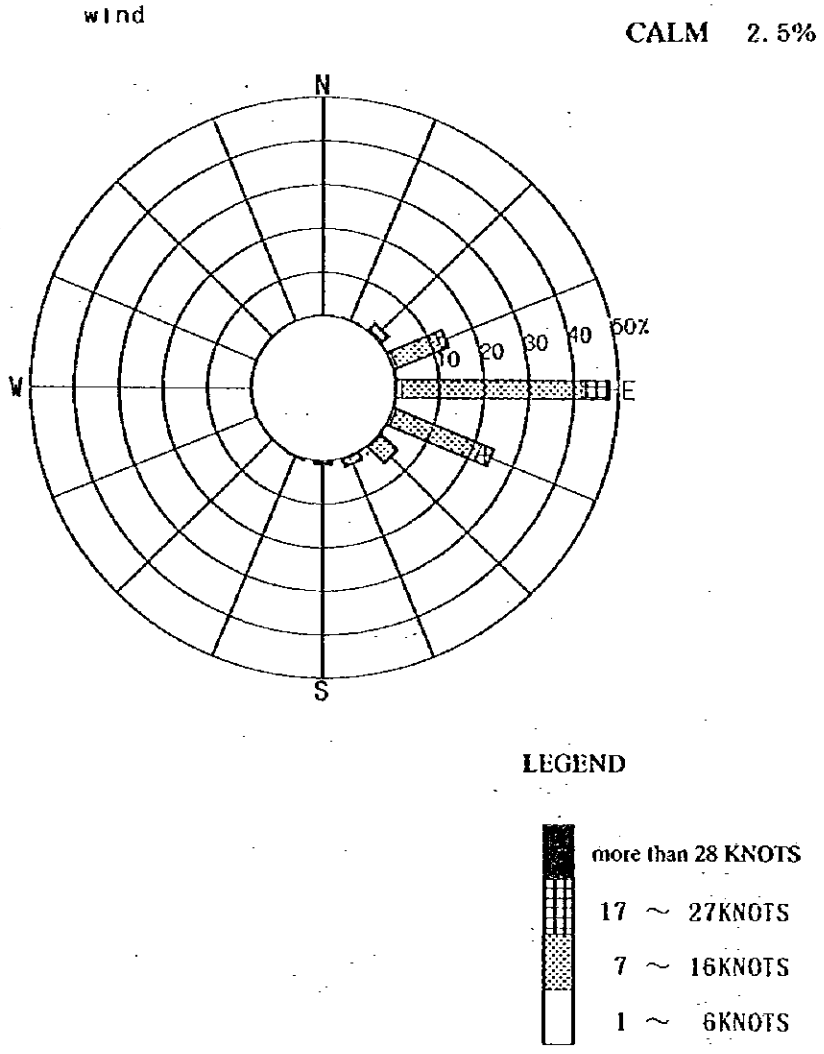


Figure-A-7.1 Wind rose (annual)

Table- A.7.2 Results of the harmonic analysis

Observation Point : ST. T

Latitude : 13 43 43 N

Longitude : 60 57 37 W

Observation Period : August 25 to September 9, 1997

Datum Level : C.D.L. of Vieux Fort Commercial Port

Component Tides	Amplitude (cm)	Lag Angle (°)
K1	0.070	189.6
O1	0.079	166.9
P1	0.023	189.6
Q1	0.025	151.9
M2	0.127	109.4
S2	0.027	143.7
K2	0.007	143.7
N2	0.030	106.7
M4	0.005	97.6
MS4	0.002	184.2
A0	0.275	

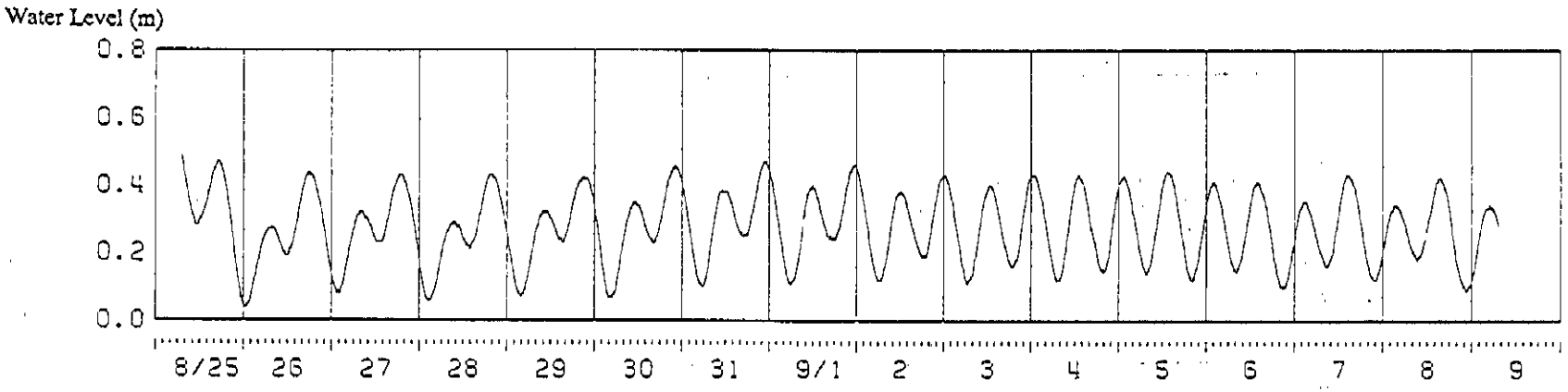


Figure-A.7.2 Tide observation data

Location : Vieux Fort

Table- A.7.3 frequency of occurrence of offshore waves

SIGNIFICANT WAVE HEIGHT (METERS) / TOTAL WAVE DIRECTION (DEGREES) -- PERCENT OCCURRENCE

MODIFIED U.S. NAVY OPERATIONAL SPECTRAL OCEAN WAVE MODEL
14.8N 60.2W
10/10/75 6/23/85

ANNUAL

SIGNIFICANT WAVE HEIGHT (METERS)	CALM	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
	TOTAL WAVE DIRECTION (DEGREES)																	
= 0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
> .0 <= .5	-	0.4	0.2	0.7	0.2	0.2	-	-	-	-	-	-	-	-	-	-	0.1	1.8
.5 <= 1.0	-	1.7	0.5	1.3	2.9	3.9	0.3	*	-	*	*	-	-	-	-	*	0.8	11.6
1.0 <= 1.5	-	0.2	0.1	1.0	7.7	10.5	0.5	0.1	-	-	-	-	*	-	-	0.1	-	20.2
1.5 <= 2.0	-	-	-	0.9	12.1	12.0	0.5	0.1	*	*	-	-	-	-	-	*	*	25.7
2.0 <= 2.5	-	-	-	1.0	12.6	9.3	0.3	*	*	*	-	-	-	-	-	*	*	23.4
2.5 <= 3.0	-	-	-	1.0	7.2	3.9	0.1	*	*	-	-	-	-	-	-	-	-	12.1
3.0 <= 3.5	-	-	-	0.4	2.4	1.0	*	*	-	-	-	-	-	-	-	-	-	3.8
3.5 <= 4.0	-	-	-	0.1	0.6	0.3	*	-	-	-	-	-	-	-	-	-	-	1.0
4.0 <= 4.5	-	-	-	0.1	0.2	*	-	-	-	-	-	-	-	-	*	-	-	0.3
4.5 <= 5.0	-	-	-	*	*	*	-	-	-	-	-	-	-	-	-	-	-	-
5.0 <= 5.5	-	-	-	*	*	-	-	-	-	-	-	-	-	-	-	-	-	0.1
5.5 <= 6.0	-	-	-	-	*	*	-	-	-	-	-	-	-	-	-	-	-	-
6.0 <= 6.5	-	-	-	*	*	-	-	-	-	-	-	-	-	-	-	-	-	-
6.5 <= 7.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.0 <= 7.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.5 <= 8.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.0 <= 8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.5 <= 9.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.0 <= 9.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.5 <= 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
> 10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	-	2.4	0.8	6.6	46.0	41.0	1.8	0.2	-	-	-	-	-	-	-	0.2	0.9	100.0

NUMBER OF OBSERVATIONS: 11538
(NOTE: '*' = < .05 PERCENT)

PREPARED BY: OCEANROUTES, INC.
19 AUG 97

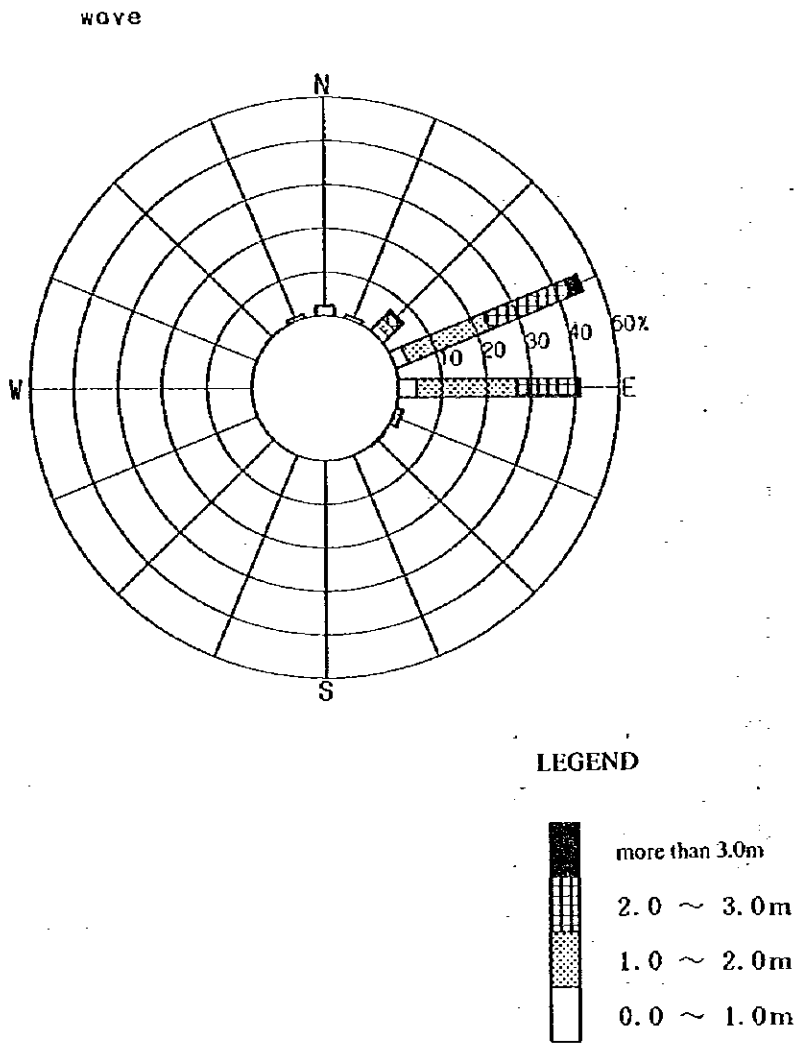


Figure-A.7.3 Wave rose of offshore waves in Vieux Fort

Table- A.7.4 Results of wave hindcasting by hurricane (offshore wave)

Maximum Modeled Site Wind Speed, Significant Wave Height, Wave Period, Direction, and Likely Maximum Wave Height for Each Cyclone

Storm Name (TCNNYY)	Highest Site 1-Minute Wind Speed (knots)	Highest Site Significant Wave Height (m)	Peak Wave Period (s)	Wave Direction (degrees)	Maximum Wave Height (m)
TC0570/Dorothy	42.1	3.6	7.5	301	6.7
TC0478/ Cora	19.6	1.1	4.8	109	2.0
TC0479/ David	49.5	5.4	9.7	285	10.0
TC0579/ Frederic	16.1	1.0	4.8	279	1.9
TC0180/ Allen	42.1	5.2	11.0	152	9.7
TC1284/ Klaus	-	-	-	-	-
TC0888/ Gilbert	27.2	2.3	6.3	259	4.3
TC1088/ Isaac	16.1	0.8	3.2	050	1.5
TC1188/ Joan	19.6	1.7	6.3	090	3.2
TC1189/ Hugo	42.1	4.7	8.5	263	8.7
TC0290/ Arthur	23.5	2.0	6.3	100	3.7
TC1390/ Klaus	17.3	1.2	4.8	256	2.2
TC0494/ Debby	58.2	3.8	7.5	217	7.1
TC0995/ Iris	45.8	5.3	9.7	290	9.9
TC1295/ Luis	31.0	3.6	8.5	284	6.7
TC1395/ Marilyn	53.2	5.9	9.7	287	11.0
TC0296/ Bertha	18.4	1.2	4.8	256	2.2
TC0696/ Fran	-	-	-	-	-

Note: NN refers to the sequential tropical storm number and YY is the year in which the storm occurred.

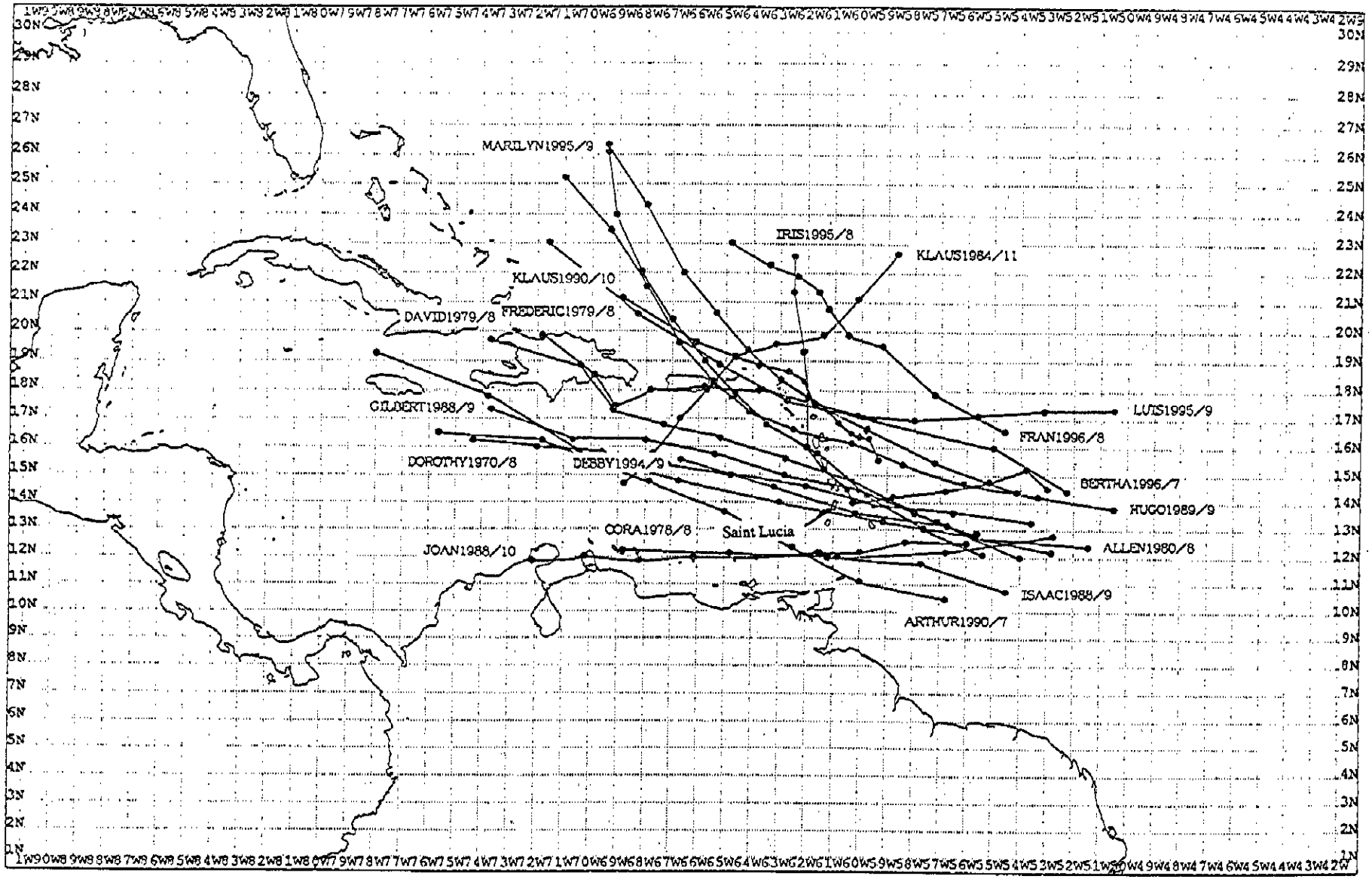


Figure-A.7.4 Tracks of hurricane

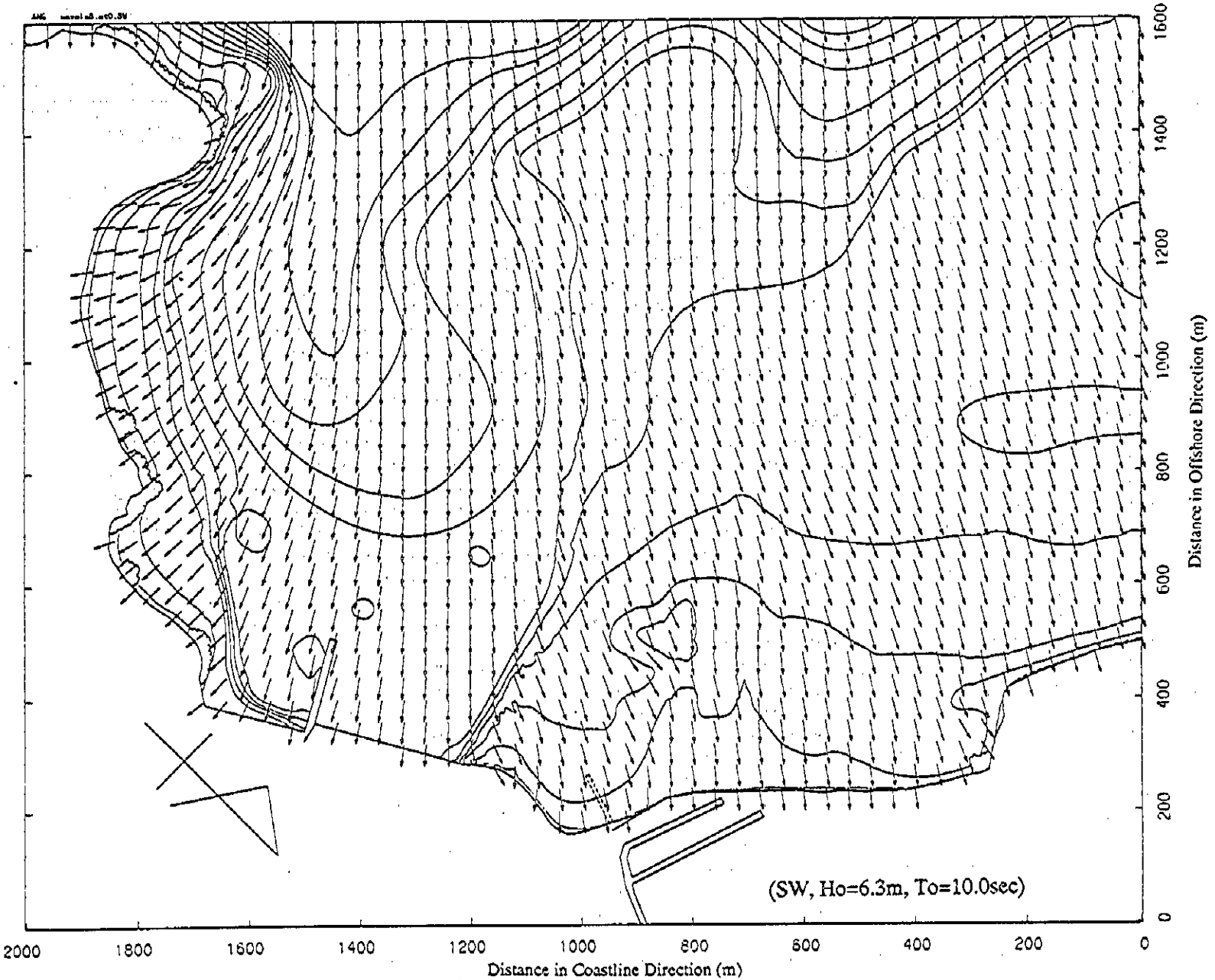


Figure-A.7.5 Results of wave deformation calculation (Distribution of wave direction)

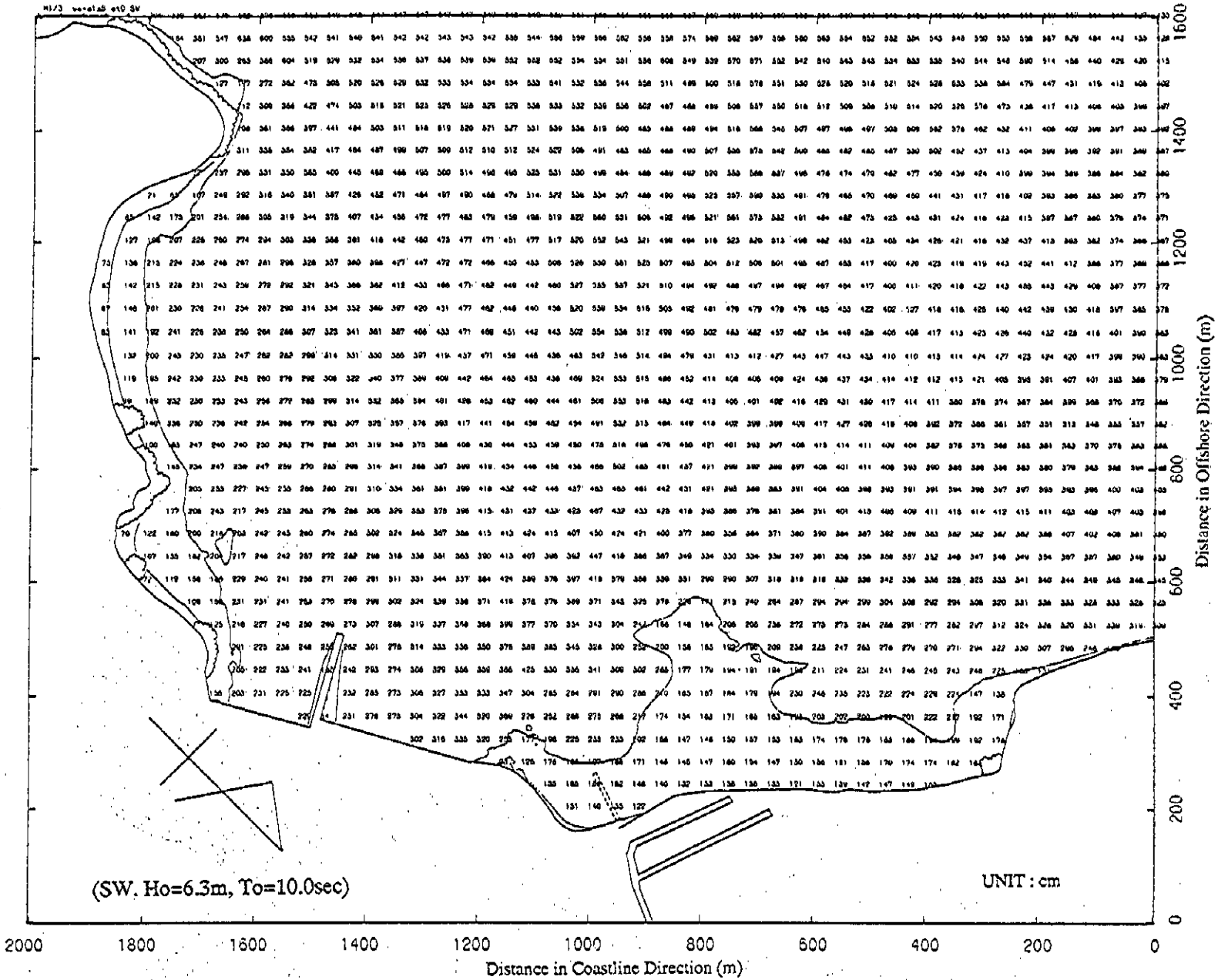
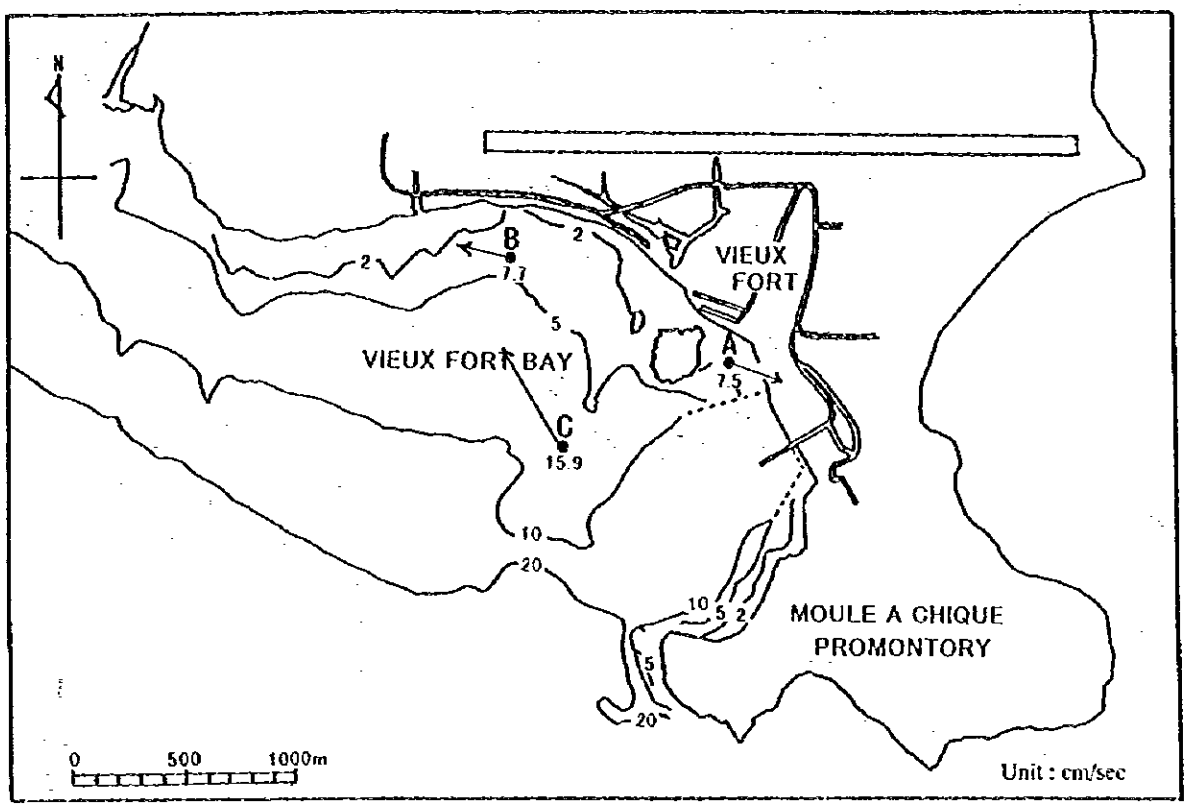
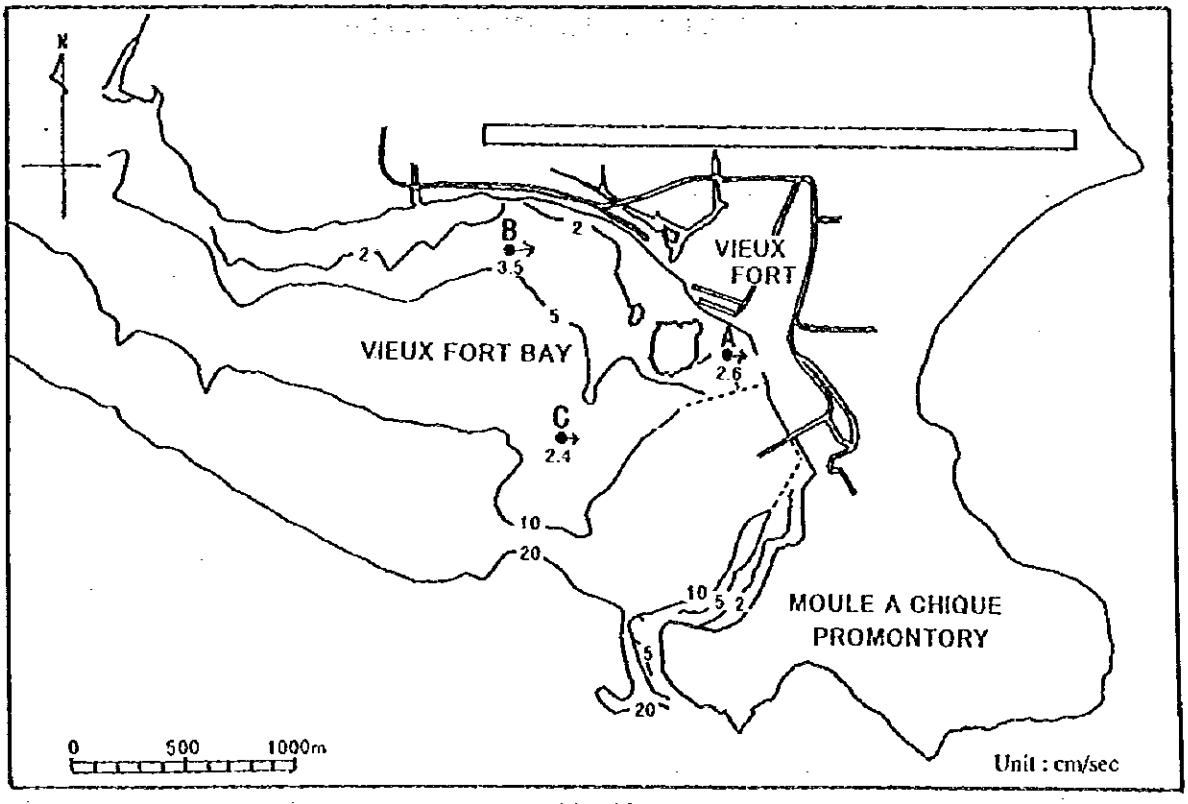


Figure-A.7.6 Results of wave deformation calculation (Distribution of significant wave height)



Flood Tide



Ebb Tide

Figure-A.7.7 Current observation (flood and ebb tide)

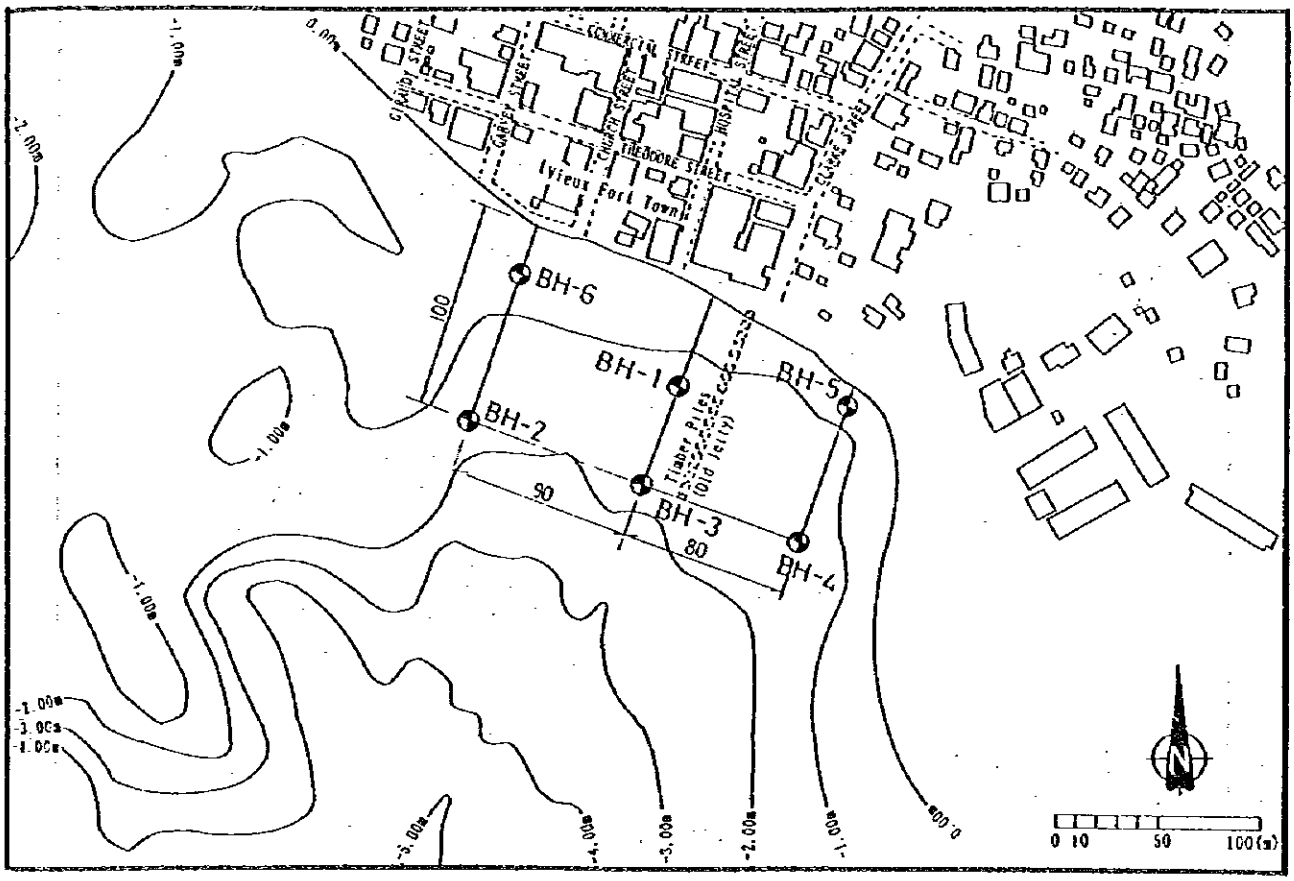


Figure-A.7.8 Location of boring points

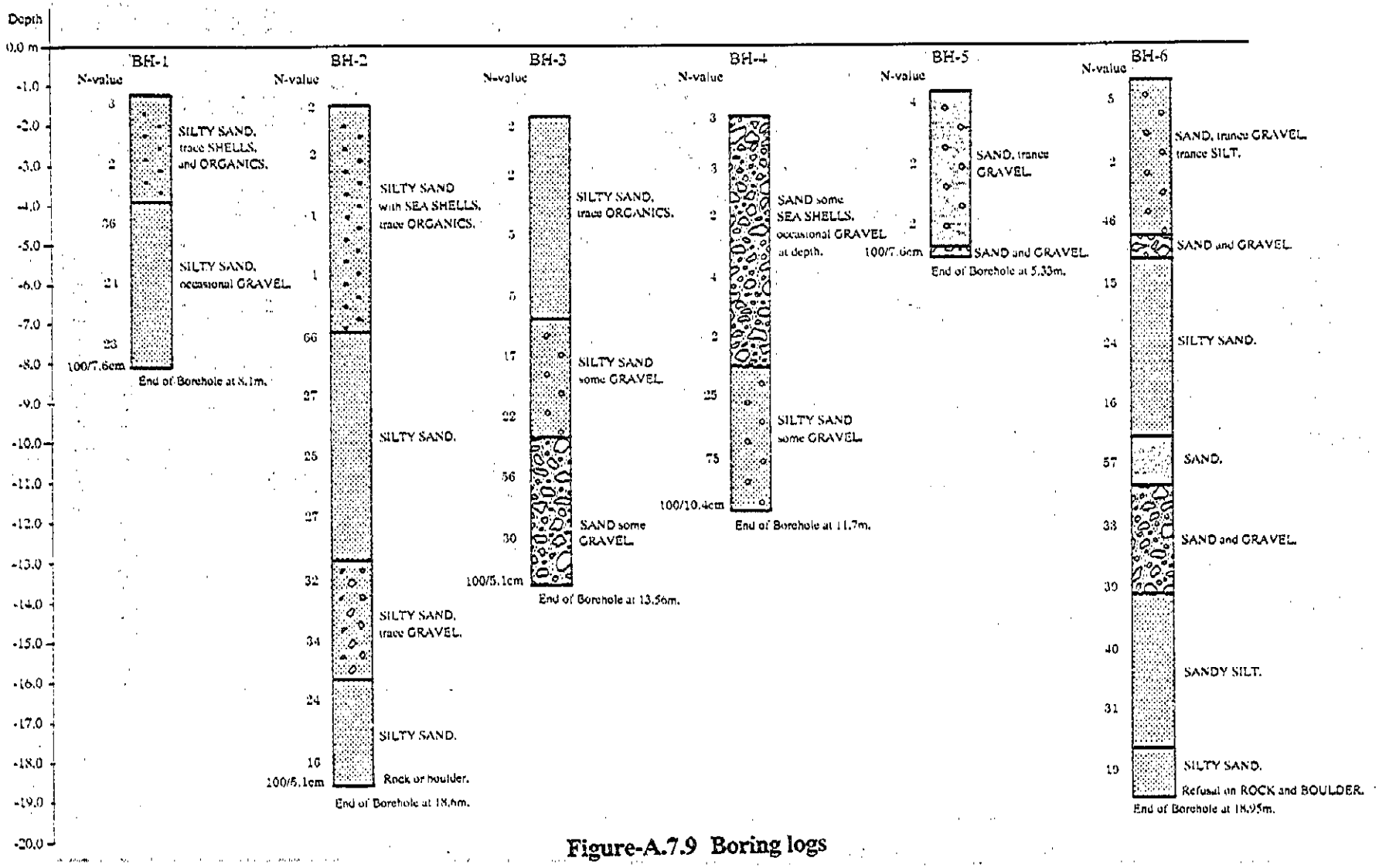
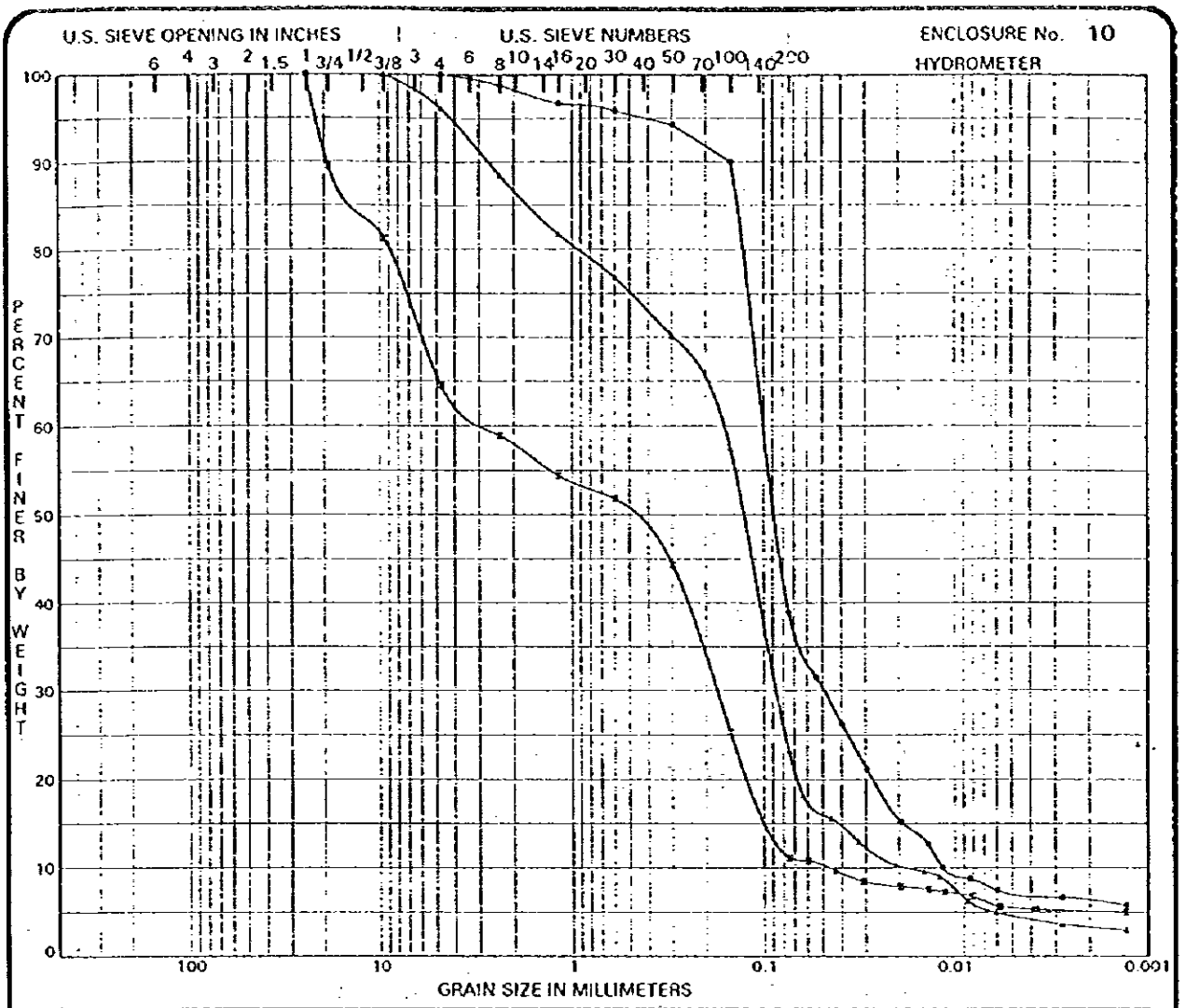


Figure-A.7.9 Boring logs



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Id.	Depth,m	Classification	MC%	LL	PL	PI	Cc	Cu
●	B 1/S 1	1.4							
⊠	B 1/S 3	4.4						0.17	38.7
▲	B 1/S 5	7.4							

	Sample Id.	Depth,m	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay
●	B 1/S 1	1.4	4.75	0.10	0.087	0.050	0.0	61.1	32.6	6.3
⊠	B 1/S 3	4.4	25.00	2.71	0.508	0.178	35.5	53.4	6.0	5.1
▲	B 1/S 5	7.4	9.50	0.17	0.129	0.086	3.9	72.9	19.8	3.4

PROJECT Vieux Fort Fishing Complex - St. Lucia.

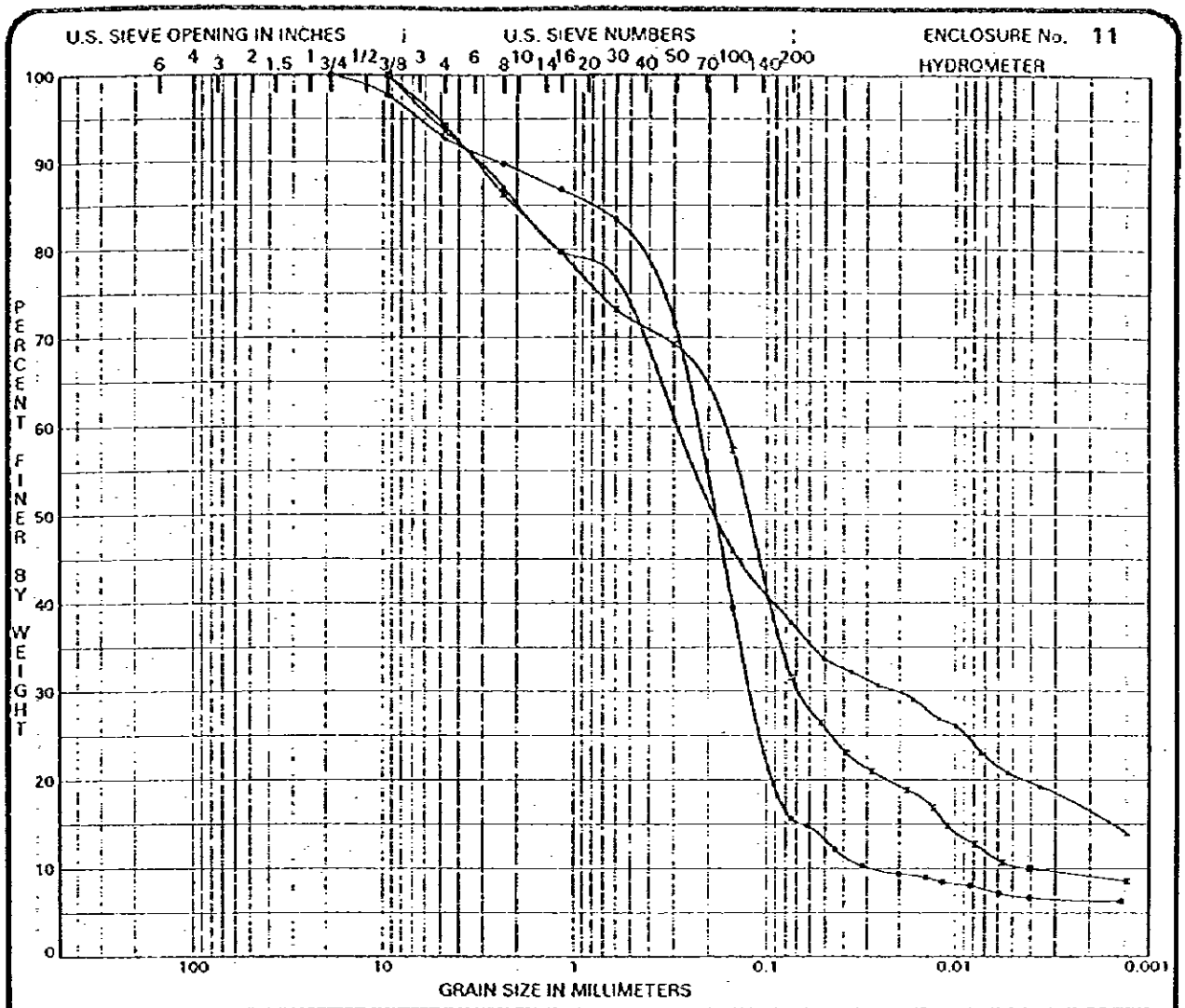
JOB NO. GA 97 468
DATE October 1997

GRADATION CURVES

Geotech Associates Limited
#4 Niles Street, Tunapuna

*GRSZL-2 97468 97/10/07

Figure-A.7.10 (1) Analysis results of drain size (BH-1)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Id.	Depth,m	Classification	MC%	LL	PL	PI	Cc	Cu
●	B 2/S 2	2.9							
■	B 2/S 5	7.4							
▲	B 2/S10	14.9							

	Sample Id.	Depth,m	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay
●	B 2/S 2	2.9	19.00	0.23	0.188	0.114	7.2	77.2	9.2	6.4
■	B 2/S 5	7.4	9.50	0.17	0.123	0.067	5.8	62.6	22.5	9.1
▲	B 2/S10	14.9	9.50	0.29	0.181	0.022	6.4	55.8	21.6	16.2

PROJECT Vieux Fort Fishing Complex - St. Lucia.

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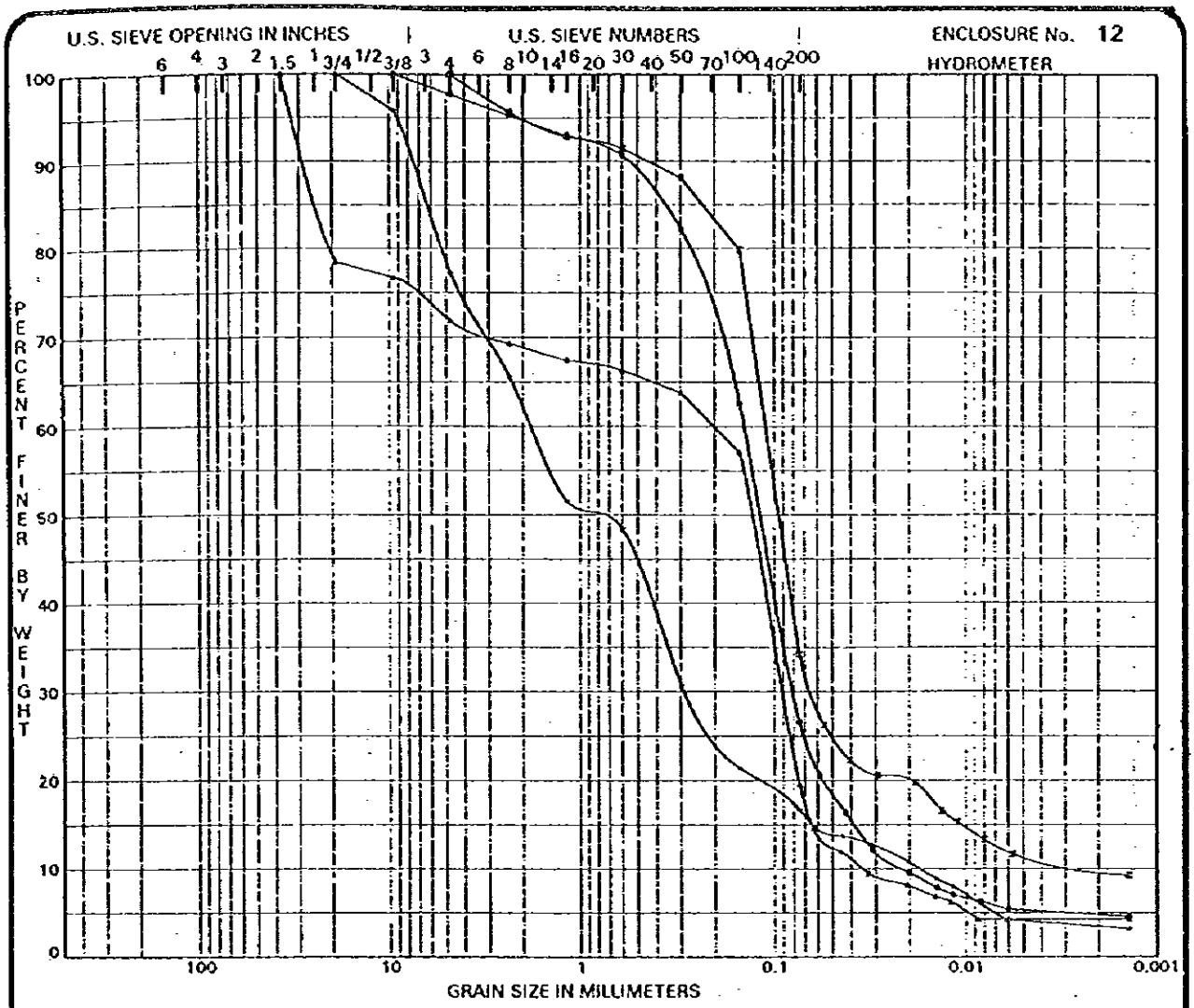
DATE October 1997

GRADATION CURVES

Geotech Associates Limited
#4 Niles Street, Tunapuna

*GRSZL-2 97468 97/10/07

Figure-A.7.10 (2) Analysis results of drain size (BH-2)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Id.	Depth,m	Classification	MC%	LL	PL	PI	Cc	Cu
●	B 3/S 1	2.0							
☒	B 3/S 3	4.7							
▲	B 3/S 5	7.7							
✱	B 3/S 7	10.7							

	Sample Id.	Depth,m	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay
●	B 3/S 1	2.0	9.50	0.14	0.118	0.080	2.3	71.1	21.8	4.8
☒	B 3/S 3	4.7	4.75	0.11	0.095	0.064	0.0	65.8	24.3	9.9
▲	B 3/S 5	7.7	37.50	0.20	0.132	0.091	28.2	52.2	15.3	4.3
✱	B 3/S 7	10.7	19.00	1.79	0.841	0.285	22.8	60.5	13.3	3.4

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GRADATION CURVES

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#4 Niles Street, Tunapuna

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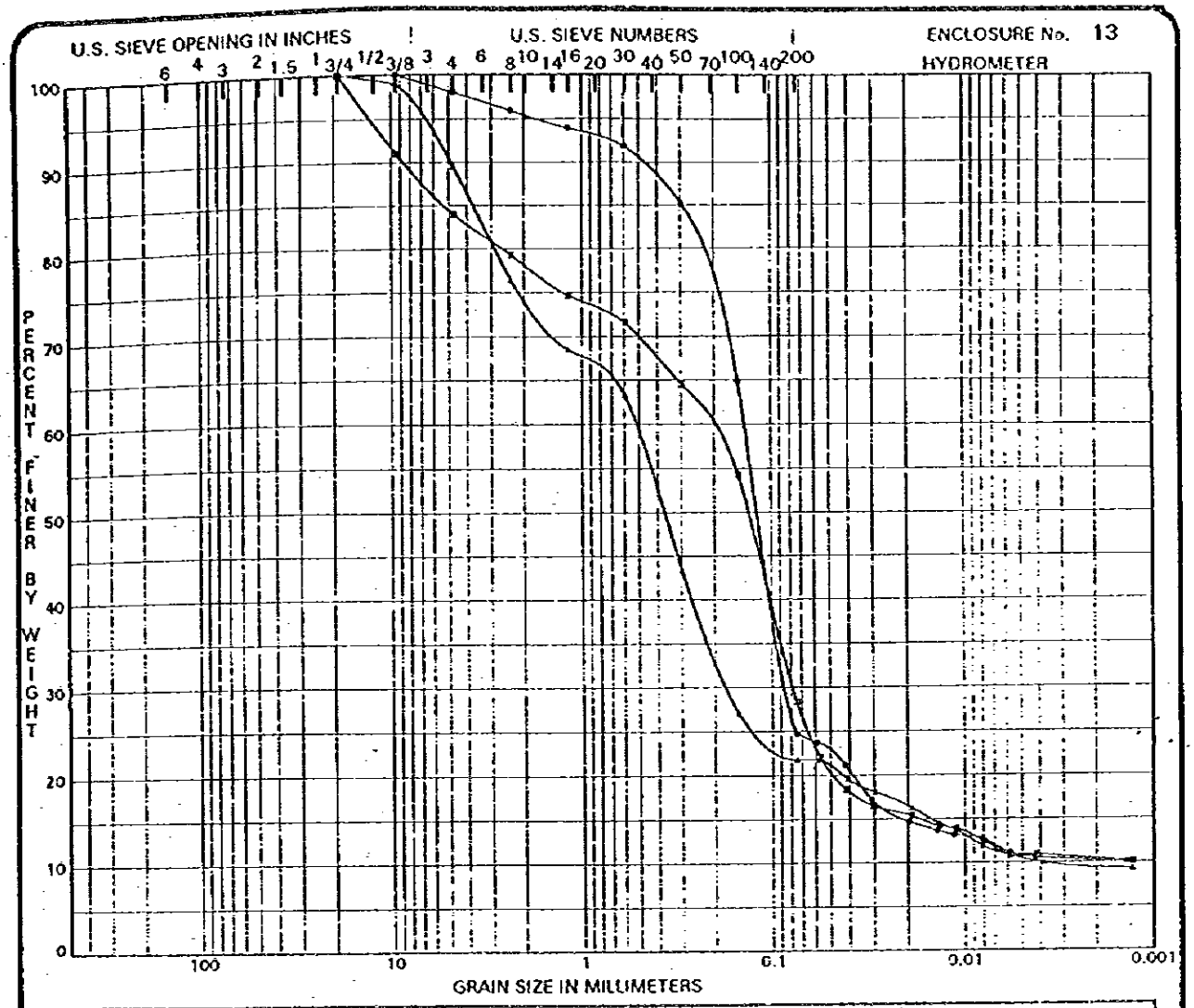
Figure-A.7.10 (3) Analysis results of drain size (BH-3)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Id.	Depth,m	Classification	MC%	LL	PL	PI	Cc	Cu
●	B 4/S 1	2.0							
☒	B 4/S 5	7.4							
▲	B 4/S 7	10.4							

	Sample Id.	Depth,m	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay
●	B 4/S 1	2.0	9.50	0.14	0.116	0.082	2.0	73.3	14.4	10.3
☒	B 4/S 5	7.4	19.00	0.22	0.134	0.078	16.0	55.6	18.0	10.4
▲	B 4/S 7	10.4	19.00	0.54	0.378	0.170	10.5	67.7	12.2	9.6

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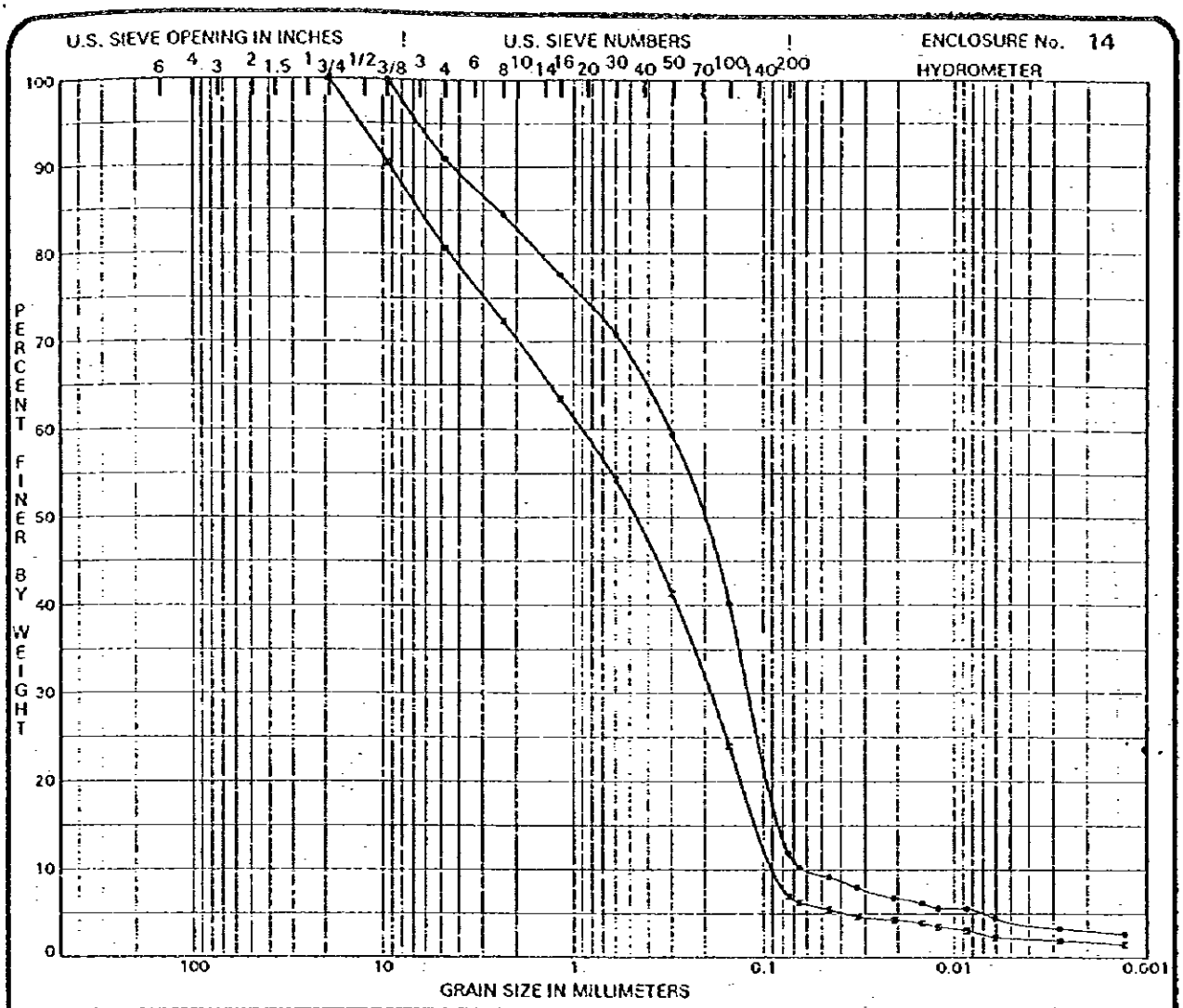
Figure-A.7.10 (4) Analysis results of drain size (BH-4)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Id.	Depth,m	Classification	MC%	LL	PL	PI	Cc	Cu
●	B 5/S 2	2.9						0.63	4.4
✕	B 5/S 3	4.4						0.47	10.8

	Sample Id.	Depth,m	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay
●	B 5/S 2	2.9	9.50	0.31	0.214	0.117	9.1	79.0	8.9	3.0
✕	B 5/S 3	4.4	19.00	0.92	0.477	0.191	19.3	73.7	5.3	1.7

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GRADATION CURVES

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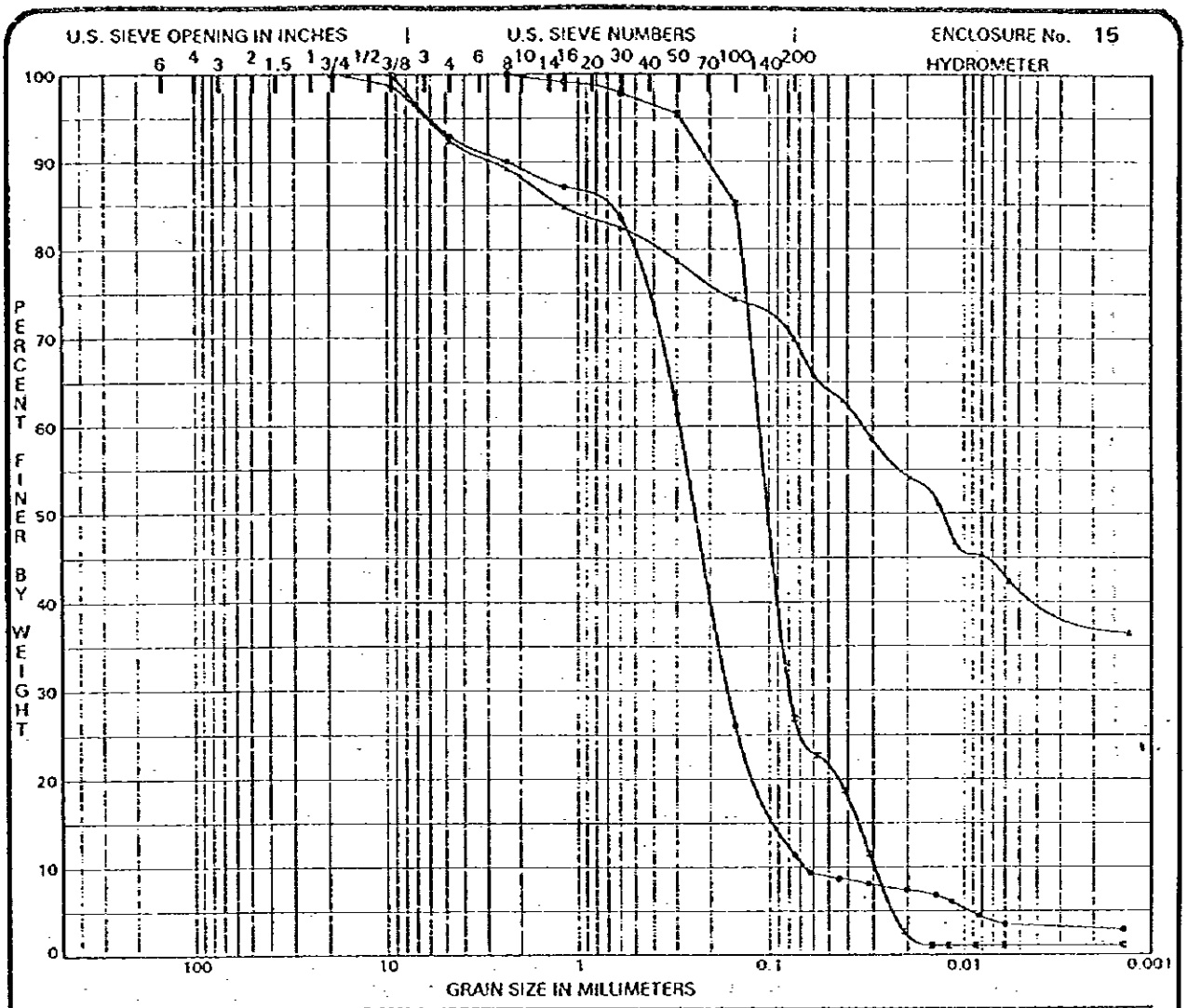
Figure-A.7.10 (5) Analysis results of drain size (BH-5)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Id.	Depth,m	Classification	MC%	LL	PL	PI	Cc	Cu
●	B 6/S 3	4.4						1.28	4.2
⧗	B 6/S 5	7.4							
▲	B 6/S12	17.9							

	Sample Id.	Depth,m	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay
●	B 6/S 3	4.4	9.50	0.29	0.240	0.162	7.1	81.5	8.4	3.0
⧗	B 6/S 5	7.4	2.36	0.11	0.099	0.078	0.0	73.1	25.8	1.1
▲	B 6/S12	17.9	19.00	0.03	0.013		7.6	22.6	31.7	38.1

PROJECT Vieux Fort Fishing Complex - St. Lucia.

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DATE October 1997

GRADATION CURVES

Geotech Associates Limited
#4 Niles Street, Tunapuna

*GRSZL-2 97468 97/10/07

Figure-A.7.10 (6) Analysis results of drain size (BH-6)

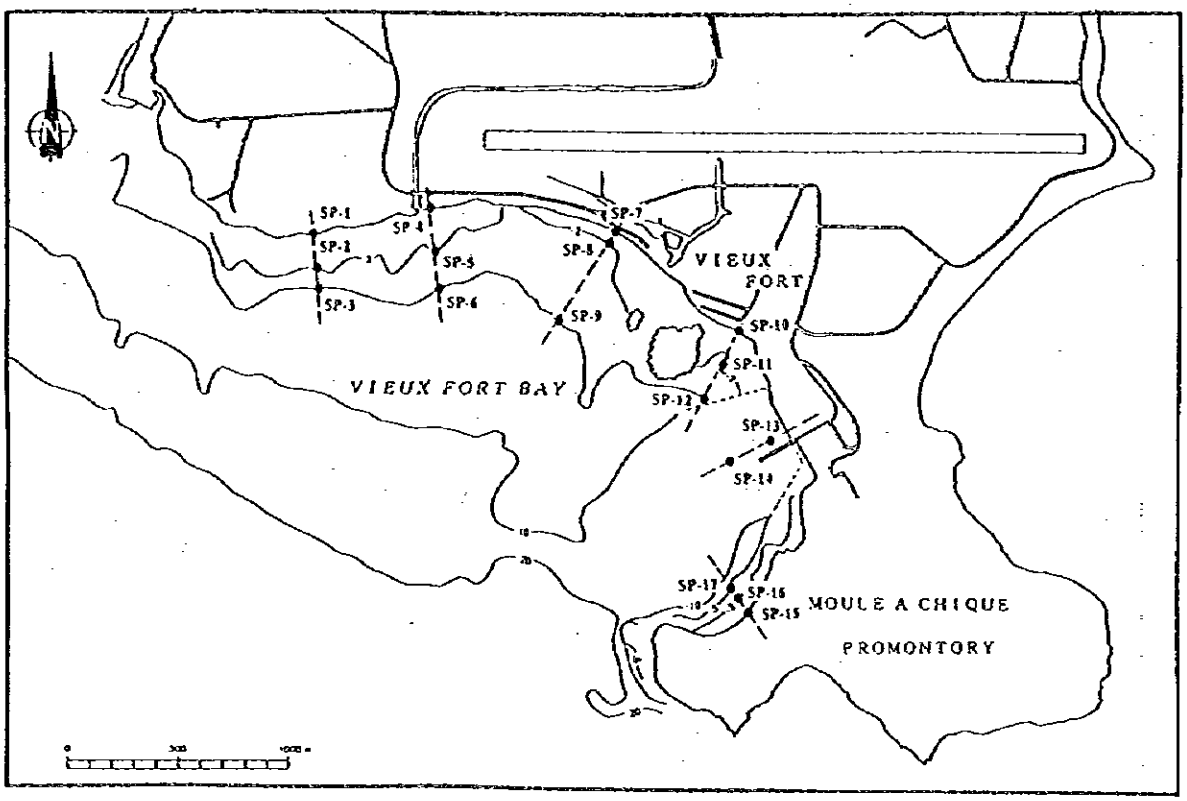


Figure-A.7.11 Location of sampling points on seabed materials

Table- A.7.5 Analysis results of seabed materials

Sample Point	Medium Grain Size	Specific Gravity	Sample Point	Medium Grain Size	Specific Gravity	Sample Point	Medium Grain Size	Specific Gravity
SP-1	リーフ上により採取不可	–	SP-7	0.19	2.59	SP-13	0.06以下	2.56
SP-2	リーフ上により採取不可	–	SP-8	0.12	2.56	SP-14	0.09	2.59
SP-3	0.62	2.62	SP-9	0.37	2.64	SP-15	1.20	2.57
SP-4	0.32	2.71	SP-10	0.11	2.43	SP-16	0.27	2.67
SP-5	0.34	2.71	SP-11	0.09	2.63	SP-17	0.24	2.63
SP-6	0.36	2.61	SP-12	0.12	2.65			

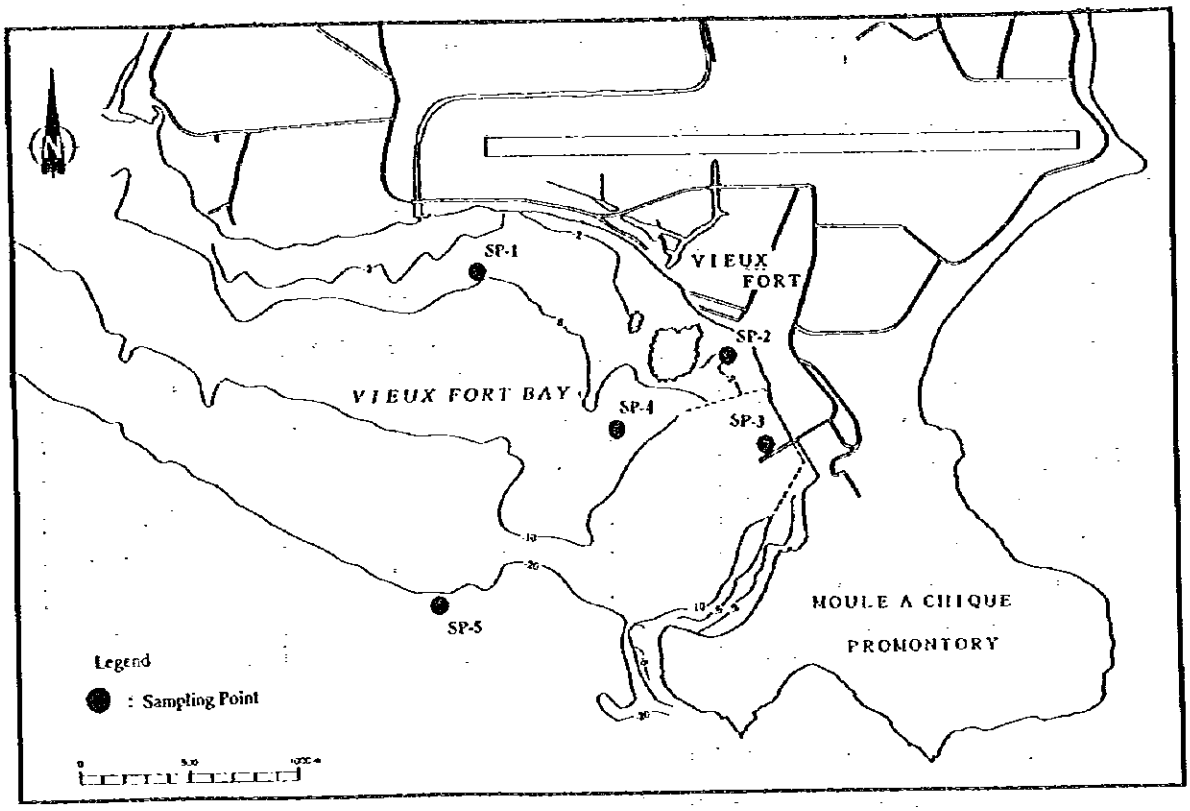


Figure-A.7.12 Location of water sampling points

Table-A.7.6 Results of water quality survey

(1) Date of Sampling: August 26, 1997
Sampling Depth: 40cm sub-surface

parameter	SP-1	SP-2	SP-3	SP-4	SP-5	Tap Water
PH	8.02	8.01	8.01	8.05	8.06	7.88
Temperature(℃)	28.2	28.6	28.3	28.3	28.2	29.1
Dissolved Oxygen (mg/l)	7.0	6.8	6.4	6.5	6.4	-
Total Suspended Solids (mg/l)	2.0	9.3	8.7	13.3	7.0	-
Chemical Oxygen Demand (mg/l)	1120	1090	850	990	900	-
Turbidity (NTU)	-	-	-	-	-	11.4
Chlorine Residual (mg/l)	-	-	-	-	-	0.37
Total Coliforms (CFU/100ml)	-	-	-	-	-	0
Total Hardness (mg/l CaCO)	-	-	-	-	-	24.0

(2) Date of Sampling: September 2, 1997
Sampling Depth: 40cm sub-surface

parameter	SP-1	SP-2	SP-3	SP-4	SP-5	Tap Water
PH	8.16	8.16	8.20	8.13	8.14	7.40
Temperature(℃)	28.4	28.9	28.6	28.7	28.8	29.2
Dissolved Oxygen (mg/l)	7.1	7.3	7.1	7.4	7.2	-
Total Suspended Solids (mg/l)	3.7	7.7	6.3	7.3	6.5	-
Chemical Oxygen Demand (mg/l)	970	870	920	1070	900	0
Turbidity (NTU)	-	-	-	-	-	12.8
Chlorine Residual (mg/l)	-	-	-	-	-	1.46
Total Coliforms (CFU/100ml)	-	-	-	-	-	0
Total Hardness (mg/l CaCO)	-	-	-	-	-	22.0

Table-A.7.7 Environmental standards for water pollution in marine environment in Japan

Environmental Ground	PH	DO (mg/l)	COD (mg/l)
Human Life	7 to 8.3	more than 2	less than 8
Fishery	7.8 to 8.3	more than 5	less than 3

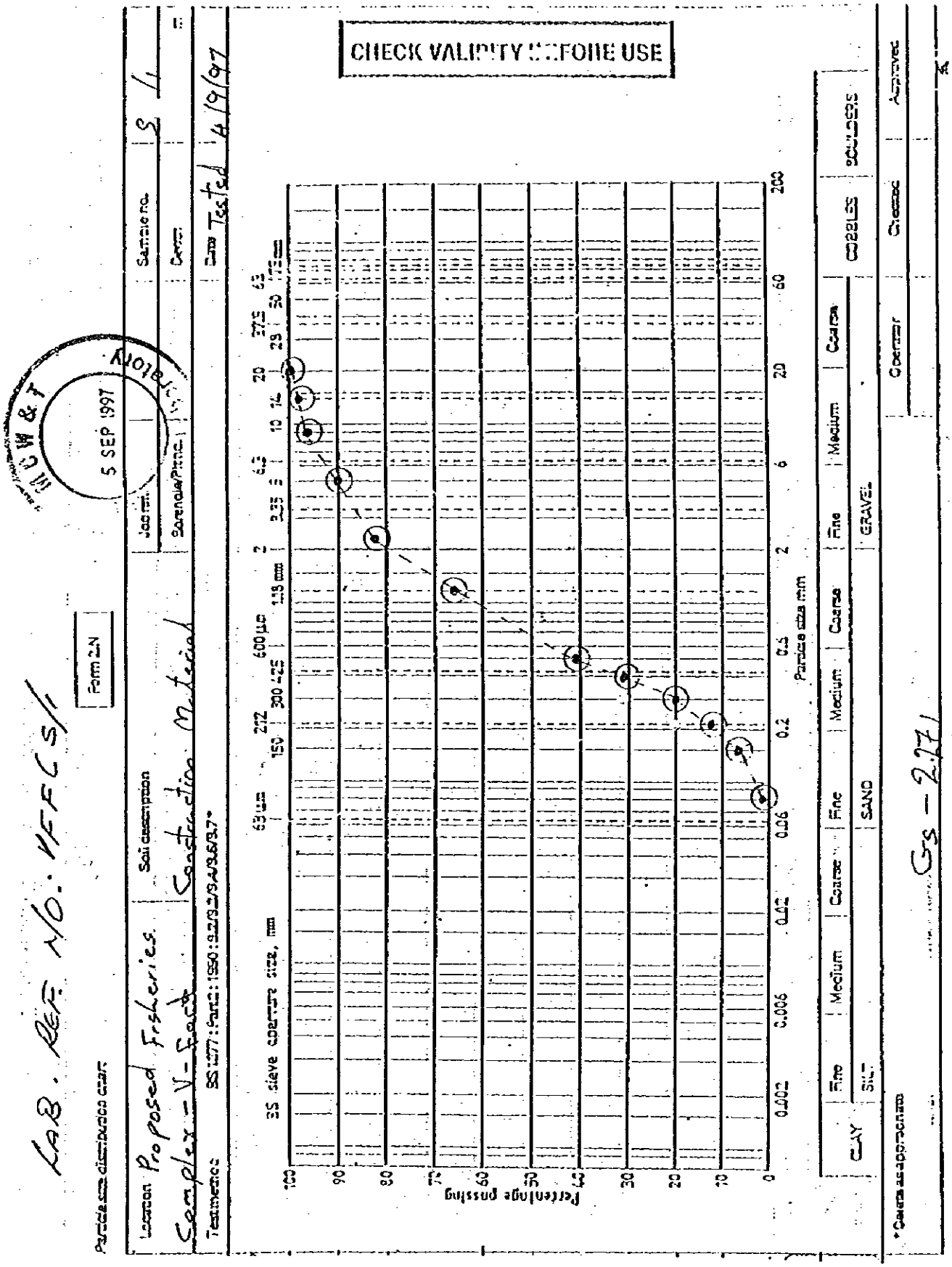


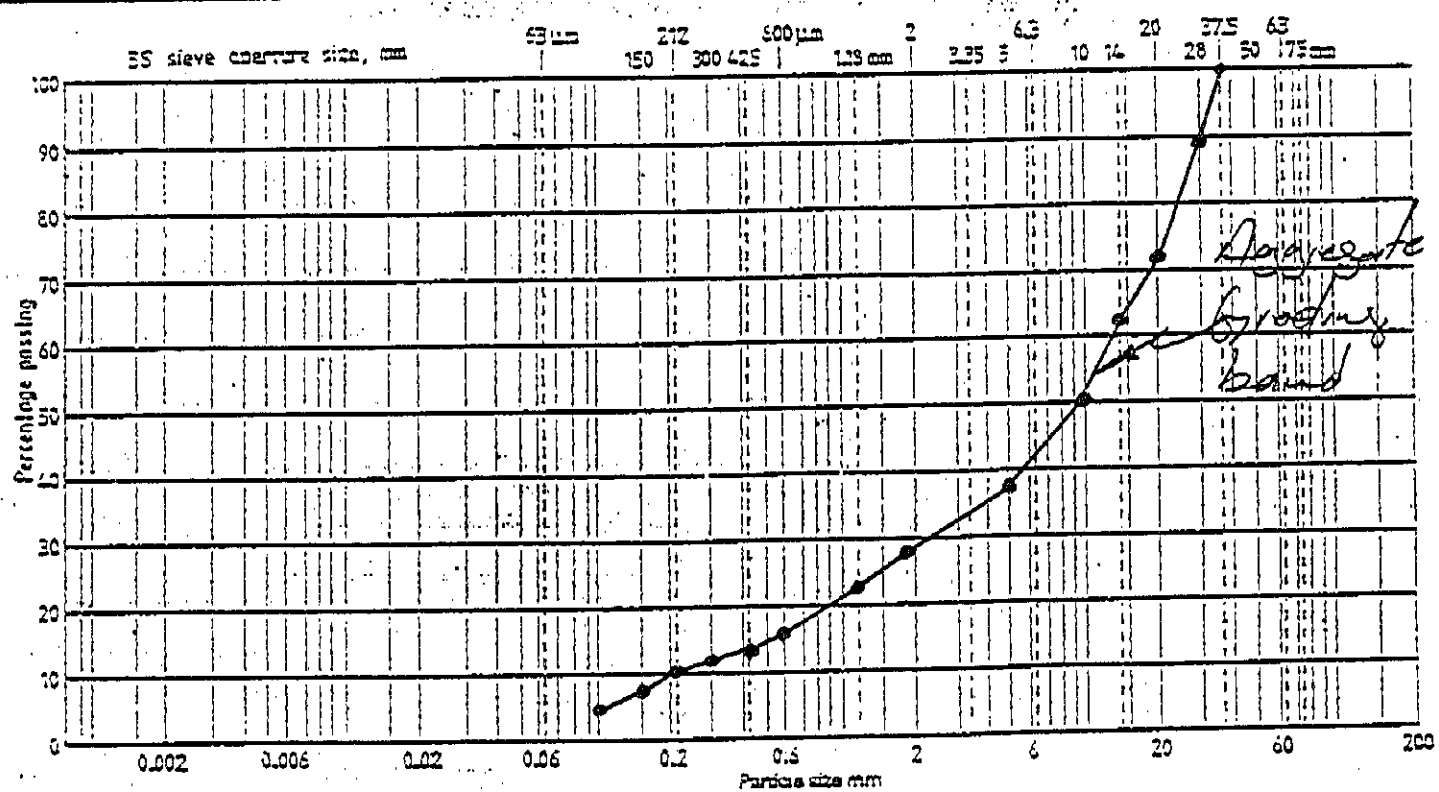
Figure-A.8.1(1) Analysis results of drain size on reclamation materials (Sample-1)

LAB. REF. NO.: VFFS/2

Particle size distribution chart

Form 2N

Location: Proposed Fisheries Complex Vieux Fort	Soil description: Construction Material	Job ref.	Sample no. S/2
		Borehole/Pit no.	Depth
Test method: BS 1377 : Part 2 : 1990 : 9.2/9.3/9.4/9.5/9.7* Soil for reclamation			Date 4/7/97



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES	BOULDERS
	SILT			SAND			GRAVEL				

Operator	Checked	Approved

* Delete as appropriate

Cto. 2.53

CHECK VALIDITY BEFORE USE

Figure-A.8.1(2) Analysis results of drain size on reclamation materials (Sample-2)

Study on foundation structure for facility building

1. Allowable design soil bearing capacity is assumed to be 5.0t/m^2.

2. Load assumption

1) Dead load (DL)

Dead loads can be estimated by multiplying slab weight by 1.2 to 1.3 as follows:

	Slab thickness	DL (t/m^2)
Roof story	20 cm	0.58 to 0.63
General story	15 cm	0.44 to 0.47
Mat foundation	30 cm	0.87 to 0.94

2) Live load (LL)

Live loads depending on the usage of the room are assumed to be the same value as those used in Japanese standards as follows:

Floor usage / room	LL (t/m^2)
Roof	0.18
Warehouse	0.50
Office, others	0.30

3) Equipment load (EL)

Equipment loads are assumed as follows:

Floor usage / room	EL (t/m^2)
Generator set, switch gear	1.00
Refrigeration, ice production facility	3.00

3. Weight at foundation

By using the above-mentioned loads, average weights of every building at foundation levels are assumed as follows:

Building	Floor	DL(t/m²)	LL(t/m²)	EL(t/m²)	Total L(t/m²)
Adoministration	Roof	0.63	0.18	0.00	
Office Building	1F	0.47	0.30	0.00	
(Offices)	Mat slab	0.94	0.00	0.00	2.52
LockerRoom	Roof	0.63	0.18	0.00	
(warehouses)	1F	0.47	0.50	0.00	
	Mat slab	0.94	0.00	0.00	2.72
SubStation	Roof	0.63	0.18	0.00	
MachineRoom	1F	0.47	0.30	1.00	
	Mat slab	0.94	0.00	0.00	3.52
ColdStorage Bld.	Roof	0.63	0.18	0.00	
Ice Making Plant	1F	0.47	0.30	3.00	
Ice Storage Bin	Mat slab	0.94	0.00	0.00	5.52

4. Soil bearing capacity and foundation type

Since from the above table, that the average vertical loads at foundation levels of all buildings but ColdStorage Bld.、Ice Making Plant・Ice Storage Bin are lower than the long-term soil bearing capacity, 5.0 t/m², the assumed mat foundations are considered to be applicable. Meanwhile, as for ColdStorage Bld.、Ice Making Plant・Ice Storage Bin, the vertical working stress at the foundation levels exceed the soil bearing capacity, thus, pile foundations shall be used.

Fish Handling Shed is also designed to be supported by pile foundation. It is because that the building itself and ties from the waterfront retaining wall might intersect under the ground, thus, possible influences on ties by the building weight shall be avoided. It is because that the building is located adjacent to the retaining wall, thus, we are concerned of any possible affection on the ties pulling the waterfront retaining wall laterally from the soil pressure.

5. Check of pile foundation

1) Pile foundation governing area

When piles are driven at every intersection of the grid lines in ColdStorage Bld., Ice Making Plant·Ice Storage Bin and Fish Handling Shed , the pile governing area per intersection and its estimated vertical loads of every building are as follows :

Building	X (m)	Y (m)	Area (m^2)	Average vertical pressure (t/m^2)	Vertical load (t)
ColdStorage Bld.	5.00	6.50	32.5	5.52	180
FishHandling Shed	6.00	7.00	42.0	2.72	123
Ice Making Plant	4.70	4.70	22.1	5.52	122

2) Load bearing capacity of a pile

Design the pile dimension and material as follows:

- Type and dimension : 300 mm square Solid Prestressed Concrete Piles
- Concrete grade : 3,600 kg/cm^2 (5,000 psi/cyl)

Load bearing capacity of a pile shall be whichever smaller value of either soil bearing capacity at strata plus side soil friction, or allowable compressive stress of the pile. Judging from the bore hole log of the soil report, the strata will come out at relatively shallow level, thus, piles can set on the strata easily. Therefore, the bearing capacity becomes the value of allowable compressive stress of the pile, that is, 88 t(1,951lbs)/pile from the table as per attached.

3) Number of piles

The vertical loads at foundation levels of each building range from 122t to 180t from paragraph 5.1. Thus, the required number of piles, Nr, assumed in paragraph 5.2 can be derived as follows: -

Cold Storage Building Nr = 180 / 88 = 2.05 ≒ 2

Fish Handling Shed Nr = 123 / 88 = 1.40 < 2

Ice Making Plant·Ice Storage Bin Nr = 122 / 88 = 1.39 < 2

Therefore, two (2) piles shall be driven to each grid line intersection, or vertical supporting point.

PC杭強度

PRES-T-CON LIMITED

12"x12" SQUARE SOLID PRESTRESSED CONCRETE PILES

(6 STRANDS - 1/2" DIAMETER) or (8 STRANDS 7/16" DIAMETER)

A = 144 in^2 Wt = 150 plf

I = 1,728 in^4 Z = 288 in^3

CONCRETE:- = f'c = 5,000 psi Cyl/6,000 psi Cube

STRANDS:- = 1/2" ⊖ 270 Ksi LOW RELAXATION - ASTM-416

A_{ps} = 1/2" ⊖ = 6 x 0.153 in^2 = 0.92 in^2
7/16" ⊖ = 8 x 0.115 in^2 = 0.92 in^2

PRESTRESS:- = 0.75 x 0.92 x 270,000 = 186,300 lbs

LOSSES = 15%

EFFECTIVE PRESTRESS = 0.65x186,300 = 158,355 lbs/STRAND

USING 6 No. STRANDS PER PILE.

$$F_{pc} = \frac{158,355}{144} = 1,100 \text{ psi}$$

(a) Direct Load:-

$$N = (0.33\ f'c - 0.27\ f_{pc})\ A = 194,830 \text{ lbs}$$

$= 194,830 \times 0.453 = 88,258$ kg

NOMINAL STRENGTH:-

$$P_n = (0.85\ f'c - 0.60\ f_{pc})\ A = 516,960 \text{ lbs}$$

$$\text{FACTOR OF SAFETY} = \frac{516.96}{194.83} = 2.65$$

(b) MOMENT CAPACITY:-

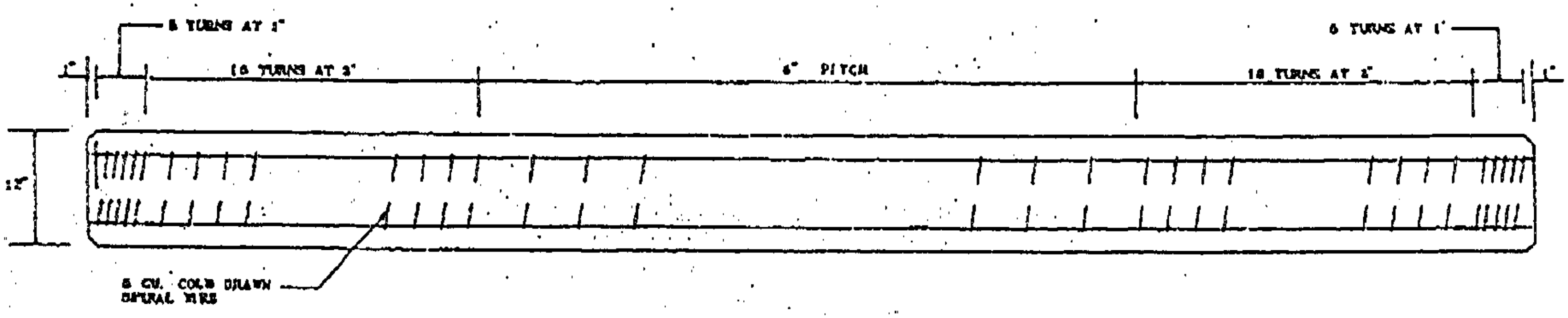
ALLOWABLE TENSION = 300 Psi (FOR EARTHQUAKE AND OTHER TRANSIENT LOADS IN CORROSIVE CONDITIONS)

$$M = f_a\ Z = (300 + 1,100) \times 288 = 403,200 \text{ in-lbs}$$

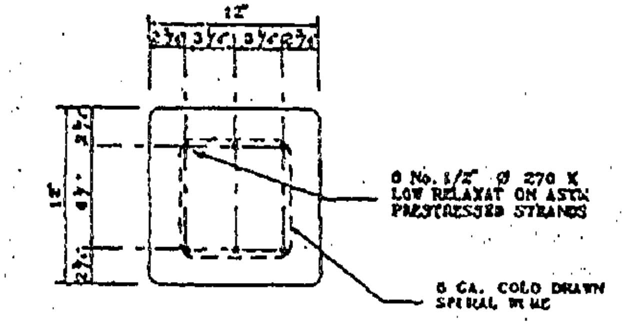
NOMINAL MOMENT STRENGTH:-

$$M_n = 0.37t\ A_{ps}\ f_{pu} = 0.37 \times 12(0.92) \times 270,000 = 1,100,500 \text{ in-lbs}$$

$$\text{FACTOR OF SAFETY} = \frac{1,100.5}{403.2} = 2.73$$



TYPICAL ELEVATION



AREA 144 in² WEIGHT = 150 lbs/Lf.

TYPICAL SECTION

P C杭の形状

PRES CON

12" PRESTRESSED CONC. PILE
DETAIL

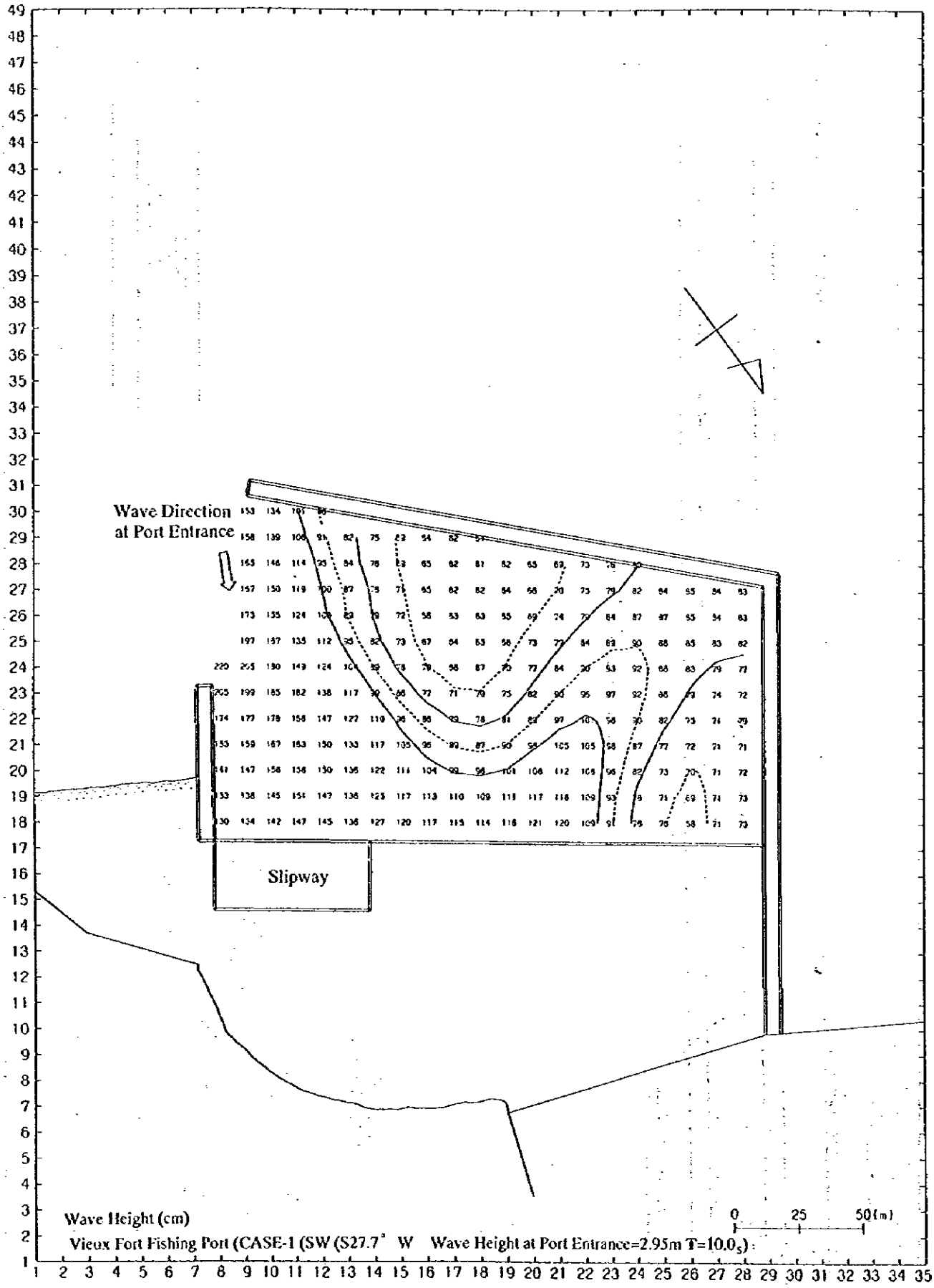


Figure-A.8.2 Results of calculation of calmness (Case-1)

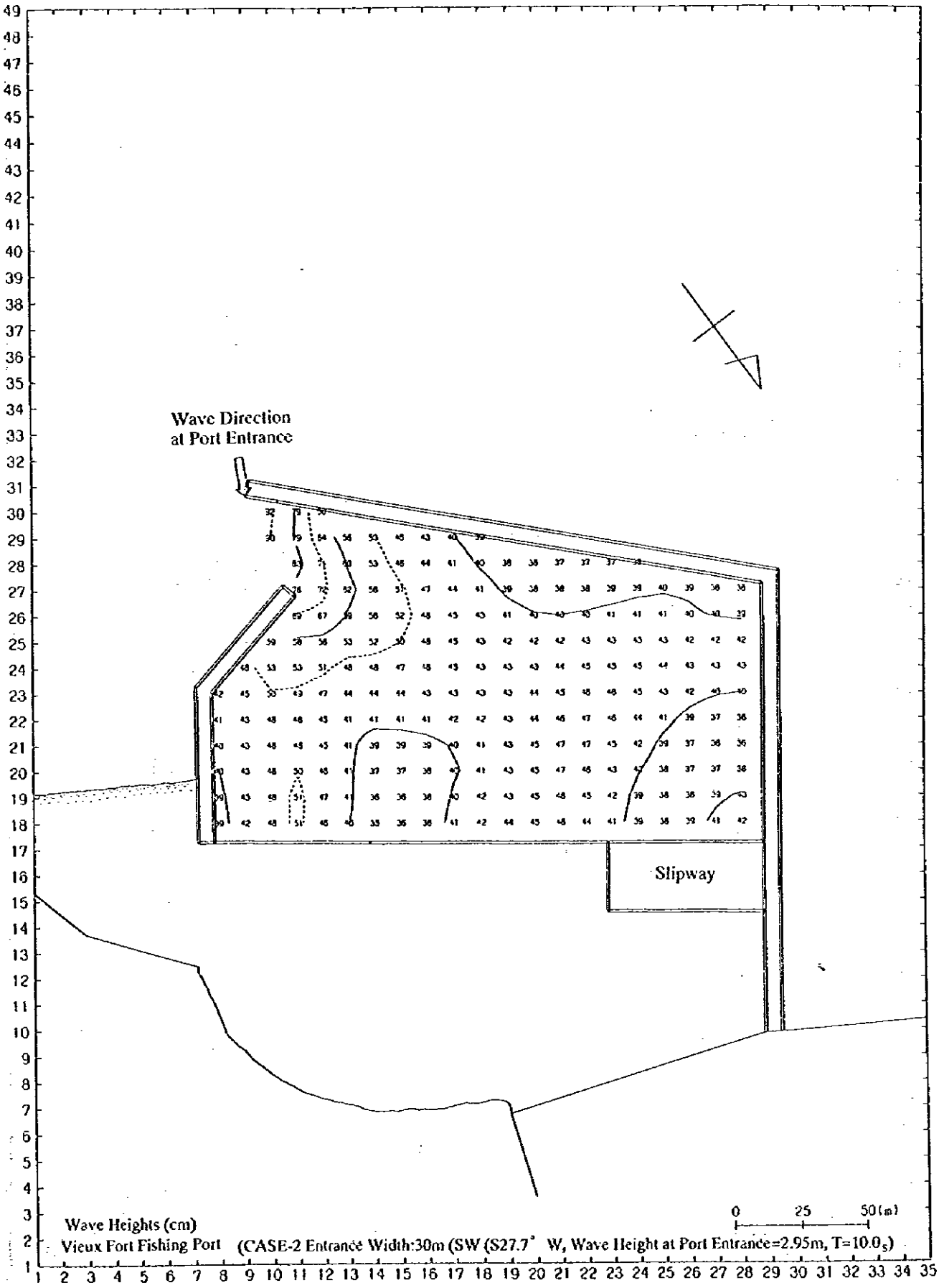


Figure-A.8.3 Results of calculation of calmness (Case-2)

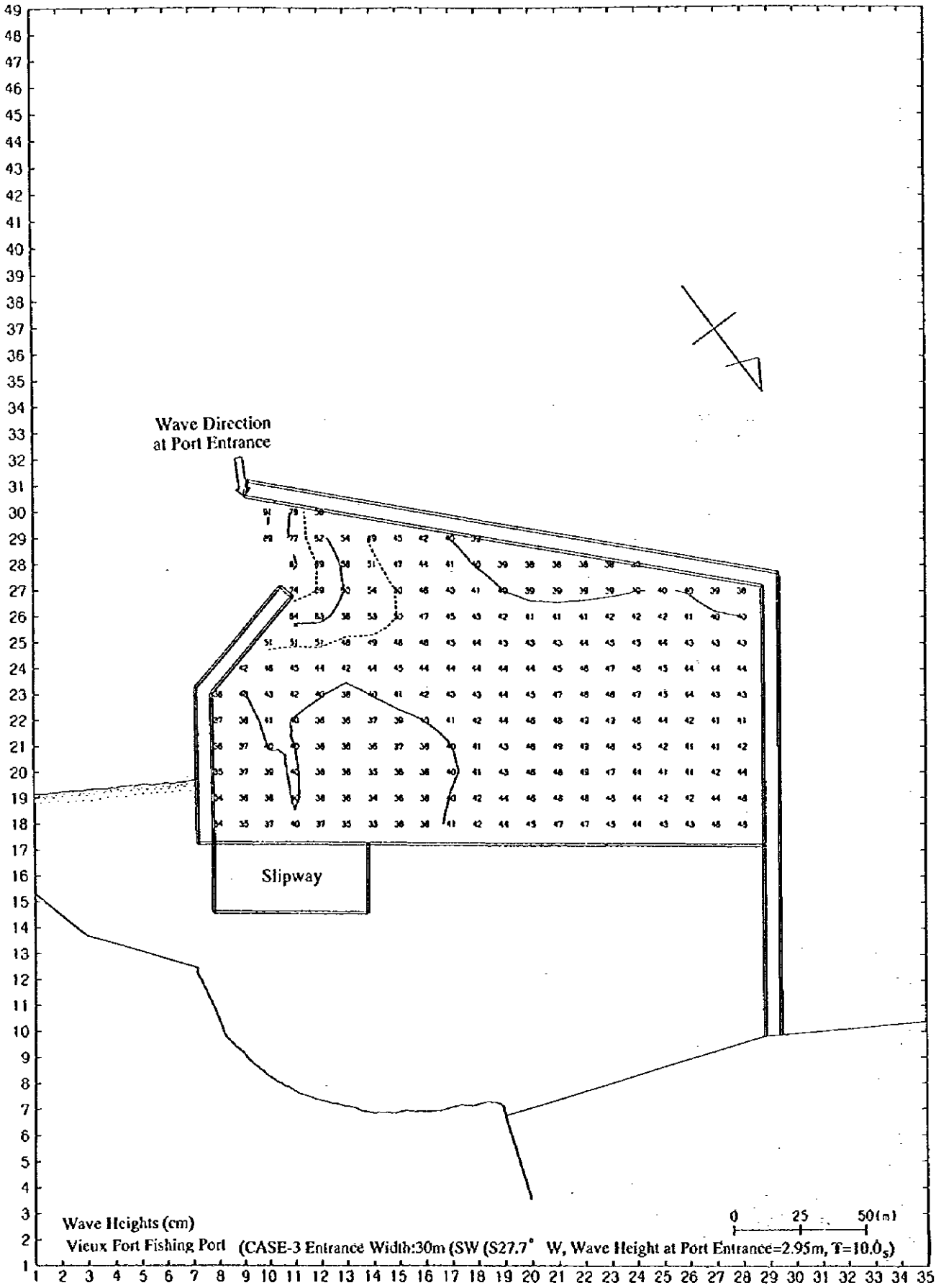


Figure-A.8.4 Results of calculation of calmness (Case-3)

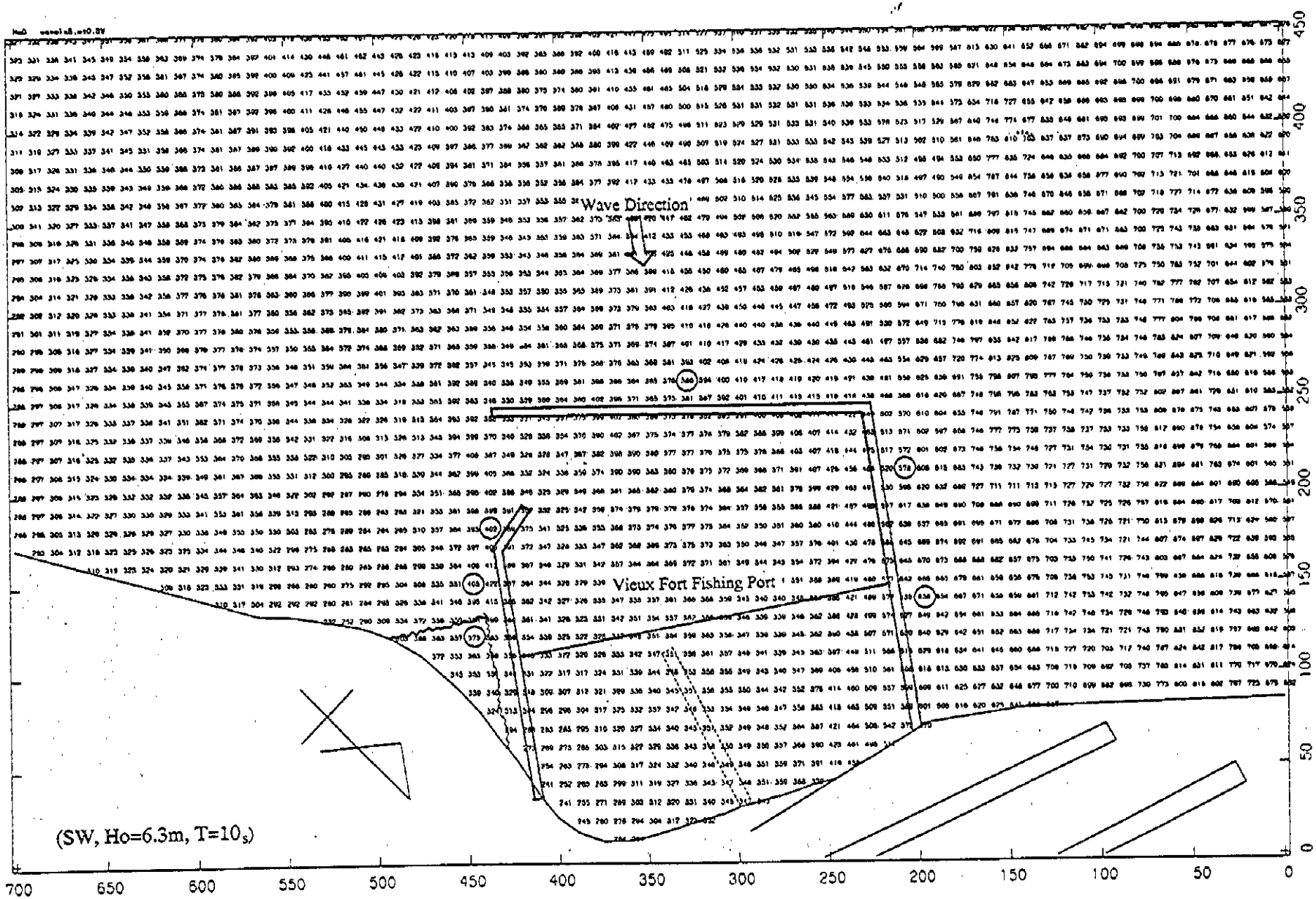


Figure-A.8.5 Distribution of equivalent deep-water wave height

Table- A.8.1 (1) Working days of fishing boats by each month (1996)

Boat No	Name	Type	January	February	March	April	May	June	Ave of 6month	July	August	September	October	November	December	Ave of 6month	Annual Ave
4	Deep Stars	F	15	12	17	5	0	1	8.3	1	0	1	0	1	1	0.7	
6	Lordsprayer	F	0	8	19	19	12	13	11.8	19	19	15	20	13	20	17.7	
10	Psolms 121	F	20	16	20	18	6	3	13.8	0	0	0	0	0	0	0.0	
11	Isabella	F	11	7	14	18	3	0	8.5	2	13	15	9	8	15	10.0	
13	Dos Domingo	F	5	9	13	1	0	0	4.7	0	0	0	0	0	11	1.8	
22	St Paut	F	7	6	11	0	0	0	4.0	0	0	0	0	0	0	0.0	
25	Love at Home	C	10	8	11	17	9	10	10.8	6	13	8	8	11	11	9.5	
26	Isueal	C	6	1	11	12	1	0	5.2	0	0	0	0	0	0	0.0	
39	Devine Gift	F	3	4	11	4	3	0	4.2	5	6	7	8	3	0	4.8	
46	National	C	10	6	15	11	8	6	9.3	1	12	16	14	14	6	10.5	
50	So help me God	C	11	9	4	13	7	0	7.3	0	1	1	0	0	0	0.3	
52	Realite	F	23	21	26	19	18	26	22.2	22	23	22	22	20	25	22.3	
53	Exodus	F	20	15	21	18	13	19	17.7	19	12	17	18	7	19	15.3	
55	St Anthony	F	14	3	20	19	9	17	13.7	18	23	19	20	18	24	20.3	
64	Salathel	C	7	9	12	12	12	4	9.3	8	9	6	1	4	0	4.7	
77	Selah	F	16	10	18	15	8	0	11.2	9	8	13	13	15	14	12.0	
79	Grass Hopper	C	13	18	21	16	13	18	16.5	19	19	21	16	17	19	18.5	
88	Girl ah rush me	F	18	26	23	21	16	0	17.3	0	1	13	12	11	8	7.5	
97	Wint Worth	F	20	19	25	22	14	14	19.0	9	4	18	24	19	23	16.2	
98	Vision	C	17	25	24	12	0	0	13.0	0	0	0	0	0	0	0.0	
102	Numbers	F	11	9	15	12	4	0	8.5	1	10	12	7	12	14	9.3	
104	Conviction	F	9	7	19	10	12	0	9.5	0	3	11	11	15	11	8.5	
108	Elyon	F	11	12	22	16	12	4	12.8	14	10	12	10	10	12	11.3	
115	Epaension	F	14	12	15	16	14	6	12.8	5	20	13	20	16	18	15.3	
120			11	11	14	14	8	2	10.0	5	6	12	16	12	2	8.8	
124	St. Celestine	C	24	20	20	9	15	9	16.2	16	13	6	13	12	11	11.8	
130	Anes	F	11	12	18	22	13	1	12.8	3	7	10	8	7	7	7.0	
132	Tresure	C	0	0	0	0	0	0	0.0	0	0	0	10	15	10	5.8	
133	Thanks be to God	C	18	21	13	19	17	18	17.7	18	19	16	21	17	17	18.0	
135	Dues Donne	F	2	0	0	0	7	19	4.7	22	25	23	21	21	20	22.0	
137	Mystic	F	7	10	16	14	7	0	9.0	1	7	8	6	7	6	5.8	
141	Thanks & Praise	C	22	16	22	15	6	0	13.5	18	15	16	17	17	17	16.7	
146	Isreal King	F	11	10	21	24	11	21	16.3	22	21	12	23	20	19	19.5	
150	Convoy	F	4	7	15	16	10	3	9.2	2	3	7	6	5	1	4.0	
154	Cyborg	F	0	0	0	0	8	0	1.3	2	11	4	0	6	6	4.8	
157	Hore Grace	C	6	11	14	14	11	10	11.0	13	14	10	12	4	14	11.2	
161	Lati Free	F	20	16	16	20	11	21	17.3	23	24	16	17	22	20	20.3	
162	God Father	F	19	14	11	14	7	11	12.7	11	13	15	14	14	15	13.7	
163	Trial	F	17	16	20	9	18	14	15.3	19	19	16	21	8	14	16.2	
Average			11.9	11.2	15.6	13.2	8.7	6.9	11.2	8.5	10.3	10.5	11.2	10.2	11.0	10.3	
%			38.0	39.9	50.1	44.6	28.9	23.6	37.5	28.2	34.2	35.9	37.2	34.9	36.4	34.5	

Table- A.8.1 (2) Working days of fishing boats by each month (1997)

Boat No	Name	Type	January	February	March	April	May	June	Ave of 6month	July	August	September	October	November	December	Ave of 6month	Annual Ave
4	Deep Stard	F	3	1	13	13	7	5	7.0	1	0	-	-	-	-	0.5	
6	Lordsprayer	F	23	20	23	20	17	13	19.3	18	18	-	-	-	-	18.0	
11	Isabella	F	19	11	16	19	11	9	14.2	11	1	-	-	-	-	6.0	
12	Top Secret	F	0	0	0	18	17	18	8.5	15	14	-	-	-	-	14.5	
13	Dos Domingo	F	9	6	3	1	0	0	3.2	0	0	-	-	-	-	0.0	
22	St Paut	F	0	10	8	18	11	8	9.2	3	0	-	-	-	-	1.5	
25	Loue at Home	C	14	6	20	11	18	16	14.2	20	12	-	-	-	-	16.0	
39	Devine Cift	F	9	1	8	8	7	0	5.5	1	4	-	-	-	-	2.5	
46	National	C	1	1	0	0	0	0	0.3	0	0	-	-	-	-	0.0	
50	So help me God	C	0	1	0	1	3	0	0.8	1	0	-	-	-	-	0.5	
52	Realite	F	24	25	25	26	20	16	22.7	23	21	-	-	-	-	22.0	
53	Exodus	F	15	15	22	20	14	16	17.0	18	14	-	-	-	-	16.0	
55	St Anthony	F	11	17	18	22	15	16	16.5	15	13	-	-	-	-	14.0	
64	Salathel	C	24	20	20	20	13	12	18.2	16	14	-	-	-	-	15.0	
77	Selah	F	17	12	19	19	12	6	14.2	13	14	-	-	-	-	13.5	
79	Grass Hopper	C	24	15	20	23	9	19	18.3	26	26	-	-	-	-	26.0	
88	Girl ah rush me	F	9	4	6	7	5	1	5.3	0	0	-	-	-	-	0.0	
97	Wint Worth	F	15	19	23	26	20	19	20.3	23	20	-	-	-	-	21.5	
102	Numbers	F	9	15	26	26	15	10	16.8	10	3	-	-	-	-	6.5	
108	Elyon	F	16	13	16	21	17	12	15.8	15	14	-	-	-	-	14.5	
115	Epaension	F	14	8	14	18	13	8	12.5	15	1	-	-	-	-	8.0	
124	St. Celestine	C	12	10	9	9	5	5	8.3	8	9	-	-	-	-	8.5	
130	Anes	F	10	19	25	21	16	3	15.7	8	9	-	-	-	-	8.5	
132	Tresure	C	5	15	25	27	13	15	18.7	17	15	-	-	-	-	16.0	
133	Thanks be to God	C	13	6	22	19	17	11	14.7	17	15	-	-	-	-	16.0	
135	Oues Donne	F	17	12	22	21	13	16	16.8	18	15	-	-	-	-	16.5	
137	Mystic	F	16	10	21	12	6	3	11.3	4	6	-	-	-	-	5.0	
141	Thanks & Praise	C	14	10	19	12	12	8	12.5	17	11	-	-	-	-	14.0	
146	Isreal King	F	14	13	19	18	15	13	15.3	22	22	-	-	-	-	22.0	
150	Convoy	F	19	17	21	20	17	5	16.5	6	1	-	-	-	-	3.5	
154	Cyborg	F	6	8	5	3	1	0	3.8	0	0	-	-	-	-	0.0	
157	Hore Grace	C	16	8	15	13	8	11	11.3	15	13	-	-	-	-	14.0	
161	Lati Free	F	26	16	23	15	18	14	18.7	19	20	-	-	-	-	19.5	
162	God Father	F	19	17	14	10	8	11	13.0	20	12	-	-	-	-	16.0	
163	Tnal	F	20	9	18	16	10	0	12.2	15	6	-	-	-	-	10.5	
Average			11.8	10.0	14.3	14.2	10.3	8.1	11.5	11.0	8.8	-	-	-	-	9.9	
%			43.4	36.8	51.5	51.1	37.5	29.5	41.6	40.8	32.4	0.0	0.0	0.0	0.0	36.5	

Table- A.8.2 (1) Rate of operation boats by each day in March (1996)

Boat No	Name	Type	1/3	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
4	Deep Start	F	1	0	0	0	1	1	1	1	0	0	1	0	1	1	1	1	1	0	1	1	0	1	0	1	0	1	0	0	0	1	0	17
6	Lordsprayer	F	1	1	0	1	0	1	1	0	1	0	0	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	20
10	Psolms 121	F	1	1	0	0	0	1	1	1	1	0	1	1	0	1	0	1	0	1	1	1	0	1	0	1	0	1	1	0	1	0	1	19
11	Isabella	F	0	0	1	1	1	1	0	1	0	0	0	1	1	0	1	0	0	0	1	0	0	1	0	0	1	1	1	1	0	0	0	14
13	Dos Domingo	F	1	1	0	1	0	0	0	1	1	1	1	0	1	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	13
22	St.Paut	F	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	1	1	0	0	1	1	1	1	0	1	0	0	0	11
25	Love at Home	C	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	1	1	0	1	1	0	0	1	1	0	11
26	Isueal	C	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	1	1	1	1	1	1	0	1	0	0	0	1	0	1	13
39	Devine Gift	F	0	0	1	0	0	1	1	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1	1	0	0	1	1	0	0	11
46	National	C	1	0	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	15
50	So help me God	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	1	0	4
52	Realite	F	1	1	0	0	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	26
53	Exodus	F	1	1	0	1	1	1	1	1	0	0	1	1	0	1	1	1	0	1	1	1	0	1	0	0	1	1	1	0	1	1	0	21
55	St Anthony	F	1	0	0	1	1	0	0	1	1	0	1	1	1	1	1	0	1	0	1	1	1	1	1	0	1	1	1	0	1	0	0	20
64	Salathel	C	0	0	1	1	1	0	1	1	0	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	12
77	Selah	F	1	1	0	0	0	0	1	0	0	0	1	1	1	1	0	0	0	1	1	1	0	1	0	1	1	1	1	1	1	0	1	18
79	Grass Hopper	C	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	1	0	1	0	0	0	1	1	1	1	1	0	21
88	Girl ah rush me	F	1	0	1	1	1	1	1	0	1	0	1	1	0	1	1	1	0	1	1	1	0	1	1	0	1	1	1	0	1	1	1	23
97	Wint Worth	F	1	0	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	25
98	Vision	C	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	0	0	1	0	1	1	0	1	1	1	1	1	1	0	24
102	Numbers	F	1	1	1	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	1	1	1	1	1	0	1	1	0	1	0	0	0	15
104	Conviction	F	1	0	1	0	1	1	1	1	0	0	1	0	1	0	1	0	1	0	1	1	0	1	1	0	1	1	1	1	1	0	0	19
108	Elyon	F	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0	1	0	0	1	0	1	1	1	0	22
115	Epaension	F	0	0	0	0	0	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	0	0	0	1	0	1	1	1	0	15
120			1	0	1	1	0	0	1	1	1	0	0	1	0	1	1	0	0	1	0	1	0	1	0	0	0	0	0	1	1	0	0	14
124	St. Celestine	C	1	0	0	1	1	1	1	0	0	1	0	0	1	0	0	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	0	20
130	Aries	F	1	1	0	0	1	0	0	1	1	0	1	1	0	1	1	1	0	1	1	1	0	1	1	0	0	1	0	1	0	1	0	18
132	Tresure	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133	Thanks be to Go	C	1	1	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	0	1	0	1	1	1	0	0	0	0	0	1	1	0	13
135	Dues Donne	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
137	Mystic	F	1	0	0	0	1	0	1	0	1	0	1	0	1	1	1	0	0	1	1	1	0	1	1	0	1	1	0	1	0	0	0	16
141	Thanks & Praise	C	1	1	1	1	0	1	1	0	1	1	0	1	1	1	0	0	1	0	0	0	1	1	1	1	1	1	0	1	1	1	1	22
146	Isreal King	F	1	0	1	1	1	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	1	1	0	1	21
150	Convoy	F	1	0	1	0	1	1	0	0	0	0	1	1	0	1	1	0	0	1	1	1	0	0	0	0	1	1	1	0	1	0	0	15
154	Cyborg	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
157	Hore Grace	C	1	0	0	0	1	1	1	1	0	0	0	0	0	1	1	0	1	0	1	1	0	0	1	0	0	1	1	1	0	0	0	14
161	Lati Free	F	1	1	1	1	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	0	0	0	1	0	1	0	0	1	0	0	1	16
162	God Father	F	0	0	0	1	1	1	1	1	0	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	1	0	1	0	0	0	0	11
163	Trial	F	0	0	1	1	1	0	1	1	0	0	1	1	1	0	1	0	0	1	1	1	1	0	1	1	1	1	1	1	0	0	1	20
Average			27	14	15	17	21	20	23	21	15	7	20	21	18	26	26	16	13	23	29	29	15	27	21	11	25	26	16	21	23	13	10	15.62
%			69%	36%	38%	44%	54%	51%	59%	54%	38%	18%	51%	54%	46%	67%	67%	41%	33%	59%	74%	74%	38%	69%	54%	28%	64%	67%	41%	54%	59%	33%	26%	50%

Average Rate of Operation Boat 70% (From the Heighest to 10th)

Table- A.8.2 (2) Rate of operation boats by each day in March (1997)

Boat No	Name	Type	1/3	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
4	Deep Stam	F	0	0	1	1	1	1	1	0	1	0	1	1	1	0	0	0	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	13
6	Lurdsprayer	F	1	1	0	0	1	1	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	23
11	Isabella	F	0	0	0	1	1	1	1	0	1	0	1	1	0	0	1	0	1	1	1	1	0	1	0	0	1	1	1	0	0	0	0	16
12	Top Secret	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Dos Domingo	F	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	3
22	St.Paut	F	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	1	0	0	0	0	0	0	8
25	Love at Home	C	0	0	1	1	0	1	1	0	1	1	1	0	1	1	1	0	1	0	1	1	1	0	0	1	1	1	1	0	1	1	0	20
39	Devine Gift	F	0	0	1	1	0	0	0	0	0	1	0	1	0	1	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	8
46	National	C	0	0	0	0	0	0	0	0	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	So help me God	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
52	Realite	F	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	0	1	0	0	25
53	Exodus	F	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	0	1	0	0	22
55	St Anthony	F	1	0	0	0	1	1	1	0	1	1	1	1	0	1	0	0	1	1	1	1	1	0	0	1	1	1	0	0	1	0	0	18
64	Salathel	C	0	0	1	1	1	1	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	0	1	0	0	0	0	20
77	Selah	F	0	1	0	1	1	1	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	0	0	0	0	19
79	Grass Hopper	C	1	0	1	1	1	1	1	0	1	1	1	1	1	0	0	0	1	1	1	1	0	1	0	1	1	1	1	0	0	0	0	20
88	Girl ah rush me	F	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	6
97	Wint Worth	F	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	23
102	Numbers	F	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	0	26
108	Elyon	F	1	1	1	0	0	0	1	0	0	0	1	1	1	1	0	0	1	0	1	1	1	0	0	1	1	1	1	0	0	0	0	16
115	Epaension	F	0	0	1	1	0	1	0	0	1	1	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	14
124	St. Celestine	C	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	1	1	0	1	0	0	1	0	1	0	0	1	0	0	9
130	Anes	F	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	0	25
132	Tresure	C	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	25
133	Thanks be to Go	C	0	0	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	0	22
135	Dues Donne	F	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	0	1	0	1	0	0	22
137	Mystic	F	1	0	1	1	1	0	1	0	1	1	1	1	1	1	0	0	1	1	1	0	1	1	1	1	1	0	1	0	1	0	0	21
141	Thanks & Praise	C	0	0	1	0	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	0	1	0	0	1	1	1	0	0	0	0	19
146	Isreal King	F	1	0	1	0	1	1	1	0	1	1	0	1	1	1	0	0	1	0	1	1	1	1	0	1	1	1	1	0	0	0	0	19
150	Convoy	F	0	0	1	1	1	1	1	1	1	1	0	1	1	1	0	0	1	1	1	1	1	0	0	1	1	1	1	0	1	0	0	21
154	Cyborg	F	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	5
157	Hore Grace	C	0	0	0	0	0	1	1	0	0	1	1	1	0	1	0	1	1	1	0	0	0	0	1	1	1	1	1	0	1	0	0	15
161	Lati Free	F	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	0	0	0	23
162	God Father	F	1	0	1	1	1	0	1	0	0	1	1	1	0	0	0	0	0	1	1	0	1	0	0	1	0	0	1	0	1	0	0	14
163	Tnai	F	0	0	0	1	1	1	1	1	1	0	1	1	1	1	0	0	1	0	0	1	1	1	0	1	1	1	1	0	0	0	0	18
			15	10	24	21	22	25	25	10	15	22	21	27	24	22	8	7	24	24	26	24	24	18	7	23	26	22	24	1	15	3	1	16
			43%	29%	69%	60%	63%	71%	71%	29%	43%	63%	60%	77%	69%	63%	23%	20%	69%	69%	74%	69%	69%	51%	20%	66%	74%	63%	69%	3%	43%	9%	3%	52%

Average Rate of Operation Boat

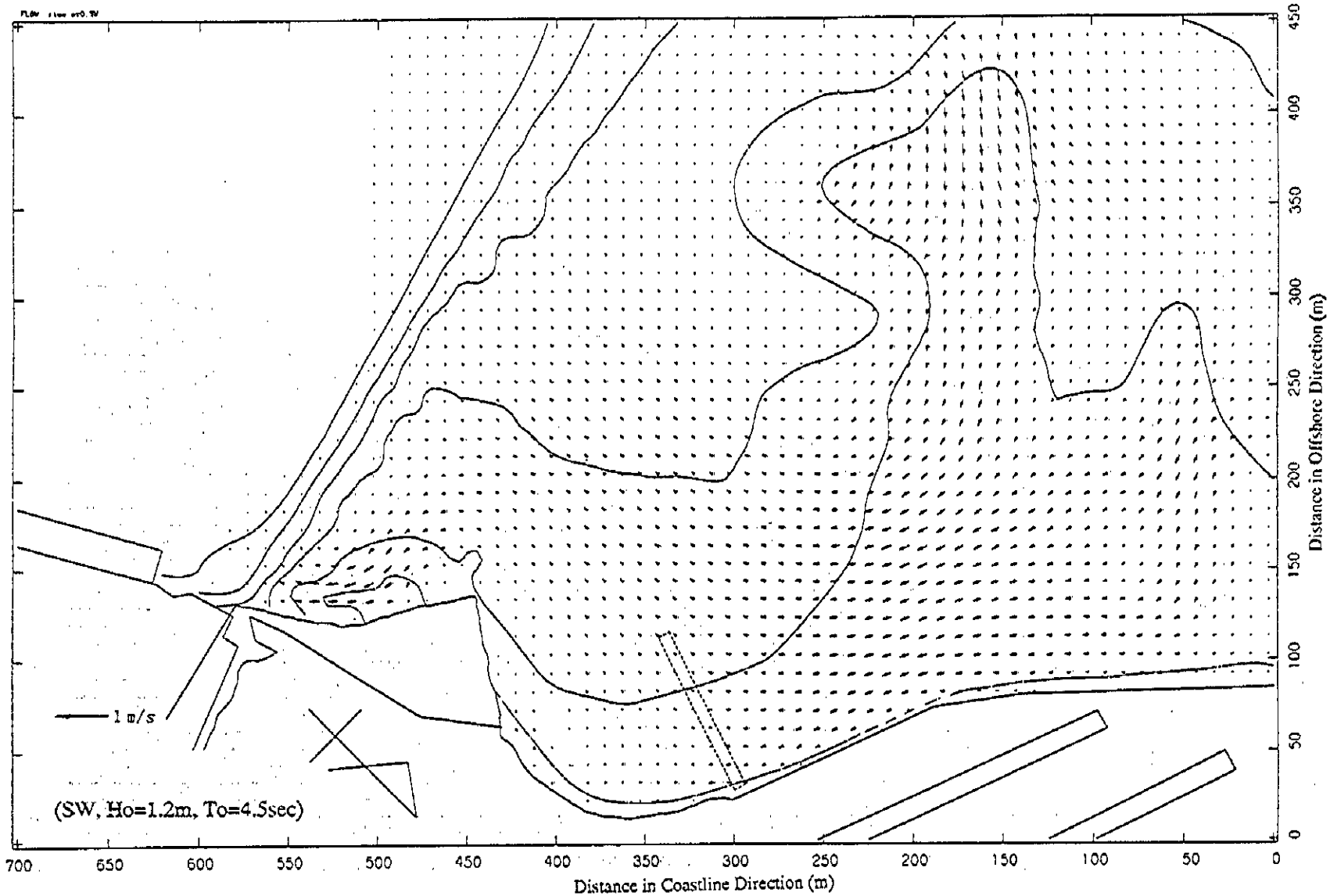


Figure-A.8.6 (1) Nearshore current pattern (Present Condition)

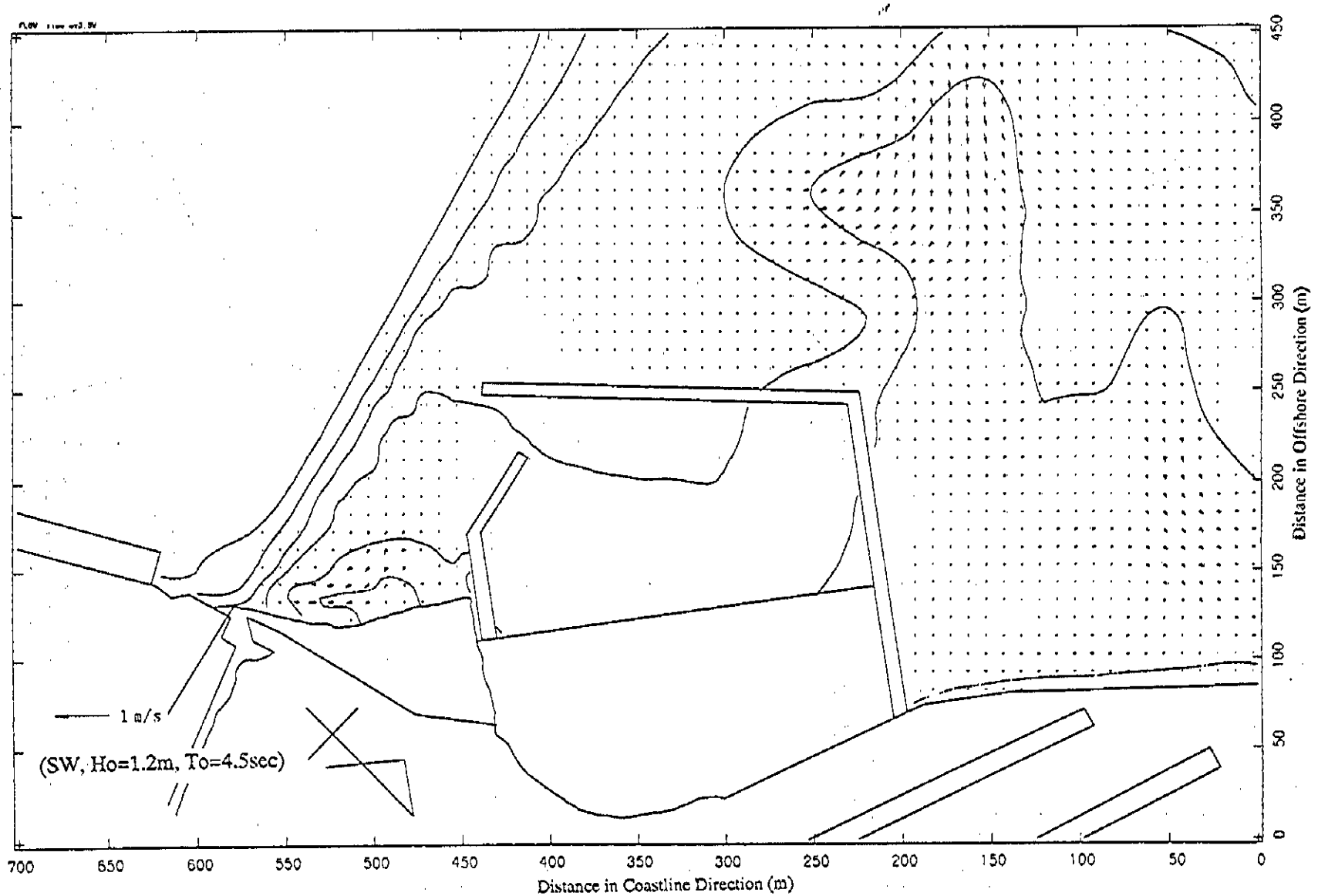


Figure-A.8.6 (2) Nearshore current pattern (After Construction of Breakwaters)

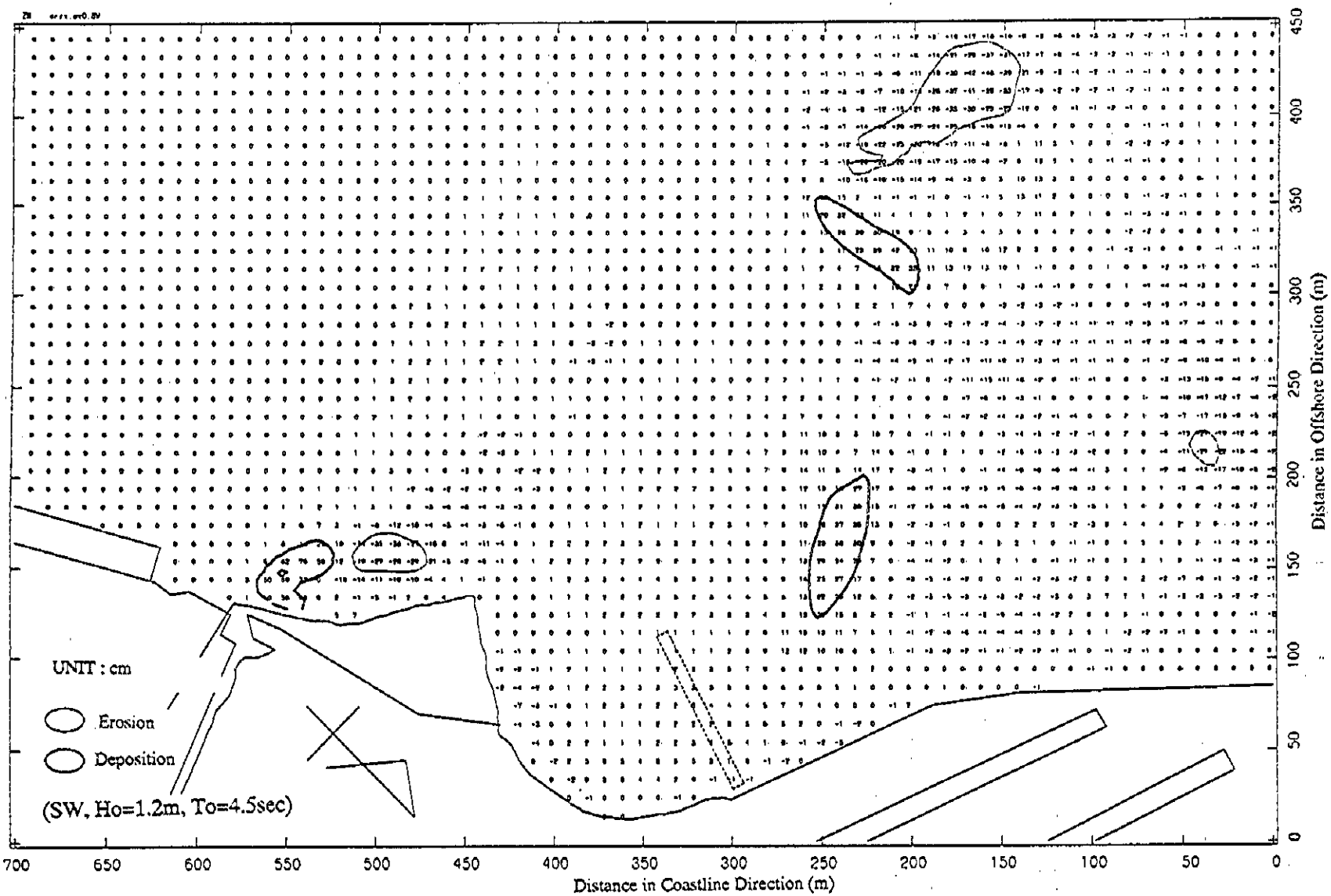


Figure-A.8.7 (1) Bathymetric changes (Present Condition)

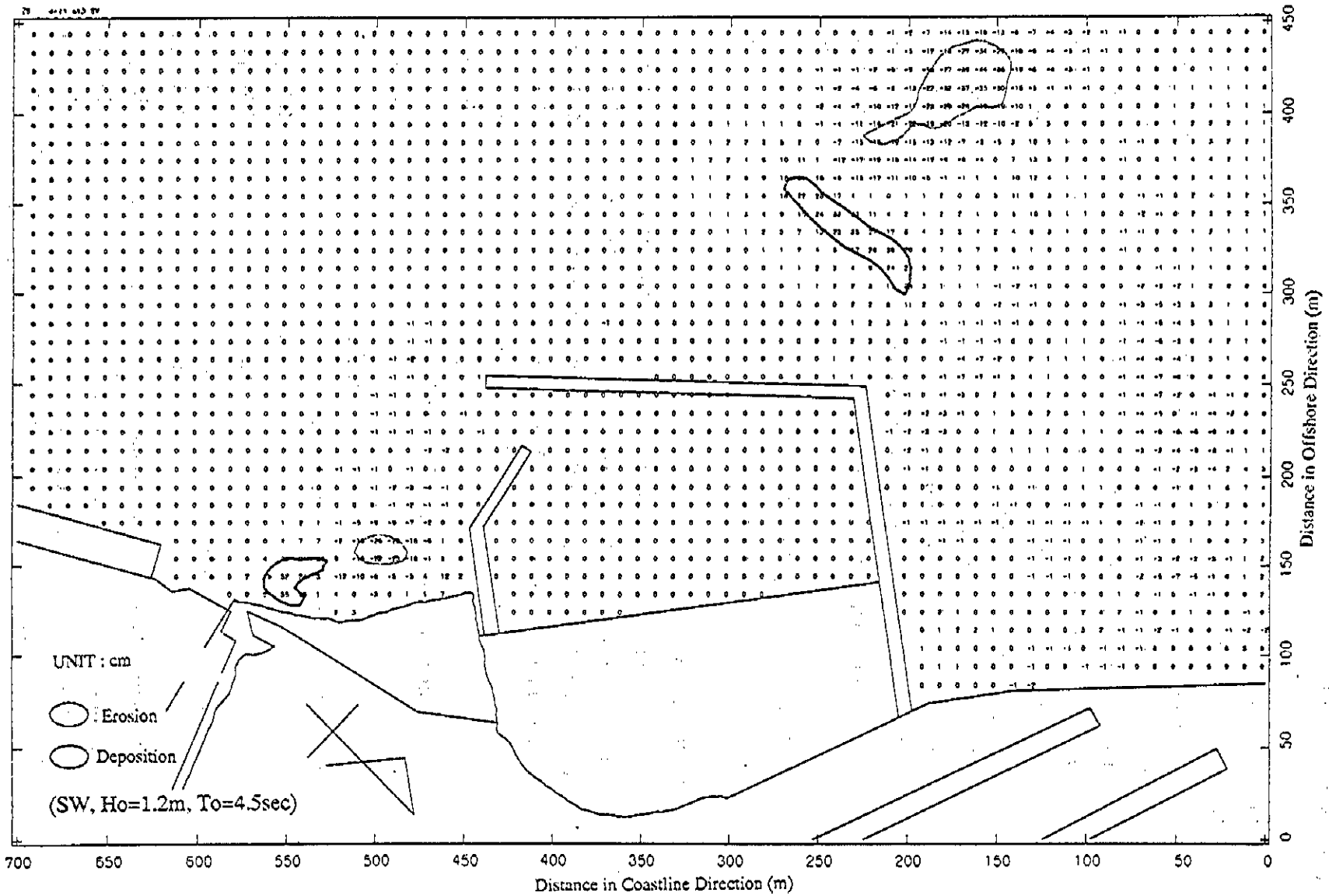


Figure-A.8.7 (2) Bathymetric changes (After Construction of Breakwaters)

Appendix-9 List of Equipment

(1) Fishing Gear

1) Tuna Long-Line Fishing Gear

a) Main line	: Mono-filament #400	20,000	m
b) Branch line	: Mono-filament #150	10,000	m
c) Tuna hook with ring	: Size #30	2,000	pcs
d) Sheavels with sinker	: 30g per piece	500	pcs
e) Sheavels	: Size M	1,200	pcs
f) Snap hunger	: Size M	450	pcs
g) Float	: Type A	50	pcs
h) Float	: Type B	20	pcs
i) Clip	: brass made size 6mm	1,500	pcs
j) Aluminum course	: Size 4mm	1,500	pcs
	: Size 3mm	1,500	pcs
k) Handy type of clip pressure :		5	pcs
l) Floor type of clip pressure :		5	pcs

2) Trolling Gear

a) Trawling head	: new pearl	cut size 20mm	400	pcs
b) Trawling head	: KO jig Kona	cut size 25mm	400	pcs
c) Trawling head	: KO jig Kona straight	cut size 16mm	400	pcs
d) Trawling outer skirt	: size 220mm	blue	100	pcs
		brown	100	pcs
		white	100	pcs
e) Trawling outer skirt	: size 270mm	blue	100	pce
		brown	100	pcs
		white	100	pcs
f) Trawling outer skirt	: size 180mm	blue	100	pcs
		brown	100	pcs
		white	100	pcs
g) stainless double hook		1	400	pcs
ditto		3	400	pcs
h) Shiokiri hikooki	: size 200mm		40	pcs
ditto	: size 250mm		40	pcs
ditto	: size 300mm		40	pcs

3) Surface Gill Net

a) 5 units of nets x 5 boats = 25 units

b) 25 units x 40m/unit = 1,000 m.

4) Payao Equipment

a) Main float two empty drum tin/set		1	set
b) Sub float one empty drum tin/set		1	set
c) Anchor for fixed of unit of Payao		1	set
	Stuffed cement with half drum tin x 2		
d) Iron chain	Size: 16mm diameter x 5m length		
	Quantity:	4	pcs
e)Anchor rope	Size:22mmdiameter x 1,000m length	polipuropilen	
	Quantity:	1	pc
f) Suivel	Size:18mm diameter	15	pes
g) Stainless shackle	Size:14mm diameter	20	pes
h) Stainless Shackle	Size:18mm diameter	20	pcs

(2) Other Equipment

1) Cold Storage

a) Electric forklift 2 ton		1	unit
b) Spar battery for forklift		1	unit
c) Battery charger for electric forklift		1	unit
d) Fish pallet	2,150×1,250×1,260 mm	270	pcs

2) Quick Freezer

a) Freezing pack	1.2m×0.9m×1.9m	24	pcs

3) Ice Making Machine

a) Plastic container box approx.	740×550×250 mm #83	12	pcs
b) Push cart loud cap. 500 kg		2	pcs

4) Processing

a) Processing table (4m×2m×1m H)		2	units
b) Electric fish scales		2	pcs
c) Meat saw		1	unit
d) Plastic container box approx.	1,100×550×330 mm #160	20	pcs
e) Push cart loud cap. 500 kg		2	pcs

5) Fish Handling Shed

a)	Scale cap. 500 kg	2	pcs
b)	Plastic container box approx. 1,100×550×330 mm #160	90	pcs
c)	Plastic container box approx. 1,340×865×688 mm #500	5	pcs
d)	Hand lifter cap. 1.5 ton	1	pc

6) Work Shop

(a) Freezer Maintenance

a)	Vacuum pump. exhaust 175 L/min. 400W/100V/50HZ	1	unit
b)	Transformer 240V-100/110V 2KW	1	unit
c)	Tube cutter 4 mm-28mm (1/8-11/8)	1	unit
d)	Flare tool kit (3/16, 1/4, 5/16, 3/8, 7/16 1/2, 5/8 Open 45 / Each 1pc)	1	set
e)	System analyzer kit (Manifold kit)	1	set
f)	Charge House 150mm	1	set
g)	Circuit tester (DC, AC, DCA, Register, Low frequency, Transistor)	2	sets
h)	Tool kit	1	set

(b) Vehicle Maintenance

a)	Jack 2 ton	2	units
b)	Battery charger, Movable, Output DC : 12/24V, 300-480Amp. Cap. 1500W	1	pc
c)	Spark plug cleaner pressured air cleaning with compound table top	1	pc
d)	High pressure washer	1	pc

(c) Work Shop

a)	Working table approx.	1,500(W)×750(D)×740(H) mm		
	Heavy duty		2	units
b)	Steel shelves approx.	1800×520×1800 mm		
	Five shelves heavy duty		1	unit
c)	Steel tool cabinet approx.	880×520×1040 mm		
	Tow shelves/Two drawers		1	unit
d)	Bench drill		1	unit
e)	Electric bench grinder		1	unit
f)	Vice chuck opening approx.	165 mm /Width approx. 125 mm	1	unit

g)	Air compressor	1	unit
h)	Arc welding set	1	set
i)	Hammer Drill with drill bit set	1	set
j)	Chain block 1,5 ton , Cap.1.5, Height : 5.0 m	3	units
k)	Calipers (S=150 mm, M=200 mm, L=300 mm/Each 1pc)	1	unit
l)	Pipe wrench (S=1", M=2", L=5"/Each 1pc)	1	unit
m)	Drum Can pump, hand manual, 1Cycle=1Litter	1	unit
n)	Surface plate (500×750×100 mm)	1	pc
o)	Wall plate type tool kit	2	units
p)	High Speed circular cutter with spar disk (20)	1	unit

(d) Special Tool for Outboard Engine

a)	Special tool kit for outboard engine (75HP, 85HP)	3	sets
b)	Hydro-pressure 1.5 ton	1	unit
c)	Carrying and stand for outboard engine	4	units
d)	Repair stand for outboard engine	2	units
e)	Dial gauge	4	pcs
f)	Dial gauge holder (Magnet base)	2	pcs
g)	Point checker (Spark boil checker)	2	pcs
h)	Tachometer for engine	2	pcs
i)	Timing light tester	2	pcs
j)	Torque wrench	2	pcs
k)	Coil tester	2	pcs
l)	Plastic hammer	2	pcs

(e) Electrical Tool

a)	Cable cutter (Cap. Dia.35 mm/180 mm^2)	1	pc
b)	Terminal crippling wrench	2	pcs
c)	Electrician tool kit	2	sets

7) Others

a)	Insulated cap. 4 ton truck	1	unit
b)	Stand by generator 250KVA	1	unit

Appendix-10 Supplementary Data on Implementing Construction Plan

Steps to be taken for uneven subsidence in the reclamation plan

(1) The field surveys proved that the reclamation materials were considered suitable on the basis of the analysis of grain size. In future, the analysis of grain size will be conducted periodically during the implementation of construction work and the reclamation will be carried out by examining the suitability of the reclamation material.

(2) Quality reclamation materials will be used for the spot where the fishery complex facilities will be built.

(3) The reclamation site will be divided into four blocks. Settlement plates will be placed in each block so as to measure the settlement of the reclaimed land. Settlement curves will be drawn by plotting the settlement on a time series basis. When the settlement has become stable, foundation work will be commenced for building the complex facilities.

(4) Before the foundation work is started for building the complex facilities, plate bearing tests will be carried out in order to ensure the soil bearing capacity.

(5) After the steel sheet pile for the wharf has been driven into seabed, the movement of steel sheet piles (i.e. falling of the sheet pile, forward or backward movement of the face line, settlement) will be examined. After the position of sheet piles has become stable, construction work will be started to make the cap concrete to be placed on sheet piles.

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