No.

Ministry of Agriculture and Environment
The Commonwealth of Dominica

BASIC DESIGN STUDY REPORT

ON

THE PROJECT

FOR

IMPROVEMENT OF COASTAL FISHERIES DEVELOPMENT

IN

THE COMMONWEALTH OF DOMINICA

January 2001

JAPAN INTERNATIONAL COOPERATION AGENCY

ECOH CORPORATION

GR4
CR(3)
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PREFACE

In response to a request from the Government of Dominica, the Government of Japan decided to conduct a basic design study on the Project for Improvement of Coastal Fisheries Development and entrusted the study to the Japan International Cooperation Agency (JICA).

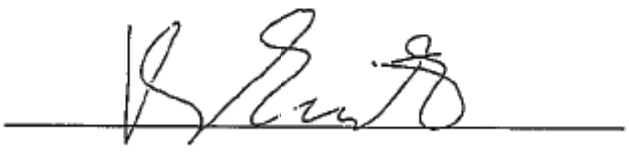
JICA sent to Dominica a study team from August 6 to August 27, 2000.

The team held discussions with the officials concerned of the Government of Dominica, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Dominica in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Dominica for their close cooperation extended to the teams.

January, 2001



Kunihiko Saito
President
Japan International Cooperation Agency

January, 2001

Letter of Transmittal

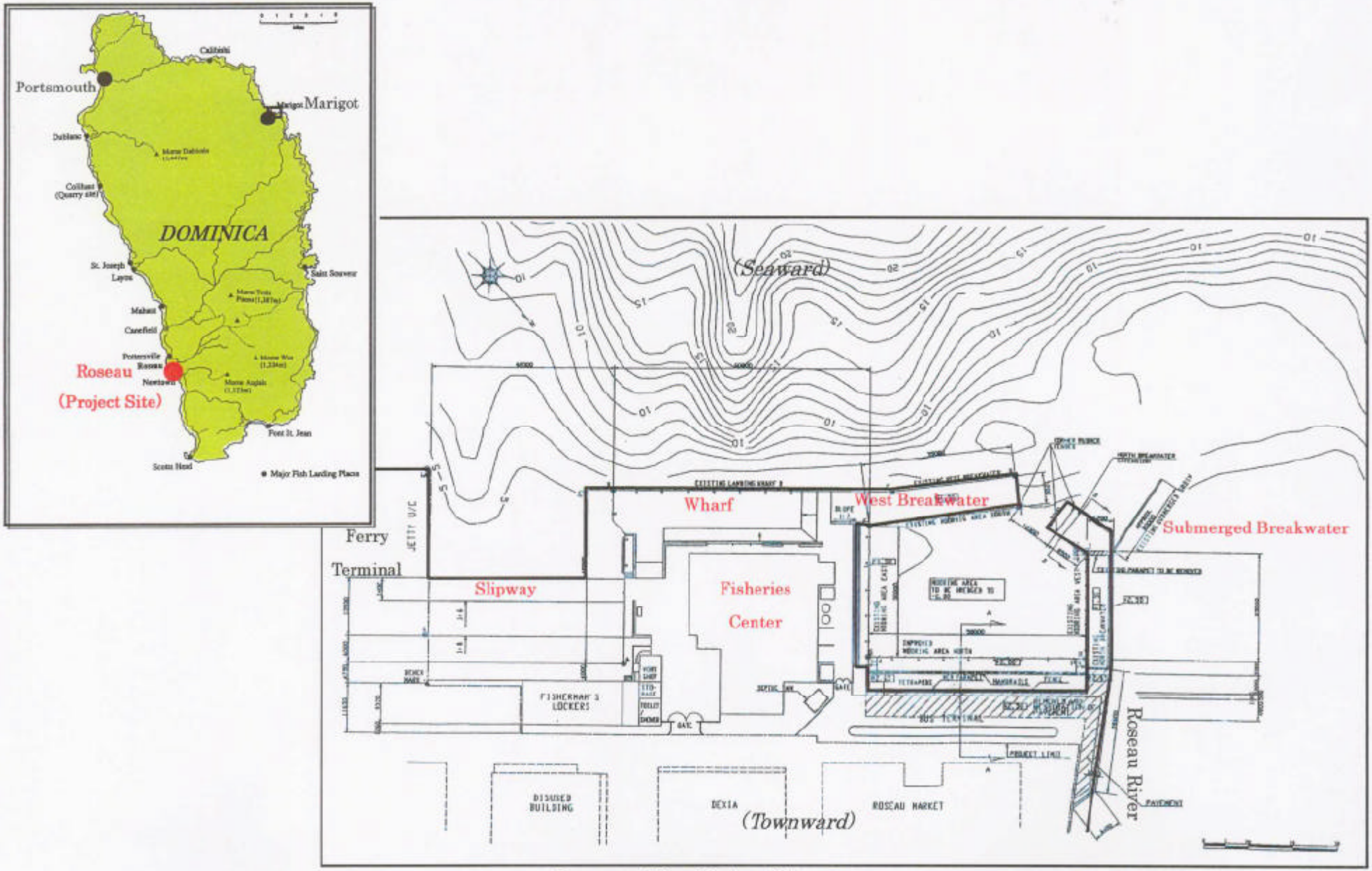
We are pleased to submit to you the basic design study report on the Project for Improvement of Coastal Fisheries Development in the Commonwealth of Dominica.

This study was conducted by ECOH Corporation, under a contract to JICA, during the period from August 8, 2000 to January 26, 2001. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Dominica and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

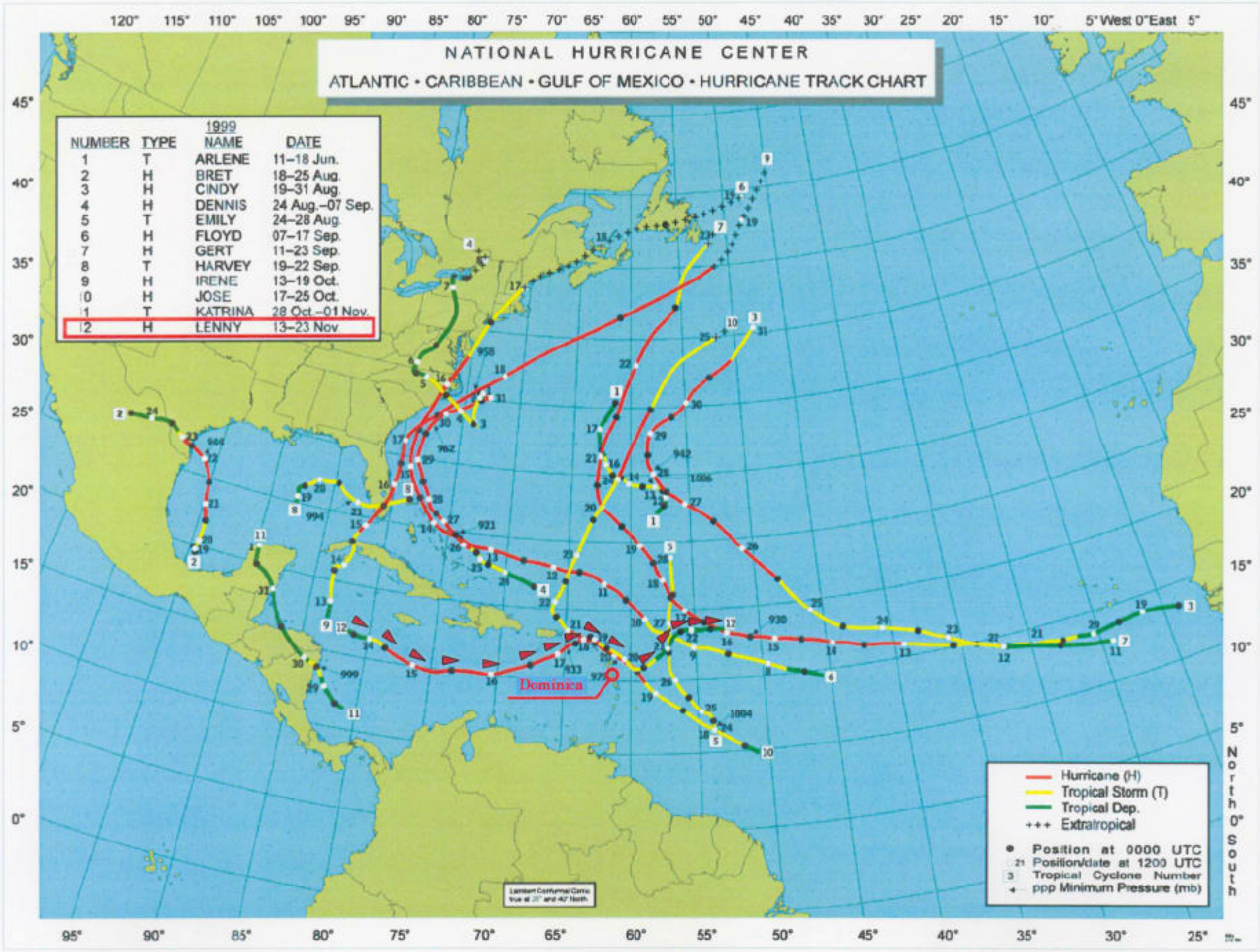
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,

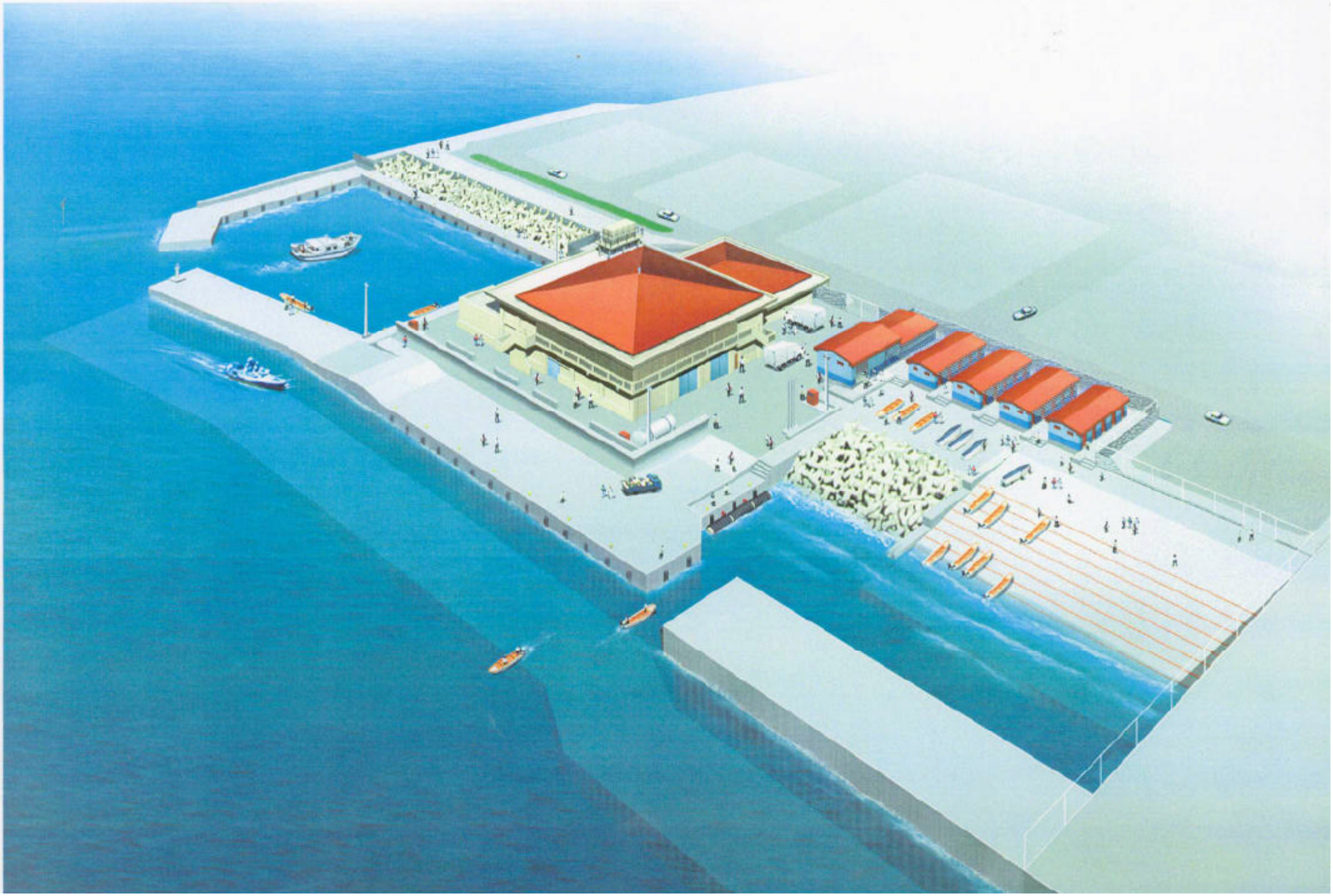
Eiichi Matsuura
Project Manager,
Basic design study team on
the Project for Improvement of
Coastal Fisheries Development
ECOH CORPORATION



Layout of the Project Site



Track Chart of Hurricane Lenny



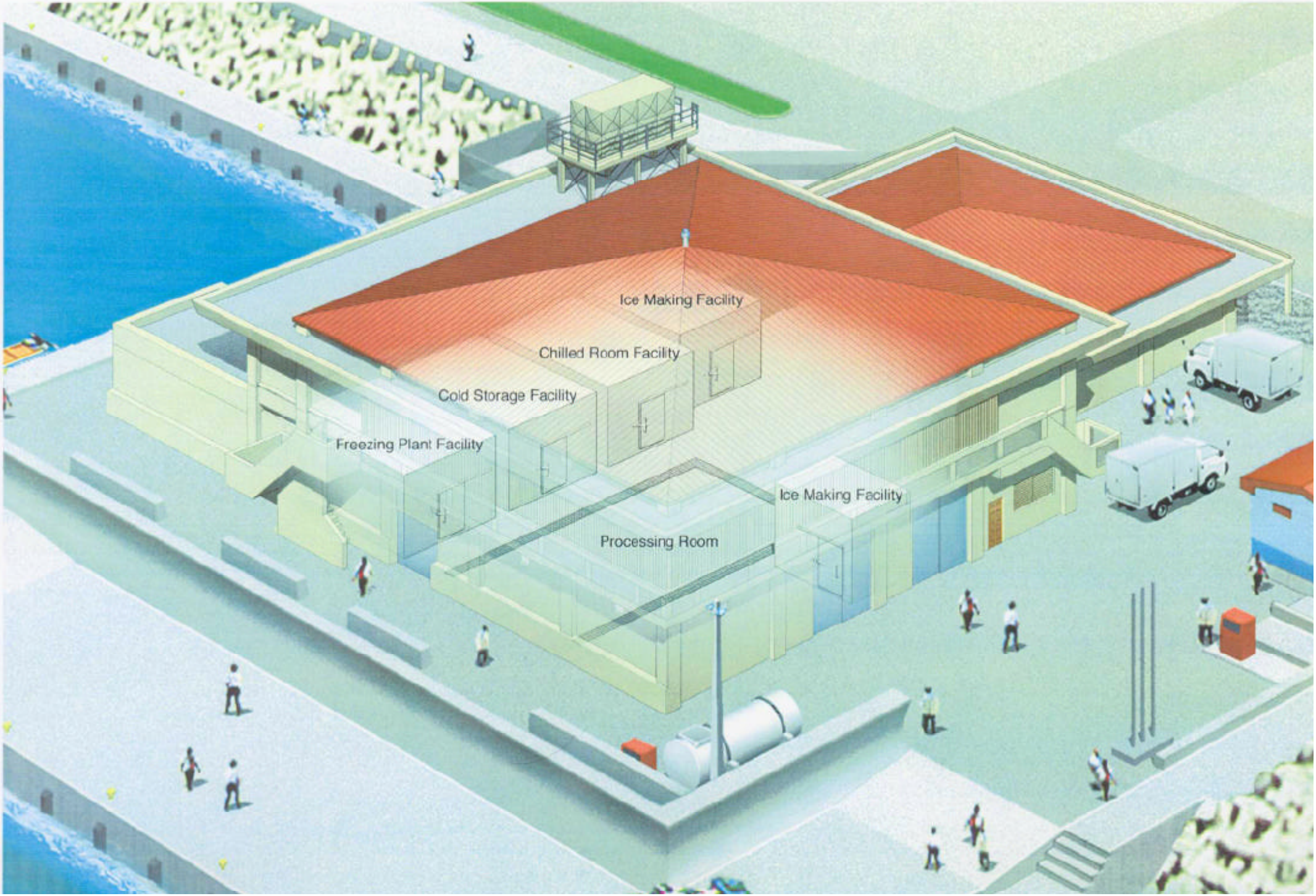

Ice Making Facility
Chilled Room Facility
Cold Storage Facility
Freezing Plant Facility
Ice Making Facility
Processing Room

Photo-1 Damages at Slipway

Photo-2 Damages at Slipway

Photo-3 Subsidence of Foot Protecting Underwater Concrete in front of Wharf

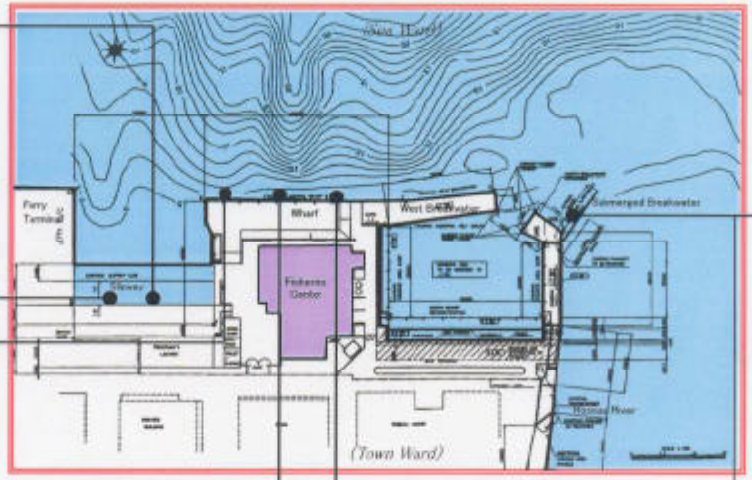


Photo-4 Damages at Sheet Piles of Submarged Groin

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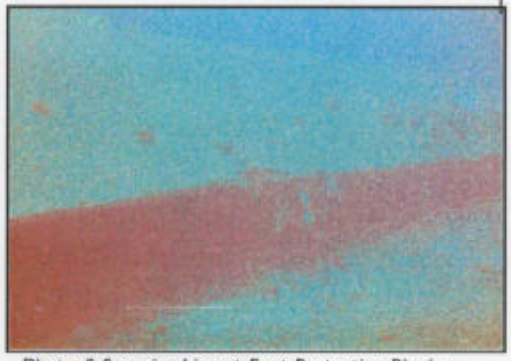

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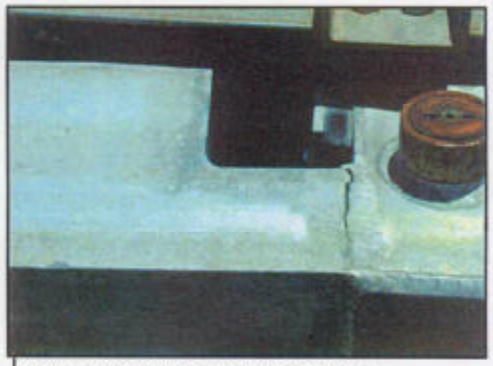


Photo-11 Damages Fook at Sliding Gate

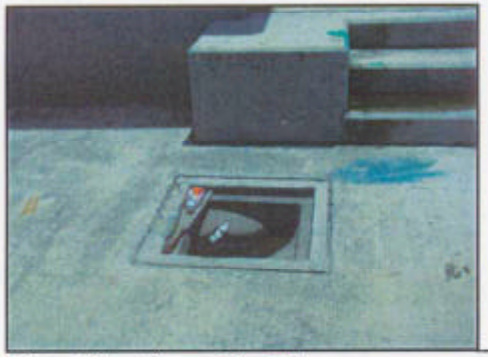
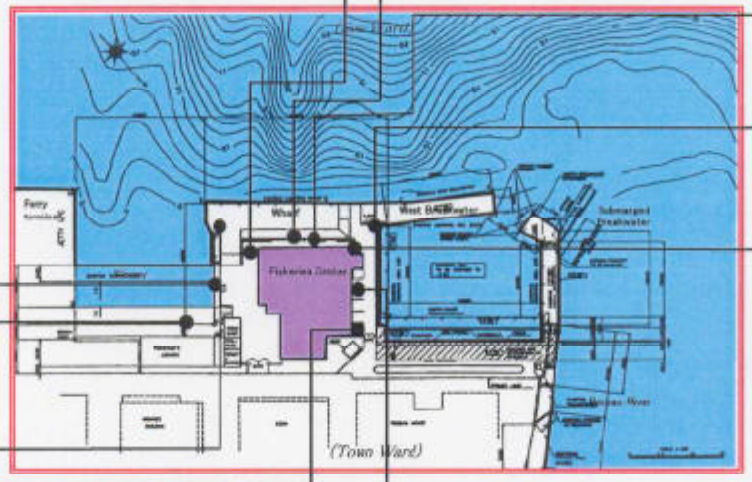


Photo-12 Lost Cover of Drain Pit



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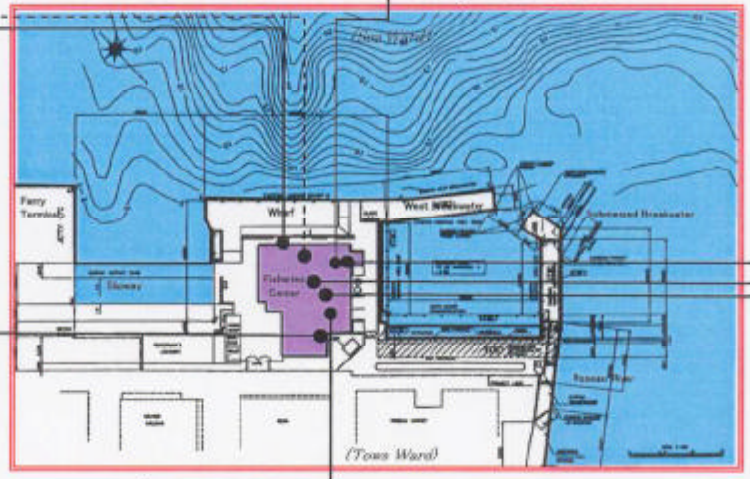

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Abbreviations

ASTM	American Society for Testing and Materials
BS	British Standards
C.B	Concrete Brock
CIDA	Canadian International Development Agency
CUBIC	Caribbean Uniform Building Code
D.L.	Datum Level
E	East
EC$	East Caribbean Dollar
EDF	Europe Development Fund
E/N	Exchange of Notes
ENE	East-Northeast
FAO	Food and Agriculture Organization of the United Nations
FRP	Fiber Reinforced Plastic
ESE	East-Southeast
GDP	Gross Domestic Product
H.A.T	High Astronomical Tide
H.W.L	High Water Level
JICA	Japan International Cooperation Agency
JIS	Japan Industry Standard
KVA	Kilovolt Ampere
L.A.T	Low Astronomical Tide
M.H.H.W	Mean Higher High Water
M.H.L.W	Mean Higher Low Water
M.L.H.W	Mean Lower High Water
M.L.L.W	Mean Lower Low Water
M.L	Mean Level
N	N
NE	Northeast
NEIC	National Earthquake Information Center
NHC	National Hurricane Center
NNE	North-Northeast
NNW	North-Northwest
NW	Northwest
PVC	Poly Vinyl Chloride
S	South

SE	Southeast
SSE	South-Southeast
SSW	South-Southwest
SW	South West
UN	United Nations
USGS	United States Geological Survey
US$	United States Dollar
W	West
WFP	World Food Program
WNW	West-Northwest
WSW	West-Southwest

Chapter 1 Background of the Project

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1-1 Background of the Project

The commonwealth of Dominica is located in the Windward Islands in the East Caribbean Sea and has a land area of some 790km^2. Most of the land is mountainous and tropical rain forests covers 65% of it. Many branches run to the east and west from the central mountain of 1,000～1,400m height and a steep mountain and valley makes alternate. Population is concentrating to the city of Roseau, Portmouth and Marigot on the shoreline area of the Island.

Weather condition is divided into two. One is dry season for the period of, December to May, and the other one is wet season for the period of June to November, due to the prevailing Northeast trading wind. Annual average rainfall is 2,200 to 3,300mm and the central zone reaches more than 5,000mm. The temperature is varied 24℃ to 30℃ by the height of land. The country locates in the midst of a hurricane belt and, in recent years, has suffered extensive damage due to Hurricane David (1979), Allen (1980), Hugo (1989), Luis (1995), Marilyn (1995), Iris (1995) and Lenny (1999).

Fisheries in Dominica are small-scale coastal fisheries conducted by coastal residents using wooden canoes or small boats. The surrounding sea of Dominica is a rich with migratory fish resources (flying fish, skipjack and tuna). However, Dominica has been forced to import some 900 tons of marine products a year because of the following problems.

(1) Inadequate fishing ports and landing facilities
(2) Inadequate distribution facilities and channels
(3) Inadequate facilities to support the promotion, guidance and administration relating to fisheries

Dominica made a request for the construction of Roseau Fisheries Complex as a measure to solve the aforementioned problems. Under the Project, Fisheries Grant Aid Cooperation was provided in fiscal 1993 and 1994 to construct a fisheries complex performing the following functions at Roseau which is the capital of Dominica and a major consumption area with the country's highest concentration of population. The role of Roseau Fisheries Complex is shown in below.

(1) Landing of the catch and safe mooring of fishing boats
(2) Distribution and marketing of the catch
(3) Support and control of fishing activities
(4) Guidance for fishermen and extension activities
(5) Development and quality control of marine product processing industries
(6) Temporary Storage

During the Phase II (construction of ground facilities) work, late August to early September 1995, Hurricanes Luis and Iris damaged the fishing port facilities that were completed during the Phase I period (Landing Wharf, Breakwater and Slipway, etc., handed to the Dominican side in March, 1995 upon completion). However, the port is unable to perform most of the functions. For rehabilitating these facilities, the Government of Dominica has requested to the Government of Japan's provision of Grant Aid. This rehabilitation work was completed in March 1997. After the completion, the disturbance of water in the mooring area has been sometimes observed. Water in the mooring area was sometimes disturbed, even if the outside of the mooring area was not very rough. In the case of large turbulence, waves get over the wharves and make splashes at the corners of the mooring area, which fall on the bus-terminal area and the equipment outside of the Center building. It is difficult to forecast when the mooring area becomes turbulent.

Due to the disturbance of the water in the mooring area, there are problems in utilization and maintenance of the facilities. It has become difficult for fishing boats to use the mooring area, while the Fisheries Development Division has made efforts to manage the Complex. Since Roseau Fisheries Complex is essential facilities for fishing and marketing in promotion of the fisheries sectors, it is necessary to improve the condition of the mooring area and encourage people to utilize the complex more effectively. The government of Dominica, therefore, made a request for a Grant Aid to improve the mooring area of the Complex.

In November 1999, Hurricane Lenny hit and damaged the Complex. Slipway and the Fishery Center were severely damaged and the function of center stopped and the fishing industry activity was obstructed. The cause of damage of it has been identified as strong waves over the design wave and the change of sea bottom topographical condition by the hurricane in August and September 1995, therefore, considered to be an act of God. Under these circumstances, the Government of Dominica has requested to the provision of Grant Aid by the Government of Japan to rehabilitate those damaged facilities by hurricane.

1-2 Outline of Hurricane Lenny

The scale of Hurricane Lenny indicates the followings based on the data from National Hurricane Center, USA.

(1) Scale

Hurricane Lenny occurred on the northwest of Caribbean Sea. On November 13, 1999, it developed to the tropical depression near the Islands of Cayman. On November 14, 1999, it run to the southwest direction and reached to the tropical storm near 175

sea miles on the south of Jamaica. Hurricane Lenny proceeded the middle of Caribbean Sea toward East with developing its scale and grew up to the hurricane on the sea beyond 140 sea miles of Dominica. On November 17, 1999, Hurricane Lenny switched her truck to Northeast with bigger scale and passed the south of US Virgin Island. She stopped and switched her truck from East to Southeast there. Her scale weakened with zigzag truck and became to the tropical storm and depression on November 20, 1999. The largest scale of Hurricane Lenny on November 17, 11pm 1999 was as follows.

1) The location of center: North Latitude 17.7° , West Longitude 64.2°
2) The pressure of center: 929mb
3) The maximum wind velocity: 130 knot
4) Category level: Hurricane 4

(2) Hurricane Track

The truck of most of Hurricanes on the Caribbean Sea is from Atlantic Ocean to the west. Hurricane Lenny was one of very few cases to move from west to east on the low latitude. She runs the center of Caribbean Sea, North Latitude of 15 degree, from west to east. Small Antilles Islands including the commonwealth of Dominica where locate on the half circle area of right hand side of progress direction and front sea area of her was damaged by the severe wave and swells. The center of truck of Hurricane Lenny is noted on Figure-1-2 (1).

(3) Wave condition on Hurricane Lenny

The probable wave condition that Hurricane Lenny generated in the study area was estimated. The estimation of offshore waves in Dominica offing was done on the basis of her observed data by the US National Hurricane Center (NHC) in Miami. The wave conditions such as the significant wave and the equivalent deepwater wave in the study area was estimated on the basis of the topographical survey map of the study area in 1998 with the transformation calculation of the waves. Using the spectral method (one-point method (Gotoh method) and MRI model), the offshore wave height and period at the point of Dominica offing (North Latitude of 15° 16' 6", West Longitude of 61° 25' 0")was estimated. Table-1-2 (1) shows the estimated maximum wave condition of each directions and Table-1-2 (2) shows the estimated wave condition in time series.

As a result, offshore wave of Dominica caused by Hurricane Lenny was estimated at 7.77m and wave period was 10.54 second. This estimated result met the wave of 50 to 60 year probable cycle based on the result of Weibull distribution on the study report on the coastal fisheries development project in the commonwealth of Dominica in March 1996.

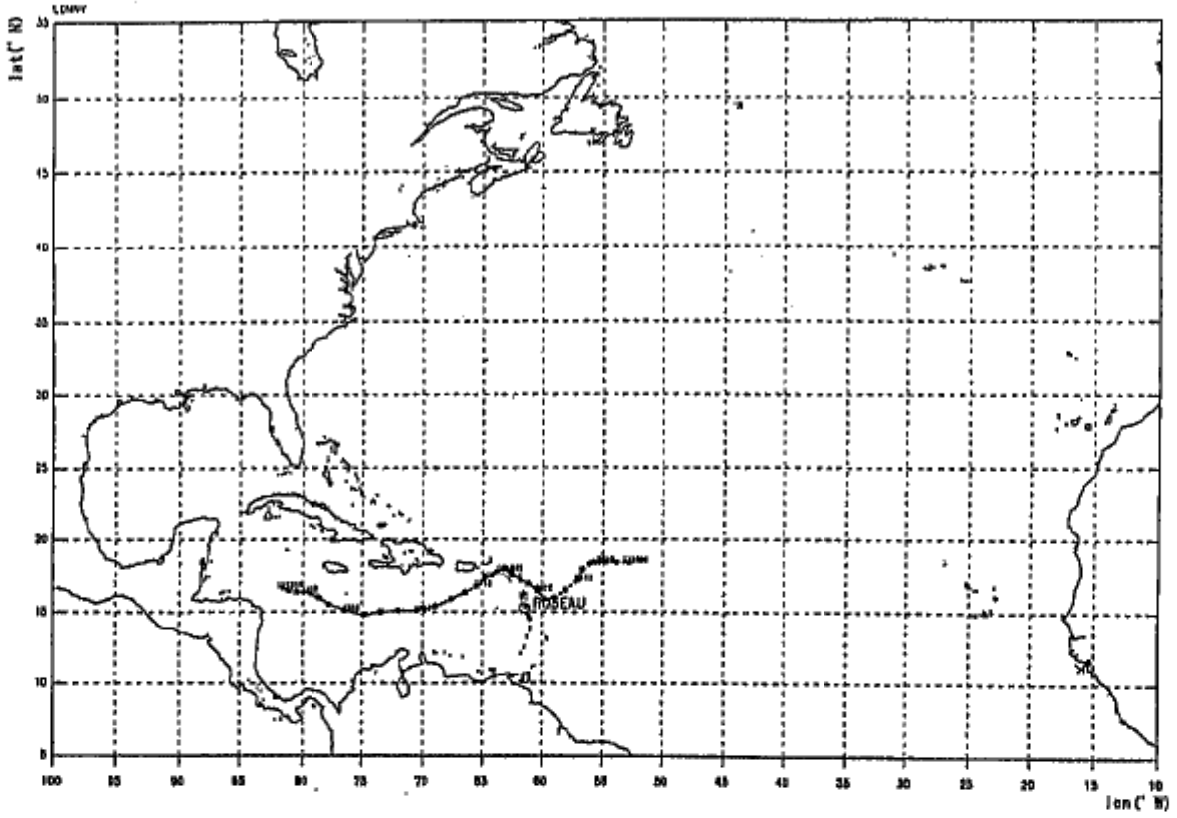


Figure-1-2 (1) The Center of Truck of Hurricane Lenny

Table-1-2 (1) The Estimated Maximum Wave Condition of Each Direction

No.	Wave Direction	Offshore Wave					
		Wave Height (m)	Period (s)	Year	Month	Day	Time
1	NNE	0	0	0	0	0	0
2	NE	0	0	0	0	0	0
3	ENE	0	0	0	0	0	0
4	E	0	0	0	0	0	0
5	ESE	0	0	0	0	0	0
6	SE	0	0	0	0	0	0
7	SSE	0.34	2.36	99	11	16	11
8	S	0.48	2.69	99	11	16	16
9	SSW	0.86	3.72	99	11	17	6
10	SW	3.31	7.77	99	11	17	15
11	WSW	7.77	10.54	99	11	18	7
12	W	0	0	0	0	0	0
13	WNW	0	0	0	0	0	0
14	NW	0	0	0	0	0	0
15	NNW	0	0	0	0	0	0
16	N	0	0	0	0	0	0

Table-1-2 (2) The Estimated Wave Condition in Time Series

No.	Year	Month	Day	Time	Offshore Wave			Point of Wave Hindcasing	
					Wave Height (m)	Period (s)	Wave Direction	Wind Velocity (m/s)	Wind Direction
1	99	11	16	5	0.19	1.92	SSW	3	SSE
2	99	11	16	6	0.19	1.92	SSW	3	S
3	99	11	16	7	0.34	2.36	SSE	4	SSE
4	99	11	16	8	0.19	1.92	SSE	3	S
5	99	11	16	9	0.34	2.36	SSE	4	SSE
6	99	11	16	10	0.19	1.92	SSE	3	S
7	99	11	16	11	0.34	2.36	SSE	4	SSE
8	99	11	16	12	0.34	2.36	S	4	S
9	99	11	16	13	0.34	2.36	S	4	S
10	99	11	16	14	0.34	2.36	S	4	S
11	99	11	16	15	0.48	2.68	S	5	S
12	99	11	16	16	0.48	2.69	S	5	S
13	99	11	16	17	0.48	2.69	SSW	5	S
14	99	11	16	18	0.57	2.84	SSW	6	S
15	99	11	16	19	0.57	2.84	SSW	6	S
16	99	11	16	20	0.57	2.85	SSW	6	S
17	99	11	16	21	0.62	2.92	SSW	7	S
18	99	11	16	22	0.62	2.93	SSW	7	S
19	99	11	16	23	0.66	2.98	SSW	8	S
20	99	11	16	24	0.66	3.00	SSW	8	S
21	99	11	17	1	0.68	3.05	SSW	9	S
22	99	11	17	2	0.70	3.10	SSW	9	S
23	99	11	17	3	0.73	3.18	SSW	10	S
24	99	11	17	4	0.75	3.29	SSW	10	S
25	99	11	17	5	0.80	3.47	SSW	11	S
26	99	11	17	6	0.86	3.72	SSW	11	S
27	99	11	17	7	0.96	4.08	SW	12	S
28	99	11	17	8	1.09	4.52	SW	12	S
29	99	11	17	9	1.27	5.02	SW	13	S
30	99	11	17	10	1.49	5.52	SW	13	S
31	99	11	17	11	1.76	6.04	SW	14	S
32	99	11	17	12	2.07	6.53	SW	15	S
33	99	11	17	13	2.49	6.95	SW	16	SSW
34	99	11	17	14	2.88	7.38	SW	17	SSW
35	99	11	17	15	3.31	7.77	SW	18	SSW
36	99	11	17	16	3.73	8.15	WSW	19	SSW
37	99	11	17	17	4.15	8.49	WSW	20	SSW
38	99	11	17	18	4.54	8.81	WSW	20	SSW
39	99	11	17	19	4.93	9.09	WSW	21	SSW
40	99	11	17	20	5.30	9.35	WSW	21	SSW
41	99	11	17	21	5.60	9.56	WSW	21	SSW
42	99	11	17	22	5.90	9.75	WSW	21	SSW
43	99	11	17	23	6.20	9.90	WSW	22	SSW
44	99	11	17	24	6.42	10.02	WSW	22	SSW
45	99	11	18	1	6.61	10.13	WSW	22	SSW
46	99	11	18	2	6.81	10.22	WSW	22	SSW
47	99	11	18	3	6.99	10.30	WSW	22	SSW
48	99	11	18	4	7.21	10.38	WSW	23	SSW
49	99	11	18	5	7.40	10.47	WSW	23	SSW
50	99	11	18	6	7.56	10.54	WSW	23	SSW
51	99	11	18	7	7.77	10.54	WSW	22	SW
52	99	11	18	8	7.74	10.63	WSW	21	SW
53	99	11	18	9	7.68	10.65	WSW	20	SW
54	99	11	18	10	7.53	10.68	WSW	18	SW
55	99	11	18	11	7.40	10.68	WSW	17	SW
56	99	11	18	12	7.24	10.66	WSW	16	SW
57	99	11	18	13	7.07	10.63	WSW	15	SW
58	99	11	18	14	6.93	10.56	WSW	15	SW
59	99	11	18	15	6.78	10.47	WSW	15	SW
60	99	11	18	16	6.57	10.38	WSW	14	SW
61	99	11	18	17	6.38	10.25	WSW	14	SW
62	99	11	18	18	6.18	10.11	WSW	14	SW
63	99	11	18	19	5.95	9.98	WSW	13	SW
64	99	11	18	20	5.73	9.81	WSW	13	SW
65	99	11	18	21	5.52	9.64	WSW	13	SW
66	99	11	18	22	5.32	9.46	WSW	13	SW
67	99	11	18	23	5.09	9.31	WSW	12	SW
68	99	11	18	24	4.89	9.14	WSW	12	SW
69	99	11	19	1	4.71	8.96	WSW	12	SW
70	99	11	19	2	4.53	8.79	WSW	12	SW
71	99	11	19	3	4.38	8.61	WSW	12	SW
72	99	11	19	4	4.23	8.44	WSW	12	SW
73	99	11	19	5	4.06	8.31	WSW	11	SW
74	99	11	19	6	3.92	8.16	WSW	11	SW

Max → (row 51)

← Max (row 51)

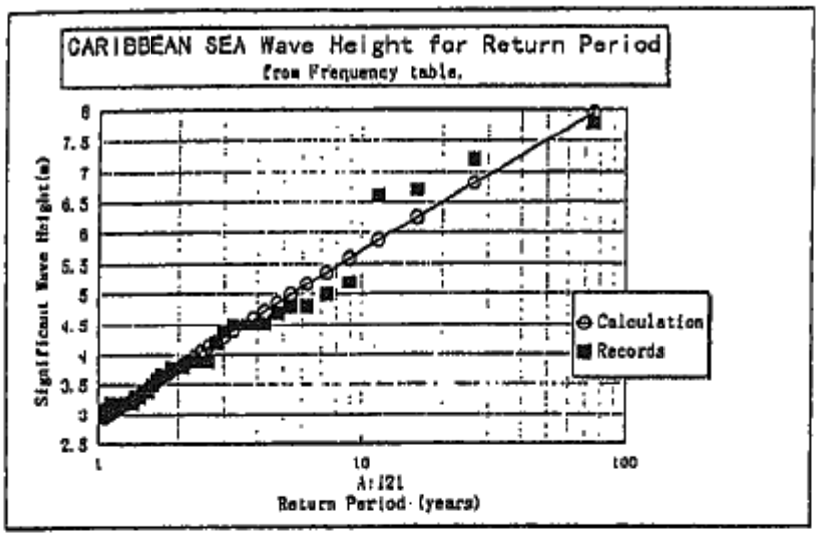


Figure-1-2 (2) Probable Offshore Wave Height using the Weibull Distribution Method

Generally speaking, the offshore wave energy reach the shoreline with the effect of refraction, diffraction and reflection. The wave condition of the study area at the event of Hurricane Lenny was calculated with the method of equivalent energy equation. The wave transformation was carried out regarding the wave direction of SW and WSW that exerts a strong influence on the study area. Table-1-2 (3) shows the significant and equivalent offshore wave height in the study area. The waves on the head line of landing wharf and west breakwater were supposed to the higher wave height because the study area is in the shock breaking wave area from the very steep sea bottom conditions. It is conceivable that the attacked wave by Hurricane Lenny to the study area was over the design wave on a 30-year probable.

Table-1-2 (3) The Significant and Equivalent Offshore Wave Height in the Study Area (Estimated Wave Height by Hurricane Lenny)

Wave Height and Year of Sea Bottom Condition	Slipway Area	Landing Wharf Area	West Breakwater Area
SW 1993			
Significant Wave	3.30~3.76m	3.10~3.29m	1.39~2.98m
Equivalent Offshore Wave	2.98~3.58m	2.86~3.01m	2.70~2.96m
WSW 1993			
Significant Wave	4.07~5.34m	4.34~5.13m	1.70~2.85m
Equivalent Offshore Wave	6.42~8.59m	6.25~6.60m	6.07~6.79m
SW 1998			
Significant Wave	3.06~3.88m	2.53~3.09m	2.74~3.05m
Equivalent Offshore Wave	2.99~3.77m	2.62~3.07m	2.72~3.05m
WSW 1998			
Significant wave	5.25~6.48m	5.85~6.77m	5.16~5.34m
Equivalent Offshore Wave	8.05~8.78m	5.21~6.93m	5.61~6.75m

1-3 Damages and Causes at the Project Site

1-3-1 Damages at the Project Site

Damages at Project Site are described in Table-1-3-1 (1), and locations and points of damaged facilities are indicated in Figure-1-3-1 (1), then photographs of damaged facilities are shown in Figure-1-3-1 (2), (3) and (4).

Table-1-3-1 (1) Damages at the Project Site

No.	Outline of Damage	Quantity	Detail of Damage
1	Break of Distribution Pipe	2 Places	Besides Slipway
2	Break of Fence Base	16.5m	Length: 16.5m, Height: 1.0m
3	Break of Boat Pulling Upper	9 lines	
4	Damage of Slipway	2 Parts	・ Slope of 1/8: Sucking out of filling sand and stone on 2m width of edge of slipway ・ Slope of 1/6: All damaged
5	Break of Light Tower	4 poles	Break of all lights on the top : 2 x 4 =8
6	Lost of Fuel Distributor	3 units	
7	Flooded Gasoline Tank	1	Flooded underground Gasoline Tank
8	Lost of Light Diesel Tank	1	Lost of Tank, Break of Protection Wall (7.0m x 3.0m)
9	Sliding Gates on Parapet Wall	3	
10	Cave of Asphalt Concrete	14.85m²	3.3m x 4.5m=14.85m²
11	Cave of Asphalt Concrete (partly)	90.24m²	9.0x4.8+1.4x6.0+4.2x5.2+4x4.2 =43.2+8.4+21.84+16.8=90.24
12	Damaged of Gates (Partly)	2 gates	Entrance of Mooring Area and Emergency Gate of Slipway
13	Score of Foot Area of Landing Wharf and Breakwater	3 areas	・ The area of heavy scoring, zigzag futures of concrete blocks and caving of underwater concrete: 1 area ・ The area of digging as like as a hole on the sheet piles: 2area
14	Damage of Head of Submerged Groin	2 areas	Covering part of concrete blocks and Steel sheet piles area: Flooded out of blocks, break of head of sheet piles and zigzag futures of blocks
15	Damages of Fisheries Center	5 doors	Lost of doors on the west-side
		1 door	Damage door of Emergency Generator Plant beside mooring area
		1 cover	Lost cover of duct for Emergency Generator Plant on west-side
		2 area	Exfoliation of wall of stairs on west-side
		7 pieces	Break window flames on first floor on the north-side

No.	Outline of Damage	Quantity	Detailed of Damage
15	Damages of Fisheries Center	4 units	Lost four cooling towers unit
		1 unit	Break Incinerator
		1 unit	Break Fish Mill Plant
		1 section	Break Ceiling of Laboratory
		Listed	Lost and Break testing Machines
		1 unit	Break Chilled Room
		1 unit	Break Blast Freezer
		1 unit	Break Cold Storage
		1 unit	Break Ice Making Plant
		4 units	Break Compressor for Cold Storage etc.
		4 units	Break Control Panel for Cold Storage etc.
		1 unit	Break Generator for Emergency
		1 unit	Break Main Panel for Power Supply
		1 unit	Break Main Distribution Panel
		1 unit	Break Accessories of Waste Water Treatment Plant

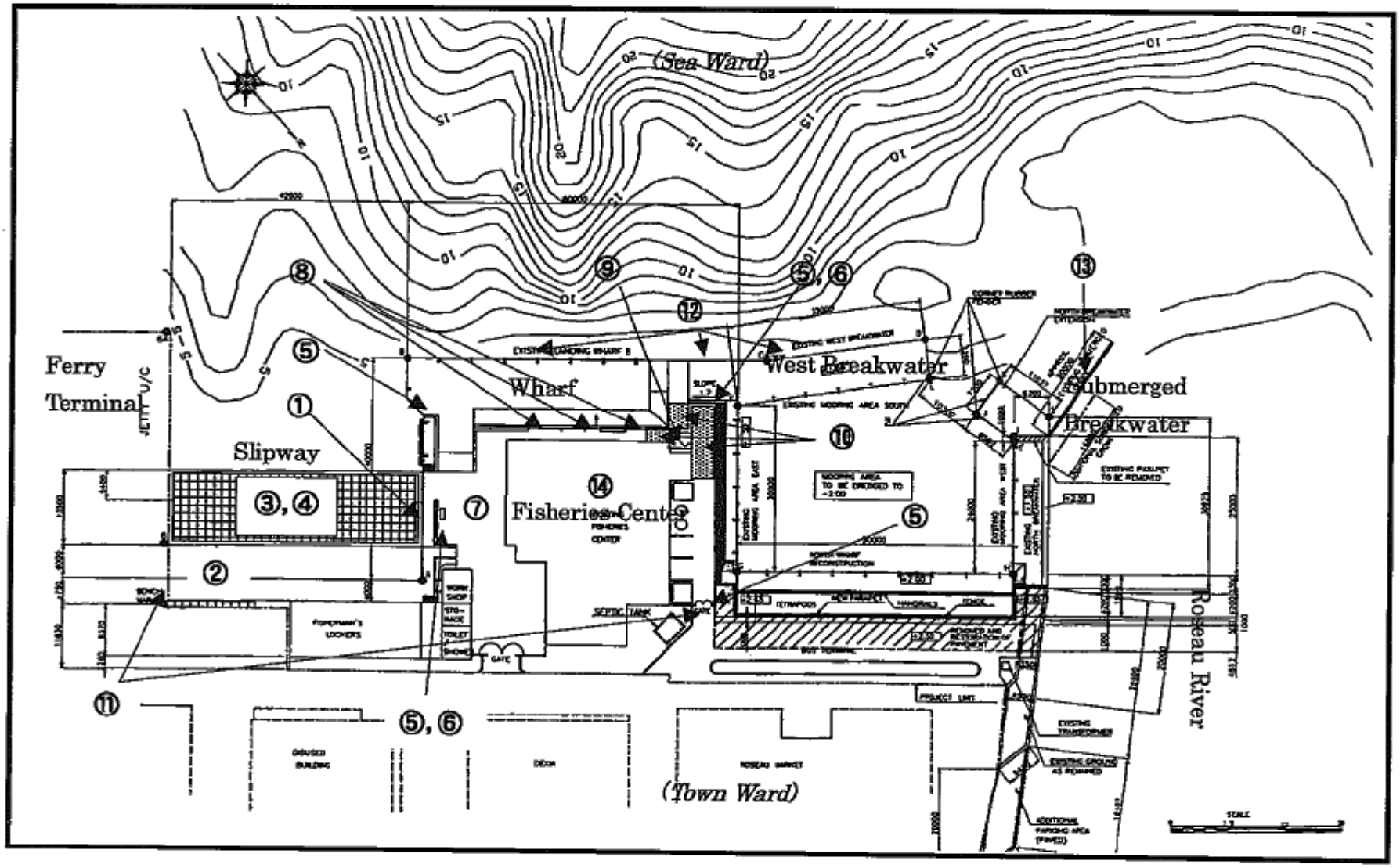


Figure-1-3-1 (1) Locations and Points of Damaged Facilities

1-3-2 Causes at the Project Site

The causes of damages of the study area are as follows:

(1) The track of most of Hurricanes on the Caribbean Sea is from Atlantic Ocean to the west. Hurricane Lenny runs the center of Caribbean Sea, North Latitude of 15 degree, from west to east. Small Antilles Islands including the commonwealth of Dominica where locate on the half circle area of right hand side of progressing direction and her front sea area was damaged by severe wave and swells.

(2) Offshore wave of Dominica induced by Hurricane Lenny was estimated that wave height was 7.77m and wave period was 10.54 second. This estimated result met to the wave of 50 to 60 year probable based on the result of the Weibull distribution on the study report on the coastal fisheries development project in the Commonwealth of Dominica in March 1996.

(3) Severe waves of Hurricane Lenny broke shockingly at the landing wharf and struck there. The most of water body of shock wave flooded over the apron with the pressure and wave setup. The flooded over wave floated up the gate and pulled up and down from the parapet wall. Those waves struck and broke the doors of Fisheries Center and the facilities and equipments inside the Fisheries Center.

(4) Severe waves of Hurricane Lenny attacked the area of Fisheries Center faced to the mooring basin. Those waves destroyed the cooling tower, fish waste treatment plant and garbage depot. The northern door and exhaust hole of emergency generating plant were destroyed and it was washed up by seawater.

(5) Slipway was headed on the severe waves of Hurricane Lenny. The wall of Fisherman's Lockers stopped the running up waves on the slope of slipway and those waves were running back to the foot area of slipway. The running up waves on the slope destroyed the dike, that is the boundary of the city road, and those waves were flooded over the dike and the emergency gate to the city road.

(6) Severe running back waves scored the foot area of slipway and the concrete blocks on the foot area were destroyed. The filling sand and stones of slipway was taken to the offshore and the concrete plates were left suspended. Severe waves attacked the concrete plates and those were broken and sunk down.

(7) Hurricane Lenny had a severe rainfall. Roseau River that located on the next of the Complex had a severe flow. The submerged groin was moved out the inserted concrete blocks and bended the head of steel sheet piles toward the south. The

surface flow and flooded over the city drainage was caused the flood damage on the ankle to the Complex.

(8) The severe running back waves after striking the landing wharf and breakwater on the western side of the Complex scored the concrete blocks on the tip of foot area of those areas. Those concrete blocks were slightly moved toward the offshore and the tops of those blocks were zigzag figures. The underwater concrete also moved toward offshore. There are several caves in front of the steel sheet piles.

Chapter 2 Contents of the Project

Chapter 2 Contents of the Project

2-1 Objectives of the Project

Roseau Fisheries Complex, which is expected to be the center of fishery industry in Dominica, had been constructed under a part of the Coastal Fisheries Development Project assisted by the Japanese Grant Aid starting from the fiscal year 1993. However, in November 1999, Hurricane Lenny damaged the Complex. Slipway and the fishery center were severely damaged and the function of the center stopped and the fishing industry activity was obstructed. This Project aims to rehabilitate and improve the damaged facilities and complete the originally designed Fisheries Complex.

2-2 Basic Concept of the Project

2-2-1 Contents of the Project and its Appropriateness for the Provision of Grant Aid

The Government of Dominica has requested the Government of Japan's provision of Grant Aid to rehabilitate and improve the damaged facilities and equipments that is indicated in Table 2-2-1 (1). Field survey was carried out identifying the contents of the Project and its appropriateness for the provision of Grant Aid. Tables 2-2-1 (2) to (13) shows the survey result of the damaged condition and the appropriateness for the provision of Grant Aid by each facility and equipment.

Table-2-2-1 (1) Outline of Damages of Each Facility

No.	Name of Facility	Outline of Damages
1	Slipway	Annihilated including the foot area
2	Parapet Wall with Gates	All gates were annihilated
3	West Breakwater and Landing Wharf	Appearance of gap between the underwater concrete and steel sheet piles and partly damaged underwater concrete on foot area
4	Chilled Room	Annihilated panel for anti-fever Salt covered on the coil and fin of cooling unit Rusted severely of distribution pipe and valve of freezer unit
5	Cold Storage	Annihilated panel for anti-fever Other equipments were severely damaged
6	Blast Freezer	Rusted Ice-making Plant Flooded seawater of reduction gear and the inside of pump etc. Ice storage room were annihilated
7	Machine Room	All exteriors were rusted Leaked out of distribution pipe of cooling unit The power cable inside the control panel are partly way out and cut off Lost of one unit of cooling tower and other 3 units were broken. All cooling towers are out of order.
8	Fisherman's Locker	Some doors were broken by the running up wave on the slipway

Table 2-2-1 (2) The Survey Result of Identifying the Contents of the Project

EQUIPMENT FOR THE ROSEAU FISHERIES CENTER IN DOMINICA

Item No.	Name of Equipment	Manufacturer	Description (Type/Model/Index No.)	Qnty	Result by Checking at Study Time A	B	C
Chapter I Workshop Equipment							
I-1	General tool kit for outboard engine	Toyo	with tool box	2			
I-2	Electric drill	Makita	6300-4	1			
I-3	Electric grinder	Makita	9006-B	1			
I-4	Electric bench grinder	Makita	9306-S	1			
I-5	Electric circular saw (for metal)	Makita	2412-N	1			
I-6	Electric bench drill	Ensyu Industry	ESD-100A	1			
I-7	Chiesl set	Hisizet		1			
I-8	Motor threading machine	Rex Industry	N-50A	1			
I-9	Chain blocks with tripod	Futaba & Ezaki	AL-1 AL-2 & F2030	1			
I-10	Gear and bearing extractor kit	Super		1			
I-11	Hydraulic jack	Masada	SJ-30H	1			
I-12	Hand operated pipe bender	Taiyou	TB-1	1			
I-13	Anvil	Nabeya	40	1			
I-14	Engineer's vice	Nabeya	150	2			
I-15	Micrometer set	Mitutoyo	M110-25 and others	1			
I-16	Slide caliper set	Mitutoyo	N-15 & N-20	1			
I-17	Thickness gauge	Fujimi	19sheets	1			
I-18	Surface plate kit	Yamaha Motor Co., Ltd.		1			
I-19	Vee-blocks	Nabeya	B-75 & B-150	1			
I-20	Tachometer	Yamaha Motor Co., Ltd.		1			
I-21	Ignition timing checker	Yamaha Motor Co., Ltd.		1			
I-22	Dial gaugue kit	Yamaha Motor Co., Ltd.		1			
I-23	Torque wrench	Tounithi		1			
I-24	Cylinder gauge	Yamaha Motor Co., Ltd.		1			
I-25	Battery charger	Yuasa	YS-1000	1			
I-26	Fuel oil injection tester	Banzai	DT-60	1			
I-27	Work bench	Sakae	KWF-1881	3			
I-28	Steel shelves	Sakae	ML1745	5			
I-29	Work tables with caster	Sakae	PMR-150N	2			
I-30	Repair stand for outboard engine	Yamaha Motor Co., Ltd.		2			
I-31	Cart and stand for outboard engine	Yamaha Motor Co., Ltd.		1			
I-32	Electric welding set	Makita	Y-150N	1			○
I-33	Battery tester set	Banzai	PB-12 VAM-500	1			
I-34	Battery hydraulic set	Banzai	HM-100	1			
I-35	Horning tool set	Yamaha Motor Co., Ltd.		1			

Lenged: A=Damaged
B=Lost
C=Un-useable

Table 2-2-1 (3) The Survey Result of Identifying the Contents of the Project

Item No.	Name of Equipment	Manufacturer	Description (Type/Model/Index No.)		Qnty	Answer by Examiner & Study Team A	B	C
I-36	Re-threading tool kit for spark plug hole	Nippon Suprew			1			
I-37	Flare tool kit	Super	TSC-457M		1			
I-38	Tap and die set	Shiota			1			
I-39	Hollow punch set	Banzai	H-75		1			
I-40	Hydraulic oil press	Masada	MHP-15 with accessories crank shaft etc		1			
I-41	Air compressor and paint spray	Meiji	GH-2B		1			
I-42	Spark plug cleaner and tester	Banzai	SP-40G		1			
I-43	Kerosine burner	Sakaefuji	KS-2		1			
I-44	Gear oil filler	Yamada	Stb-50		1			
I-45	Crank aligned	Yamaha Motor Co., Ltd.			1			
I-46	Syringes	Eurupura & Yamada	KH-120 & OS-600		1			
I-47	Grease gun set	Yamada	KH-32		2			
I-48	Oil pan and wire brush	Sakae	6300-4		1			
I-49	Hand oil pump	Nabeya	ESB-25		1			
I-50	Cart and wrench for oil drum	Hansin & Banzai	TB-151		1			
I-51	Compression gauge set	Banzai	G-4C		1			
I-52	Hand operated crane	Okudaya Giken	OC-H500		1			
I-53	Special tool kit for outboard engines	Yamaha Motor Co., Ltd.	A & B		1			
I-54	Hand tool kit with a wagon type container	Tone	TC-3000		1			
I-55	Portable tool set with a case	Tone	K-60		1			
I-56	Socket wrench set	Tone		146	1			
I-57	Files set for metal	Tubomiya			1			
I-58	Hacksaw frame and blade for metal use	SoMax & Nachi			1			
I-59	Scissors for metal use	Morimiro	MC240 & MY240		1			
I-60	Punch set	Hisizet			1			
I-61	Screw driver set	Bessel			1			
I-62	Impact driver set	Bessel	2600D		1			
I-63	Allen key set	Asahi			1			
I-64	Hammer set	Bessel			1			
I-65	Adjustable wrench set	Super & Maruzaka			1			
I-66	Pliers set	Fujiya & Ebi			1			
I-67	Oil filter wrenches set	Banzai			1			
I-68	Portable light and extension cable reel	Hataya Limited	UKB-3223, ILI-5		2			
I-69	Electric soldering iron set	Ishizak			1			
I-70	Electric circular saw (for wooden work)	Makita	1923-B		1			
I-71	Electric hand planer (for wooden work)	Makita		1600	1			
I-72	Needle tackier	Nino Kouki	EJC-32		1			
I-73	Tools for assembling of fishing gear							

Lenged: A=Damaged
B=Lost
C=Un-useable

Table 2-2-1 (4) The Survey Result of Identifying the Contents of the Project

Item No.	Name of Equipment	Manufacturer	Description(Type/Model/Index No.)	Quty	Answer by Tomikawa & Study Team A	B	C
I-1	Hand presser	Tohari	700 mm L	5			
I-2	Dies set	Tohari	for 2.85 mm Aluminum	5			
I-3	Dies set	Tohari	for 2.05 mm Aluminum	5			
I-4	Dies set	Tohari	for wire leader Copper	5			
2-1	Mini-presser	Tohari		5			
2-2	Kulkiri	Tohari	200 mm for wire leader	5			
2-3	Spike	Tohari	150 mm for rope work	5			
2-4	Ohkubo Hasami Scissors	Tohari	150 mm fot line work	5			
2-5	Pliers	Tohari	150 mm for wire leader	5			
Chapter II	Education & Training Equipment						
II-1	Scuba diving set	Aqualung	or equivalent	2			
II-2	Video set	JVC	HR-J507MS and others	1	○		
II-3	Manuals for outboard engines	Yamaha		1			
II-4	Overhead projector set	Elki	AHP-4400	1			○
II-5	Slide projector set	Elki	SLD-260M	1			
II-6	White & Black boards	Ito	Reversible type	2			
II-7	Underwater camera with strobe light	Nikon	Nikonos	1			○
Chapter III	Fish Handling and Marketing Equipment						
III-1	Hand scale with scoop 300 Lbs capacity	Chatillon	Heavy duty #7290-4G	18		○	
2	Hand scale with scoop 20 Lbs capacity	Deteco	Heavy duty #MCS-20P	15		○	
III-2	Spring top-pan scale	Homs	Model #20DS	5		○	
III-3	Platform scale	Gold	SP902	2			
III-4	Insulated fish container	Bonar	Model #1545	21			
2	Insulated fish container	Bonar	Model #1800	22			
III-5	Plastic fish container	Sanko	Model #215800	32			
2	Plastic fish container	Sanko	Model #207010	100			
3	Plastic fish container	Sanko	Model #202901	50			
4	Plastic fish container	Sanko	Model #113000	20			
III-6	Freezing pan	Contec	Galvanized	90			
III-7	Hand cart	Sakae	1200 × 750 500 kgs capacity	2			
2	Hand cart	Sakae	90 × 600 300 kgs capacity	10			
III-8	Hand cart with hydraulic lift	Okubaya Giken Co., Ltd	CPFS-15S-107	2			
III-9	Electric band saw	Biro	Model 22 Stainless steel cutter	1	○		
III-10	Vacuum packing machine	Furukawa	FVC-II	1			○
III-11	Electric top pan scale with label printer	Yamato Scale	Netcell	1			
III-12	Processing tables	Yoshimitu Machinery	Order made	6			
2	Processing tables	Yoshimitu Machinery	Order made	3			
III-13	Chilled fish display case	General Refrigeration	8SD	1			○

Lenged: A=Damaged
B=Lost
C=Un-useable

Table 2-2-1 (5) The Survey Result of Identifying the Contents of the Project

Item No.		Name of Equipment	Manufacturer	Description(Type/Model/index No.)	Qnty	A	B	C
	2	Chilled fish display case	General Refrigeration	6SD	1			○
III-14		Fitting for fish handing & processing work						
	1	Cutting board		50×27 cm	18			
	2	Knife	Dexter/Russell	Model #136S	18			
		Knife	Dexter/Russell	Model #S122-7	18			
	3	Apron	A & G	Model #54-733	18			
	4	Globs	A & G	Shrimp Heading	18			
	5	Boots	U.S.	Short white 11"	18			
	6	Freezer	A & G	Model #392/#40G/#395	2			
Chapter IV		Fish Quality Inspection Equipment						
IV-1		Analytical balance	A & D	ER-180A	1			○
IV-2		Electric top-pan balance	A & D	FX-300	1			
IV-3		Blender	TOSHIBA	TFP-1500	1			
IV-4		Homogenizer	IUCHI	57-229-02/05, 51-315-01	1 set			
IV-5		Meat chopper	NIHON MINCER	No.5	1			
IV-6		Centrifuge	KOKUSAN	H-103N	1			○
IV-7		Hot-plate stirrer	SIBATA	MGH320	2			
IV-8		Refrigerator	SANYO	SR117NF	1			
IV-9		Incubator	ISUZU	SLV-11C	1			○
IV-10		Water treatment apparatus	ADVANTEC	PU-200, GSL-200, TU-200	1 set			
IV-11		pH meter with spare electrode	TOA	HM-5S	1			
IV-12		Mercury analyzer	HIRANUMA	HG-1	1			
IV-13		Automatic tiring apparatus	SIBATA	E665/8, E552-20BC	1 set			○
IV-14		UV Spectrophotometer	SIMADZU	UV-1201	1			○
IV-15		Biological microscope	NIKON	LABOPHOT-2	1			
IV-16		Stereo Microscope	NIKON	SMZ-1-D	1			
IV-17		Inversion Microscope	NIKON	TMS-12A	1			
IV-18		Colony counter	SIBATA	GL-560	1			
IV-19		Drying sterilized	SIBATA	STO-450	1			
IV-20		Autoclave	SIBATA	KS-230	1			
IV-21		Thermnister thermometer	SATO KEIRYOKI	SK-1250MC	1		○	
IV-22		Electric Drill	BANZAI	D-6C, HSD-13	1			
IV-23		Water quality checker	Banzai	U-10	1		○	
IV-24		Salinometer	HORIBA	C-121	2			○
IV-25		Hot plate	HORIBA	NP-5	1			○
IV-26		Cooking table with oven	SIBATA	FTK-210Z	1			
IV-27-1		Laboratory table	YAMATO	FPK-150GZ	1			
IV-27-2		Side table	YAMATO	FUL-150GZ	3			

Lenged: A=Damaged
B=Lost
C=Un-useable

Table 2-2-1 (6) The Survey Result of Identifying the Contents of the Project

Item No.	Name of Equipment	Manufacturer	Description (Type/Model/Index No.)	Qnty	Area by Dubbie & Study Team		
					A	B	C
IV-27-3	Corner table	YAMATO	FUP-35GZ	1			
IV-27-4	Work table	YAMATO	FKM4-120GZ	1			
IV-28	Laboratory table with cabinet	YAMATO	FFK2-180GZ	1			
IV-29	Laboratory cart	YAMATO	SWC	1			
IV-30	Laboratory stool	YAMATO	LD-360	4			
IV-31	Dry desiccate	IUCHI	11-057-01	1			○
IV-32	Clean box	YAMATO	CYH-2	1			
IV-33-1	Petri dishes	IUCHI	22-128-05	100			
IV-33-2	Forceps	IUCHI	56-531-03	5			
IV-33-3	Erlenmeyer flask	IWAKI / IUCHI	4980FK30/50, 56-017-02/04/05	1 set			
IV-33-4	Test tube	IUCHI	56-296-05/07/08/11	1 set			
IV-33-5	Aluminum Tray	IUCHI	45-175-06/07	1 set			
IV-33-6	Laboratory Scissors	IUCHI	22-536-03	5			
IV-33-7	Volumetric Pipette	IUCHI	56-274-06/07/08/09/12	1 set			
IV-33-8	Measuring Pipette	IUCHI	56-273-06/07/08/09/11	1 set			
IV-33-9	Beaker	IWAKI / IUCHI	1000BK50, 56-214-03/05/06	1 set			
IV-33-10	Sterilizing Pan	IUCHI	74-194-01	5			
IV-33-11	Test Tube Rack	TGK	360-51-23-12/18/22/05	1 set			
IV-33-12	Graduated Cylinder	IUCHI	56-231-02/04/05/06/08/10/11	1 set			
IV-33-13	Utility Tray	IUCHI	45-173-10	3			
IV-33-14	Buccaneer Funnel	IUCHI	52-268-03	10			
IV-33-15	Utility Basin	IUCHI	45-196-01	3			
IV-33-16	Drying Rack	IUCHI	74-153-01	1			
IV-33-17	Sample Bottle	TGK	323-05-83-02/04/05/06	1 set			
IV-33-18	Sample Vial	IUCHI	45-115-04/10	1 set			
IV-33-19	Sample Bag	IUCHI	56-633-07/08/03	1 set			
IV-33-20	Disposal Dish	IUCHI	22-127-01/22/126-01	1 set			
IV-33-21	Weighing paper	IUCHI	56-725-03/01	1 set			
IV-33-22	Whatman Filter Paper	WHATMAN	996-41-03-08/17/27	1 set			
IV-33-23	Precipitating Vases	TGK	055-04-65-02/04	1 set			
IV-33-24	Funnel	IUCHI	56-316-04/06/09	1 set			
IV-33-25	Sepia Screen	TGK	635-51-03-03	2			
IV-33-26	Durhan Tube	IWAKI	9820TST8-50	10			
IV-33-27	WASH Bottle	IUCHI	45-080-02/03	1 set			
IV-33-28	Plastic Bottle	TGK	358-22-02-06/05/04/03	1 set			
IV-33-29	Solution Bottle	TGK	821-05-02-06	10			
IV-33-30	Jerry Can	IUCHI	45-037-01/45-038-02	2 sets			
IV-33-31	Bunsen Burner with Tripod and Tubing	SIBATA	54-42-46, 17-04-01, 50-09-01, 5-7511	6 sets			

Lenged: A=Damaged
B=Lost
C=Un-useable

Table 2-2-1 (7) The Survey Result of Identifying the Contents of the Project

Item No.	Name of Equipment	Manufacturer	Description(Type/Model/Index No.)	Qnty	Answer by Drawing & Study Team A	B	C
IV-33-32	Bottle-top Dispenser with Replacement parts	IWAKI	1801 BUNCHU 1/10/50	2 sets			
IV-33-33	Micro-pipette	IWAKI	DISP4027-010/020/030, FINTIP-60-1000/61-40(	1 set			
IV-33-34	Burettes	IWAKI	Burette 50	5			
IV-33-35	Burette Stand with Cramp	TGK	350-55-19-02/454-51-53-02	2 sets			
IV-33-36	Stopwatch	SEIKO	SVAD001	3			
IV-34	Conway analysis set	SIBATA	6031-01	1			
IV-35	Nitrogen determination apparatus	Laboratoriums-Technik	B-426/B-316/B-412	1 set			
IV-36	Vortex Shaker	IWAKI	TM-152	1			○
IV-37	Constant Temperature Water Bath	ADVANTEC	LH800C/LH-20P	1 set			○
Chapter V	Communication & Data Analysis Equipment						
V-1	VHF Radio	Motorola	GM300 25 wart 16 ch	8			
V-2	Data analyzing apparatus						
2.1	Desk top computer (A)	Dell	Optiplex 4100/Mxe 486DX4 100 MHz	1			
2.2	Desk top computer (B)	Dell	Optiplex 466/Mxe 486DX2 66 MHz	1			
2.3	Desk top computer (C)	Dell	Optiplex 466/Mxe 486DX2 66 MHz	1			
2.4	Desk top computer (D)	Dell	Optiplex 466/Mxe 486DX2 66 MHz	1	○		
2.5	Notebook type computer	Dell	Optiplex 450/Mxe 486DX2 50 MHz	1	○		
2.6	Notebook type computer	Dell	Optiplex 450/Mxe 486SX 33 MHz	1	○		
2.7	Software	Microsoft etc	Microsoft Access, Lotus Windows, Wordperfect	1			
V-3	Photo copying machine	Xerox	Xerox 5035	1			
V-4	Facsimile machine	Xerox	Xerox 7041	1	○		
Chapter VI	Refrigeration Facilities	MYCOM Refrigeration F42WA2		1			
VI-A	Ice Making Facility						
VI-A-1	Refrigeration packaged unit		Reciprocating compressor condensing unit /CRW22A-50/MYCOM-F4WA2	2 units			○
VI-A-1-1	Components and accessories:						○
	Oil separator			1			○
	Condenser & receiver (Water cooled shell & tube type)			1			○
	Oil cooler			1			○
	Oil pump			1			○
	Gauge board with high, low and oil pressure gauges			1			○
	Pressure switches (HP, OP, LP & WP)			1 set			○
	Solenoid valve (for capacity control)			1			○
	Thermometer set (HT & LT)			1 set			○
	Common steel base			1			○
	Motor pulley, V-belt, belt cover			1 set			○
VI-A-2	Heat exchanger		Double tube type, 6SA/80A	2 sets			○

Lenged: A=Damaged
B=Lost
C=Un-useable

Table 2-2-1 (8) The Survey Result of Identifying the Contents of the Project

Item No.	Name of Equipment	Manufacturer	Description (Type/Model/Index No.)	Qnty	Answer by Feasibility Study Team A	B	C
VI-A-3	Flake ice machine		R-22 direct expansion/5M3000	4 sets			○
VI-A-4	Cooling tower		Low noise type/CTA-30NE	2 sets			○
VI-A-5	Cooling water pump		Centrifugal pump/65SG52.2	2 sets			○
VI-A-6	Monitoring panel (A-control panel)		Floor mounted self standing type	1 set			○
VI-A-6-1	Complete with:						
	Compressor protection system						○
	Alarm device for water pressure failure						○
	Automatic and manual control for ice making						○
	Wiring materials						○
	Down transformer (10KVA), 200V, 50Hz, 3Phase						○
	Down transformer (2KVA), 200V, 50Hz, Single phase						○
VI-A-7	Prefabricated ice storage		Prefabricated insulated panel	1 set			○
VI-A-7-1	Complete with:						
	Compartment lamp, door heater (AC, 200V, 55W)						○
	Insulated door (2sets)						○
	Manual single swing door						○
	Plywood (15mm) wall guard, wooden duck boards, wooden ice stopper, water drain and partition						○
VI-A-8	Connecting pipes, pipe fittings, valves and fittings for refrigerant circuit			1 set			○
VI-A-9	Connecting pipes, pipe fittings, valves and fittings for water circuit			1 set			○
VI-A-10	Insulation material for low temperature piping system			1 set			○
VI-B	**Blast Freezer Specifications**						
VI-B-1	Refrigeration packaged unit		Reciprocating condensing unit/CRW30F-50	1 unit			○
VI-B-1-1	Components and accessories:						
	Oil separator			1			○
	Condenser & receiver (Water cooled, shell & tube type)			1			○
	Inter-cooler			1			○
	Oil cooler			1			○
	Liquid sight glass, & dryer/filter			1			○
	Gauge board with pressure gauges (HP, LP and OP)			1			○
	Pressure switches (HP, OP, LP & WP)			1 set			○
	Capacity control solenoid valve			1			○
	Thermometer with casing (HT, MT & LT)			1 set			○
	Common steel base			1			○
	Motor priley, V-belt, belt cover			1 set			○

Lenged: A=Damaged
B=Lost
C=Un-useable

Table 2-2-1 (9) The Survey Result of Identifying the Contents of the Project

Item No.	Name of Equipment	Manufacturer	Description(Type/Model/Index No.)	Qnty	Lost or Damaged & Unuseable Items		
					A	B	C
VI-B-2	Heat exchanger		Double tube type, 65A/90A	1 set			O
VI-B-3	Unit cooler		Al Plate fin/copper tube floor mounted type	1 set			O
VI-B-4	Cooling tower		Low noise type/CTA-30NE	1 set			O
VI-B-5	Cooling water pump		Centrifugal type/65SGS2.2	1 set			O
VI-B-6	Defrost water pump		Centrifugal type/50SG51.5	1 set			O
VI-B-7	Monitoring panel (B-Contorol Panel)		Floor mounted, self standing type	1 set			O
VI-B-7-1	Complete with:						
	Compressor protection system, alarm device for water pressure failure, automatic and manual control for freezing and wiring materials						O
VI-B-8	Prefabricated freezing room		Prefabricated insulation panel	1 set			O
VI-B-8-1	Complete with:			1 set			
	Compartment lamp, door heater and air damper heater						
VI-B-9	Connecting pipes, pipe fittings, valves and fixing materials for refrigerant circuit			1 set			O
VI-B-10	Connecting pipes, pipe fittings, valves and fixing materials for water circuit			1 set			O
VI-B-11	Insulation material for low temperature piping line			1 set			O
VI-C	-20℃ cold storage facility specifications						
VI-C-1	Refrigeration packaged unit		Reciprocating compressor condensing unit/MYCOM	1 unit			O
VI-C-1-1	Components and accessories:						
	Oil separator			1			O
	Condenser & receiver (Water cooled shell & tube type)			1			O
	Intercooler			1			O
	Oil cooler			1			O
	Liquid sight glass			1			O
	Dryer/filter			1			O
	Gauge board with gauges (HP, LP and OP)			1 set			O
	Pressure switches (HP, LP OP and WP)			1 set			O
	Solenoid valve for capacity control			1			O
	Thermometer with casing (HT, MT & LT)			1 set			O
	Common steel base			1			O
	Coupling and coupling guard			1			O
VI-C-2	Heat exchanger		Double tube type,40A/65A	1 set			O
VI-C-3	Unit cooler		Al plate fin/copper tube, ceiling mounted type	1 set			O
VI-C-4	Cooling tower		Low noise type/CTA-15NE	1 set			O
VI-C-5	Cooling water pump		Centrifugal type/50SGS1.5	1 set			O
VI-C-6	Monitoring panel (C-Control panel)		Floor mounted, self-standing	1 set			O

Lenged: A=Damaged
B=Lost
C=Un-useable

Table 2-2-1 (10) The Survey Result of Identifying the Contents of the Project

Item No.	Name of Equipment	Manufacturer	Description (Type/Model/Index No.)	Qnty	Answer by Bankers & Study Team A	B	C
VI-C-6-1	Complete with:						
	Compressor protection system, alarm device for water pressure failure, auto and manual control for cooling and wirign materials						○
VI-C-7	Prefabricated cold storage		Prefabricated insulation	1 set			○
VI-C-7-1	Complete with:						
	Compartment lamp, door heater, air damper heater and insulated door (850W×1,700H×100Tmm, manual single swing type) and wooden duck boards.						○
VI-C-8	Connecting pipes, pipe fittings, valves and fixing materials for refrigerant line, insulation material for low temperature piping system			1 set			○
VI-C-9	Connecting pipes, pipe fittings, valves and fixing materials for water line			1 set			○
VI-C-10	Insulation materials for low temperature piping system			1 set			○
VI-D	0℃ Chilling room specifications						
VI-D-1	Refrigerarion packaged unit:		"ALL-IN-ONE" cooling unit/AFL-R2A	unit 3 s			○
VI-D-1-1	Complete with:						
	Air cooled condenser (50W/unit), air cooler (15W×2sets/unit) and auto temperature controller						○
VI-D-2	Prefabricated chilling room		Prefabricated insulation	1 set			
VI-D-2-1	Complete with:						
	Compartment lamps, door heater and wooden duck boards						○
VI-D-3	Chilled panel		Waterproof type	1 set			○
VI-S	Spare parts and hand tools for maintenance VI-S. Spare parts						
VI-S-1	Ice-making facilities						
VI-S-1-1	Condensing unit (CRW22A-50)					○	
VI-S-1-1-1	Suction plate valve		Index No.71	4		○	
VI-S-1-1-2	Discharge plate velve		Index No.110	4		○	
VI-S-1-1-3	Spring set for suction plate valve		Index No.72	4 sets		○	
VI-S-1-1-4	Spring set for discharge plate valve		Index No.116	4 sets		○	
VI-S-1-1-5	Assembly, discharge plate valve		Index No.108	1 set		○	
VI-S-1-1-6	Piston ring set		Index No.88	4 sets		○	
VI-S-1-1-7	Piston and connecting rod assy, with rings		Index No.76-101	2 sets		○	
VI-S-1-1-8	Bearing halves		Index No.84	4 sets		○	
VI-S-1-1-9	Assembly, shaft mechanical seal		Index No.32	1 set		○	

Lenged: A=Damaged
B=Lost
C=Un-useable

Table 2-2-1 (11) The Survey Result of Identifying the Contents of the Project

Item No.	Name of Equipment	Manufacturer	Description(Type/Model/Index No.)	Qnty	Answer by Examiner & Study Team: A	B	C
VI-S-1-1-10	Gasket, head cover		Index No.51	2		○	
VI-S-1-1-11	Gasket, handhole cover		Index No.47	2		○	
VI-S-1-1-12	Gasket, cover plate		Index No.27	1		○	
VI-S-1-1-13	Gasket set			1 set		○	
VI-S-1-1-14	V-belt, C-125×4pcs./set			2 sets		○	
VI-S-1-1-15	Thermometer without case, L/45, 0~200℃		Index No.197	1		○	
VI-S-1-1-16	Thermometer without case, L/45, -50~150℃		Index No.199	1		○	
VI-S-1-1-17	Pressure gauge, DUF75D, 20kg/cm^2			1		○	
VI-S-1-1-18	Pressure gauge, DUF75D, 15kg/cm^2			1		○	
VI-S-1-1-19	Pressure switch, DNS-D606MQ			1		○	
VI-S-1-1-20	Pressure switch, SNS-C106Q010			1		○	
VI-S-1-1-21	Pressure switch, FNS-C106Q003			1		○	
VI-S-1-1-22	Differential pressure switch, ONS C106NQ004			1		○	
VI-S-1-1-23	Safety valve, SV20A-PT, 17.2kg/cm^2		Index No.213	1		○	
VI-S-1-1-24	Fuse metal, HS-3C (φ5)			2		○	
VI-S-1-1-25	Coil for solenoid valve, SX-7			1		○	
VI-S-1-1-26	Coil for solenoid valve, SB19PB-02FRS			1		○	
VI-S-1-1-27	Coil for solenoid valve, 30MV-LI			1		○	
VI-S-1-2	Ice-making Unit						
VI-S-1-2-1	Ice blade			1		○	
VI-S-1-2-2	Float valve for water circulating tank			1		○	
VI-S-1-2-3	Gear unit with motor for ice-making drum			1		○	
VI-S-1-2-4	Water spray nozzle (7 pcs./set)			2 sets		○	
VI-S-1-2-5	Bearing for gear unit			2		○	
VI-S-1-2-6	Motor for ice making drum (Maker Guarantee)			4		○	
VI-S-1-3	Ice-making Panel						
VI-S-1-3-1	Molded case circuit breaker, NF30-CF			2		○	
VI-S-1-3-2	Lamp, LS-6, 6.3V, 1W			5		○	
VI-S-1-3-3	Timer, H3CR-A8			2		○	
VI-S-1-3-4	Star-delta timer, H3CR-G8L			2		○	
VI-S-1-3-5	Relay, MY4N			5		○	
VI-S-1-3-6	Selector switch, ASLS32620N			2		○	
VI-S-1-3-7	Push button switch, ALS22611N			2		○	
VI-S-1-3-8	Magnetic conductor, MSO-K11 (0.5kW)			1		○	
VI-S-1-3-9	Fuse, BLA-003, 1A			5		○	
VI-S-1-3-10	Glass tube fuse, 3A			3		○	
VI-S-2	Blast freezer						

Lenged: A=Damaged
B=Lost
C=Un-useable

Table 2-2-1 (12) The Survey Result of Identifying the Contents of the Project

Item No.	Name of Equipment	Manufacturer	Description(Type/Model/Index No.)	Qnty	Assess by Damages & Study Team		
					A	B	C
VI-S-2-1	Condensing Unit						
VI-S-2-1-1	Suction plate valve			4		○	
VI-S-2-1-2	Discharge plate valve			4		○	
VI-S-2-1-3	Spring set for suction plate valve			4 sets		○	
VI-S-2-1-4	Spring set for discharge plate valve			4 sets		○	
VI-S-2-1-5	Assembly, discharge plate velve			1 set		○	
VI-S-2-1-6	Piston ring set			4 sets		○	
VI-S-2-1-7	Priston and connecting rod assy with rings			2 sets		○	
VI-S-2-1-8	Bearing halves			4 sets		○	
VI-S-2-1-9	Assembly, shaft mechanical seal			1 set		○	
VI-S-2-1-10	Gasket, head cover			2		○	
VI-S-2-1-11	Gasket, handhole cover			2		○	
VI-S-2-1-12	Gasket, shaft seal cover			2		○	
VI-S-2-1-13	Gasket set			1 set		○	
VI-S-2-1-14	V-belt, C125×4pcs./set			2 sets		○	
VI-S-2-1-15	Thermometer without case, L/45,0-200℃			1		○	
VI-S-2-1-16	Thermometer without case, L/45,-50~150℃			1		○	
VI-S-2-1-17	Thermometer without case, L/15,-50~150℃			1		○	
VI-S-2-1-18	Safety valve, SV20A-PT, 17.2kg/cm ^{2}			1		○	
VI-S-2-1-19	Coil for solenoid valve, SX-7			1		○	
VI-S-2-1-20	Coil for solenoid valve, SB19PB-03FRS			1		○	
VI-S-2-1-21	Coil for solenoid valve, 30MV-L1			1		○	
VI-S-2-2	Air blast control panel						
VI-S-2-2-1	Magnetic conductor, MSO-11,22kW			1		○	
VI-S-3	Cold storage						
VI-S-3-1	Condensing unit						
VI-S-3-1-1	Suction plate valve			4		○	
VI-S-3-1-2	Discharge plate valve			4		○	
VI-S-3-1-3	Spring set for suction plate valve			4 sets		○	
VI-S-3-1-4	Spring set for discharge plate valve			4 sets		○	
VI-S-3-1-5	Assembly,discharge plate velve			1 set		○	
VI-S-3-1-6	Piston ring set			4 sets		○	
VI-S-3-1-7	Piston and connecting rod assy, with rings			2 sets		○	
VI-S-3-1-8	Bearing halves			4 sets		○	
VI-S-3-1-9	Assembly, shaft mechanical seal			1 set		○	
VI-S-3-1-10	Gasket, head cover			2		○	
VI-S-3-1-11	Gasket, handhole cover			2		○	
VI-S-3-1-12	Gasket, shaft seal cover			1		○	

Lenged: A=Damaged
B=Lost
C=Un-useable

Table 2-2-1 (13) The Survey Result of Identifying the Contents of the Project

Item No.	Name of Equipment	Manufacturer	Description (Type/Model/Index No.)	Qnty	Answer by Republic & Study Team A	B	C
VI-S-3-1-13	Gasket set			1 set		○	
VI-S-3-1-14	Thermometor without case, L/C, 0~150℃			1		○	
VI-S-3-1-15	Thermometer without case, L/C, -50~+50℃			1		○	
VI-S-3-1-16	Pressure gauge, DUF60D, 20kg/cm^2			1		○	
VI-S-3-1-17	Pressure gauge, DUF60D, 15kg/cm^2			1		○	
VI-S-3-1-18	Coil for solenoid valve, SX-7			1		○	
VI-S-3-1-19	Coil for solenoid valve, SB19PB-03FRS			1		○	
VI-S-3-2	Cold storage control panel						
VI-S-3-2-1	Molded case circuit breaker, NF30-CS, 10AT			1		○	
VI-S-3-2-2	Thermal relay, TH-K12AB, (0.55~0.95A)			1		○	
VI-S-3-3	Unit cooler						
VI-S-3-3-1	Defrost heater pole with wire, 380W×1000L			10		○	
VI-S-4	Chilling room (0℃)						
VI-S-4-1	Chilling room control panel						
VI-S-4-1-1	Molded case circuit breaker, NF30-CS, 30AT			1		○	
VI-S-4-2	Maintenance hand tools						
VI-S-4-2-1	Vacuum pump			1 set			○
VI-S-4-2-2	Charging tool, with hose			1 set		○	
VI-S-4-2-3	Manifold gauge			1 set		○	
VI-S-4-2-4	Ratchet handle for valve operation			1		○	
VI-S-4-2-5	Refrigerant leak detector			1 set		○	
VI-S-4-2-6	Cartridge for refrigerant leak detector			12		○	
VI-S-4-2-7	Service tools with toolbox for Compressor Model W A			2 sets		○	
VI-S-4-2-8	Service tools with toolbox for Compressor Model C			1 set		○	
Chapter VII	Waste/Garbage Treatment Equipment						
VII-1	Fish waste treatment machine	Nakayasu Co.Ltd.	K-24C	1			○
VII-2	Incinerate	Daito	EC-400	1			○
Chapter VIII	Vehicle						
VIII-1	Refrigerated panel van (1 ton)	Toyota Motor Corp	LN106R-TRMRS3	1			
VIII-2	Insulated panel van (2 tons)	Toyota Motor Corp	BU50R-MDBT3	4			
VIII-3	Extension Service Car (Station wagon)	Toyota Motor Corp	HZJ80R-GCMRS	1			
VIII-4	Extension Service Car (Pick up truck)	Toyota Motor Corp	LN1-6R-PRMRS	1			

Lenged: A=Damaged
B=Lost
C=Un-useable

2-2-2 Basic Policy of Improvement

(1) Experiences due to Damages by Hurricane Lenny

The cause of damages on the study area was attacked by the severe wave attack, which was over the design wave condition on a 30-year probable wave. We have learned a lot of things from this unexpected damage. Those facilities and equipments are needed to rehabilitate to be able to minimize the damages of Fishery Center even if attacked by the wave over a 30-year probable wave nevertheless the basic policy is rehabilitation. Our experiences by this damage are shown as follow:

1) The parapet wall with gates, which is located on the landing wharf, served as a barrier to wave attack. Over flooding wave of it straightly struck the doors of Fishery Center. The allotment of gates and doors for convenience of landing the fish catches became with causes of damages inside the building.

2) It is conceivable that damages would have been minimum in the event of over flooding of the parapet wall if the quick draining system for over flooding wave was set up.

3) Severe waves to be reached to the northern part of Fisheries Center was supposed to be protected if the parapet wall was settled to the end of stairs in the mooring basin. It is conceivable that damages of cooling towers and fish waste treatment plant etc, were minimum if the protection wall has been set there.

4) It is conceivable that damages by one flood from the city drainage and surface flow were minimum if the floor level of Fisheries Center was setting up more.

5) As the slipway is directly opened to the ocean, it is impossible to protect against flood by running up on the slope of it. Therefore, all fishing boats must to pulling up by using this slipway to the city road on the anomalous wave condition. To avoid damages to the city by running up wave on the slipway, it is necessary to set up the huge parapet wall and emergency gate. The area for them is very tight.

6) The receding wave action on the slipway caused scoring of the foot area. The increased depth of foot area caused the attacking wave energy become bigger and bigger. It is indicated that the weak point for wave attacking is immanent.

7) The scoring condition on the foot area of the landing wharf and west breakwater with severe running back wave after shocked breaking there was reached to the part of underwater concrete. The existing protecting system with the concrete blocks and

the underwater concrete is impossible to protect the scoring condition. It is necessary to improve the existing protecting system. It is not able to deny that the landing wharf and west breakwater with scoring will slide toward offshore if we will not improve the existing protecting system.

(2) Basic Policy of Improvement

Based on the aforementioned experiences, the basic policy of improvement is as follows:

1) Fisheries Center plays a role of central facility for the Complex. It is a keen factor to prevent Fishery Center as the basic policy of improvement.

2) It is necessary to reinforce the Fisheries Center for preventing from the shock wave on the anomalous condition. However, the pressure of shock wave on the landing wharf reaches to the Fisheries Center without decrease this pressure. The existing building structure of Fisheries Center is impossible to prevent against this pressure. The most of pressure of shock wave should be weakened with the improved parapet wall and the pressure of wave after over flooding become weaker at the sidewall of Fisheries Center. It is an actual improvement plan that the doors and holes on the west side of Fisheries Center will close and the sidewall of it will reinforce.

3) The rehabilitation and improvement of Fisheries Center should be examined the combined solution with the improvement of parapet wall and the reinforcement of west side of it. The space between the parapet wall and Fisheries Center is a role of the catchments basin for over flooding wave. The energy to be reached to the building of Fisheries Center can be decreased greatly if those spaces can be provided wider. Therefore, it is possible to prevent the Fisheries Center from the severe shock wave striking on the anomalous condition if it takes to the combined rehabilitation and improvement plan with the parapet wall, the over flooding basin, the reinforcement of sidewall of the building and the close of doors and holes on the west side of the building. The parapet wall should be placed on the point that is the shock wave striking on the landing wharf.

4) It is necessary to improve the foot area of landing wharf and west breakwater because of scoring condition.

5) In the event of rehabilitation of slipway, the factor of the suffering to a city must be avoided. The suffering factor is immanent in the case of rehabilitation of the original design of slipway. Therefore, it is necessary to improve the slipway.

2-2-3 Policy of Improvement for Each Structure

Followings are the policy of improvement for each structure.

(1) Necessity of Improvement of the Parapet Wall and Building of Fisheries Center

1) Necessity of Improvement of the Parapet Wall

The existing parapet wall with sliding gate is installed on the point of 3.4m from the building of Fisheries Center and its height is 1.50m above chart datum level (CDL+3.50m). The depression effect for over flood wave of existing parapet walls are as follow:

a. The Depression Effect of Over Flooding Wave

Based on the thesis, " Experimental research of motion of overtopping wave on the breakwater without the parapet", Takahashi, et. al. Collection Volume 38(1) 1991, the height of over flooding wave at the point of striking on the landing wharf is estimated 4.29m for a 30-year probable wave. The height of existing parapet wall is 1.50m. The effect of depression for over flooding wave is 4.29m-1.50m=2.79m. The part of water of 2.79m will over flood. The effect of depression for the over flooding wave of existing parapet wall is 1.50m. Consideration of over flooding wave is described in Figure-2-2-3 (1).

b. The Depression Effect of Water Pressure to the Building of Fisheries Center

The basin (3.4m) between the existing parapet and building is a role of depression for the over flooding wave energy. The quantity of this depression effect can be evaluated as follows:

① If there is no basin, the existing parapet will reduce the water pressure (=P) of shock wave on the landing wharf is P=27tf/m2x2.79m=75.33tf/m. The building will be stricken this pressure (=75.33tf/m). However, the existing basin will reduce this pressure to 75.33tf/m2÷3.4m=22.16tf/m.

②If there is no parapet wall there, the water pressure is P=27tf/m2x3.79m=102.33tf/m because the top height of landing wharf is 0.50m above chart datum level (CDL+2.50m) and the height of over flood is 4.29m-0.50m=3.79m. Therefore, the doors of building was received the water pressure, 102.33tf/m, because of no sliding gates. The depression effect of existing parapet wall is assumed to 102.33tf/m-22.16tf/m=80.17tf/m.

③ However, the building cannot prevent from the shock wave attacking of water pressure, 22.16tf/m based on their structure.

c. Rehabilitation Method of Existing Parapet Wall and Building of Fisheries Center

The parapet wall has the reducing effect against the suffering of building of Fisheries Center by the above examination. It is necessary to rehabilitate the parapet

Calculation of Over Flooding Wave

			Input Value								Boundary Condition		Calculation Value								Calculation Value								
			Wave Height	Period	Wave Length	Wave Velocity	Depth at a Tip of Mound	Depth on the Top of Mound	Width of Mound	Mound Elevation	Input Data of $\eta = hc$			Equivalent Offshore Water Depth	Model of Hit Water							Model of Over Flooding Water								
			H	T	L	C	h	d	BM	hc	σt	η	BM/L	hm	$\eta 3$	I3	κ	σ	κhm	Vsf	$\eta 1$	$\eta 2$	I1	K	H/hm	A	hc'	tan θ
Lenny	Significant Wave Height	Low Tide	6.0	10.5	112.23	11.22	16.2	6.2	7.5	1.8	5.20	1.80	0.07	16.20	1.38	3.58	0.06	0.63	0.91	5.21	4.56	1.83	7.10	1.06	0.37	0.10	1.04	0.39
		High Tide	6.0	10.5	113.26	11.43	16.6	6.6	7.5	1.4	5.15	1.40	0.07	16.60	1.35	3.60	0.06	0.63	0.92	5.15	4.87	1.95	7.78	1.05	0.36	0.08	0.78	0.38
		High Tide + Wind Setup + Suction Depression	6.0	10.5	116.47	11.65	17.9	7.9	7.5	0.1	4.99	0.10	0.06	17.90	1.18	3.43	0.05	0.63	0.97	4.81	5.92	2.37	9.83	1.00	0.34	0.01	0.05	0.36
Lenny	Maximum Wave Height	Low Tide	10.8	10.5	112.23	11.22	16.2	6.2	7.5	1.8	5.20	1.80	0.07	16.20	7.44	8.29	0.06	0.63	0.91	12.07	9.61	3.85	11.17	1.06	0.67	0.10	0.97	0.52
		High Tide	10.8	10.5	113.26	11.43	16.6	6.6	7.5	1.4	5.18	1.40	0.07	16.60	7.28	8.36	0.06	0.63	0.92	11.95	9.86	3.95	11.76	1.04	0.65	0.08	0.74	0.50
		High Tide + Wind Setup + Suction Depression	10.8	10.5	116.47	11.65	17.9	7.9	7.5	0.1	5.11	0.10	0.06	17.90	6.71	8.18	0.05	0.63	0.97	11.47	10.73	4.29	13.29	1.00	0.60	0.01	0.05	0.48

$Vsf=-H*\delta*\cos\delta t-2\delta(H^2/8)*\kappa*(\cosh\kappa hm)*(2+\cosh 2\kappa hm)/(\sinh\kappa hm)*\cos 2\delta t$

δt at $\eta = hc$

$I3=0.6*C*Vsf/g$

$\eta 1=K*H-hc$ $\eta 2=0.40*\eta 1$

$K=(1+\sqrt{(1+4*hc'/hm)})/2$

$I1=0.6*\eta 1/\tan\theta$ $\tan\theta=\sqrt{(0.3+g*\eta 1)/(C*(\eta 1/(\eta 1+hc)))}^{0.5}$

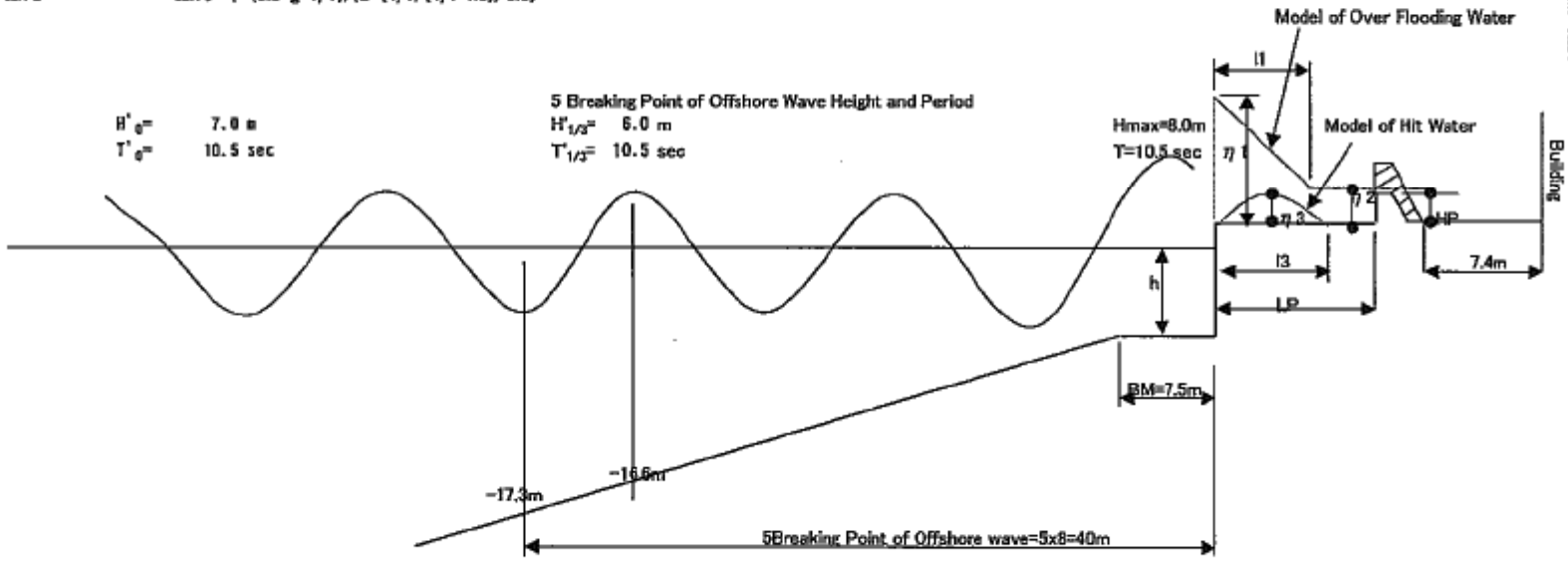


Figure-2-2-3 (1) Calculation Measure of Over Flooding Wave

wall. However, the existing parapet wall is not sufficiently effective for reducing the water pressure to the building of Fisheries Center. Therefore, it is necessary to move the location of placement that the basin is able to increase for catching volume and size up of height of the parapet wall without gates.

The improvement of these facilities is as follows:

① Size up of Height of the Parapet Wall

If the height of parapet wall will be set 2.50m (CDL+4.50m), the height of over flooding water will be 4.29m-2.50m=1.79m and the water pressure will be P=27tf/mx1.79m=48.33tf/m. The reducing effect of size-up parapet wall is 40% more than the existing parapet wall.

② Setting up the New Parapet Wall

The new parapet wall will be placed at the point of 7.4m from the west side of building of Fisheries Center. The water pressure of over flood of the new parapet wall to the building is P=48.33tf/m2÷7.4m=6.53tf/m. The height of over flood water is 1.79m÷7.4m=0.24m. Therefore, there is no suffering of the building if the doors of building will be closed and the floor level of it will be leveled up.

The floor of building will be leveled up of 0.40m. The basin need to the function of quickly drainage system for catching water. The hydraulic gradient is 2% on the basin. The receiving water will be divided by the center of basin with the hydraulic gradient of 2%. The water level of center of basin is 35mx0.5x0.02=0.35m. Therefore, the floor level should be Existing Floor Level (CDL+2.75m) + Water Level of Center (0.40m)= The Floor Level after leveling up (CDL+3.15m).

③ Extension of the New Parapet Wall

The existing parapet wall is placed up to the end of building of Fisheries Center and it is not covered the room of emergency generating plant. It is not sufficient to protect the area of northern part of building. The parapet wall should extend to the end of stairs of mooring area for protecting the northern part of the building. The parapet wall should also extend to the southern end of existing parapet wall.

④ Protection Works of Fisheries Center

The over flooding wave still has the energy of 6.53tf/m to the building. The doors and ventilation mouth at the western side of building should be closed for protecting the over flooding wave. It is also necessary to reinforce the sidewall of building for protecting the over flooding waves. The entrance of west side must be switched to the southern part of building. The distance from landing wharf to the southern entrance should be longer than the west side entrance, but it must not be inconvenient to transport fish catches from the landing wharf.

It is necessary that the layout of facility and equipment in the building should be changed because of switching the entrance to the south.

2) Necessary of Improvement of Slipway

The water depth in front of the slipway is changed to deeper due to score by the running back wave on the slipway. Hurricane Lenny changes the wave condition more severely before suffering. In the event of rehabilitation of existing figure of slipway, the following improvement measures are necessary.

* It is necessary to protect the scoring of foot area and the sucking of filling sand and stones of slipway with steel sheet pile.
* The shock wave pressure on the slipway is bigger than the original design because the water depth of foot area of slipway is deeper. It is necessary that the concrete plate of slipway should be thicker and the unit weight of plate should be increased. The earth anchor system needs to support the heavy weight concrete plate.

The slipway is able to rehabilitate by the above-mentioned system. But it is impossible to prevent the Fisherman's Locker Area, dike of city road and city area of next door from over flood suffering by the running up wave on the slipway. For example, in the case of the depth of end of slipway, 0.5m, the running up wave of a 30-year probable reaches to the height of 5.96m at the top of slipway. For preventing from the suffering by this running up wave, the height of dike on boundary needs to be 6.0m. However it is impossible to place on the slipway because of the narrow space. The emergency gate is also needed to improve.

Therefore, the rehabilitation of existing figure of slipway is possible by the above-mentioned measures. But the suffering by running up wave to the city side cannot be prevented.

It is most effective measure that the wave energy is reduced in front of sea of the slipway. The energy of offshore wave reaches directly to the study area because of steepness condition of sea bottom condition. It is best solution that the wave energy is compulsory decreased by the breakwater. The dimensions of breakwater are as follows:

a. Dimension of Breakwater

① The Location and Length of Breakwater

The breakwater headline will be set on same line of the wharf of Ferry Terminal. It is apprehended that the turbulent of the mouth of breakwater caused by the current along the breakwater and wharf of Ferry Terminal. But this headline will be set in the view of necessity of wider turning basin behind the breakwater. The

mouth of breakwater will be opened to the landing wharf side in order to avoid the conflict between the fishing boat and Ferryboat. The width will be set 7.0m for reducing the induced wave energy although the mouth of breakwater will be assumed some 6.0m to 9.0m of width based on Japanese Standard of Fishery Port. The length of breakwater is estimated as 35m.

② The Crown Height of Breakwater

The crown height of breakwater will be set same level of wharf of Ferry Terminal.

③ The Structure Type and Width of Breakwater

It is the best way that the structure of breakwater is the combined type with steel sheet pile and gravity structure for the severe condition of scoring in the study area. The role of steel sheet pile is the protection of scoring. The gravity structure consists with concrete filling. This filling concrete resists the shearing force. The width of breakwater is 9m because the stability is required and we need the wider turning basin behind it.

b. Alternative Plans of Rehabilitation and Improvement of Slipway

The registered fishing boats are 30 in numbers based on the original basic design. It is assumed that those fishing boats are parking on the slipway by two raw. Based on the direction of slipway, we have two alternative plans for rehabilitation and improvement. One is the same direction of existing one. Second one is the switched direction toward Ferry Terminal. Table-2-2-3 (1) summarizes two alternative plans for rehabilitation and improvement of slipway.

c . Evaluation of Alternative Plans for Rehabilitation and Improvement of Slipway

Alternative plans are able to evaluate with the operational condition, the satisfaction of required space for parking of fishing boat and the condition of construction. The evaluated measures above matters are indicated as follows.

① The Operational Condition

The working ratio of fishing boats per day was assumed 60% of 30 registered boats on the original design. The number of rest of boats in normal operating day are estimated 30x0.60=18 boats. According to the original design, the length of slipway for 18 fishing boats is calculated 18 boats x (1.5m +1.0m)÷2=22.5m based on the same manner of two raw rest and the width of a boat of 1.5m and the clearance is 1.0m.

The length of turning basin is required three times of the length of fishing boat based on the Japanese Standard of Fishery Port. It is calculated 6m x3 =18m.

② The Satisfaction of Required Space for Parking of Fishing Boat

In the event of anomalous condition, all fishing boats will be moved to the back site on the original design. The slipway will not be attacked from the running up wave to the top of it because the breakwater protect offshore wave. Alternative plans have a space for boat parking area because of settlement of breakwater. The required space for parking of 30 fishing boats is calculated as follows:

The required space; S=(boat length x boat width + clearance 10%) x No. of Boats
The length of designed boat; 6.0m
The width of designed boat; 1.5m

S=6.0m x 1.5m x 1.1=9.9m^2 say 10m^2 per boat
Total of S = 10m^2 x 30 =300m^2

Therefore, the total required space for parking is the standard of evaluation for alternative plans.

③ The Condition of Construction

Generally speaking, the cheaper construction cost and the shortened period of construction works are applied for the condition of construction.

Table-2-2-3 (1) shows the comparison of alternative plans with each evaluated item. According to this comparison, Plan 1 is the best solution for rehabilitation and improvement of slipway with a wider parking space and larger turning basin.

Table-2-2-3 (1) Summarize Two Alternative Plans for Rehabilitation and Improvement of Slipway

	Plan 1	Plan 2
Slipway Width	30m	27m
Area of Boat Storage Yard	375 m² (30m×12.5m=375 m²)	667.5 m² (27m×12.5m+12m×15m+5m×30m=667.5 m²)
Size of Basin	· 15.4m limited by Breakwater	· 24m, which if enough for boat maneuvering
Breakwater	· Exist	· Exist
Structural Character	· Breakwater will be constructed against the storm waves. · Slipway will be restored as smaller scale with same direction of damaged one. · Armor blocks will be installed for securing the calmness. · Small scaled boat storage yard will be provided.	· Breakwater will be constructed against the storm waves. · Slipway will be restored with switched direction toward ferry terminal. · Armor blocks will be installed for securing the calmness at basin. · Boat storage yard will be provided.
Merit	· Protection capability against storm waves will be satisfied. · Damages at town will not be caused by running up waves. · Even in stormy sea condition, most of boats will not be necessary to escape.	· Protection capability against storm waves will be satisfied. · Damages at town will not be caused by running up waves. · Even in stormy sea condition, boats will not be necessary to escape. · Boat storage yard will be utilized with multi-purposes.
Demerit	· Area of boat storage yard is slight short to whole boats · Due to limited basin area, boat con not approach to slipway straightly	· Due to limitation of width of slipway, a part of boats shall be rested at boat storage yard

3) Sub-merged Breakwater

a. The situation of Sub-merged Breakwater

The role of sub-merged breakwater is to prevent the sand deposition to the port mouth from Roseau River. The tip of it, which consists with steel sheet piles, is deformed toward south direction. The deformed steel sheet piles are the area of three concrete apron blocks from the tip. The tip of internal concrete apron blocks among the tip of steel sheet piles is dropping down toward the sea and the next two concrete apron blocks moved to the tip with 1 meter sinking. All concrete apron blocks on the outside of steel sheet piles are moved. Four concrete apron blocks from the tip moved more than 10 meters to the riverside and two blocks in the trunk of sub-merged breakwater 3 meters toward the seaside. The causes of this situation are described below.

1. The concrete apron blocks on the south side of sub-merged breakwater are moved by the severe wave.
2. The strong stream of Roseau River scored the basement area of two internal concrete apron blocks on the riverside. After then, the strong stream moves these concrete apron blocks to the seaside.
3. The strong river stream deformed the tip of steel sheet piles toward the seaside.

b. The Rehabilitation of Sub-merged Breakwater

The deformed sub-merged breakwater is necessary to rehabilitate the functions to prevent the sand deposition to the port mouth from Roseau River. The rehabilitation method is as follows.

1. The deformed steel sheet piles will be underwater cut off.
2. The new steel sheet piles will drive besides the cutting off piles.
3. The deformed concrete apron blocks will place back the original position.
4. The underwater concrete will cast to cover the concrete apron blocks among the steel sheet piles.

4) Rehabilitation of West Breakwater

a. The Situation of West Breakwater

In the event of rehabilitation of the previous damages by Hurricane Luis and Iris, the west breakwater was rehabilitated the cut off the crown height and the structure which is protected the shearing force by the hard connecting top of piles with the reinforced coping concrete. The same manner of foot protection of the landing wharf was placed for the reason of protection of sliding force caused by the short length of sheet pile of backward.

The foot area was scored by the severe running back waves and uplifting force in Hurricane Lenny. The tip of foot area is covered with the concrete blocks. Those were slightly moved toward offshore and top of those were zigzag figures. Some part of those is sliding toward offshore and scored the underwater concrete near the sheet pile. It is assumed that the tip of foot area of west breakwater is being scored and shifting toward offshore. It is conceivable to slide the breakwater.

b. The Rehabilitation of West Breakwater

The limitation of usage of the mooring area on the anomalous condition due to the

cut off the crown height of west breakwater are agree by both parties on the previous rehabilitation project. Therefore, the improvement of weakened foot area for protection of sliding of breakwater will be carried out.

The improvement plan of foot area of west breakwater is as follows:

It is assumed that the resistance of shock wave pressure is possible by the passive earth pressure at the forward sheet pile. New steel sheet pile will drive in front of tip of concrete blocks and the underwater concrete of 1m thicknesses will cast on the existing underwater concrete. This improvement plan of foot area is possible to resist the sliding force.

The role of this improvement plan is to sustain the existing breakwater. This plan is impossible to protect the function of mooring area on the anomalous condition. Therefore it is necessary to continue that all fishing boats in the mooring area should escape to any safety area at the anomalous condition.

2-3 Basic Design

2-3-1 Design Concept

(1) Design Concept for Natural Conditions

Design condition concerning natural conditions made the revisions of wave condition regarding the change of sea bottom topographical condition. Other original design conditions shall remain unchanged. The soil conditions were based on the values obtained from the boring and soil tests conducted at this time and the original design. The design conditions for natural conditions are as indicated below.

Table 2-3-1 (1) Design Conditions

	Item		Design Value	Remarks
Climate and Sea Conditions	Maximum wind velocity		53.8m/sec.	During approach of hurricanes
	Maximum wave height (significant)		H=8.0m	30 year probability offing waves, Ho=7.0m, To=10.5 sec.
	Water level	Tide level (high tide)	MHWL=CDL+0.6m	
		Suction height	Maximum+0.6m	During approach of hurricanes
	Maximum flow velocity		0.5m/sec.	
	Seismic coefficient		0.1	Recommended value:0.20
	Bottom sediment		Crushed sand mixed with gravel (gravel pieces of 200-30cm diameter in places)	
	Rainfall		2,073mm/year	
	Temperature	Annual variation	Maximum temperature 35℃	Maximum 34.0℃
		Daily difference	11.6℃	Maximum daily difference
	Humidity		80%	
	Water temperature		Fresh water temperature 32℃	
Soil Conditions			Surface	Foundation Bed
	Wet density		1.75~1.90ton/m^3	Ditto
	Moisture content		19%wt	11-14%wt
	Soil type/Particle size		Sand (0.07-2.0mm) 80%	Sand 45-65%, rest is gravel
	N value		3~26	26 minimum
	Layer thickness		3m~5m	Seabed surface and below

CDL: chart datum level (±0.000 m in the Project)

1) Re-examination of Design Waves

a. Offshore Waves

The study report on the coastal fisheries development project in the commonwealth of Dominica in March 1996, JICA was re-examined offshore waves based on the most powerful 54 hurricanes, in terms of wind velocity at the point of entry into the Caribbean Sea, that passed through an area stretching 400km east to west and 800km north to south(from 59° 36' to 63° 17' W. Long. and 10° 26' to 17° 40' N. Lat.) which encompasses Dominica and St. Vincent, over the past 40 years (1955-1994). Using the spectral method (one-point method (Gotoh method) and MRI

model), 39 offshore waves estimated from observations made at one point in the Roseau region during Hurricanes David and Luis and five more observation points in waters around St. Vincent during hurricanes Allen, Flora and Iris. These estimated offshore waves were then used to calculate the non-excessive probability for each wave height by means of the Weibull distribution. The 30-year probable waves, which used generally in Japan in the design of the Fishing Port Facilities, were obtained in the wave estimations conducted here. As the result, offshore waves with a height of 7.0m, period of 10.5 second and a westerly direction shall be used.

b. Design Maximum Wave Height of Facilities

The maximum wave height on each facility is re-examined because of the change of sea bottom topographical condition. It is shallow in the point of 5 waves distance forward the facilities. Figure-2-3-1 (1), (3) and (5) show the sea bottom profile of west breakwater, the landing wharf B and slipway. Re-examined design maximum wave height of facilities is shown in Table-2-3-1 (2).

c. Design Wave Height of Facilities

① West Breakwater

According to the result of sounding survey in this study, it is indicated that the area surrounding the west breakwater is changed to the occurrence condition of shock wave because of the change of sea bottom topographical condition. Forward area of west breakwater is shallow and offshore area is deeper before Hurricane Lenny. Therefore the shock wave pressure is calculated 17tf/m^2 using thesis of Coastal Engineering Volume 39, 1992, the shock wave power coefficient from the Mound Shape of Composite Breakwaters by Shigeo Takahashi, et. al. The maximum design wave height at the point of five wave offing is estimated Hmax. =1.8 x 6.0m =10.8m. Calculation results of pressure of shock waves in the vicinity of west breakwater are described in Figure-2-3-1 (2).

② Landing Wharf

This area is steeper than the forward area of west breakwater. The sea bottom Topographical profile changes to steeper than the result of sounding survey in 1998. This area is in shock wave. The shock wave pressure is estimated to 27tf/m^2 using the above mentioned method of Takahashi's thesis. In this case, the maximum wave height is 10.8m of same of west breakwater. Calculation results of pressure of shock waves in the vicinity of landing slipway are described in Figure-2-3-1 (4).

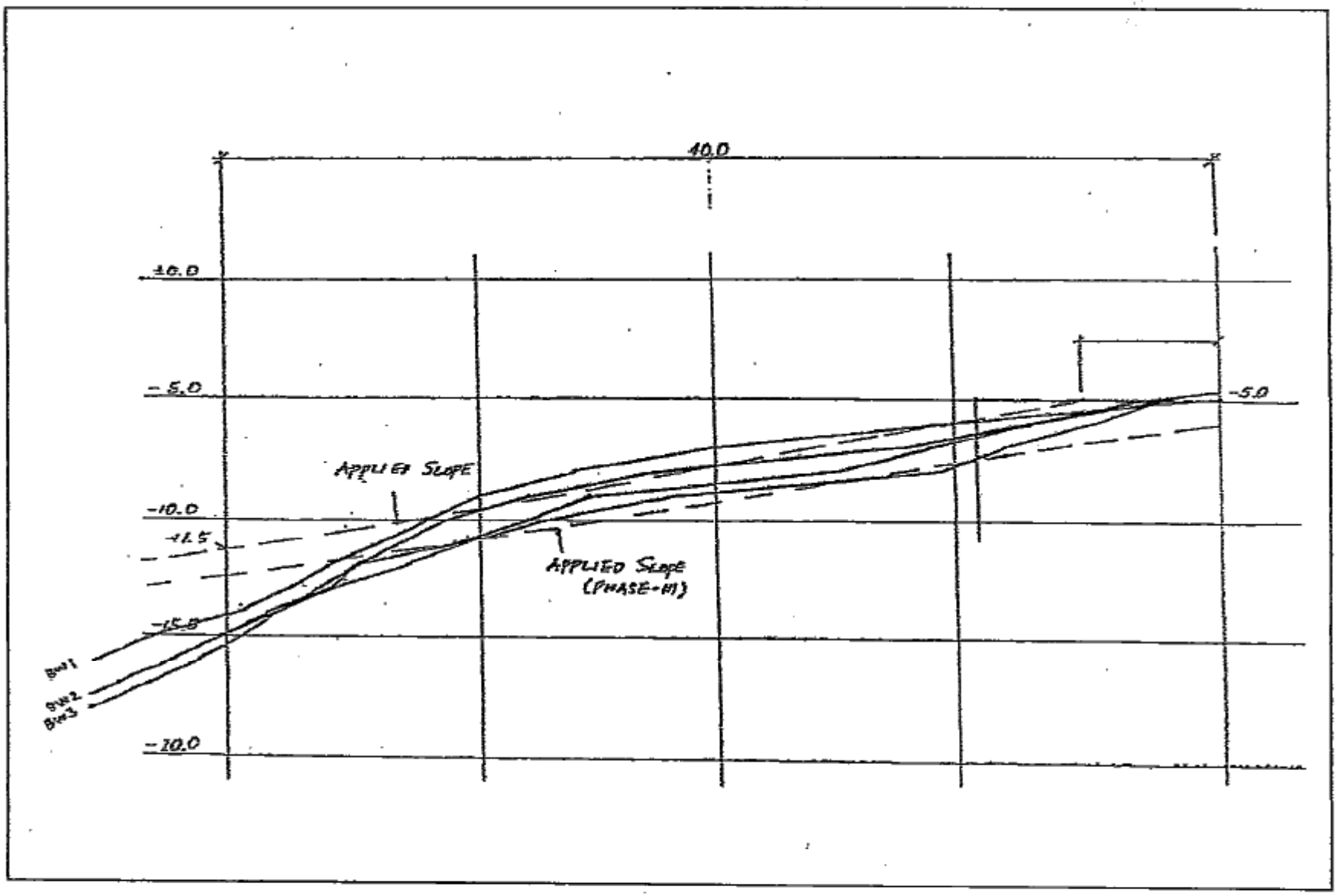


Figure-2-3-1 (1) Sea Bottom Topographical Condition of West Breakwater

Calculation of Shock Wave Pressure (SEP/2000 PHASE-V) (West Breakwater) H1/3=8.0m

Pressure of Shock Wave(tf/m2)		17.0	17.0	17.0	19.7	23.8	29.9	26.0	19.4	17.0
Water Depth in Breaking Point	h	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10	12.10
Water Depth at Berm	d	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60
Design Wave Height	Hd(m)=Hmax	10.80	10.80	10.80	10.80	10.80	10.80	10.80	10.80	10.80
Design Wave Period	T	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50
Design Wave Length	L	105.90	105.90	105.90	105.90	105.90	105.90	105.90	105.90	105.90
	d/h	0.463	0.463	0.463	0.463	0.463	0.463	0.463	0.463	0.463
Length of Berm	Bm	0.00	3.00	5.00	7.50	10.00	15.00	20.00	25.00	30.00
GODA's Coefficient	α1	0.862	0.862	0.862	0.862	0.862	0.862	0.862	0.862	0.862
GODA's Coefficient	α2	0.666	0.666	0.666	0.666	0.666	0.666	0.666	0.666	0.666
	δ11	-0.134	-0.108	-0.090	-0.068	-0.046	-0.002	0.041	0.085	0.129
	δ22	-0.015	-0.025	-0.032	-0.041	-0.049	-0.066	-0.083	-0.100	-0.117
	δ1	-2.684	-2.157	-1.806	-1.367	-0.928	-0.050	0.621	1.280	1.939
	δ2	-0.075	-0.125	-0.158	-0.199	-0.241	-0.324	-0.408	-0.491	-0.574
	α10	1.929	1.929	1.929	1.929	1.929	1.929	1.929	1.929	1.929
	α11	0.136	0.226	0.316	0.469	0.664	0.947	0.765	0.455	0.237
	α1	0.261	0.437	0.609	0.905	1.281	1.826	1.476	0.878	0.457
Coefficient of Shock Wave Pressure	α*=max(α2、α1)	0.666	0.666	0.666	0.905	1.281	1.826	1.476	0.878	0.666

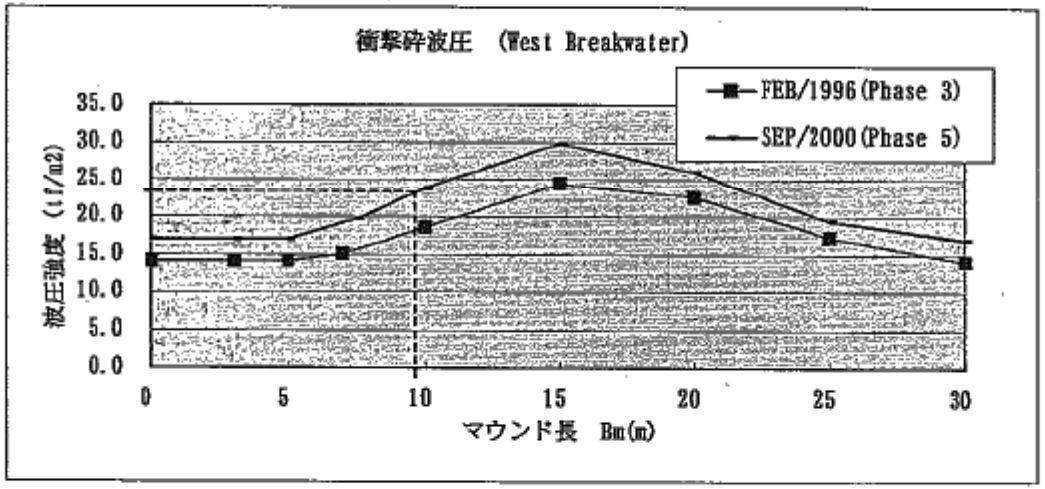


Figure-2-3-1 (2) Pressure of Shock Waves at West Breakwater

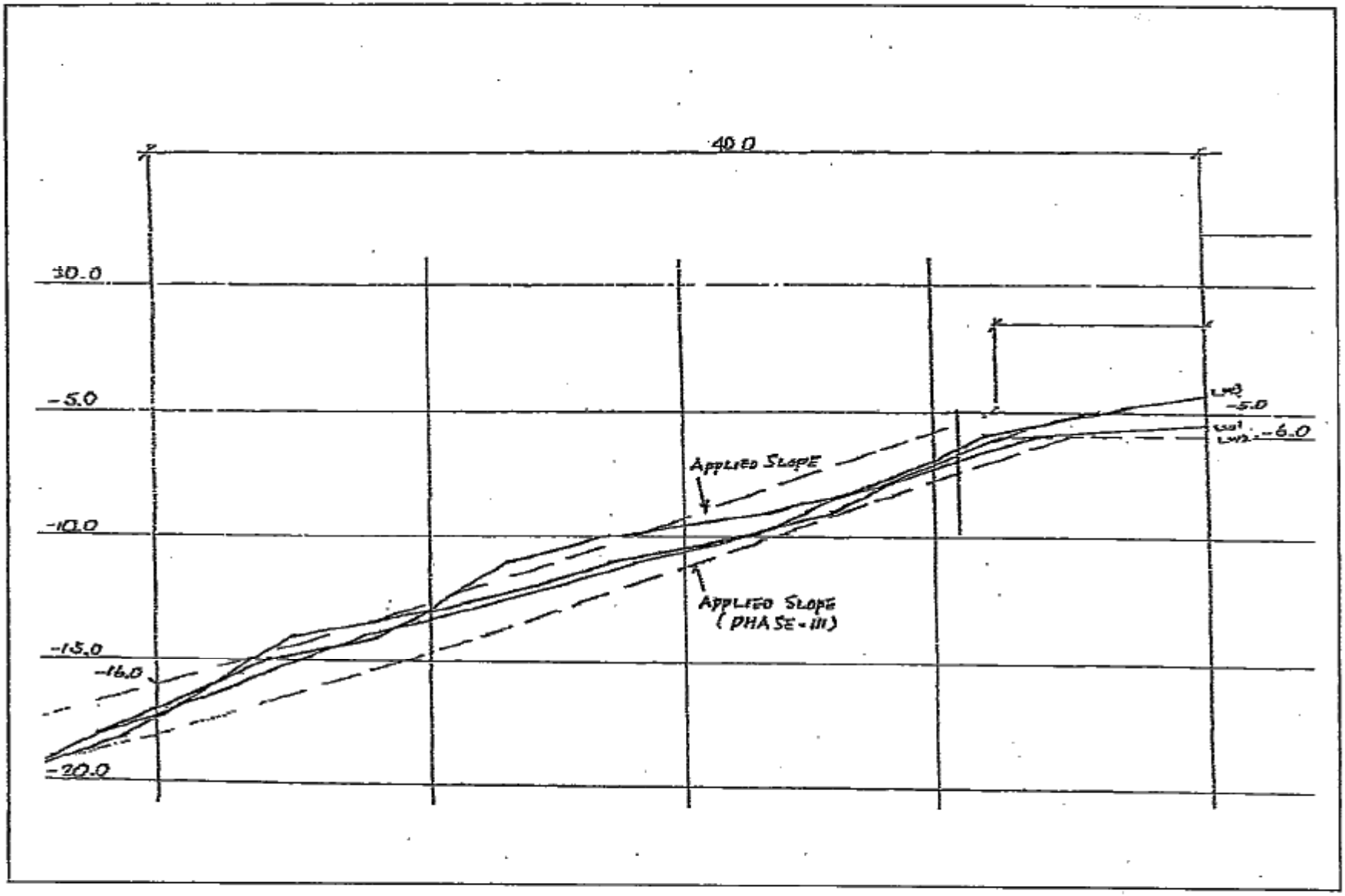


Figure-2-3-1 (3) Sea Bottom Topographical Condition of Landing Wharf

Calculation of Shock Wave Pressure (SEP/2000 PHASE-V) (Landing Wharf) H1/3=8.0m

Pressure of Shock Wave(tf/m2)		18.0	19.4	22.5	26.5	29.5	28.6	22.9	18.0	18.0
Water Depth in Breaking Point	h	16.60	16.60	16.60	16.60	16.60	16.60	16.60	16.60	16.60
Water Depth at Berm	d	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60
Design Wave Height	Hd(m)=Hmax	10.80	10.80	10.80	10.80	10.80	10.80	10.80	10.80	10.80
Design Wave Period	T	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50
Design Wave Length	L	120.30	120.30	120.30	120.30	120.30	120.30	120.30	120.30	120.30
	d/h	0.337	0.337	0.337	0.337	0.337	0.337	0.337	0.337	0.337
Length of Berm	Bm	0.00	3.00	5.00	7.50	10.00	15.00	20.00	25.00	30.00
GODA's Coefficient	$\alpha 1$	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
GODA's Coefficient	$\alpha 2$	0.822	0.822	0.822	0.822	0.822	0.822	0.822	0.822	0.822
	$\delta 11$	-0.089	-0.066	-0.050	-0.031	-0.012	0.027	0.066	0.104	0.143
	$\delta 22$	0.101	0.092	0.087	0.079	0.072	0.057	0.042	0.027	0.012
	$\delta 1$	-1.781	-1.317	-1.008	-0.621	-0.235	0.404	0.984	1.563	2.143
	$\delta 2$	0.304	0.277	0.260	0.237	0.215	0.170	0.125	0.080	0.035
	$\alpha I0$	1.929	1.929	1.929	1.929	1.929	1.929	1.929	1.929	1.929
	$\alpha I1$	0.320	0.491	0.634	0.822	0.962	0.917	0.654	0.401	0.231
	αI	0.618	0.946	1.222	1.586	1.855	1.769	1.261	0.773	0.446
Coefficient of Shock Wave Pressure	$\alpha *=\max(\alpha 2, \alpha I)$	0.822	0.946	1.222	1.586	1.855	1.769	1.261	0.822	0.822

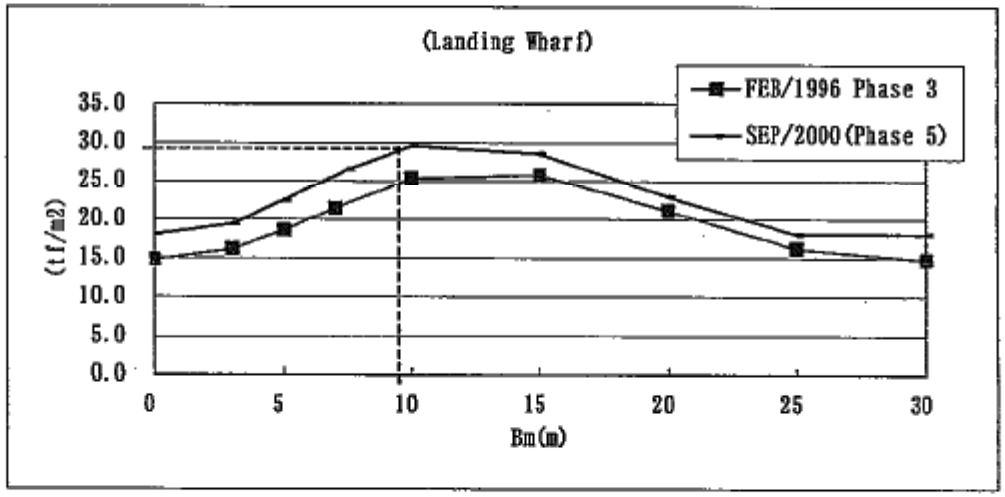


Figure-2-3-1 (4) Pressure of Shock Waves at Landing Wharf

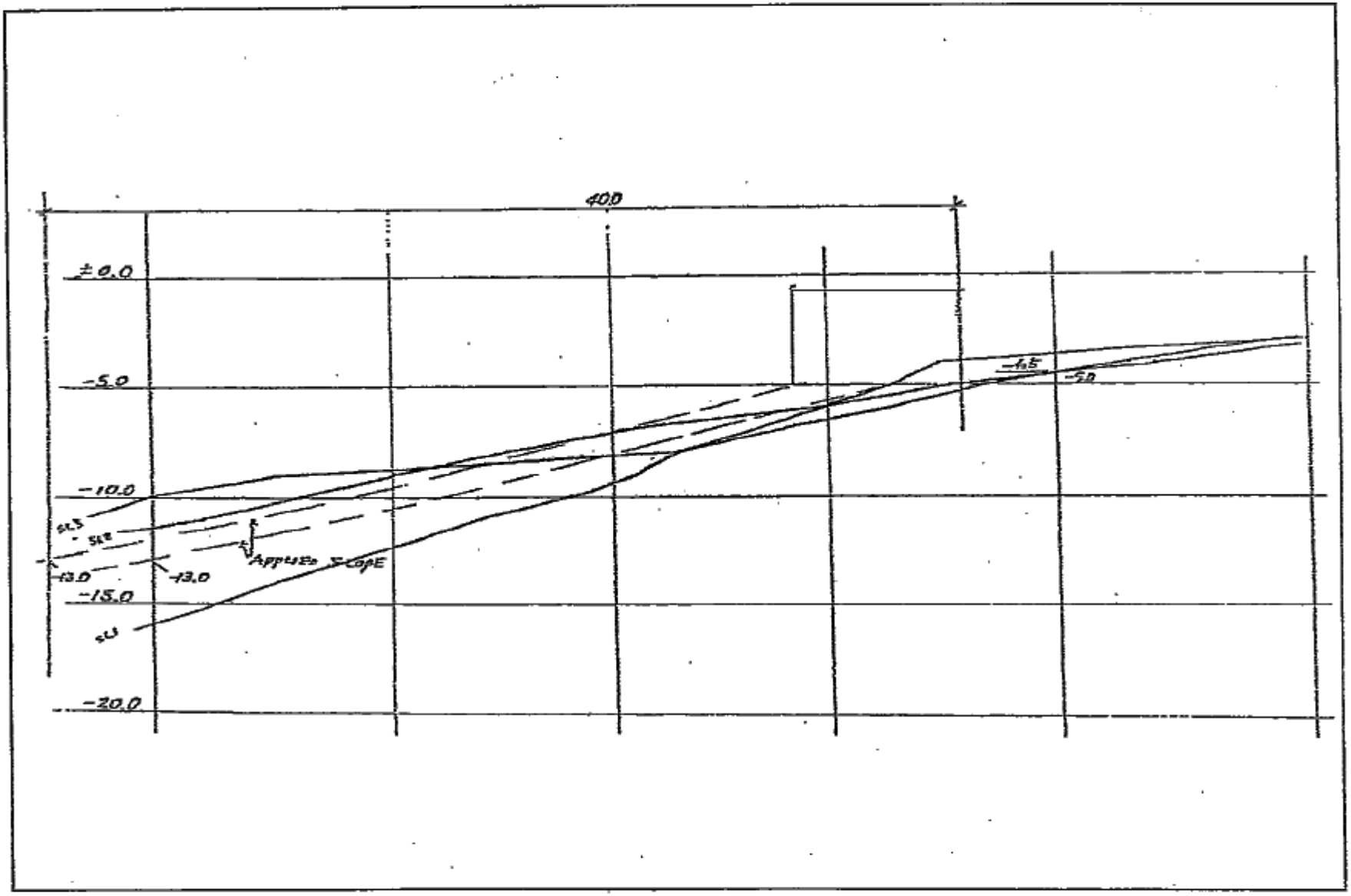


Figure-2-3-1 (5) Sea Bottom Topographical Condition of Slipway

Calculation of Shock Wave Pressure (SEP/2000 PHASE 5) (Slip Way) H1/3=8.0m

Pressure of Shock Wave(tf/m2)		17.5	17.5	18.6	22.6	27.0	30.5	25.5	19.1	17.5
Water Depth in Breaking Point	h	13.60	13.60	13.60	13.60	13.60	13.60	13.60	13.60	13.60
Water Depth at Berm	d	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60
Design Wave Height	Hd(m)=Hmax	10.80	10.80	10.80	10.80	10.80	10.80	10.80	10.80	10.80
Design Wave Period	T	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50
Design Wave Length	L	111.30	111.30	111.30	111.30	111.30	111.30	111.30	111.30	111.30
	d/h	0.412	0.412	0.412	0.412	0.412	0.412	0.412	0.412	0.412
Length of Berm	Bm	0.00	3.00	5.00	7.50	10.00	15.00	20.00	25.00	30.00
GODA's Coefficient	$\alpha 1$	0.840	0.840	0.840	0.840	0.840	0.840	0.840	0.840	0.840
GODA's Coefficient	$\alpha 2$	0.729	0.729	0.729	0.729	0.729	0.729	0.729	0.729	0.729
	$\delta 11$	-0.116	-0.091	-0.074	-0.053	-0.032	0.010	0.051	0.093	0.135
	$\delta 22$	0.032	0.023	0.016	0.008	0.000	-0.016	-0.032	-0.049	-0.065
	$\delta 1$	-2.317	-1.815	-1.481	-1.063	-0.646	0.143	0.769	1.396	2.023
	$\delta 2$	0.097	0.068	0.048	0.024	0.000	-0.080	-0.159	-0.238	-0.317
	$\alpha i0$	1.929	1.929	1.929	1.929	1.929	1.929	1.929	1.929	1.929
	$\alpha i1$	0.195	0.317	0.432	0.617	0.823	0.987	0.753	0.453	0.247
	αI	0.376	0.611	0.833	1.190	1.586	1.903	1.453	0.874	0.477
Coefficient of Shock Wave Pressure	$\alpha *=\max(\alpha 2, \alpha 1)$	0.729	0.729	0.833	1.190	1.586	1.903	1.453	0.874	0.729

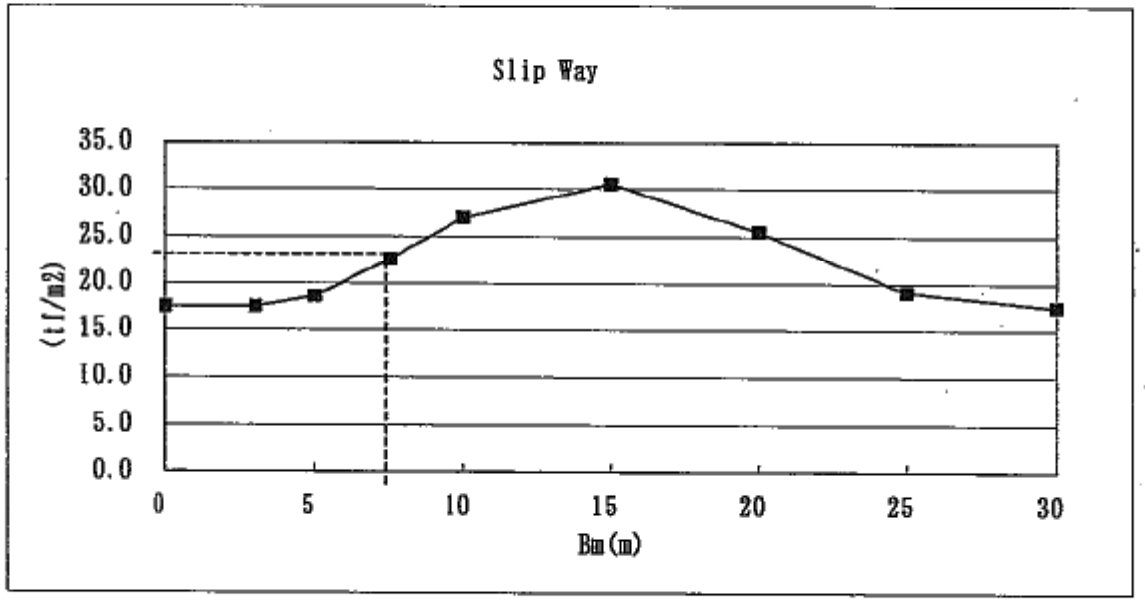


Figure-2-3-1 (6) Pressure of Shock Waves at Slipway

③ Slipway

The sea bottom profile Topographical condition in front of slipway is steep. The gradient of steepness is calmer than other area. However, this area is also zone of shock wave. Therefore, the shock wave pressure is estimated to 23 tf/m2 using the same method of above. The maximum wave height is 10.8m.

Table-2-3-1 (2) Re-examined Maximum Design Wave Height

		Facilities
Prevailing Direction of Offshore Wave		W
Offshore Wave Height H_0 (m)		7.0
Offshore Wave Period T_0 (m)		10.5
Offshore Wave Length L_0 (m)		172
Equivalent Offshore Wave Height H'_0 (m)		6.89→7.0
Peak Wave Height (Wave before Facilities)	Water Depth (m)	5.6
	h/H'_0	0.94
	H_{max}/H'_0	1.2
	$H_{1/3}$ (m)	6.0
	H max (m)	8.0
Shock Wave Height	Water Depth of Point at 5 Wave Height	18.1
	H max (m)	10.8

Note : HWL : + 0.6 m

2) Design Standard for Structures

a. Design Standards

As Dominica does not have its own technical standards, it was decided to conduct the design in conformity with technical standards that are used throughout the world. In Dominica, both BS and ASTM standards are generally applied with regard to steel and concrete materials. For the purpose of the project, the following standards, including BS and ASTM standards, shall be adopted.

Technical Standard for Fishery Port: Japan Fishery Port Association
Guideline for Road Pavement: Japan Road Association
Method of Soil Testing: Japan Soil Engineering Association
Standard Manual of Concrete: Japanese Association Civil Engineers Association
Japan Industrial Standard (JIS): Japan Standard Association
British Standard (BS)
American Society for Testing and Materials (ASTM)

b. Design Loads

The dead loads of materials on the design loads are used the original design in the manner shown in Table-2-3-1 (3)

Table-2-3-1 (3) Material Loads (after compacting)

	Type	Density (ton/m^3)		Internal Angle	Remarks
		In Air	In Water	of Friction	
Load	Seabed sediment	1.90	1.00	35°	In case of sand only
	(after dredging and compacting)				1.6/0.85ton/m^3
	Reclaiming sediment	1.80	1.00	35°	
	(filling sand)				
	Back filling sediment	2.10	1.24	35°	
	(maximum 70mm)	(1.80)	(1.00)		
	Stones	2.8			
	Plain concrete	2.3			
	Reinforced concrete	2.45			
Live load		1 ton/m^2(pier,wharf)			

c. Concept of Construction Conditions

As above-mentioned, the facilities of the Project shall be basically designed based on the Japanese Technical Standards, and shall be also conformed to British and American Building Regulation and Standards and the CUBIC Code (Caribbean Unified Criteria). With regard to environmental standards, European and American and/ or Japanese criteria shall be adhered to.

Construction materials shall be sufficiently durable and the utmost effort shall be made to use items that are procurable locally (including imported materials). Other materials shall be imported from Japan, USA or other neighboring countries.

d. Concept with Respect to Local Contractors and Local Equipment and Materials

Because the previous works were conducted by local sub-contractors including locally based USA corporate persons, it should be possible for the local sub-contractors to handled the works. However, the special processes such as the placing of steel sheet piles and underwater operations, etc., shall be given to employing foreign technicians. Moreover, special items of equipment such as steel sheet pile placing machines, etc. shall be procured from USA and other neighboring countries.

e. Concept with Respect to the Operation and Maintenance Ability of the Implementing Agency

The maintenance of the Complex in particular the dredging works will be carried out according to necessity with the cooperation of the Ministry of Communications and Public Works.

f. Concept with Respect to the Setting of Scope and Grades of Facilities and Equipment

The size and contents of the facilities shall remain as originally designed, however, with regard to grades, the facilities shall be made stronger than originally designed by giving them the structural strength and stability to withstand the re-examined design waves.

g. Concept of Construction Period

The Project will carry out the two phases works according to the quantity of construction works and over one Fiscal Year of Japan. The marine construction works should not carry out during the Hurricane season, July to November, because this site had two times of damage by Hurricane. It is necessary that the preparatory works, the removal work inside the Fisheries Center and testing of refrigerator etc. during Hurricane season.

2-3-2 Basic Design of Civil Engineering Facilities

The rehabilitation and improvement plan of the landing wharf, west breakwater, submerged groin of north breakwater and slipway is described below.

(1) Landing Wharf

The protection line consisted with the new parapet wall will be placed to the point of seaside on the apron. The area between the parapet wall and the building of Fisheries Center will be functioned as the reducing basin of over flood of shock wave. The drainage water discharging system in the basin will be divided to north and south direction. The improvement of the sidewall of building and its dimensions has been explained as previous chapter.

The foot area of landing wharf will be driven the steel sheet pile at the offing tip of concrete blocks and cast the underwater concrete of 1m thickness on the existing underwater concrete. The foot structures consisted of the steel sheet pile and the underwater concrete is expected to protect the up-lift force by the shock wave on the anomalous condition.

(2) West Breakwater

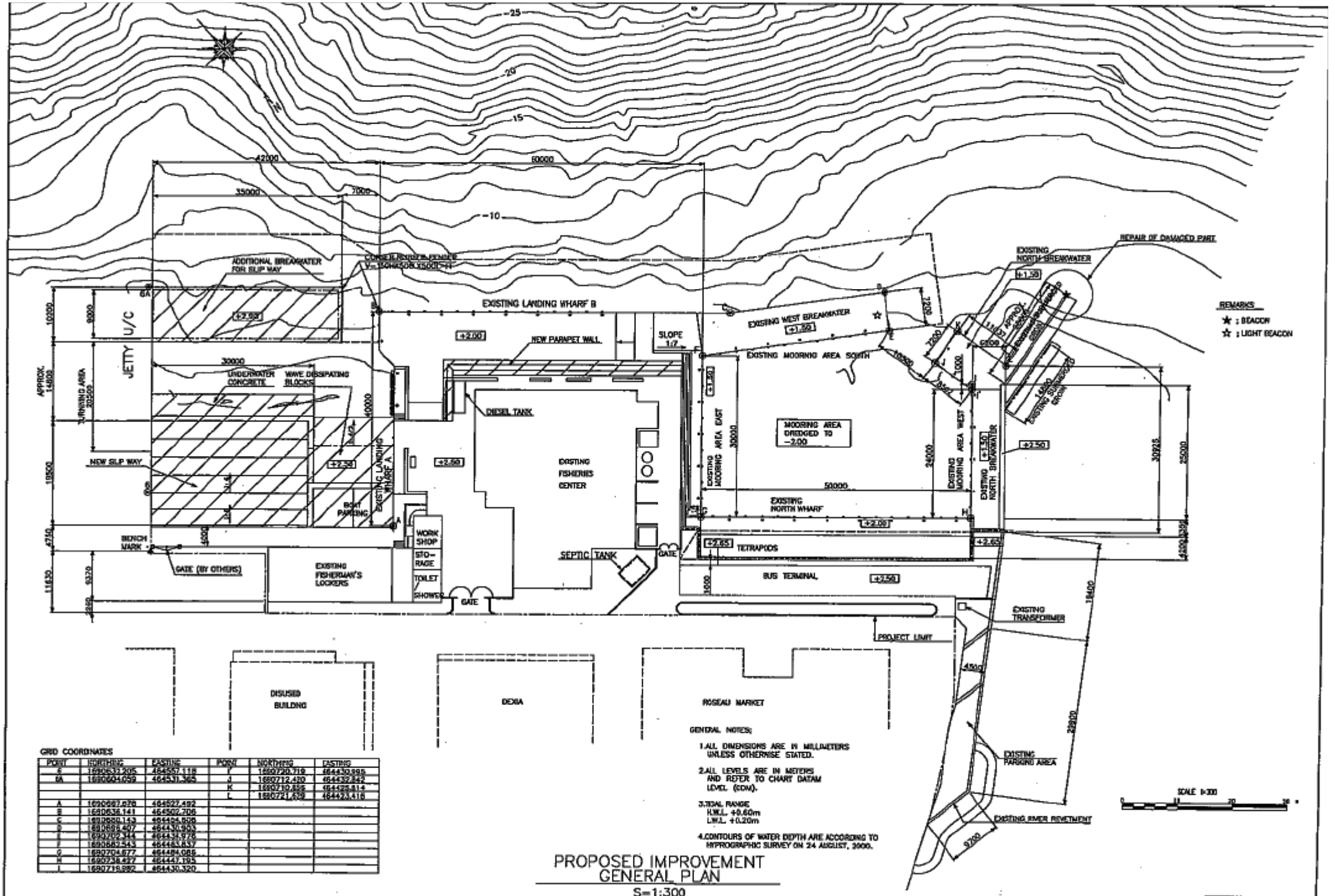
The foot area of west breakwater will be set up same protection measures as the continuous structure of landing wharf. These areas will do the same manner of foot area of landing wharf against the sliding force.

(3) Submerged Groin of North Breakwater

The role of submerged groin of north breakwater is to protect the discharged sand from the river of Roseau to the mooring area. The suffered steel sheet piles will be removed and drive the new steel sheet pile of same size. The remained concrete blocks among the steel sheet piles will be temporally removed and the inside of steel sheet piles will be dredged some 50cm deep and those blocks will be placed back. The underwater concrete will cast on the concrete blocks of 1m thicknesses. The concrete

blocks of outside of steel sheet piles will be placed back to the original position. The outside concrete blocks allow moving for attacking over 30-year probable wave conditions because the improvement of submerged groin with the above mentioned works is effective for the role of protection of discharged sand.

General layout of plan 1 is shown in Figure-2-3-2 (1), cross-section of landing wharf and cross-sections of parapet wall are shown in Figure-2-3-2 (2), plan and cross-section of slipway, plan 1, are shown in Figure-2-3-2 (3), cross-section of slipway, plan 2, is shown in Figure-2-3-2 (4), and plan and cross-section of submerged breakwater and cross-section of west-breakwater is shown in Figure-2-3-2 (5).



GRID COORDINATES

POINT	NORTHING	EASTING	POINT	NORTHING	EASTING
6	1690632.205	464557.118	F	1690720.719	464430.995
6A	1690604.059	464531.365	J	1690712.420	464432.842
			K	1690710.858	464428.814
			L	1690721.659	464423.416
A	1690667.676	464527.492			
B	1690636.141	464502.206			
C	1690630.143	464464.606			
D	1690699.407	464430.903			
E	1690702.314	464431.976			
F	1690687.543	464448.837			
G	1690704.677	464484.086			
H	1690738.427	464447.195			
I	1690719.882	464430.320			

GENERAL NOTES;

1.ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

2.ALL LEVELS ARE IN METERS AND REFER TO CHART DATUM LEVEL (CDM).

3.TIDAL RANGE
H.W.L. +0.60m
L.W.L. +0.20m

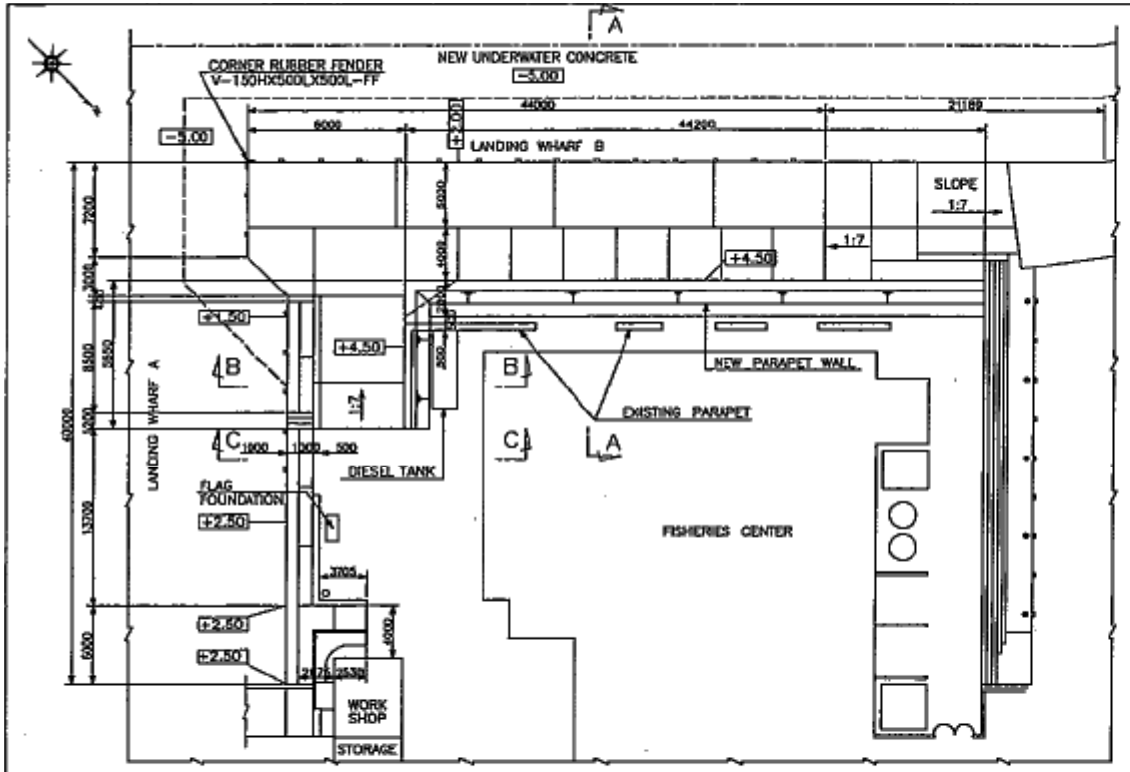
4.CONTOURS OF WATER DEPTH ARE ACCORDING TO HYDROGRAPHIC SURVEY ON 24 AUGUST, 2000.

PROPOSED IMPROVEMENT GENERAL PLAN

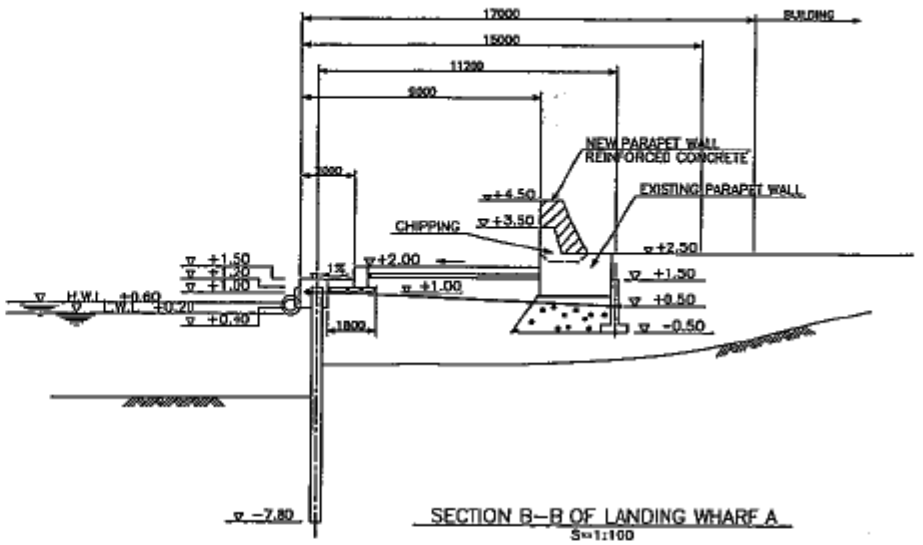
S=1:300

D-001

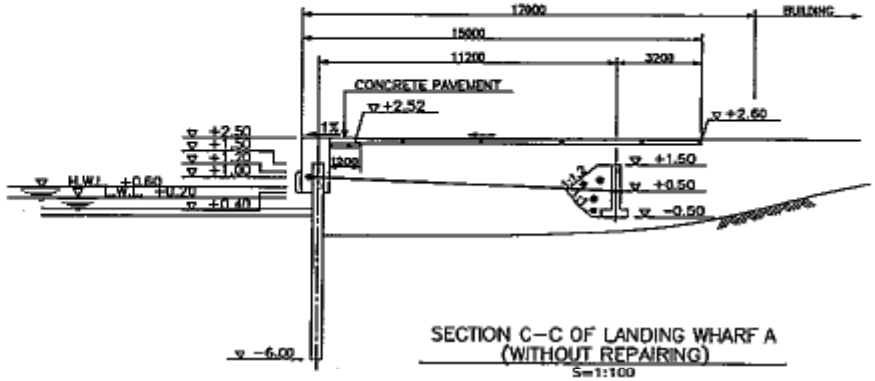
Figure-2-3-2 (1) General Layout of Plan 1



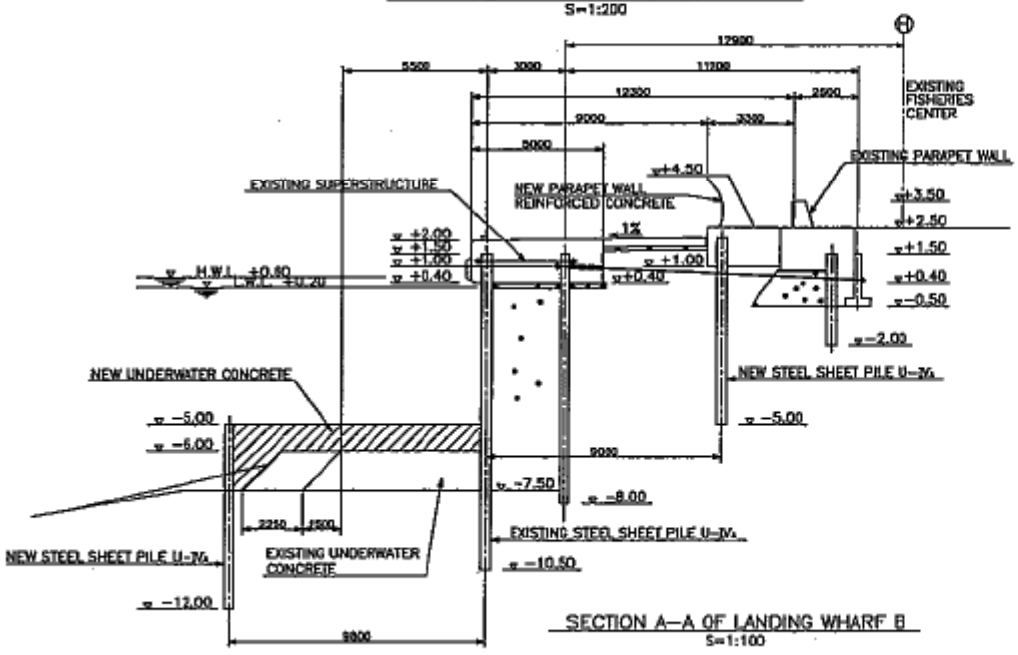
PLAN OF LANDING WHARF IMPROVEMENT
S=1:200



SECTION B-B OF LANDING WHARF A
S=1:100



SECTION C-C OF LANDING WHARF A
(WITHOUT REPAIRING)
S=1:100

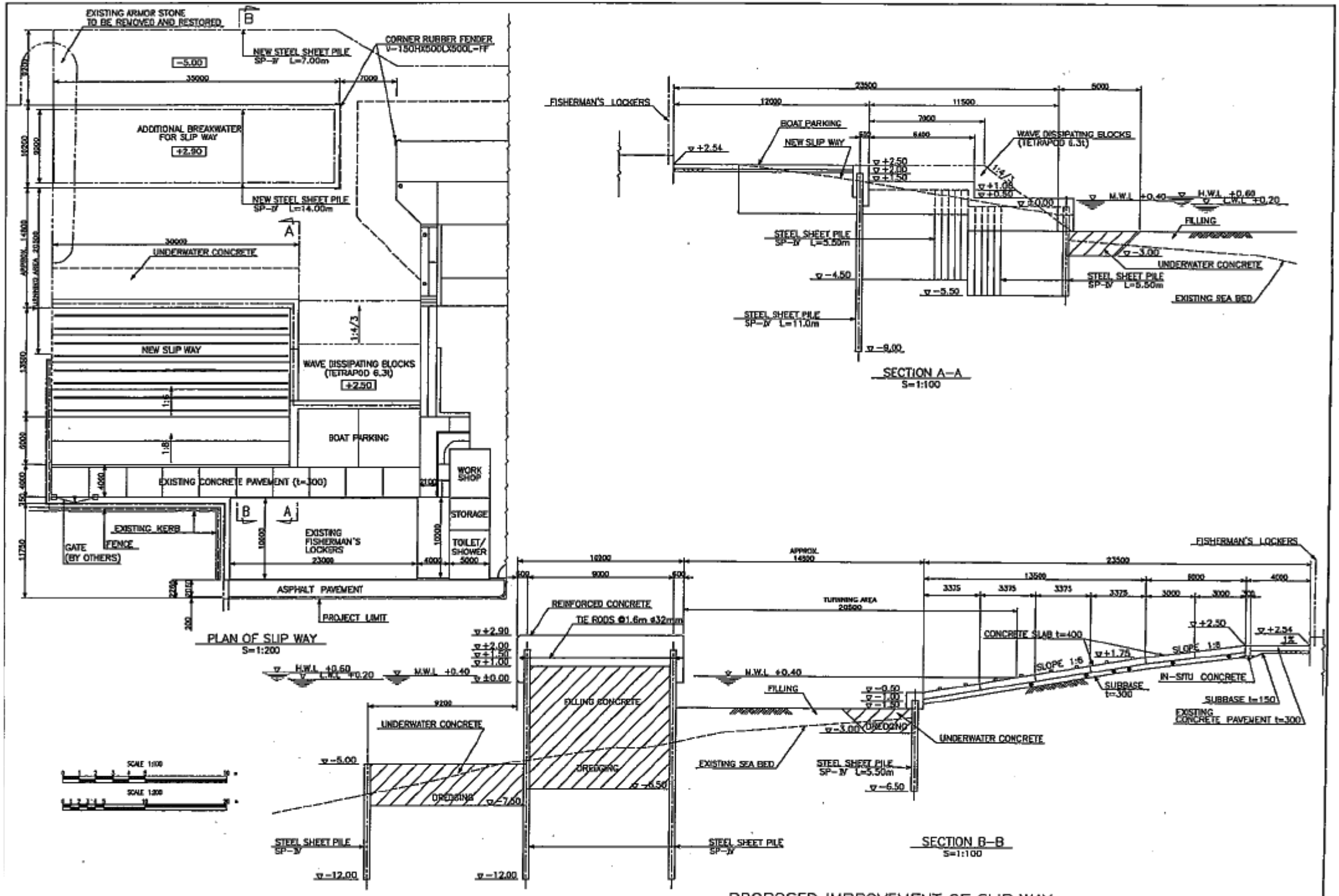


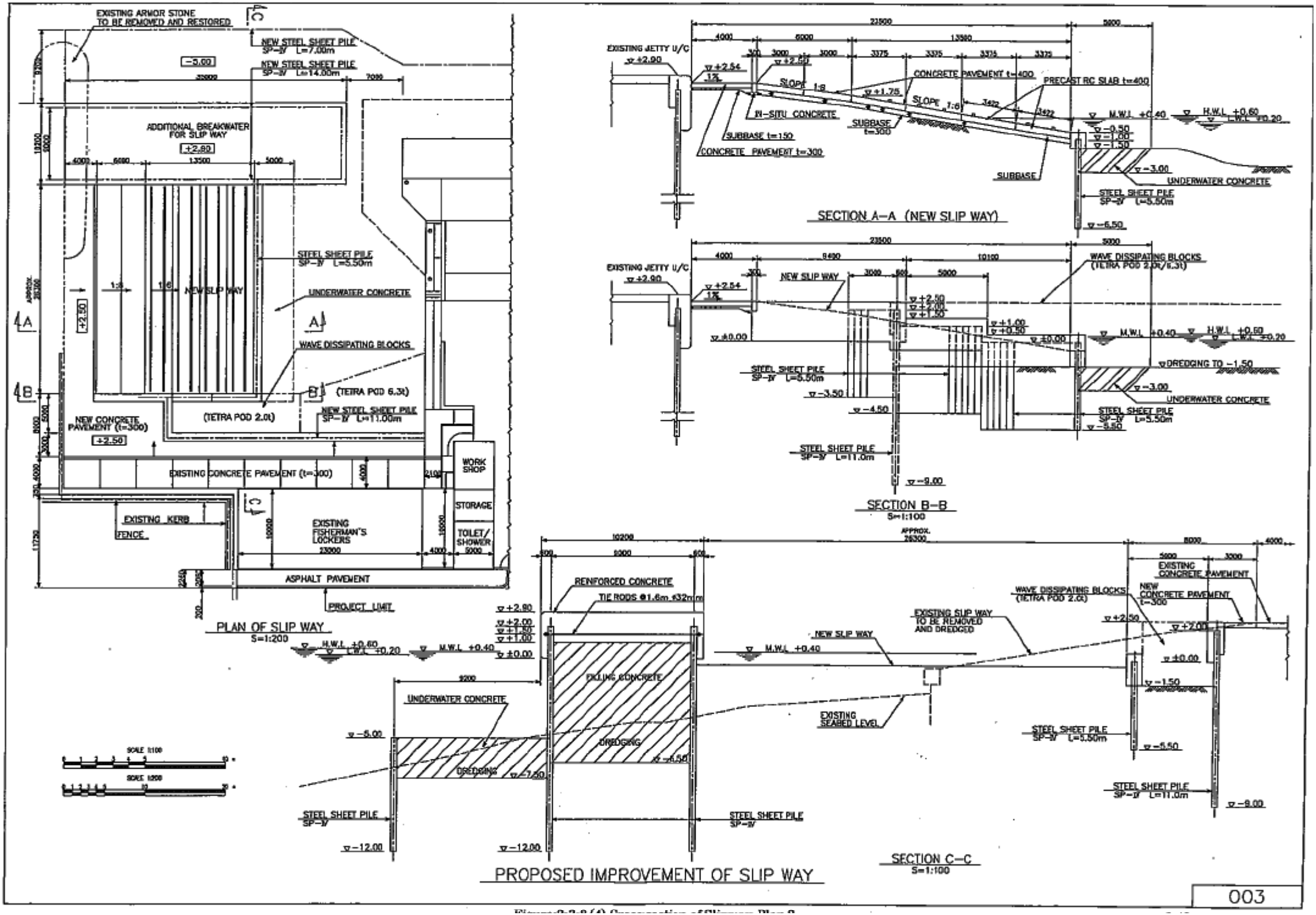
SECTION A-A OF LANDING WHARF B
S=1:100

PROPOSED IMPROVEMENT OF LANDING WHARF

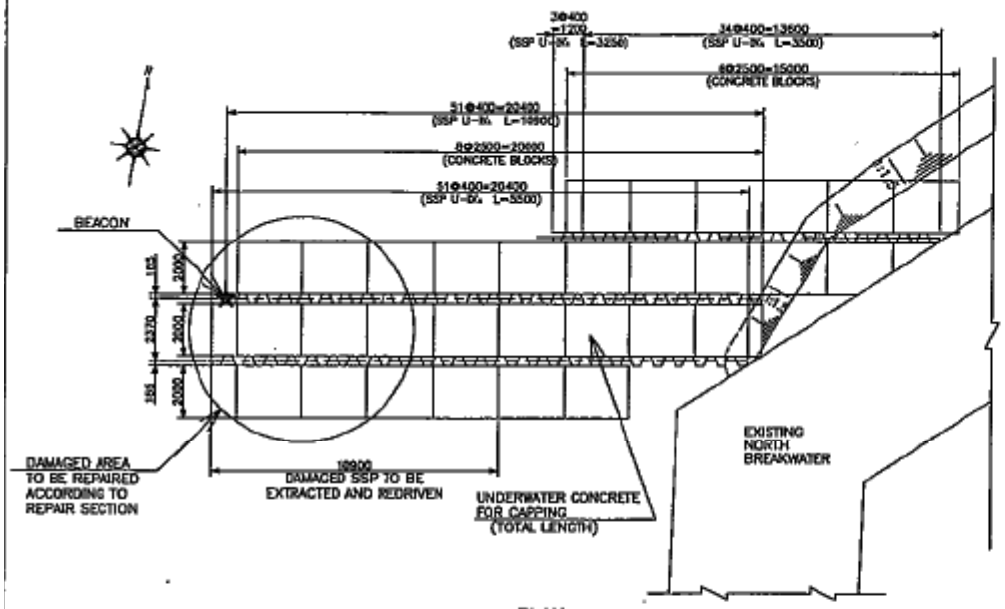
D-002

Figure-2-3-2 (2) Cross-section of Landing Wharf and Cross-Sections of Parapet Wall

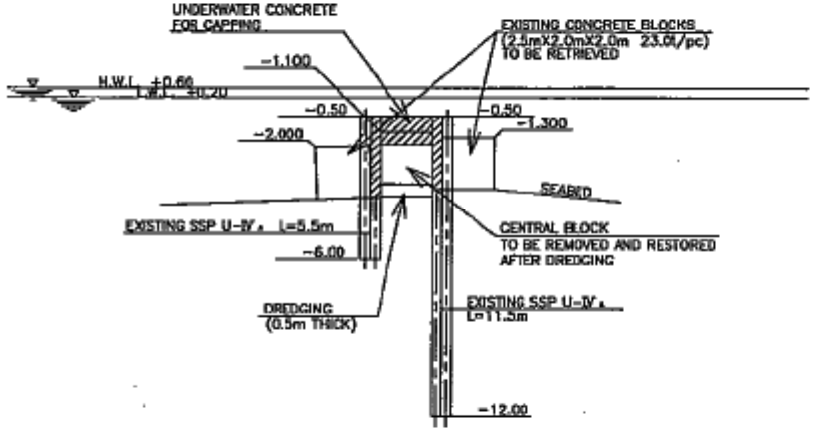

EXISTING ARMOR STONE TO BE REMOVED AND RESTORED
CORNER RUBBER FENDER V=150HR500CX500L-FF
NEW STEEL SHEET PILE SP-IV L=7.00m
NEW STEEL SHEET PILE SP-IV L=14.00m
ADDITIONAL BREAKWATER FOR SLIP WAY
UNDERWATER CONCRETE
NEW SLIP WAY
WAVE DISSIPATING BLOCKS (TETRAPOD 6.3t)
BOAT PARKING
EXISTING CONCRETE PAVEMENT (t=300)
WORK SHOP
STORAGE
TOILET/ SHOWER
EXISTING FISHERMAN'S LOCKERS
EXISTING KERB
FENCE
GATE (BY OTHERS)
ASPHALT PAVEMENT
PROJECT LIMIT
PLAN OF SLIP WAY
S=1:200
FISHERMAN'S LOCKERS
BOAT PARKING
NEW SLIP WAY
WAVE DISSIPATING BLOCKS (TETRAPOD 6.3t)
STEEL SHEET PILE SP-IV L=5.50m
STEEL SHEET PILE SP-IV L=11.0m
FILLING
UNDERWATER CONCRETE
EXISTING SEA BED
SECTION A-A
S=1:100
REINFORCED CONCRETE
TIE RODS Φ1.6m @32m/m
FILLING CONCRETE
UNDERWATER CONCRETE
DREDGING
EXISTING SEA BED
CONCRETE SLAB t=400
SLOPE 1:6
SUBBASE t=300
IN-SITU CONCRETE
SUBBASE t=150
EXISTING CONCRETE PAVEMENT t=300
SECTION B-B
S=1:100
PROPOSED IMPROVEMENT OF SLIP WAY
D-003


EXISTING ARMOR STONE TO BE REMOVED AND RESTORED
NEW STEEL SHEET PILE SP-IV L=7.00m
NEW STEEL SHEET PILE SP-IV L=14.00m
-5.00
ADDITIONAL BREAKWATER FOR SLIP WAY
+2.80
NEW SLIP WAY
STEEL SHEET PILE SP-IV L=5.50m
UNDERWATER CONCRETE
WAVE DISSIPATING BLOCKS
(TETRA POD 6.3t)
(TETRA POD 2.0t)
NEW STEEL SHEET PILE SP-IV L=11.00m
NEW CONCRETE PAVEMENT (t=300)
+2.50
EXISTING CONCRETE PAVEMENT (t=300)
WORK SHOP
STORAGE
TOILET/ SHOWER
EXISTING KERB
FENCE
EXISTING FISHERMAN'S LOCKERS
ASPHALT PAVEMENT
PROJECT LIMIT
PLAN OF SLIP WAY
S=1:200
SCALE 1:100
SCALE 1:200
EXISTING JETTY U/C +2.90
+2.54
1%
SLOPE 1:8
SLOPE 1:6
CONCRETE PAVEMENT t=400
PRECAST RC SLAB t=400
IN-SITU CONCRETE
SUBBASE t=150
CONCRETE PAVEMENT t=300
SUBBASE t=300
SUBBASE
M.W.L +0.40
H.W.L +0.60
L.W.L +0.20
-0.50
-1.00
-1.50
-3.00
UNDERWATER CONCRETE
STEEL SHEET PILE SP-IV L=5.50m
-6.50
SECTION A-A (NEW SLIP WAY)
NEW SLIP WAY
WAVE DISSIPATING BLOCKS (TETRA POD 2.0t/6.3t)
+2.00
+1.50
+1.00
+0.50
±0.00
DREDGING TO -1.50
-3.50
-4.50
-5.50
STEEL SHEET PILE SP-IV L=11.0m
-9.00
SECTION B-B
S=1:100
REINFORCED CONCRETE
TIE RODS ø1.6m c32m/m
+2.80
+2.00
+1.50
+1.00
±0.00
M.W.L +0.40
H.W.L +0.60
L.W.L +0.20
FILLING CONCRETE
UNDERWATER CONCRETE
DREDGING
-5.00
-7.50
-6.50
-12.00
STEEL SHEET PILE SP-IV
SECTION C-C
S=1:100
EXISTING SLIP WAY TO BE REMOVED AND DREDGED
EXISTING SEABED LEVEL
EXISTING CONCRETE PAVEMENT
NEW CONCRETE PAVEMENT t=300
WAVE DISSIPATING BLOCKS (TETRA POD 2.0t)
+2.50
+2.00
-1.50
-5.50
-9.00
PROPOSED IMPROVEMENT OF SLIP WAY

003

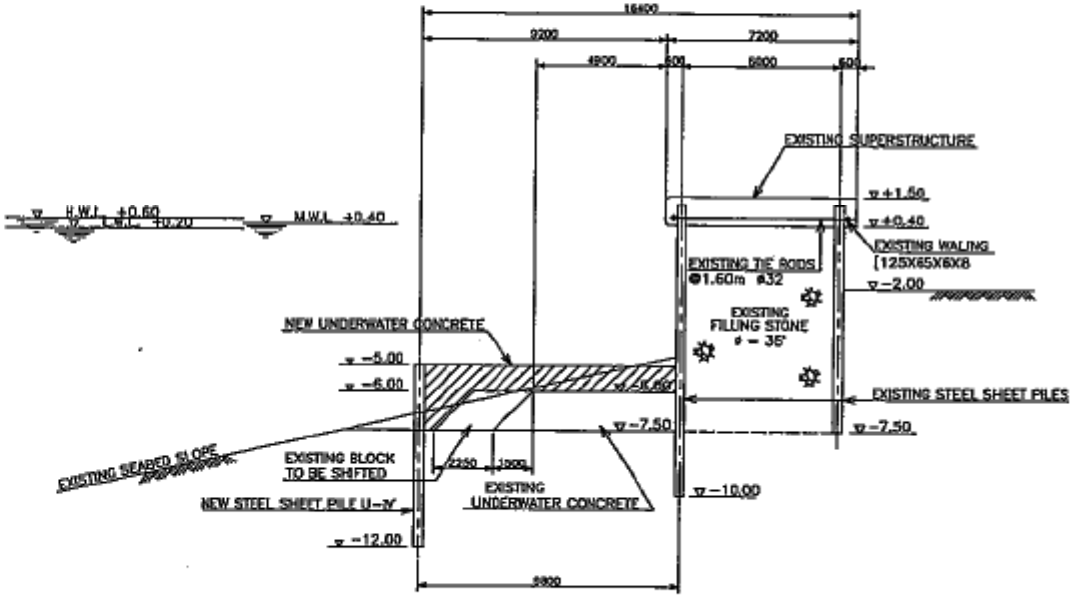


PLAN
S=1:100



REPAIR SECTION
S=1:100

PROPOSED REPAIR OF SUBMERGED GROIN
S=1:100



TYPICAL SECTION
S=1:100

PROPOSED IMPROVEMENT OF WEST BREAKWATER
S=1:100

SCALE 1:100

D-004

2-3-3 Basic Design of Building Facilities and Equipments

(1) Rehabilitation and Improvement Plan of Fisheries Center

It is considered requisite to close the west-side entrance (sea-side) and raise the ground floor elevation by 20 cm and the basement level of major facilities by 40 cm from the necessity of protecting the Roseau Fisheries Complex against the flooding damage, which serves as its central facility. Concept of ground floor elevation is described in Figure-2-3-3 (1).

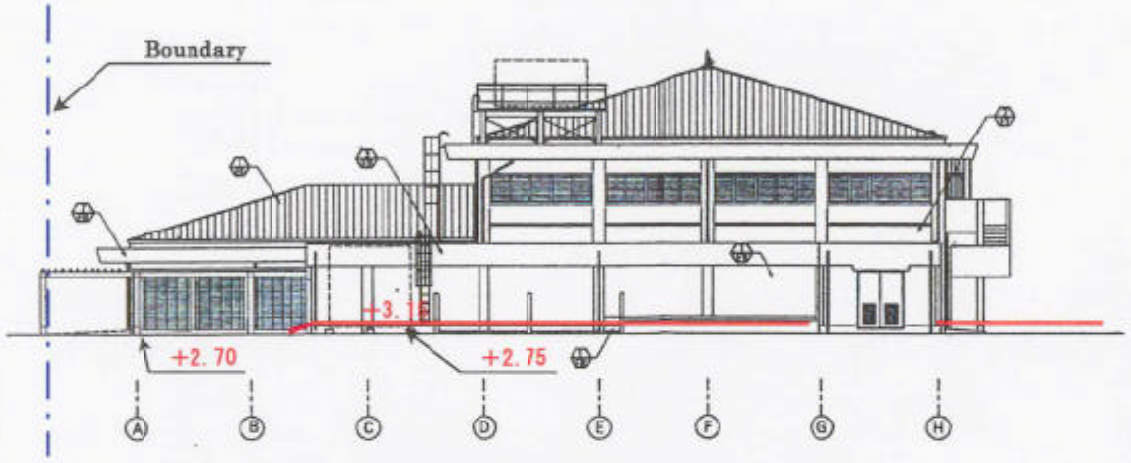


Figure-2-3-3 (1) Concept of Ground Floor Elevation

To realize these ideas, the followings are to be implemented.

1) Closure of west side (seaside) entrances and making a small door on the ground floor of building of the Center.
2) Strengthen the spandrel wall on the ground floor of building of the Center.
3) Switching of the entrance on the ground floor to south-side of building of the Center.
4) Raising the floor elevation on the ground floor of building of the Center.
5) Altering the inner layout on the ground floor of building of the Center.
6) Restoration of facility, machinery etc. inside the Center.

The following rehabilitation and improvement plans are carried out.

Table-2-3-3 (1) Rehabilitation and Improvement Plans

	Item of Works	Remarks
Features of Layout	• Closure of west-side (sea-side) entrances	• Elimination of weak point in the west-side
	• Making a small door of west-side (sea-side)	• Keep passage between processing area and wharf
	• Switching of entrance to south	• Improvement of safety of the Center.
	• Alteration of layout	• Change of access route due to switch entrance.
	• Raising of floor elevation	• Reduction of damages by flood
	• Construction of new north-side concrete protection wall	• Reduction of floor damage possibility .
Features of protection Role	• Protection of damages by shockwave	• No weak points in west-side
	• Reduction of flooded damage from town side (land side)	• Reduction of refrigerators damage and improvement of floor by floor rising.
	• Reduction of damage in the north side area.	• Reduction of damage by north-side wall.
Features for facility & machinery	• To be rehabilitated to the original shapes basically.	
	• Improvement and restoration of cooling facility by floor raising	• Floor panel to be embedded
	• Switch to the temperature setting of chilled facility. (0℃～-20℃)	• Increase of function with same facility cost.

(2) Basic Design of Facilities

1) Building Facility

Although it is basically intended to rehabilitate the original conditions, it would be required to close the west-side entrance, to relocate the entrance to the south-side, to raise the floor elevation, to provide new protection wall for cooling tower, waste incinerator and sewage disposal plant, etc. for which some design changes become necessary. Changes of activity line are described in Figure-2-3-3 (2).

a. Water Supply Facility

Water supply pipes damaged at 5 spots and water taps damaged at 5 spots are to be rehabilitated to the original shapes, However, such water supply pumps, control panels, motors, and other electric items as damaged by the hurricane "LENNY" have low resistance against seawater.

Foundation of two pumps for water supply is to be switched to 400mmH from the existing 200mmH in an attempt to reduce the damage possibility. Installation level of the control panels is raised to highest level as long as it does not interfere with handling and maintenance.

b. Waste Water Treatment Plant

In a similar principle, the wastewater treatment plant is to be rehabilitating to the original conditions, except the floor for motor and electrical equipment. The installation level for control panel, is needed to be raised to a limit height of no-interference with handling and maintenance.

c. Electrical Equipment

Most of the electrical equipment is to be rehabilitated to the original conditions, except the main power supply panel, main distribution panel, and emergency generator etc., which are damaged by the hurricane in this time, are needed to raise the installation levels.

Foundation level of the main power supply panel and emergency generator is to be height of 400mm. Wall-type main distribution panel is to be raised to higher position so long as it does not interfere with handling and maintenance.

Under the original designs for emergency generator, the power supplied only to the cold storage. However, there are some testing equipments in the laboratory on the 2nd floor of the Fishery Center that need constant power supply, otherwise the study (records) are feared to be lost by the power failure. To prevent such incident, it is required to make uninterrupted power supply to the testing equipment.

But, total power requirement for the testing equipment is so small (5KVA); it is possible to supply the necessary power from the original generator of 70KVA. The additional supply line wiring to the laboratory is to be implemented.

All other electric items are restored to their original conditions.

d. Fire Hydrant

Fire hydrant facility is to be rehabilitated to the original conditions. As the damaged fire hydrants are located at the east end of the slipway, it would be temporarily removed during the restoration work of the slipway and thereafter be restored to the original conditions

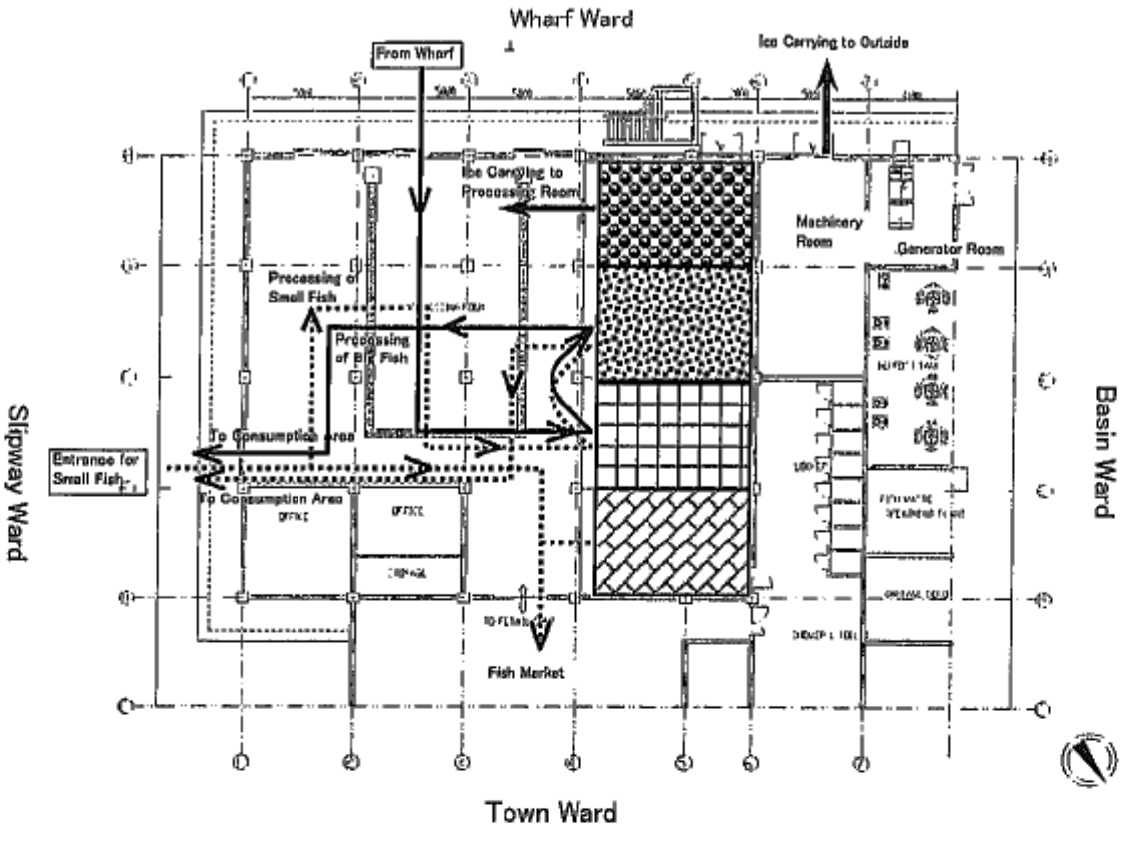
e. Oil Supply Facility

Oil supply system is to be restored to the original positions as well. A diesel oil tank and 3 fuel oil dispensers have been lost by Hurricane "LENNY". In order to reduce the damage possibility in the future, the foundation level of the fuel oil supply equipment is to be raised to height of 400mmH and to be fixed by bolt/nut with its foundations.

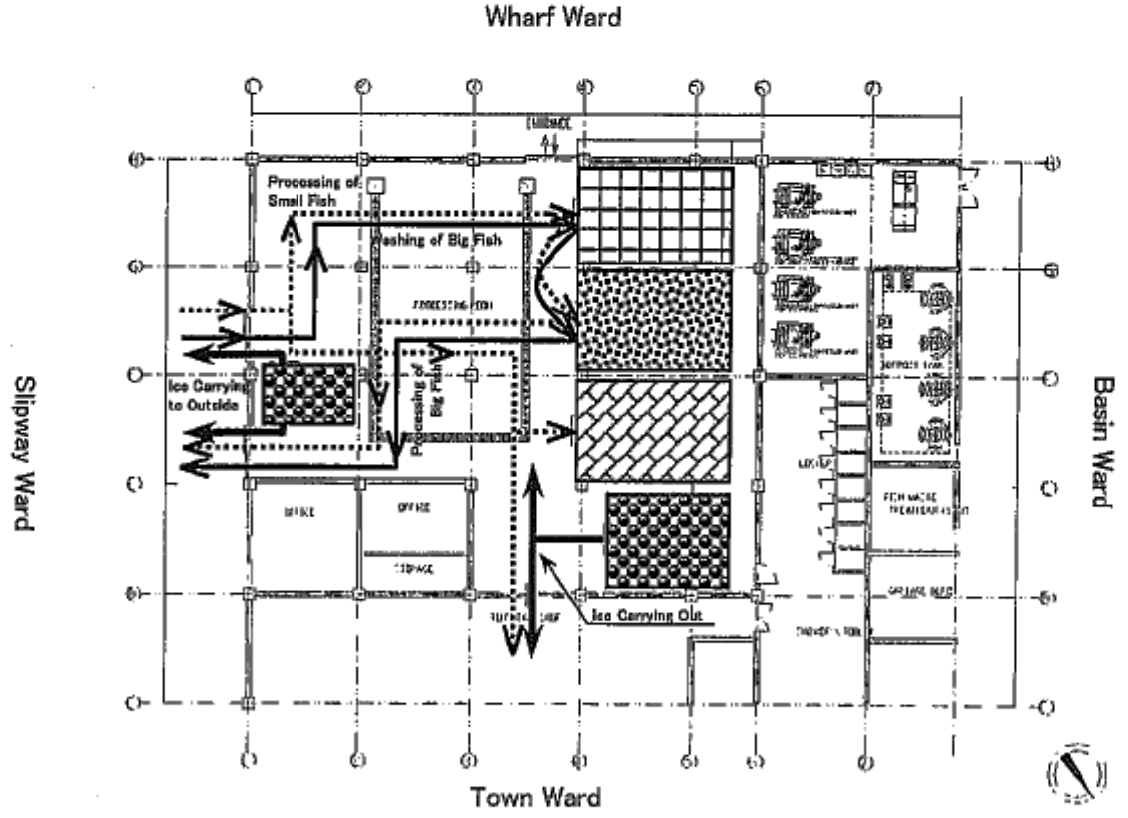
f. Waste Disposal Plant and Incinerator

All facilities are suffered from flooding damage caused by hurricane. From this fact, it will be required to raise the floor of its installation to 400mmH in the same way as in the ground floor of the fisheries Center. In addition, construction of new concrete block wall is to be needed to protect the facility against direct wave attacking from north.

■Existing Layout Plan (Fishery Center, Ground Floor)



■Restration Layout Plan (Fishery Center, Ground Floor)



〔Legend〕

	: Ice Making Facility	→	: T. L. of Big Fish
	: Cold Storage Facility	⇢	: T. L. of Small Fish
	: Freezing Plant Facility	→	: T. L. of Ice
	: Chilled Room Facility	▥	: Drainage

Figure-2-3-3 (2) Changes of Activity Line

2) Basic Design of Equipments

As for the equipments, original design are to be respected, except for the equipment which 7 years have passed since their initial designing and some model changes have been made, for which selections of new equipment are not to be deviated from the original designs.

a. Equipments for Workshop
b. Equipments for Education and Training
c. Equipments for Fish Processing and Market
d. Equipments for Laboratory
e. Equipments for Communication and Laboratory

3) Basic Design of Storage Facility

Basic design of storage facilities is based on the original models. Because of the closure of west-side entrance and provision of new entrance at south side, need to be changed access route for fishery products and ice products.

In order to minimize the damages by the natural disasters, it will be necessary to change the facility layout. But main specification and capacity of the facilities are to be based on the original design. Existing layout plan on the ground floor of the Fishery Center is shown in Figure-2-3-3 (3). Also the improved layout plan of it is shown in Figure-2-3-3 (4).

a. Ice Making Plant
b. Freezing Plant
c. Cold Storage
d. Chilled Room
e. Spare Parts

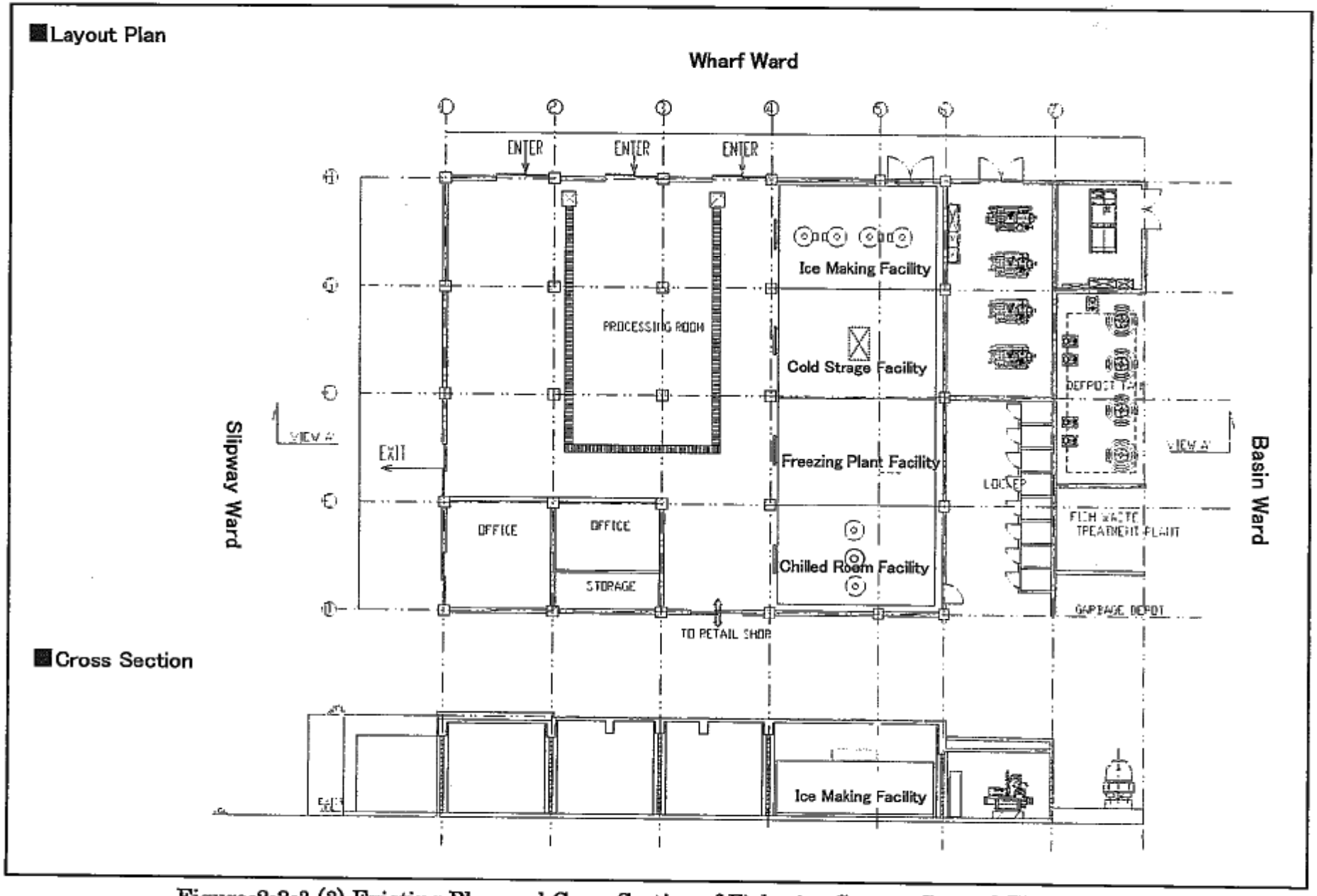


Figure-2-3-3 (3) Existing Plan and Cross Section of Fisheries Center, Ground Floor

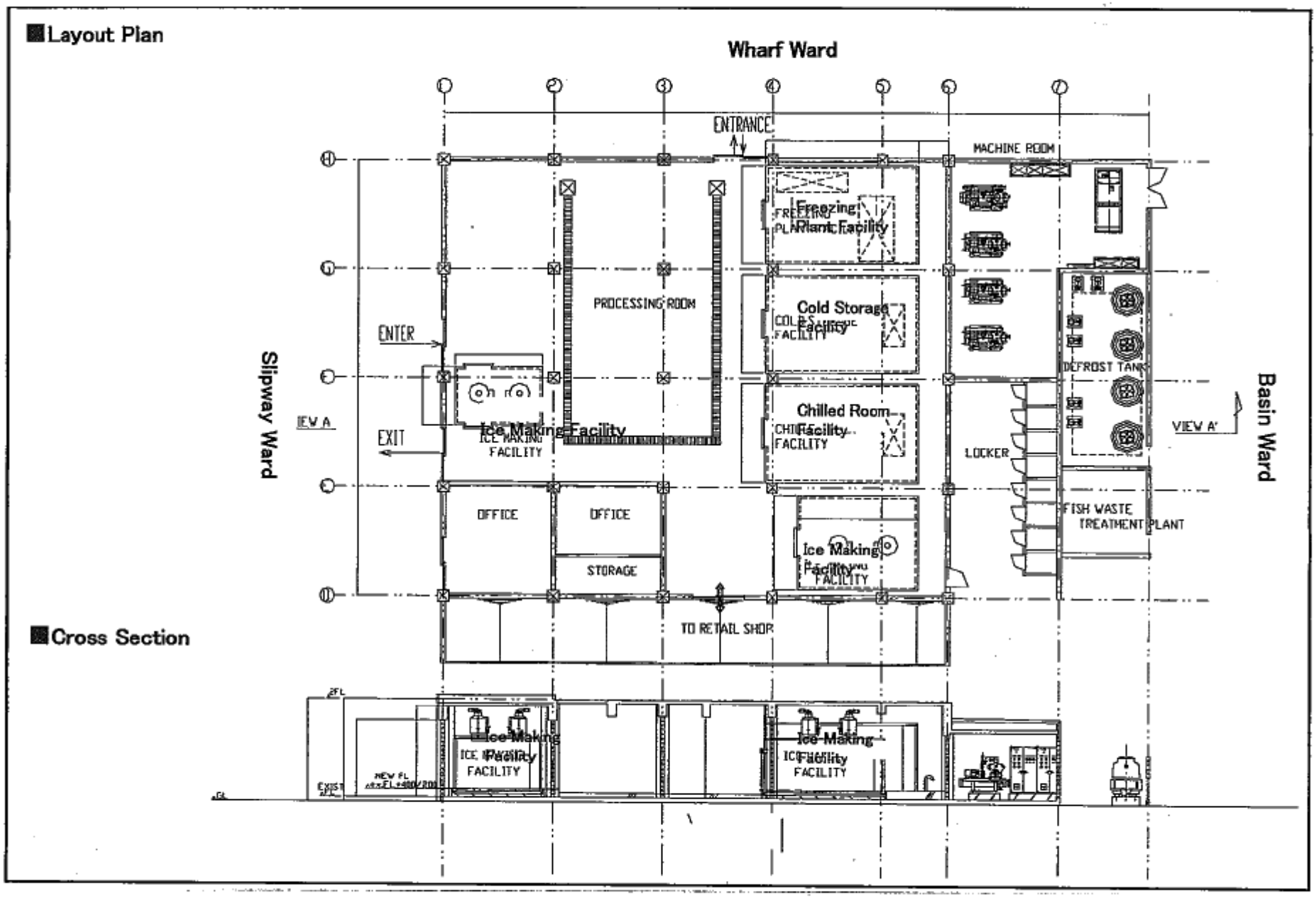


Figure-2-3-3 (4) Restoration Plan and Cross Section of Fisheries Center, Ground Floor

(2) Basic Design Plan and Work Contents

Detail contents for rehabilitation and improvement of the building and facilities are shown in Table-2-3-3 (2).

Table-2-3-3 (2) Details of Rehabilitation and Improvement

No.	Name of Work	Quantity	Contents
A.	Fisheries Center		
①	Building restoration work		
1.	Fisheries Center ground floor raising work (Height of 400/200mm)	3 places	Scope of work : D line~H line, ① line~⑥ line, about 460 ㎡
2.	Fishery Center ground floor spandrel wall strengthen work	32m	Reinforcing bar anchor, Reinforcing bar, forms, concrete placing, mortar, painting works.
3.	Replacing the west side sliding door to steel small door of entrance of Fishery Center.	1 place	Door removal, doorframe rail fixing, door installation, plastering, painting works.
4.	Closure work of west side sliding door of entrance of Fishery Center.	2 places	Removal, reinforcing bar anchor, concrete block (C.B), plastering, painting works.
5.	Closure work of west side double wing door of entrance of Fishery Center.	2 places	Doorframe removal, reinforcing bar anchor, concrete block (C.B), plastering, painting works.
6.	Replacing the north-side generator room double swing door.	1 place	Door removal, door installation, plastering, painting works.
7.	Installation work for the south-side new sliding door . (F to G line)	1 place	C.B. wall removal, reinforcing bar anchor removal, plastering, doorframe rail fixing, door installation, plastering, painting works.
8.	Sliding door replacing between fish processing section and fish market	1 place	Door removal, door installation, painting works.
9.	Replacing of wooden door on the ground floor.	1 place	Door removal, door installation, painting works.
10.	Replacing of wooden double swing door of materials store	1 place	Door removal, door installation, painting works.
11.	Fishery Center ground floor office aluminum sash window	1 place	Window/window frame removal, C- B line chipping, window frame/window installation, plastering, painting works.

No.	Name of Work	Quantity	Contents
12.	Generator room/machinery room concrete block partition wall removal.	12.5 ㎡	C-B line wall removal, reinforcing bar anchor removal, plastering, painting works.
13.	Generator room west wall exhaust duct removal and new gallery installation	1 place	Exhaust duct removal, outer hood removal, duct-hood fixing frame removal, C-B line partial removal, plastering, gallery frame fixing, gallery installation, plastering, painting works.
14.	Laboratory Jalousie & transom glass window replacing on second floor.	3 places	Blind removal, glass and blind installation works.
15.	Ceiling board replacing of Laboratory	3 pcs	Ceiling board removal, installation works.
16.	The vertical blind providing of 1st Floor of Fisheries Center (Ocean Side)	2 places	Outer blind installation works.
17.	The jalousie window glass replacing of conference room	2 places	Blind removal, glass fixing, blind installation works.
18.	The jalousie window glass replacing of training room	2 places	Blind removal, glass fixing, blind installation works.
19.	West-side staircase outer wall repair of Fishery Center	1 place	Plastering, painting works.
20.	West-side storm drain repair of Fishery Center	2 places	PVC piping, PVC jointing, metal fixing works.
21.	New protection wall installation of north-side cooling tower	20 ㎡	Chipping, reinforcing bar for C-B line gallery frame installation, reinforcing structural steel work on tower body.
22.	North-side waste disposal plant & incinerator floor raising (400mmH)	16 ㎡	Removal of waste disposal plant & incinerator, reinforcing bar anchor, steel bar arrangement, form work, concrete placing, removed facilities, insulation resistance test

No.	Name of Work	Quantity	Contents
23.	New protection wall installation on the north-side waste disposal plant & incinerator	1 complete	Reinforcing bar for C·B line work, reinforcing structural steel work on protection wall, plastering, painting
②	Water Supply Facility		
1.	Replacing of water supply pumps	2 pcs	Removal of water supply pipes & wirings, pump removal, foundation raising, plastering, pump installation, piping & wiring works.
2.	Control panel replacing	1 pc	Wiring removal, panel removal, installation of new control panel, wiring, insulation resistance tests
3.	Water supply piping, water taps replacing	5 places each	Pipe cutting, jointing, piping, and water tap fixing works.
③	Waste Water Treatment Plant		
1.	Blower machine replacing	1 ps	Pipes & wires removal, blower machine removal, foundation raising, blower installation, pipe & wire restoring, insulation resistance tests.
2.	Control panel replacing	1 set	Wires removal, control panel removal, fixing anchor embedding, control panel installation, wire restoring, insulation resistance tests
3.	Submergible pump replacing	2 pcs	Pipes & wires removal, submerged pump removal, installation of new submergible pump, pipe & wire restoring, insulation resistance tests
④	Electrical Facility		
1.	Emergency generator replacing	1 complete	Pipes & wires removal, exhaust duct removal, foundation raising, plastering, wire & pipe restoring works.
2.	Main power panel replacing	1 complete	Pipes & wires removal, main power supply board removal, foundation raising, plastering, and installation of new main power supply board, wire & pipe restoring, insulation tests.

No.	Name of Work	Quantity	Contents
3.	Main power distribution panel replacing	1 complete	Pipes & wires removal, main power distribution panel removal, fixing anchor, installation of new main distribution panel wire & pipe restoring, insulation resistance tests.
4.	Air-conditioner replacing of Laboratory	1 complete	Pipes & wires removal, air-conditioner removal, installation of new air-conditioner, wire & pipe restoring, insulation resistance tests.
5.	Air-conditioner replacing of the office on the ground floor	1 complete	Pipes & wires removal, air-conditioner removal, installation of new air-conditioner, wire & pipe restoring, insulation resistance tests.
6.	Electric wiring, piping and switch box replacing on the second floor	1 complete	Removal of pipes, switch box and wires and restoring, insulation resistance tests.
7.	Lighting equipment replacing inside Fisheries Center	26 lights	Removal of wires and lighting equipment, installation of new lights, wire restoring, insulation resistance tests.
8.	Tungsten light replacing outside Fisheries Center	4 place	Removal of wiring & tungsten halogen light, new installation, wire restoring, insulation resistance tests.
⑤	**Fire Extinguishing Facility**		
1.	Fire extinguisher improvement of east side of slipway	1 complete	Removal of fire extinguisher and pipe, new piping and new fire extinguisher.
⑥	**Fuel Supply Facility**		
1.	Fuel oil tank repair	1 complete	Pipes & wires removal, fuel oil supply pump removal, tank repair, installation of new fuel oil pump, wire & pipe restoring, insulation resistance tests, painting
2.	Diesel oil tank repair	1 complete	Pipes & wires removal, removal of oil fence (concrete wall), fixing anchor bolt, band fixing on tank, wire & pipe restoring, oil fence restoring, plastering, painting.

No.	Name of Work	Quantity	Contents
3.	Fuel oil dispenser replacing	1 set	Pipes & wires removal, foundation raising, dispenser installation, wire & pipe restoring, plastering, painting, insulation resistance tests.
4.	Diesel oil dispenser replacing	2 set	Pipes & wires removal, foundation raising, dispenser installation, wire & pipe restoring, plastering, insulation resistance tests.
⑦	Waste Disposal Plant & Incinerator		Pipes & wires removal, waste disposal plant removal, foundation raising, plastering, wire & pipe restoring, plastering, insulation resistance tests
1.	Waste disposal plant improvement	1 complete	Pipes & wires removal, waste disposal plant removal, foundation raising, plastering, wire & pipe restoring, plastering, insulation resistance tests
2.	Incinerator improvement	1 complete	Pipes & wires removal, incinerator removal, foundation raising, plastering, wire & pipe restoring, plastering, insulation resistance tests
B.	Equipment		
①	Workshop Equipment		
1.	Electric welding set	1 set	Ⅰ-32. 200VAC 50Hz 11kw
②	Educational & Training Equipment		
1.	Video set Video Recorder TV Monitor Video Camera TV Stand	1 set	Ⅱ-2. VHS・Multi-Type・AC230V. 50Hz.1φ 21 inch・Multi-Type・AC230V. 50Hz.1φ Handy Type・NTSC Dimension s :760Lx 400W x 800H
2.	Overhead projector	1 set	Ⅱ-4.f=330 Type : Portable type with carrying belt Lamp : 400W Dimensions : 392L x 473W x 582H Weight : Approx 10.5kg

No.	Name of Work	Quantity	Contents
3.	Underwater camera with Flashing light	1 set	Ⅱ-7. Type : Electronically controlled 35mm Amphibious focal plane shutter camera Flash light : Speed light capable to attaching the camera body with bracket arm Accessories : Soft case for camera 1 pc O-ring set for camera 1 pc O-ring for battery 1 pc Quick battery charger 1 pc
③	**Fish Handling and Marketing Equipment**		
1.	Small Scale	15 sets	Ⅲ-1-1. Scale capacity : Approx.20 lbs
2.	Large Scale	18 sets	Ⅲ-1-2. Scale capacity : Approx.300 lbs
3.	Spring top-pan balance	5 sets	Ⅲ-2. Scale capacity : Approx.20 lbs
4.	Electric band saw	1 set	Ⅲ-9. Type : Electric driven band saw suitable for cutting frozen tuna and fish Base structure : Stainless steel. Maximum saw height : 470mm Dimension : 1330L x 1200W x 1972H Power source : 400V.50Hz.3φ.2.2kw
5.	Vacuum packing machine	1 set	Ⅲ-10. Type : Batch and manual. Integrated with vacuum pump. Equipped with wheels with wheel rock for moving. Dimensions : 1000L x 500W x 1135mmH Power source : 400V.50Hz.3φ.4.0kw

No.	Name of Work	Quantity	Contents
6.	Chilled Fish Display Case	2 units	Ⅲ-13 Type : Chilled fish showcase with a wide front glass panel for showing and sliding glass doors on seller's side and decorative front panel. Capacity of display area : 550 liters Dimensions : 2400L x 1000W x 1400H Power Source : 230V.50Hz.1φ.
④	Fish Quality Inspection Equipment		
1.	Analytical Balance	1 set	Ⅳ-1. Type : Analytical top-pan balance with weighing Chamber equipped with semi-automatic calibration. Weight indication : Digital. Measuring range : Approx, 0g to 210g Resolution : 0.1mg Power source : 230V.50Hz.1φ.
2.	Centrifuge	1 set	Ⅳ-6 Type : Tabletop electric centrifuge with rotor and tubes. Capacity : Max.600ml(15mlx40pcs,) Speed : 5000rpm／min. Accessories : Swing bucket rotor 1 pc 50mlx4-bucket assembly 1 set 15mlx32-bucket assembly 1 set Balance 1 pc Power source : 230V.50Hz.1φ.
3.	Incubator	1 set	Ⅳ-9. Type : Low temperature incubator (Forced draft system) Temperature range : 0～70℃ Effective capacity : Approx.64 liters Dimensions : 540L x 670W x 960H Power source : 230V.50Hz.1φ.

No.	Name of Work	Quantity	Contents
4.	Automatic titration apparatus	1 set	Ⅳ-13 Display : 16-figure digital display. Cylinder : 20ml (Resolution at least 0.002ml) Titration accuracy : Approx. ±0.15% (for 20-ml cylinder use) User memory : Max 10 memories Power source : 230V.50Hz.1φ.
5.	UV Spectrophotometer	1 set	Ⅳ-14. Operating mode : Photometric. Weave length range : 200~1100 NM Spectral bandwidth : 5 NM Display : LCD with back lighting. Power source : 230V.50Hz.1φ.
6.	Thermister thermometer	1 set	Ⅳ-21. Type : Digital thermometer with thermister suitable for measuring temperature of central part of frozen fish such as Tuna. Handy type for outdoor use. Measuring range : −30~199.9℃ Size of Thermister : 3mm in diameter x 100-mm(L) Power source : D.C6V (dry battery UM-4x4 pcs.)
7.	Water Quality Checker	1 set	Ⅳ-23. Type : Portable water quality checker with sensors. Out-door use. Temperature : 0-50.0 degree C ph : 0~14.00 DO : 0~19.9mg/lit. Conductive : 0~99.9mS/cm Turbidity : 0~800MTU Nacl : 0~4.00% Sensor cable : 10m Power source : Battery 6F22 x 1 pc

No.	Name of Work	Quantity	Contents
8.	Salinometer	1 set	Ⅳ-24. Type : Portable type, suitable for measuring salinity of processed fish at site. Measurement range : 0.1～10% Weight : Approx. 40g Power source : Battery Spare parts : 10 pcs
9.	Hot Plate	1 set	Ⅳ-25. Type : Glass ceramic hot plate. Heating temperature : Max.400℃ Power source : 230V.50Hz.1φ.
10.	Dry desiccate	1 set	Ⅳ-26. Type : Desiccate with automatic drying unit and with casters. Dimensions : 450L x 450W x 1000H Power source : 230V.50Hz.1φ.
11.	Vortex shaker	1 set	Ⅳ-36. Type : Vortex type test tube mixer. Rotation : Approx. Max. 2900rpm／min Power source : 230V.50Hz.1φ. Spare Parts : Stirring plate 5 pcs
12.	Constant Temperature Water Bath	1 set	Ⅳ-37. Working temperature : 5～70℃ Dimensions : 460L x 305W x 155H
⑤	**Communication & Date Analysis Equipment**		
1.	Desktop Computer set	1 set	Ⅴ-2.4 Power source : 230V.50Hz.1φ.
2.	Note Type Computer	2 sets	Ⅴ-2.5&2.6 Power source : 230V.50Hz.1φ.
3.	Photo Copying Machine	1 set	Ⅴ-3. Type : Photocopying machine with automatic document feeder and Both single & Multi-sheet feeder. Power source : 230V.50Hz.1φ.

No.	Name of Work	Quantity	Contents
4.	Facsimile Machine	1 set	V-4. Type : Desktop and digital Facsimile terminal. Power source : 230V.50Hz.1 ϕ.
⑥	Ice Making Machine	1 set	Type : Flake Ice Type Capacity : 2.5tons／day x 4 sets Cooling System : R-22 Direct expansion system Condensing Unit : 22kw x 2sets Control Panel : 1 set Row water temperature : 25℃ Ice storage capacity : Approx. 66 Power source : 400V.50Hz.3 ϕ.
⑦	**Blast Freezer**	1 set	Type : Air Blast Freezer Capacity : 2.5 tons／day Room temperature : −25℃ Cooling System : R-22 Direct expansion system Condensing Unit : 22kw x 2sets Control Panel : 1 set Defrosting method : Water sprinkling system Power source : 400V.50Hz.3 ϕ
⑧	Cold Storage	1 set	Storage Capacity : Approx. 30 tons Room temperature : −20℃ Cooling System : R-22 Direct expansion system Condensing Unit : 22kw x 1set Control Panel : 1 set Defrosting method : Water sprinkling system Power source : 400V.50Hz.3 ϕ

No.	Name of Work	Quantity	Contents
⑨	Chilling room	1 set	Storage Capacity : Approx. 30 tons Room temperature : 0～－20℃ Cooling System : Concurrent use with above ③ R-22 Direct expansion system Condensing Unit: Concurrent use with above ③ Control Panel : Concurrent use with above ③ Defrosting method : Water sprinkling system Power source : 400V.50Hz.3φ
⑩	Spare parts		
1.	Ice Making Machine Spare parts	1 set	(Refrigeration Facility)
2.	Blast Freezer Spare parts	1 set	(Refrigeration Facility)
3.	Cold Storage Spare parts	1 set	(Refrigeration Facility)
4.	Chilling Room Spare parts	1 set	(Refrigeration Facility)
⑪	Incinerator	1 set	Installation of new incinerator
⑫	Waste disposal plant	1 set	Installation of new waste disposal plant
⑬	Emergency Generator	1 set	Installation of new emergency generator
⑭	Diesel Oil Tank	1 set	Installation of new diesel oil tank

Chapter 3 Implementation Plan

Chapter 3 Implementation Plan

3-1 Implementation Plan

3-1-1 Implementation Concept

(1) Basic Concept

1) As the implementation of the Project for Improvement of Coastal Fisheries Development, after the Exchange of Notes (E/N) is signed between the Government of Japan and the Government of Dominica, a contract for undertaking consulting services will be concluded between the Government of Dominica and the Consulting Firm having Japanese nationality.

2) The Consulting Firm will prepare all documents required for the tender including the drawings, technical specifications, cost estimations, tender and the contract documents. After the approval of these documents by the Government of Dominica, the contractor for this project will be selected from and among Japanese construction companies by examining their pre-qualifications and tender procedures.

3) The construction work will be performed by the selected construction company in accordance with the construction contract concluded between the Government of Dominica and the construction company.

4) The construction period is to be totally 20 (twenty) months including detailed design for the Project taking into considerations of the scale and complexities of the Project as well as the site conditions at Roseau. It shall be materialized as two phases project.

(2) Implementation concept

The improvement works of the Project will be performed as per the following basic concepts.

1) Local labor, equipments and materials shall be utilized as much as possible at the Project. However concerning necessary capability of marine civil engineering that requires matured experience and specialized technology for the Project, there are no local contractors or engineers that possess such experience and technology. Therefore procurement from neighboring countries shall be considered.

2) The cold storage and ice making/storage equipment will be procured from Japan and assembled under the instruction and supervision of Japanese experts considering of

keeping the level of the quality and the durability.

3) Special attention shall be paid to protecting the surrounding environment, preventing disruption of traffic and market or ferry terminal's activities around the Project Site.

4) Close-communication shall be maintained with neighborhood to ensure smooth implementation of the Project.

5) Especially careful attention shall be paid to preventing disruption for management of International Ferry Terminal beside the slipway in the Project Site.

6) The care shall be taken to ensure the operation of the facilities of Roseau Fisheries Complex during construction period.

7) The Project Site is limited due to the close proximity to the road, market, Roseau City Council and International Ferry Terminal, therefore the possible efficient construction method shall be adopted so as to conduct the work smoothly.

8) The law, the regulation and the standard of the Government of Dominica shall be respected.

(3) Executing Agency in the Government of Dominica

Agencies, which will be involved in the Project on the part of the Government of Dominica are described below.

1) Responsible Agency for the Tender:
Ministry of Agriculture and Environment, Fisheries Development Division

2) Responsible Agency for Project Implementation: -Ditto-

3) Responsible Agency for the Supervision of Construction Work: -Ditto-

4) Management Authority after Completion of the Works: -Ditto-

3-1-2 Conditions for Implementation

(1) Conditions for Construction

1) Construction Company

Construction companies of Dominica might be utilized as possible as we can.

However, in this country, the number of construction companies is limited and less experience of large-scaled works. Therefore, it may be necessary to hire the construction companies having necessary technology and experience from neighboring countries.

2) Construction Machinery

There are a few leasing companies of construction machinery in Dominica. Almost of the available construction machinery are small backhoes, dump trucks and etc. However the number of machinery is limited and maintenance condition is not so sufficient. Heavy construction machinery like floating crane, diver's boat, crawler crane, truck crane and etc. shall be used in the Project.

Thus, basically, the construction machinery will be procured from Dominica and neighboring countries but the machinery, which cannot be supplied from Dominica or the neighboring countries, may be procured from Japan.

Large quantity of concrete will be used in the Project. It is possible to procure of such concrete in domestic market because there is capable ready-mixed concrete plant and agitator truck in Dominica

3) Labor

Experts will be required to supervise for the construction of cold storage facilities and ice making plants to supervise. Japanese experts will be dispatched to Dominica to undertake this responsibility. At the operation of working vessels and piling work of the steel sheet piles, Japanese experts will be required as well. Common skilled labor will be employed in Dominica and neighboring countries.

4) Goods and Materials to be imported

The procurement sources of materials required for the Project are described below;

* Local Procurement: Sand, Stone, Cement, Wood and etc.
* Procurement from Japan or third countries: Steel Frame, Steel Sheet Piles, Underwater Concrete Admixture, Boat Pulling Upper, Steel Mould and etc.

5) Safety Control

This project is to improve the damaged fisheries facility neighboring existing town. For the construction of breakwater and wharf at the Project Site, it is necessary to clearly mark the construction area and the site with buoys and other signs to secure the safe navigation of International Aviation Ferry or other boats. For the construction of land facilities, the roads and routes, which will be used for the transportation of material and equipment, should be clearly indicated to avoid any nuisance of the city residents. Although, dumping yard of removed material from damaged slipway will be provided in the vicinity of Roseau, the transportation plan will be well-considered preventing from the accident with third party when it is transported through public road.

(2) Care Points for Construction Work

1) The Project Site is narrow and close to road, market, Roseau City Counsel, and Ferry Terminal. Therefore, preventing from the accident with third party shall be secured, namely, it shall be provided suitable safety procedure like setting the fence to separate the site from third party, also guiding measure for construction and transportation vehicles to and from the site. These procedures will be secured the safety of residential person in town and private vehicles around the Project Site.

2) Special consideration for keeping lifelines of water and electrical supply to other facilities in Roseau Fishery Complex is ensured during construction period.

3) An appropriate construction plan will be prepared taking the natural conditions at the sites into account, especially against hurricanes.

4) The dispatched Japanese experts will be planned carefully in respect of the number of persons, the timing and duration in accordance with the progress of work.

5) Local equipment and material will be used as much as possible and minimize such procurement from foreign countries in order to save cost.

6) The project will involve a long-term marine construction works. Therefore special attention will be paid to the navigating boats in the construction sites.

3-1-3 Scope of Work

Scope of work to be undertaken by the Government of Japan and the Government of Dominica are as follows.

(1) Scope of work to be undertaken by the Government of Japan

1) Improvement of Civil Engineering Facilities

* Remove of damaged existing slipway
* Construction of new slipway facility
* Construction of seawall (Parapet Wall)
* Concrete pavement between Fishery Complex Building and Seawall (Parapet Wall)
* Reinforcement of foot protection of wharf
* Reinforcement of foot protection of west breakwater
* Reinforcement of submerged groin

2) Improvement of Architectural Facilities

* Remove the damaged cold storage facilities on the ground floor

* Rising the floor level at processing room and cold storage area on the ground floor
* Closure of the exits and make construction of a small scaled new door at westward on the ground floor
* Make construction of new exit at southward on the ground floor
* Rehabilitation of ventilation and lighting system at processing room on the ground floor
* Switching exits at machinery room on the ground floor
* Construction of wall in front of cooling towers and fish waste treatment plant
* Rehabilitation of damaged parts on first floor
* Rehabilitation of diesel and gasoline distributing system
* Rehabilitation of lighting system inside the facility

3) Rehabilitation of Facilities and Equipments
* Rehabilitation of Ice Making and Ice Storage Facility: ice production capacity 2.5t/day×4 nos. storage capacity 20m³×1no. and 40m³×1no.
* Rehabilitation of Cold Storage Facility: storage capacity 78m³×1no.
* Rehabilitation of Burst Freezing Facility: freezing capacity 2.5t/day
* Rehabilitation of Chilled Room: storage capacity 69m³×1no.
* Rehabilitation of Emergency Generator: 70KVA×1unit
* Rehabilitation of Equipments for Laboratory
* Rehabilitation of Equipments for Computer Room
* Rehabilitation of Equipments for Fishermen's Training
* Rehabilitation of Equipments for Cold Facility
* Rehabilitation of Equipments for Processing Room
* Rehabilitation of Equipments for Market
* Rehabilitation of Equipments for Workshop

4) Procurement and settlement, of all equipments, materials and manpower which are required for carrying out the works

5) Marine and land transportation of equipments and materials which are necessary for the works and bear the marine insurance.

6) Assistance and consultant supervision of the detail design and the tender procedure

(2) Scope of Work to be undertaken by the Government of Dominica

1) To secure the Project Site and arrangement of the surrounding area

2) To regulate and control the traffic around the market and the International Ferry Terminal during the construction period

3) To provide to temporary construction yards, the collecting site of reclaiming material and

the quarries for obtaining stones

4) To provide dumping yard to dispose removed material from the Project Site

5) To construct boundary fences, emergency gate and boundary retaining dike

3-1-4 Consultant Supervision

It is the policy of the Government of Japan that a Grant Aid Project will be implemented under the strict supervision of the Consulting Firm that is fully aware of technical details of work during the whole period of the project. The Consulting Firm and his stationer representative will supervise the construction work through the close contact and communications with local engineers in regard to the design, inspection and schedule of work.

(1) Supervisory Policies

1) The time frame of the work will be strictly observed by establishing close contact and communications with the persons and organizations concerned on the part of the Government of Dominica to prevent from any delay of the work.

2) Provision of prompt and appropriate guidance and advice will be essential for the contractor as to the construction of the facilities in compliance with the drawings and specifications agreed upon. High priority will be accorded to the utilization of local materials and technologies.

3) The project will ensure to promote the transfer of technology in the course of the construction and engineering work so as to take effect of Japanese Government of Grant Aid.

4) The project will ensure to provide adequate advice and guidance regarding the maintenance and the management of equipment and material delivered for the work.

(2) Supervisory Work

1) Preparation of the Contract

The Consulting Firm in relation to the selection of a contractor, determining the type of contract, drafting the contract documents, evaluating the bills, and attending the contract as a witness, will provide provision of services.

2) Evaluation and Approval of the Drawings

Evaluation will be carried out the drawings, materials, finishing sample and equipment, which will be submitted by the Contractor boats.

3) Instruction on Construction Work

Reviewing construction plan and schedules, providing supervision to the contractor and reporting the progress of work to the Government of Dominica will be carried out.

4) Process of payment

Evaluation of the bills for the payment to the contractor according to the progress of work and upon completion of work will be carried out.

5) Inspection

The Consulting Firm will inspect, when necessary, the work in progress and provide appropriate instructions to the contractor. The Consulting Services will be finished with having confirmed that the work has been completed and the contract fulfilled, the transfer of the Project with the acceptance of the Government of Dominica. The Consulting Firm will also report to the Government of Japan about the progress of work, payment procedures and status and the delivery of facilities completed.

3-1-5 Procurement Plan

In the process of procurement of materials and equipments being necessary for the project, the following attentions will be considered.

(1) Procurement Policy

Priority should be given to the use of locally available material and equipment if the quality and quantities will meet the need of the project work. In this way the procurement cost from Japan will be minimized.

1) Procurement from Japan

For the special ordered or manufacturing materials and equipments in Japan, of which are procured from Japan, the detailed scheduled plan for procurement and transportation must be prepared, because those will take a long time for manufacturing, packing and shipping of goods until to be completed. Procurement machineries from Japan will be minimized, even when they are not available in the country.

2) Local Procurement

Rubble stones and aggregates that are possible to be locally procured should be carefully examined as to the quarry site, quality and transport capacities.

3) Cost

In the event of selecting the materials and equipments from Dominica and/or Japan, the cost comparison study should be examined and the cheaper cost ones must be selected.

It should be noted that the prices of procurement from Japan include the charges for

packing, transportation, insurance, and port charges while customs duties and port dues in the country are to be exempted.

On the basis of the above principles and rules, the following plans will be established for the procurement of construction materials and equipments.

(2) Procurement Items

1) Materials

As the result of study, the procurement plan of construction materials are described in Table-3-1-5 (1).

Table-3-1-5 (1) Procurement Plan of Construction Materials

Construction Material		Procurement Country			Remarks
		Local	Japan	Third	
Civil	Steel Sheet Pile		○		As the result of our consideration for quality, specifications and the appointed date of delivery, materials will be procured at Japan.
	Steel Pile (H Shape、Channel)		○		
	Tie-wire		○		
	Boat Pulling Upper		○		
	Steel Bar	○			As the result of our consideration for cost efficiency, productivity and quality, materials will be procured at Dominica.
	Stone, Aggregate, Crusher run	○			
	Cement	○			
	Ready-Mixed Concrete	○			
	Form Materials	○			
Arch.	Steel furnishing		○		As the result of our consideration for quality, specifications and the appointed date of delivery, materials will be procured at Japan.
	Steel Bar	○			As the result of our consideration for cost efficiency, productivity and quality, materials will be procured at Dominica.
	Glass	○			
	Sand and Aggregate	○			
	Cement	○			
	Ready-Mixed Concrete	○			
	Form Materials	○			
	Concrete Block	○			
	Timber	○			
	Wooden furnishing	○			
	Paint	○			

Construction Material		Procurement Country			Remarks
		Local	Japan	Third	
Arch.	Resist	○			As the result of our consideration for cost efficiency, productivity and quality, materials will be procured at Dominica.
	Tile	○			
Electric	Cable and Wire	○	○		For the priore of cost efficiency, satisfied quaritied materials will be procured at Dominica.
	Switch, Outlet	○	○		
	Conduit Pipe		○		As the result of our consideration for quality, specifications and the appointed date of delivery, materials will be procured at Japan.
	Panel boards, Switchboards		○		
	Lighting	○			As the result of our consideration for cost efficiency, productivity and quality, materials will be procured at Dominica.
	Light Valve	○			
Plumbing	Pipe	○	○		For the priore of cost efficiency, satisfied quaritied materials will be procured at Dominica.
	Valve	○	○		
	Fuel Distributor			○	Due to the priore of cost efficiency and consideration of local diesel supplier, equipments will be procured at the Third Country
	Fuel Pump			○	
	Panel boards of Fuel Pump			○	
	Water Supply Pump		○		As the result of our consideration for quality, specifications and the appointed date of delivery, materials will be procured at Japan.
Air Con.	Air Conditioner		○		
	Ventilating and Exhaust Fan		○		

Construction Material		Procurement Country			Remarks
		Local	Japan	Third	
Equip.	Ice-making Plant with Spare Parts		○		As the result of our consideration for quality, specifications and the appointed date of delivery, equipments will be procured at Japan.
	Cold Storage Plant with Spare Parts		○		
	Blast Freezer Plant with Spare Parts		○		
	Chilled Storage Plant with Spare Parts		○		
	Emergency Generator		○		As the result of our consideration for quality, specifications and the appointed date of delivery, equipments will be procured at Japan.
	Electric Distribution Panel		○		
	Equipment for Laboratory		○		
	Equipment for Computer Room			○	As the result of our consideration for cost efficiency, productivity and quality, equipments made in US will be procured at Dominica.
	Equipment for Training Room		○		As the result of our consideration for quality, specifications and the appointed date of delivery, equipments will be procured at Japan.
	Equipment for Processing Room		○		
	Equipment for Workshop		○		
	Equipment for Market		○	○	For the priore of cost efficiency, satisfied quaritied equipments will be procured at the Third Country, however, Band Saw and Baccume Packer will be procured at Japan due to the result of our consideration for quality, specifications and the appointed date of delivery .

Construction Material		Procurement Country			Remarks
		Local	Japan	Third	
Equip.	Diesel Tank			○	Due to the priore of cost efficiency and consideration of local diesel supplier, equipments will be procured at the Third Country
	Fish Waste Treatment Machine		○		As the result of our consideration for quality, specifications and the appointed date of delivery, equipments will be procured at Japan.
	Incinerator		○		

2) Construction Machineries

Most of general construction machineries are available through the sub-contractors, which are in Dominica or neighboring country. Construction machineries used in the Project are shown in Table-3-1-5 (2).

Table-3-1-5 (2) Procurement Plan of Major Construction Machineries

Machinery		Country			Remarks
		Local	Japan	Third*	
	Bulldozer D3			○	
	Bulldozer D6			○	
	Tractor Shovel (JCB class)	○			
	Small Buck hoe 0.2 m^3			○	
	Buck hoe 0.4m^3	○			
	Buck hoe 0.7～1.2m^3			○	
	Big (Jumbo) Breaker			○	
	Compressed Air Breaker	○			
	Dump Truck 2～4t	○			
	Dump Truck 7t			○	
	Truck Crane 10t	○			
	Agitator Truck 10t	○			
	Truck Crane 15t	○			
	Truck Crane 20～25t			○	
	Truck Crane 40t			○	
	Crawler Crane 40t	○		○	
	Crawler Crane 50t			○	
	Crawler Crane 100t			○	
	Diesel Hummer D22			○	
	Vibration Hummer 30Kw			○	

Machinery		Country			Remarks
		Local	Japan	Third*	
	Vibration Hummer 60Kw			○	
	Vibration Hummer 120Kw			○	
	Generator 40Kva	○		○	
	Shovel Loader 0.3m³			○	
	Shovel Loader 1.8m³			○	
	Shovel Loader 2.3m³			○	
	Blade Grader 3.1m	○			
	Tire Roller 12t	○			
	Combined Roller 4t			○	
	Floating Crane 25t			○	
	Floating Crane 40t			○	
	Floating Crane 50t			○	
	Pontoon 100t	○		○	
	Pontoon 200t			○	
	Pontoon 300t			○	
	Tug Boat 100ps			○	
	Tug Boat 200ps			○	
	Tug Boat 300ps			○	
	Plying Boat 30ps	○			
	Plying Boat 50ps	○			
	Diving Boat D70ps			○	
	Anchor Boat D3t			○	

Note: * These countries means Caribbean Countries.

3-1-6 Implementation Schedule

In the event of implementing the Project under the program of Japanese Grant Aid, , a Japanese Consulting Firm will be appointed by the Government of Dominica after the Exchange of Notes (E/N) is signed between the two countries and the consulting contract will be concluded between the Government and the consulting firm.

E/N will provide detailed designing, tender documentation, procedures of tender, supervising and construction work. The project will be implemented in accordance with the conditions stated in the E/N.

(1) Preparation of Detailed Design

After the consulting contract will be concluded between the executing agency of the Government of Dominica and the Japanese Consulting Firm, the Government of Japan will verify the contract and the consultant will draw up the detailed designs. In the detailed design the tender documents consisting of design drawings, technical specifications, instruction to Tenderers, etc. will be prepared on the basis of the Basic Design Study. In the meantime, consultations will be held with the Government of Dominica regarding the details of the Project and eventually the Government of Dominica will approve the tender documents. Approximate three (3) months will be required for the preparation of a detailed

design for the first and second phase respectively.

(2) Execution of Tender

The contractor, which is a Japanese construction company, will be selected through the tender. The tender procedures will be as follows:

1. First invitations will be extended to interested parties;
2. Acceptance of the tenders;
3. Examination of the pre-qualifications;
4. Evaluation of tender documents,
5. Submitting the tender,
6. Evaluation of the tender,
7. Designation of the contractor, and
8. Conclusion of the construction contract.

The whole procedure will take one and half (1.5) months in each phase.

(3) Execution of Construction Work

The Contractor will start the construction work after the conclusion of the contract and verification by the Government of Japan. The construction period of the Project is estimated approximate 15 months (Phase1: 10 months, Phase2: 11 months) considering the size of the project and its complexities, and the construction conditions without occurring the unforeseen situations. This construction period is based with avoiding the actual marine construction works during Hurricane season. Therefore, the last quantity of construction period of phase 1 and the procurement and preparation period of phase 2 are over rapped for four (6) months.

Figure-3-1-6 (1) shows the implementation schedule of the Project of phase 1 and phase 2 covering from the Exchange of Notes to the completion of the Project.

Works, Items＼Monthes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Remarks
Consulting Services																					
Detail Design of Phase 1																					
Supervising of Phase 1																					
Detail Design of Phase 2																					
Supervising of Phase 2																					
Construction and Procurement																					
Phase 1																					
Preparatory and Temporary Works of Phase 1																					
Improvement of West Breakwater																					
Removal and Recovery of the Architecture Facility																					
Finish of the Architecture Facility																					
Procurement and Fixing of the Equipments																					
(Trial Run of Cold Facility)																					
(Technical Transfer and Inspection of Cold Facility)																					
Demobilization of Phase 1																					
Phase 2																					
Preparatory and Temporary Works of Phase 2																					
Improvement of Slipway																					
Improvement of Wharf																					
Improvement of Submarged Breakwater																					
Improvement of Seawall																					
Demobilization of Phase 2																					

Legend: Phase1 : Phase2

Figure-3-1-6 (1) Implementation Schedule

3-1-7 Obligations of the Recipient Country

The Minutes of Discussions during the Basic Design Study implemented in August/November 2000 confirmed the obligations of the Government of Dominica.

1) To secure land which is necessary for the Project prior to commencement of the construction work;

2) To provide suitable access to enter the Project Site;

3) To approve lands which is necessary for the permission of acquisition of construction soil, stone, sand and aggregates;

4) To secure the dumping sites for the dredged and excavated materials in the vicinity of the Project;

5) To provide the facilities for distribution of electricity, telephone, water supply and drainage and other incidental facilities to the site;

6) To provide the access road and utilities to the Project Site;

7) To ensure all the expenses and prompt execution for unloading, customs clearance at the ports of disembarkation and internal transportation of the products purchased under the Grant Aid;

8) To exempt Japanese nationals from customs duties, internal taxes and fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts;

9) 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 works;

10) To bear the commissions to the Japanese Foreign Exchange Bank for its banking services based upon the Banking Arrangement, namely the advising commission of the "Authorization to Pay" and other payment commissions;

11) To provide the necessary permissions, licenses and other authorizations for implementing the Project;

12) To guarantee the certain utilization of facility, which constructed by Japanese Grant Aid;

13) To bear all the expenses other than those covered by the Grant Aid, necessary for the Project;

14) To secure lands and permission for dumping disposal of concrete or metal materials in the vicinity of the Project Site; and,

15) To construct boundary fence, emergency exit with gate and boundary retaining wall at and around the Project Site.

3-2 Project Cost Estimation for Recipient Country

Recipient country burden expense becomes about 20,000 EC dollars. The details are described below.

① Emergency exit gate construction (1 place)	
② Boundary fence construction	
③ boundary retaining wall construction	
Total	20,000 EC$

Furthermore, total of 112,400 EC $/month in personnel expense 37,700 EC $/month, electricity water supply expense 39,300 EC $/month, machine maintenance repair expense 35,400 EC $/month become needed as the maintenance cost.

3-3 Operations and Maintenance Plan

(1) Operating Organization and Staffing Plan

The Fisheries Center will be operated by the corporative organization including DEXIA, Fisheries Corporation and Retail Sellers under the reviewed by the Government of Dominica. Other facilities will be operated by the Fisheries Development Division of the Ministry of Agriculture, Planning and Environment as same manner as original plan. The staffing plan is shown below.

1) Staffing Plan of Administration, Research & Development and Extension Services under the Fishery Development Division

*Fisheries Development Advisor	1
*Senior Fisheries Officer	1
*Fisheries Officers	2
*Fisheries Extension Officers	5

*Statisticians	3
*Laboratory Staff	3
*Mechanics	3
*Accountant/ General Affairs	2
*Laborers	3

2) Staffing Plan of Dish Marketing

Table-3-3 (1) Staffing Plan of Dish Marketing

Position	Number of Staff	Duties
Market Manager	1	General management
Accountant	1	Data collecting & Collection of the charge of facilities
Mechanics	3	Maintenance of ice-making plant and refrigeration equipment
Fish Handling Staff	8	Weighing, washing and sorting of catch fish
Fish Collecting Staff	8	Collection of catch fish from other fishing villages
Part-Time Workers	8	Fish filleting work

(2) Operating Income and Expenditure Plan

The Project Facilities is possible to operate with a self-accounting system that was planned at the original plan. Because the Fisheries Development Division budgets the salaries of the Fisheries Development Division's staff, the cost of research and development and the extension of fisheries work etc. The necessary cost of operation and maintenance are as shown below.

Personnel Cost: EC$37,700 per month
(Permanent Staff; 4, Operating Staff; 24)

Utility Cost: EC$39,300 per month
(Electricity; 57,600KW, Water; 1,200m^3, Gasoline; 4kl)

Maintenance and Repair Cost: EC$35,400 per month
(Maintenance and Repair; EC$31,250, other cost; EC$4,150)

Total EC$112,400 per month

Table-3-3 (2) Operating Income and Expenditure Plan

Expenditure		Operating Income	
Personnel Cost (Permanent Staff; 4, Operating Staff; 24)	EC$37,700 per month	Sales of Ice (Unit Price of Ice 1EC$/lb)	EC$555,555 per month
Utility Cost (Electricity; 57,600KW, Water; 1,200m^3, Gasoline; 4kl)	EC$39,300 per month	Charges for Custody of the fish (1EC$/kg for 15days)	EC$49,280 per month
Maintenance and Repair Cost (Maintenance and Repair; EC$31,250, other cost; EC$4,150)	EC$35,400 per month		
Total of Expenditure	EC$112,400 per month	Total of Operating Income	EC$604,835 per month
Benefit			EC$492,435 per month

Otherwise, it is possible to accumulate the sand at the mouth of mooring area and channel and slipway. The maintenance dredging is necessary under the jointly works with the Ministry of Communication, Works and Housing.

Chapter 4 Project Evaluation and Recommendations

Chapter 4 Project Evaluation and Recommendations

4-1 Project Effect

The request made by the Dominica is to rehabilitate the suffered facilities and equipments that are Fisheries Center, Submerged Groin of North Breakwater, Parapet wall with Gates on the Landing Wharf, Slipway and Equipments in the Fisheries Center.

However, it is necessary to improve the foot area of west breakwater and landing wharf because, those conditions are switched to weaker resistance force for sliding according to the field survey. It is identified to be impossible to rehabilitate the parapet wall with gate because this faces directly to Caribbean Sea and so the shock wave attacks this directly. It is planned that the multiple protection system with the parapet wall and the over floodwater catching basin is effective protection for the Fisheries Center which is core facility of Roseau Fisheries Complex from the severe shock wave attack. The parapet wall is the first protection line but, it may be enough to protect the wave and so the basin together with the parapet wall and the building of Fishery Center can be effective system as multiple protections. The sidewall of building will be improved for protecting the over floodwater. The floor of Fisheries Center will be leveled 20cm up and the basement of refrigerators will be 40cm up for protecting the over flood. This is also effective for usage of inside facilities.

The improvement plan of slipway is the settlement of breakwater and the rehabilitation toward the Ferry Terminal. The role of breakwater is to reduce the wave energy. The running up wave on the slipway will be reduced and the boat-stored area will be provided.

All entrances on the west side of Fisheries Center will be closed. The entrances will be switched to the south. The facilities and equipments inside the Fisheries Center will be rehabilitated and/or improved as a same grade and/or higher specifications. The refrigerator will be improved the wider range of temperature of 0° to –20° C. The emergency generator will be improved the distribution panel which is possible to supply the power to the laboratory for back up. The capacity is same as existing generator, 70KVA. The protection wall will be placed to the cooling towers, the incinerator and the fish mill plant on the northern part of Fisheries Center.

For promotion of the fisheries sector under the development policies for diversifying the primary industry, Roseau Fisheries Complex has important roles as a core facility for contributing to priority issues of enhancing fish landing, marketing and supporting of fishing activities. With this effect, it is anticipated that the Project will

contribute to operations at Roseau Fisheries Complex and the promotion of fisheries in Dominica.

In addition to above, the implementation of the Project under the Grant Aid Scheme of Japan is also considered to appropriate in the following point of views.

① The direct benefit of the Roseau Fisheries Complex is not only limited to the fishermen in the Project site, but all fishermen in Dominica through the collecting their catch to the Complex.
② Roseau Fisheries Complex is not a profit-making facility, but a public service facility since fishermen, fish-vender and consumers utilize it in general.
③ The Project will not make any impacts or affects on the surrounding natural and social environment.

4-2 Recommendations

Roseau Fisheries Complex will wholly function due to implementation of the Project. In order to realize the effect, it is necessary for consideration to be given to the followings in addition to the implementation of the Project.

① Prevention of Risk during Anomalous Condition
It is impossible to deal with the effects of hurricane or anomalous conditions and waves of long period waves. It is necessary to suspend the usage of the mooring area and slipway, and to evacuate fishing boats to other safety places for avoiding suffering from the anomalous conditions.
② Necessity of Maintenance Dredging
It is predicted that the sand around the mouth of mooring area and channel and slipway are accumulated. Maintenance dredging of said area is still necessary under the assistance of Ministry of Communications, Works and Housing.
③ Necessity of Maintenance Management
In the view of keeping the function of Roseau Fisheries Complex, it is essential that the building facilities and equipments such as bits on wharves and pumps, the incinerator, fish-waste disposal unit and pipes/ cable-supports, etc. are maintained with necessary measures such as rust removal and painting etc.