approximately 180° in accordance with the ebb tide, thus in the present state, the bottom sediment is stable since a structure for disturbing the current does not exist. Furthermore, as confirmed by the results of a diving investigation, the plant life of the sea bottom is also extremely stable.

However, seaside of the beach line (the boundary line dividing the sea and land, normally the C.D.L. ± 0 line) at both sites reclaimed in at a width (B). Thus, or of both sides of the landfill area on the scaled L = 1 x B anticipate the accumulation of sea sand due to movement of the bottom sediment, and the landfill area must be selected so as to minimize the effect on the facilities existing in the surrounding area.

8) Foundation conditions

The nature of the soil which forms the foundation is similar at both sides of Paget Farm and Clifton. However in the case of Paget Farm, coral clumps with a particle size of approximately 50cm are not only present at the surface, but are scattered underneath the surface as well. In the case of Clifton, a solid coral layer having a thickness of approximately 1m exists near the beach line.

The surface layer of both areas consists completely of fine coral crushed sand, while the lower layer includes a 10% silt/clay mixture: the N value does not exceed 10 - 15. The surface layer's thickness measures 15 - 18m at Clifton, and 3.5~14.5m at Paget Farm.

Foundations in which the N value exceeds 50 exist at both sites usually as solidified coral crushed sand, with a portion of silt/clay/stone also mixed in.

In consideration of the above mentioned conditions for the nature of the soil, light-weight, pile supported civil structures were deemed more appropriate than the gravity-type structures. However, the specific details for the different types of facilities will be studied hereafter.

4-1-3 Examination of the projected standard of the structures

Since technical standards do not exist in the country of St. Vincent, current international technical standards shall be applied.

In this country, normally the BS and ASTM standards are applied, in regards to steel and concrete materials. The present project adopts these standards as well as following standards which are equivalent to the aforementioned.

a. Fishery harbor structure's standard design method : National Fishery and Harbors Association., Inc.

b. Road paving practice : Japan Road Association

c. Soil test method : Japan Soil Engineering Association

d. Concrete standard specification : Japan Civil Engineering Society

e. Japanese Industrial Standard (JIS): Japan Standards Association

f. Road bridge specification and description : Japan Road Association

g. CUBIC

4-1-4 Projected conditions of the facilities and equipment

1) General facilities

In regards to the construction administration of the country in question, the Central Planning Agency performs generalizations, and it will be necessary to obtain authorization such as construction confirmation and the like. The present project is sponsored by the Ministry of Agriculture and the Ministry of Industrial Labor, however, the Central Planning Agency (CPA) is directing the entire project within the country. In addition, the technical standard will be based on both the Caribbean code existing within the region and the US. standard.

2) Disaster resistance

Project facilities will be required which will be sufficiently safe even in the event of a hurricane or concentrated heavy rains.

3) Drainage supply

Since the site is unequipped with public service waterworks, it will be necessary to use either rainwater or sea water as the water source. Similarly, storage tanks for rainwater, collection wells for sea water, etc. will also be necessary.

Since there are no public sewage pipes, currently, drainage is simply discharged naturally into the Sea. In the present project, a system will be adopted which utilizes excrement purification chambers and osmotic tubes, so that the drainage will not be directly discharged into the sea.

4) Electrical power

The electrical power currently in use is 440V/240V, 50Hz and is supplied by VINLEC (St. Vincent Electrical Company). In the project area, there exists a possibility of servicing electrical power of 11KV. IEC (International Electrical Comittie) will serve as the applicable standard. Due to the isolated nature of the outlying islands, times of electrical power failure will occur, thus an emergency power source will be necessary for the Refrigerator of Fish.

5) Wireless telephone

Presently, the Fisheries Division employs wireless telephones to maintain contact with each of the Fisheries branch offices on the outlying islands. Therefore, the present Center will also be equipped with similar facilities.

In order to establish the scale of the facilities, in regards to the engineering, items such as the fishing boats that will use the facilities as well as the number of user fishing boats will be established. In regards to equipment, it is estimated that the scale will include devices such as ice-machine, Refrigerator.

4-2 Design Standard of Civil Engineering

4-2-1 Boats which will utilize the facilities

1) Small-sized fishing boats

Although the fishing method and number of crew may vary, these small-sized fishing boats can be divided into two basic categories. The smaller of the two categories includes boats such as the double-enders and pirogues with an average boat length of 3.5~5.0m, and a draft of 0.4~0.6m. The larger boats are usually referred to as canoes or launches which have an average boat length of 6.0~8.0m, and a draft of approximately 0.6~0.8m. In the present project, these fishing boats will be treated collectively as small-sized fishing boats, the projected conditions of which will be established as follows.

Average boat length = 6.0m; average boat width = 1.4m; average draft = 0.8m; and average berth length = 8.0m.

2) Medium-sized fishing boats

Last year, 12m FRP type boats were provided by Japan as part of equipment aid, and there exists a plan to station one of these boats in the area. Additionally, longliners of approximately the same class will make port from Barbados and Grenada as well.

The projected conditions establish a boat length of 12.7m, a boat width of 3.35m, an average draft of 2.5m, and a berth length of 15.0m.

3) Fish transport boats

Currently these boats serve as trading vessels for exporting fish to Martinique. The distribution channel for fish exportation is highly regarded in the present project, and thus these boats are an object of the project. These boats are referred to as schooners and have an average boat length of 16.0~18.0m and a draft of approximately 2.0~2.5m.

In the present project, the projected conditions establish an average boat length of 18.0m, an average boat width of 4.5m, an average draft of 2.5m, and an average berth length of 20.0m.

4-2-2 Estimate of the number of fishing boats

Together with the maintenance of the present facilities, it is anticipated that the scale and operational efficiency of the fishing boats will be increased, resulting in a similar increase in the catch. The estimates will be performed based on the number of fishing boats counted in the upcoming investigation.

Furthermore, consideration will be given to secure private berths for medium-sized fishing boats and fish transport boats (schooners).

1) Assessment of the separate facilities required for each project area

a. Paget Farm, Bequia Island

The number of fishing boats registered in the region is 78, all of which are small-sized ishing boats. In the present project area, the number of fishing boats on a standard day is selected below.

Total number of fishing boats on a standard day at Paget Farm, Bequia Island

Units: boats per day

Purpose	Target boats	Vessel count	Notes
Unloading wharf	Small-sized fishing boats	39	The boats count of 39 is one-half of the number of registered boats (78)
Preparatory wharf	Small-sized fishing boats	19	The boats count of 19 is one-fourth of the number of registered boats (78)
Rest wharf	Small-sized fishing boats	19	Similar to the preparatory wharf, 19 boats will use this landing
Private wharf	Medium-sized fishing boats	1	Long line boat provided by Japan with a length of 12.75m
Private wharf	Medium-sized transport boat	1	Fish transport boat for exportation with a length of 18.0m

2) Assessment of the required length for the mooring facilities

(1) Required length of the moorings for fish unloading

Water depth	Classifi-cation of user boats	Berth length (m) ①	No. of user boats ②	Usage time (H) ③	Usage time per boat (H) ④	Rotating number ⑤= ③÷④	Required berth number ⑥=②÷⑤ Integral	Real	Required length (m)
-1.0m ~ -2.0m or less	Small-sized fishing boats	8	39	4	0.2	20	1.95	2.0	16
Total			39				2.0		16

(2) Required length of the moorings for preparations

Water depth	Classification of user boats	Berth length (m) ①	Number of user boats ②	Usage time (H) ③	Usage time per boat (H) ④	Rotating number ⑤= ③÷④	Required berth number ⑥=②÷⑤ Integral	Real	Required length (m)
-1.0m ~ -2.0m or less	Small-sized fishing boats	8	19	8	0.3	27	0.70	1.0	8
Total			19				1.0		8

(3) Required length of the moorings for rest use (requires length of the boat landing)

Water depth	No. of boats ①	Fishing boat width (m) ②	Margin (m) ③	Average boat width (m) ④=②+③	Required length (m) ⑤=①X④	Length (m) upper than H.W.L. ⑥	Required area (m^2) ⑦=⑤X⑥
Upwards of -1.0m ~ -2.0m or less	19	1.2	0.6	1.8	34.2	7	239.4
Total	19				34.2		240.0

Round up

3) Clifton, Union Island

The number of fishing boats registered by people engaged in full-time fishing is 33, all of which are small-sized fishing boats. In addition, when including the fishing boats used by those engaged in part-time fishing, the total fishing fleet numbers is approximately 80 or more. Since the fishing market is not existing in the region at this moment, when compared to Paget

Farm, the percentage of fishermen who will utilize the present project is relatively high. The number of fishing boats which will use the facilities is selected in the following.
Total number of user fishing boats on a standard day at Clifton, Union Island

Units : boats per day

Purpose	Target boat	Vessel count	Notes
Unloading wharf	Small-sized fishing boats	33	The boats count of 33 reflects the number of fishing boats of full-time fishermen of the island
Preparatory wharf	Small-sized fishing boats	16	The boat count of 16 reflects the number of fishinb boats in the region surounding the project site

Purpose	Target boat	Boat count	Notes
Rest wharf	Small-sized fishing boats	16	The boat count of 16 reflects the number of fishing boat in the region surrounding the project site
Private wharf	Medium-sized fishing boats	1	Long line boat provided by Japan with a length of 12.75m
Private wharf	Medium-sized transport boat	1	Fish trasnport boat for exportation with a length of 18.0m. Furthermore, boat landings for fishing boats that are idle and/or undergoing reparis will also be constructed

4) Assessment of the required length for the mooring facilities

(1) Required length of moorings for fish unloading

Water depth	Classi-fication of boat	Berth length (m) ①	Number of user boat ②	Usage time (H) ③	Usage time per boat (H) ④	Rotating number ⑤=③÷④	Required berth number ⑥=②÷⑤ Integral	Real	Required length (m)
-1.0m ~ -2.0m or less	Small-sized fishing boats	8	33	4	0.2	20	1.65	2.0	16
Total			33				2.0		16

(2) Required length of the moorings for preparations

Water depth	Classi-fication of boat	Berth length (m) ①	Numbe r of user boats ②	Usage time (H) ③	Usage time per boat (H) ④	Rotating number ⑤=③÷④	Required berth number ⑥=②÷⑤ Integral	Real	Required length (m)
-1.0m ~ -2.0m or less	Small-sized fishing boats	8	16	8	0.3	27	0.59	1.0	8
Total			16				1.0		8

(3) Required length of the boat landing

Water depth	No. of user boats ①	Fishing boat width (m) ②	Margin (m) ③	Ave. boat width (m) ④=②+③	Required length (m) ⑤=①x④	Length (m) upper than H.W.L. ⑥	Required area (m^2) ⑦=⑤x⑥
Upwards of -1.0m ~ -2.0m or less	16	1.2	0.6	1.8	28.8	7	201.6
Total	16				28.8		202

Round up

The quantities of the separate facilities required for each project area are as shown below.

	Paget Farm	Clifton	Notes
Unloading wharf	16m	16m	Small-sized boats targeted
Fishing provisions	8m	8m	Small-sized boats targeted
Subtotal	24m	39m	
Ship landing (Slip way)	240m²	202m²	For use during repairs or when rest
Private wharf	35m	35m	Medium sized fishing boat and fish transport boat

4-2-3 Ice-making facilities

Since both project areas are not equipped with city water piping, it will be necessary to use rainwater as the water source. The rainwater will be collected on the roofs of the buildings and stored in underground tanks so that pure water may be used in the dry season as well.

The operation and management of an ice-making system is simple, and consideration will be given to introduce a system which can make ice in response to the demand.

The ice will be used mainly for the following:

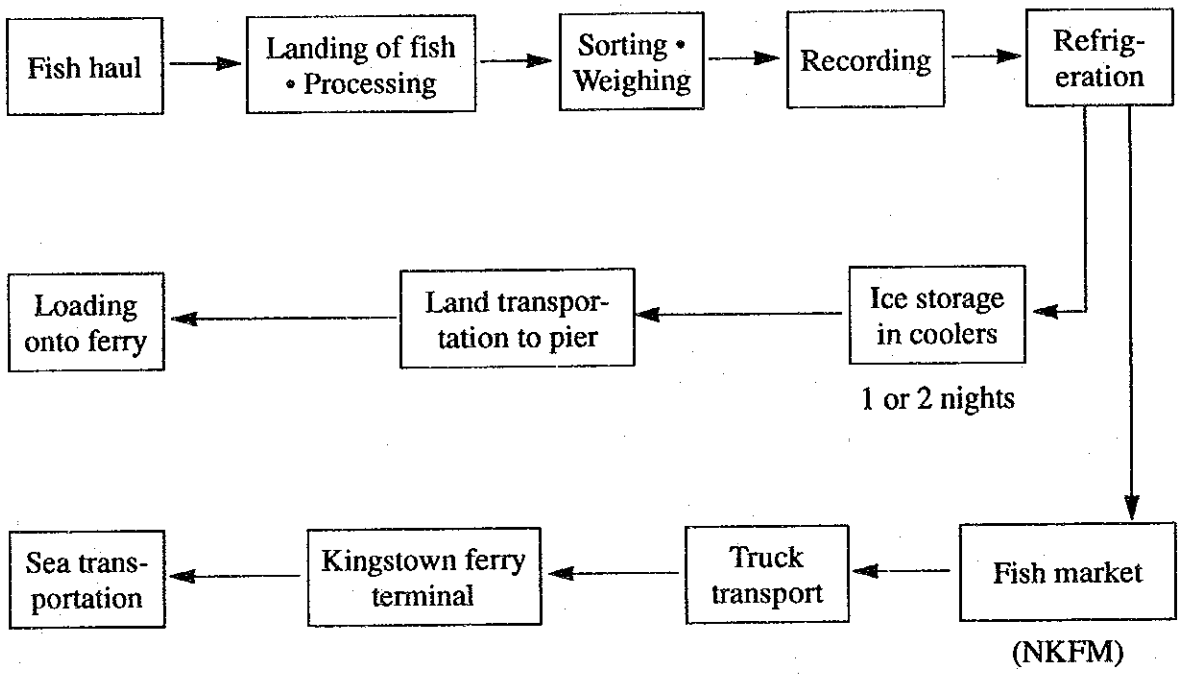
a. Transportation of fish to Kingstown

b. Storage preservation on fish transport boats

c. Fish retail sale

d. General use (yacht tourists cold storage)

As a matter of highest priority, the transportation of fish to Kingstown was designed by the Center's operations to flow as follows.



In the project, approximately 122 tons of fish per year will be sent to Kingstown from Paget Farm, and about 100 tons of fish per year will be sent from Clifton. Consequently, at the time of transporting the fish, an equivalent amount of ice will also be used:

Amount of ice used	Paget Farm	122 tons
	Clifton	100 tons

Until now, the fish transportation boats have been able to purchase and load the ice used for exporting the fish en route at Martinique and Kingstown, however, if production of the ice is performed at a nearby collecting area, the ice purchased at the Center will also increase. It is anticipated that the exportation amount will increase at Paget Farm by approximately 250 tons a year, and increase at Clifton by approximately 220 tons a year. Consequently, it has been established that production of the entire amount of ice necessary to meet the increase in the

exportation amount at Paget Farm, and one-half the necessary amount at Clifton will be undertaken.

Paget Farm	250 tons/year
Clifton	110 tons/year

In order to meet the aforementioned necessary amounts of ice, the following calculations were performed:

Paget Farm	372 tons/200/day = 1.86 = 2.0 tons/day
Clifton	220 tons/200/day = 1.1 = 1.0 tons/day

Consequently, the capacity to produce 2 tons of ice per day at Paget Farm, and 1 ton of ice per day at Clifton will be developed.

4-2-4 Refrigerator

The refrigerator at the Fisheries Center will be used for the following purposes:

a. Temporary storage while awaiting ferry transportation to the Kingstown fish market

b. Temporary storage while awaiting the arrival of the fish transport boats used in exportation

c. Temporary storage of fish for retail sale in the locale people

The required temperature of the refrigerator in order to keep the fish fresh for distribution will be 0° - -5°C. In the case when freezing is necessary, the blast freezer at the Kingstown fish market will be utilized. The capacity of the refrigerator will be designed by estimating the transportation frequency of the ferry and the approximate landing of fish that the fishermen bring in for storage in a span 2 or 3 days.

(1) Paget Farm

25kg/day/boat X 76 boats X 0.8 (availability factor) X 2 day span = 3,000kg

(2) Clifton

25kg/day/boat X 33 boats X 0.8 (availability factor) X 3 day span = 2,000kg

In addition, the maximum amount of pelagic fish i.e.. mackerel, jacks, etc. which can be taken in at a single time using haul nets at both sites is approximately 2 to 5 tons.

If, for example, at the time of stocking 1 ~2 days worth of fish in the refrigerator, even when stacking the catch brought in by the haul nets, assuming an effective stowage factor of 50%, calculation of the floor area works out as follows:

5 tons (amount of fish)/0.5 (stowage factor) = $10m^2$

Consequently, a floor area of $10m^2$ will be planned.
Principal items of the refrigerator (same for both Paget Farm and Clifton):

Model	: Insulated prefabricated-type
Refrigerant	: R-22
Cooling unit	: Independent, air-cooled type, electric driven type, hermetic type compressor
Compressor capacity	: 3KW
Floor area	: Approx. $10m^2$
Stock volume	: Approx. $20m^3$
Ambient temperature	: 40°C
Accessories	: 2 sets of fish shelves, inside lighting :2 x 20W lights

4-2-5 Fuel supply facilities

Gasoline will be sold for use in the outboard motors of the local small-sized fishing boats that will utilize the Fishery Center. The oil-feeding machine will include a dispenser, and for the purpose of safety, an underground-type storage tank will be utilized. The number of fishing boats to be fueled corresponds to the number of fishing boats with fishing provisions, and the reserve amount was determined by taking into account the contact with the main island.

1) Paget Farm

   30l /boat X 19 boats X 4 day allowance = 2,280l = 2kl

2) Clifton

   30l /boat X 16 boats X 6 day allowance = 2,880l = 3kl

4-3 Basic plan

4-3-1 Site plan

The sites was selected as described above so that the required facilities for each site would be properly arranged within the area provided. In addition, consideration was given in order to secure the necessary land area for the requested construction facilities, and also to clear the restricting factors in the surrounding areas.

Furthermore, in regards to the required height of the reclaimed sites, appropriate values were assigned by taking into account the existing conditions of similar structures in the surrounding areas and the structures of the fishing boats which will utilize the facilities of the present project, in addition to the natural conditions (tide level, wave height, water level rise) at the sites.

In addition, the construction work attributed to the reclamation of the site itself shall be carried out by St. Vincent thus consideration was given so that the extent of the preceding construction work, (1) transport/temporarily laying of the earth for the landfill into the site, and (2) placement of a temporary slope protecting stone around the perimeter of the fill-in land (rip rap slope) would not become an obstacle to the actual construction work (shore protection around the perimeter of the landfill/retaining wall construction work, housing construction within the site, site preparation) to be performed by the contractor selected through the bidding.

1) Paget Farm, Bequia Island

In the request, a site was selected midway between the end of the airport and the pier. However, it was determined from the results of the investigation of this site , that even when selecting a site closer to the pier, it would be difficult to meet the height restriction (75 feet or less = 23m, even when close to the pier) of the airport flying zone. Therefore, a site was selected which lies on the eastern side of the pier, where the height restriction is more lenient (height restriction = 100 feet or less = 30m, approximately 700m from the east end of the runway). A location has been selected which lies on a predetermined distance (- 70m) from the pier so that the project site will not hinder use of the existing pier. In addition, a road connecting the site and the existing road will be created on the sea side of the shore line. Furthermore, in regards to the project site, there exists steep slope north of the site and during rainfall it is anticipated that a large amount of rainwater will erode the slope area below the

road, thus in order for this rainwater to flow naturally out to sea, the land will be reclaimed, leaving a fixed spacing (- 5m) from the shore line.

Additionally, due to the maximum waves occurring at a frequency of once every one year with a wave direction/wave height of SE/1.2m, SSW/1.1m, and SW/0.7m, a wave-breaking shore protection will be arranged on the eastern side of the site, and a breakwater will be constructed at the eastern tip of the reclaimed site.
Mainly, by the requirement of on land facilities, the shape, structure and scale of the site is decided as 50m X 70m.

As a result, approximately 50m length of the wharves (depth = 2.5m) for medium-sized boats, and approximately 10m for the wharves for small-sized boats, will be arranged. The length of the silpway for pulling up small-sized boats (grade = 1/7, frontal water depth C.D.L. of - 0.5m) will be 35m. There are no protection against the maximum waves (SE/1.6m and SSW - SW/2.20m) striking from the SSW - SW direction which occur at a frequency of once every twenty years. Thus during such emergency time, the medium-sized boats will be evacuated to the opposite side of the island or to Port Elizabeth. It will also be necessary to pay precautionary countermeasures for pulling up and fixing down the small-sized boats at the site. Taking into consideration the calculations below, occurring, a height of 1.5m was selected for the top level of the wharf apron which will allow flooding to occur once every twenty years, while, in order to prevent flooding, a height of 2.0m was selected for the surface level of both the prepared land of the site onto which the on shore facilities will be established, and the boat landing area above the slipway.

Maximum tide level (C.D.L. + 0.73m) + maximum suction height (50cm) = C.D.L. + 1.23m - maximum tide level + maximum wave height X 1/2 (= 2.2m/2 = 1.1m) = 1.83m
The maximum height of the wharf and the breakwater is decided as CDL +3.0m based on the above mentioned natural condition and "Fishing port standard of Japan"

2) Clifton, Union Island

In the request, the site was to be arranged midway between the Anchorage Hotel and the public pier (distance 250m). However, it was discovered from the results of the site investigation of the actual locale that the area close to the existing public pier is owned by government land, thus the mooring facilities for the fishing boats will be arranged in front of this government land.

In this case, the lateral face of the existing fill-in land (at the tip, the interval with the pier is approximately 20 meters) will act as a boundary so that use of the pier is not hindered on the western side of the site. The length and location of the site front were selected as in the arrangement plan, taking into consideration the required water depth (C.D.L. - 0.5m) of the slipway for the small-sized boats, as well as the required length and area for the boat landing.

In this manner, the front end of the medium-sized boat pier (length = 30m) will protrude a distance further out into the open sea than the existing pier. However, when considering the 10m extension plan of the existing pier, these two structures will be positioned almost parallel to each other.

In addition, as the sea side portion of the site will be prepared as a landfill, the narrow sandy beach (currently being used as a walkway) between the beach line and the existing stone wall will be interrupted. However, this part of area will be divided into a sea side/shore side, and will be opened up as a passageway. The on shore facilities will mainly be arranged on the shore side of the government land.

In regards to the level height of the site, as the height of the maximum waves(Hs) occurring once every twenty years is approximately 1.0m, and thus when considering the calculations below, a height which will prevent flooding (1.5m +) is sufficient for the seashore landfill site. However, in taking into consideration conformity with the surrounding foundations (2.0m +), a height of 2.0m was determined for the government land.

Maximum tide level (C.D.L. + 0.73m) + maximum suction height (0.5m) = C.D.L. + 1.23m ~ maximum tide level (0.73m) + maximum wave height X 1/2 = C.D.L. + 1.23m

On the other hand, a level height of 1.5 m, slightly less than that of the existing public pier (1.87m), was selected for the pier to be utilized by medium-sized boats, and the same height (1.5m) was also chosen for the small-sized boats landing area.

4-3-2 Plan for civil engineering facilities

1) Breakwater

As stated in the aforementioned, in regards to the foundation conditions of the Paget Farm site, the surface layer is weak with an N value of 10 or less, and a bearing capacity of greater than 10t/m^2 cannot be expected. As a result, a light-weight vertical embankment structure (cellular block, sheet pile, etc.) is more desirable than a gravity-type structure. However, since

the cost of construction for this type of structure is over two times as great, a decision was made to choose the optimal form, from among the gravity-type structures, taking into consideration the cost of construction, operation and utilization.

In Table 4-3, a comparative study of the various gravity-type breakwater structures satisfying to the foundation conditions of the site has been summarized. Consequently, it was determined that in terms of the cost of construction and utilization, an inclined stone embanking breakwater structure that use most of local material would be optimal in the case of the present site.

Table 4-3 Type comparison of various breakwater

[water depth CDL = - 3.0m]

		Inclined embankment	Vertical embankment	
1) Structural elements		Rip rap, covered stone, coping block	Non-permeable type Rubble mound, cellular block	Permeable type Rubble mound, Vertical block
2) Q'ty of material (per +1.0m extension)	Rip rap	48m³	25m³	14m³
	Cover stone	17m³/2tons 7.2m³/500kg 5.0m³/	2m³/500kg	2m³/500kg
	Concrete	4.8m³	6.7m³	9m³
3) Comparison of construction cost	Index	90	100	100
	Actual locale procurement portion	90%	60%	60%
4) Characteristics of construction method		Possibility of on shore work depending on the temporary fill-in embankment	Sea construction, crane boats, and platform barge are required.	
(Foundation bearing power)		10t/m² or greater	10t/m² or greater	10t/m² or greater
5) Utilization characteristics		Possibility of reflected wave within the harbor is moderate	Possibility of reflected wave within the harbor is large	Possibility of a transmitted wave is moderate, but the possibility of a reflected wave within the harbor is small

The vertical height was calculated using fishing port standards as follows :

High water level (C.D.L. + 0.73m) + (= 1.0H = 1.0 x 2.2m) = 2.93m - 3.0m

Table 4-4 Required weight of the covered stone (KD = 3/5)

Water depth HD (m)		W (ton)		
		Cot 2 = 1.0	1.5	2.0
3m or less	1.5m	0.93/0.56	0.62/0.37	0.47/0.28
4 - 6m	2.2n	2.97/1.79	1.98/1.19	1.49/0.90

KD = 5 ; Damage ratio 1 ~ 5%
7.5 ; Damage ratio 5 ~ 15%

The required weight of both the cover stone and the vertical block were estimated by using the "fishing port standard" as shown in Table 4-4. The weight of the crest portions of the cover stone as well as the vertical block will need to be 1.5 times the calculated value.

(2) Mooring wharf

As the mooring wharf at Paget Farm, due to the weak surface layer of the foundation, a heavy structure is inappropriate. Three types of wharves comprising of light-weight structures applicable to the present site are comparatively examined and the results are summarized in Table 4-5.

The results reveal that in terms of constructional cost, the sheet pile/Pile supported pier is the most economical, while in terms of time, the sheet pile requires the shortest construction period. In addition, the execution of the sheet pile is simple and various sheet pile structures exist inside the country (e.g. the dry dock near Kingstown, etc.), thus a decision was made to use this sheet pile structure.

In terms of the durability, the steel sheet pile is inferior to a durable concrete structure, however, by compensating the corrosion by increasing thickness 0.3mm (submerged portion higher), 30 years x 0.1mm/year), and applying a heavy anti-corrosion coat at a level greater than H.W.L., the durability can be maintained for 20 years or more.

The required water depth in front of the mooring wharf was estimated as follows from the draft of the user fishing boats in accordance with the "fishing port standard".

Fishing boat type	Water depth	Top level vertical height
Medium-sized boat	C.D.L. -2.5m	+1.5m
Small-sized boat	C.D.L. -0.5m	+1.0m - 1.5m

Table 4-5 Type comparison of mooring wharf

[Established water depth : C.D.L. = -2.5m]

		Vertical wharf		Fence-type pier + inclined shore protection
		Self-contained sheet pile type	Gravity-type	Post pier Rip rap, covered stone
1) Structural elements		Sheet pile, back-fill stone	Cellular block Deformed block Basic rip rap	Covered stone 4.3m³ Back-fill, rip rap 12.5m³
2) Q'ty of material (per + 1m extension)	Stone	Coated stone 2m³ Back-fill, rip rap 7.6m³	Covered stone 1.5m³/1.5m³ Back-fill, rip rap 23m³/15m³	Reinforcing steel 0.52 ton
	Steel	1.35 ton (+3mm heavy corrosion protection)	Reinforcing steel 0.54 ton/1.08 ton	2m³/500g
	Concrete	1.6m³	3m³/6m³	2.6m³
3) Construction cost	Index	100	80	120
	Actual locale procurement comparison	30%	60%	60%
4) Characteristics of construction method		Possibility of on land work/in both cases, a crane (truck) with a 10 ton lifting capacity is required. Time of construction is short (1 month), Time of construction is long (3 - 4 months)		
(Foundation characteristics)		Bearing power 10T/m²	Solid block 20T/m² Cell, deformed 10T/m²	Bearing power 20T/m² or greater
5) Utilization characteristics		Possiblity of reflected wave within the harbor is large. Durability is 20 years or more taking into account the corrosion time and corrosion protection.	Excluding deformed block, the possibility of reflected wave within the harbor is large. Durability is 50 years or more.	Possibility of a reflected wave is moderate. Easy damaged during stormy weather.

Additionally, in regards to the Top level height of the wharf, a height (high water level X maximum wave height X 1/2) was selected which will allow flooding caused by the maximum waves (height = 2.2m/Paget Farm, 1.0m/Clifton) striking the project site once every twenty years, while preventing flooding caused by the maximum waves (height = 1.2m/Paget Farm, 0.6m/Clifton) occurring once every year. In the case of Paget Farm, when considering the freeboard height (50cm) of the small-sized boats, the height of the wharf level for small-sized boats use is excessive, thus it will be necessary to arrange horizontally, in which the wood fenders, creating a staircase structure.

3) Boat landing and slip way

The water depth in front of the boat slip way was determined to be 50cm using "Fishing port standards": C.D.L. + M.S.L. + draft = 0.3 + (-0.8) = 0.5m = 50cm. In addition, it was determined that the top height of the slipway slope, estimated by using the "standard" H.W.L. + 2H = C.D.L. + 0.73m + 2 X (0.7m/p, 0.6m/C) = C.D.L.+ (2.13m/Paget Farm, 1.93m/Clifton), would be excessively high based on annual occurring maximum waves, thus in the project, a vertical height of C.D.L. + (2.0m/Paget Farm, 1.5m/Clifton) was selected. Similarly, a decision was made to pull the small-sized boats up to the slipway and fix them there during the storms which occur several times every year. In order to make the operation of pulling the small-sized boats up to the slipway possible by human power, a grade of 1/7 was selected for the slipway.

4) Pier

Since the water in front of the Clifton site is shallow, it will be necessary to place the mooring pier off the coast to allow the medium-sized boats access to the moorings. In addition, as the surface layer of the weak sandy foundation has an N value of 5 or less and a large layer thickness of 20m, thus a gravity-type mooring pier would be inappropriate. The existing piers in the vicinity, is a post-type structure, while the pier at the Anchorage Hotel for yacht use is a pontoon type pier which utilizes a simple floating body.

The floating pier is a suitable for weak foundation, and also in the case when the tide difference is large, thus the optimal mooring facilities for small-sized boats. However, anchoring system, either of chain and post is easily inflicted and damaged during stormy weather. Furthermore, for the production of medium-sized floating bodies (manufactured from FRP, concrete or steel), a technology in high level is required which, in the case of St. Vincent, must be manufactured in a foreign country and then imported, resulting is high cost.

Therefore, in consideration of the aforementioned points, a light-weight post-type pier structure was selected.

In this case, most safe way is one in which the post ends are placed deep into the support foundation (approximately 20m deep). However in consideration of the cost, the post lengths were buried just to the required depth necessary to stabilize the mooring pier.
In consideration of the maximum draft (2.5m) of the medium-sized boats, a depth of -3.0m was established as the water depth in front of the pier, while a top level height of C.D.L. + 1.5m was selected by taking into account the "standard" (H.W.L. +0.7m) and the top level height of the existing public pier (+1.87m).

Portions of the pier neighboring the side which possess a shallow water depth, of approximately 10m length, will be utilized for mooring small-sized fishing boats.

5) Landfill shore protection

In order to protect the landfill preparation perimeter of the site, since the bottom sediment at both the Paget Farm and Clifton sites, comprising coral (reef) crushed sand with an individual particle diameter of 0.5~2.4mm, is easily scoured, it will be necessary to construct the rip rap foundation with a sufficient thickness and width in order to prevent this scouring from occurring.

As the eastern shore protection of Paget Farm which is ordinarily exposed to particularly strong winds and waves from the east - southeast direction, will be used a breakwater like structure such as a wave-breaking shore protection.

As the top level height of the wave-breaking shore protection, "fishing port standard", give the value that the high water level equals 0.73m + aHo'. In the case of Paget Farm when the slope of the sea bottom is set to 1/20 and the slope of the wave-breaking revetment is set to 1/1.5, a becomes equivalent to 0.63/beach line - 1.4/water depth of Ho'. Therefore, a height was selected (C.D.L. + 2.93 -> 3.0m) which will prevent entry of the maximum waves (height Ho' = 1.6m) occurring once every 20 years from the SE direction.

In regards to the other perimeter shore protections, those portion possessing a water depth of C.D.L. + 0m or less will employ concrete vertical walls, while other portion possessing a water depth of C.D.L. + 0m or greater will utilize concrete vertical walls/stone masonry vertical walls. It was also determined that covering stone of slope would be sufficient on both sides of the fill-in land to form the access road at Paget Island.

6) Access road

In the case of Clifton, if the height of the site level is arranged to reflect that of the surrounding foundations (+2.0m), an access road for vehicles can be constructed entering into the site at the same level as of the existing road. In regards to the seashore walkway, a difference of 0.5 - 1.0m will be created between the currently existing seashore (+0.5m) and the walkway within the site (+1.5m), thus a slope or staircase will be necessary on one side. In the case of Paget Farm, vehicles will descend from the coastal road to the pier access road, and from the end of this route, a two-lane extension access road measuring approximately 70m, with a 6.0m breath (the width of the road including the shoulders is 8.0m) will be established at the same level (CDL + 2.0m) and will enter into the site at the same height as the site level (+2.0m).

Pedestrians will of course be able to use this vehicle access road, however, a walkway will also be provided which will cross the waterway at the land/site boundary and connect to both a stairway and the access road above the shore side slope of the site. This walkway will also function during stormy weather as an emergency evacuation means.

7) Access road bridge

At Paget Farm, since a drainage gutter, for rainwater from the back mountain crosses the access road, a crossing bridge will be installed to facilitate drainage.

In order to execute the present project, the following civil structures are required.

	Paget Farm	Clifton
1) Breakwater	Composite embankment (+3) m x 20m	———
2) Mooring wharf	Medium-sized boats (-2.5)m x 35m Small-sized boats (-2.5)m x 24m Apron: 7m X 60m	———
3) Ship landing	Slipway: (-0.5m) x 35m (1/7) Shipyard: 7m x 35m	Slipway: (-0.5m) x 30m (1/7) Shipyard: 7m x 30m
4) Pier	———	Post-type: 5m x 30m (+1.5m)
5) Landfill shore protection	Wave-breaking shore protection: (+3m) x 50m Vertical shore protection: 8m + 70m	Vertical shore protection: 2 x 2.5m + 2 x 16m
6) Access	Road: 6m x 70m Walkway: (1) Existing slope	Gate: (1) location Walkway: (Opening)/seashore
7) Access road bridge	Width: 6m; Lenght: 4m	
Site reclamation (Responsibility of St. Vincent)	Landfill : Height (1.5 ~ 2.0m), 50m x 70m	Landfill : Height (1.0 ~ 1.5m), 50m X 16m Government Land:

:

4-3-3 Basic policy of the facility design

The most critical elements on the facility design in this project are securing of water and control of draining. The yearly precipitation of the St. Vincent, main island, is around 2,000mm. However, Bequia Island Paget Farm and Union Island Clifton, sites of the project, have only 1,600mm and 1,000mm, respectively.

Since both islands neither have enough trees to keep rainwater nor public water supply system, each house individually reserve rainwater to secure water for their living. With the project, facilities is so designed that rainwater can be used for ice making and for general living water. Also, in the site of Clifton, since it is surrounded by resort facilities, drained water shall not pollute water quality of the environment.

Since the site of Paget Farm faces to the open sea, facility shall be made strong enough to rough waves and gusty wind. Also, since reclamation area is limited, facilities shall be integrated into one building for efficient use of the site.

In Clifton, the buildings shall be designed so that it is harmonized with surrounding area landscape. The building shall be separated and made compact according to necessary functions and areas and consideration should be given to the appearance such as the shape of the roof and finish of the wall.

Because of high temperature and high humidity during summer, ventilation and blocking of sun light shall be taken into consideration for both sites.

The ceiling of the living space shall be high and transom shall be provided in order to release inside heat. For the working space, just like many other buildings seen in St. Vincent, a ceiling shall not be provided and a ventilating louver. Eaves shall be deep for light blocking and collection of rainwater.

Building materials to be used shall be durable because the sits face to sea and receive spray of waves and salt sea breeze. The pillar, beam and floor which are the main components shall be concrete structure and the wall shall be concrete block structure. The roof shall be wooden framework/bed and to reduce weight and light and durable asphalt single shall be used as finish material.

For equipment and fittings, durable hot-dipped galvanized steel or aluminum shall be used to make buildings maintenance free. Furthermore, consumable and easy-to-be-damaged tools, materials and parts such as the outlet of electricity, fluorescent lamp, glass, etc. shall be local procurement as mush as possible to facilitate maintenance and management.

Incinerator and gasoline tank shall be installed within the sites. The incinerator shall be surrounded by heat-proof partition wall. The gasoline tank shall be ground burial type.
The foundation shall be basically direct foundation. Bearing capacity of soil of both sites is estimated 3.5t/m^2. Since Clifton, especially, is loose land layer and carrying away of the sand under the foundation can be occurred, improving of the ground or use of friction pile should be considered.

Water storage tank

The height water storage tank shall be 3.0m and plain size is 6.0m x 12.0m. The structure shall be reinforced concrete and the foundation is the direct foundation.

4-3-4 Layout and external structure

This fisheries centers are small in scale but need facilities with various functions. And to collect rainwater as water resource by utilizing wide roof, facilities shall not be unified and be dispersed. The center building and processing area shall be arranged at the center and locker and sanitary and other facilities shall be arranged at peripheral area of the site.

Since, the site in Paget Farm is a reclaimed land and is independent from the surrounding environment, the fence won't be built but a gate shall be provided on the boundary between the access road and the site. Trees shall be planted around the building to prevent from sun light, gusty wind and splash of waves.

In the site of Clifton, yachts people who use the pier of Anchorage Yacht Club pass through the site to get to the city. Therefore, pedestrian road shall be provided for their convenience. Taking an environment as a tourist resort area into consideration, low hedge and fence shell be made on the site boundary in order not to disturb the view from the adjacent public road to the shore. However, the cost of the construction of this part shall be borne by the St. Vincent side.

Also, outdoor lighting shell be installed for both sites so that fish transport boats can get into the port and fishermen can work during night.

4-3-5 Building plan for facilities

1) Center building

The main functions of the center building are ice making, preservation of fish, loading, collection of catch data and training for fishermen. In Paget Farm, the building shall be two storied because of the limited space and the 1st floor is for work place and 2nd floor is for the

clerical section. In Clifton, two one-story buildings shall be built because of consideration to the surrounding environment. Building A is for work place and building B is for the office section. The work place shall have loading and unloading space for fish and ice making at the center and has the ice storage, chilling room, fish retail space, office and auxiliary room shall surround it. In the office section, Fisheries Division's office, meeting room, cooperative's office and rest room shall be arranged. Also, for shared space, a warehouse shall be provided for storing fish box and fishing gears.
Size and area of each room are as follows.

Name	Paget Farm	Clifton
Shipping packing space	5.5m x 10.0m	5.5m x 8.0m
Ice storage/chilling room	4.0m x 10.0m	4.0m x 8.0m
Fish retail place		4.0m x 4.0m
Office	2.0m x 5.0m	3.0m x 4.0m
Machine room	4.0m x 5.0m	4.0m x 4.0m
Warehouse and other	26.0m^2	22.0m^2
Fisheries Division's office	5.0m x 7.0m	5.0m x 7.0m
Meeting and training room	4.0m x 5.0m	4.0m x 5.0m
Cooperative's office	4.0m x 5.0m	4.0m x 5.0m

Number of full-time staff shall be 6 people. The effective area of office space excluding corridor shall be 8.5m^2/person.

Machine room shall have a compressor and emergency diesel power generator and the office in the work place shall have a window where people pay fees for ice and use of the center's facilities.

Pillars and beams, major structure, shall be reinforced concert structure. The external wall shall be made of hollow concrete block but the wall facing to the ice storage and cooling space shall be made of screen block for good ventilation in order to release heat and prevent condensation.

2) Locker building

Fishing tools and outboard engines are stored in lockers. The size of a locker is 1.5m x 2.0m. The number of lockers shall be 20 for Paget Farm and 16 for Clifton and these numbers are based on the number of fishermen who could reach to the center on foot. Furthermore, to

collect rainwater, a roof shall cover the whole locker space. Major structure shall be hollow concrete block structure. Upper wall shall be screen block for good ventilation.

3) Toilet/shower building

Fishermen work under strong sun shine during fishing operation. Therefore, shower room and toilet shall be provided for them to wash salt and dirt.

Pillar and beam shall be reinforced create structure and the wall shall be hollow concrete block structure.

4) Fish processing bay

Before bringing the landed fish inside the center, pre-processing such as washing, gutting etc. is necessary. Therefore, a space having sink and processing table shall be provided. Here, sea water will be provided to be used for washing.

5) Diagram of the project

Paget Farm

Landing and carrying out of catch are taken place at the quay in front of the center. Dedicated berth shall be secured for the fish transport boat and FRP long line boat. Two berths shall be used for landing of fish from local fishing boats and one berth for preparation such as fuel, water and ice supplies. For passage way, an concrete apron shall be provided behind the quay.

Clifton

Landing and carrying out of fish are taken place at the pier in front of the center. Because of the depth of the water under the pier, the fish transport boat and FRP long line boat shall use the offshore side and local fishing boats shall use the side near the land. As well as for Paget Farm, two berths shall be secured for landing of fish, one berth for preparation of going out fishing and 6 boats of berth for resting.

6) Diagram of the project

Paget Farm

Landing and carrying out of catch are taken place at the quay in front of the center. Dedicated berth shall be secured for the fish transport boat and FRP long line boat. Tow

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Clifton

Landing and carrying out of fish are taken place at the pier in front of the center. Because of the depth of the water under the pier, the fish transport boat and FRP long line boat shall use the offshore side and local fishing boats shall use the side near the land. As well as for Paget Farm, two berth shall be secured for landing of fish, one berth for preparation of going out fishing and 6 boats of berth for resting.

7) Particulars of the facilities

	Paget Farm	Clifton
• Center building:		A/B building
Reinforced concrete structure	Two story	One story each
Building area	220.0m^2	176.0/100.0m^2
Floor area	385.0m^2	176.0/100.0m^2
Work space	220.0m^2	176.0/ - m^2
Clerical section	165.0m^2	- /100.0m^2
• Locker building:		
Concrete block structure	Both one story	
Building area	60.0m^2	48.0m^2
Floor area	60.0m^2	48.0m^2
• Toilet/shower building:		
Reinforced concrete structure	Both one story	
Building area	28.0m^2	28.0m^2
Floor area	28.0m^2	28.0m^2
• Fish processing area:		
Reinforced concrete structure	Both one story	
Building area	18.0m^2	18.0m^2
Floor area	18.0m^2	18.0m^2

8) Finish for each facility is as follows.

- Exterior finish schedule

Roof	:	Asphalt single on wood frame
External wall	:	Acrylic emulsion paint on fair-faced concrete
		Acrylic emulsion paint on concrete block
		Unglazed tile on concrete block (Clifton center only)
Door and window	:	Steel hanger door, steel door
		Aluminum jalousie
		Aluminum louver
External floor	:	Concrete steel trowel finish

- Interior finish schedule

a. Center building

Work place/fish retail room

Floor	:	Concrete steel trowel finish w/hardner
Wall	:	Emulsion paint on cement mortar steel trowel finish

Tile (fish retail room)

Column	:	Fair-faced concrete
Ceiling	:	Exposed wood roof frame

Storaqe/workshop/power generation room

Floor	:	Cement mortar steel trowel finish w/hardner
Wall	:	Exposed concrete block
Column/beam	:	Fair-faced concrete
Ceiling	:	Fair-faced concrete

Office

Floor	:	Vinyl tile
Wall	:	Emulsion paint on cement mortar steel trowel finish
Ceiling	:	Rockwool board w/wood suspension

Rest room/gallery

Floor	:	Ceramic tile on cement mortar
Wall	:	Ceramic tile on cement mortar
Ceiling	:	Vinyl paint on plywood

b. Locker/storage building

Floor : Cement mortar steel trowel w/hardner
Wall : Exosed concrete block
Column/beam : Exposed wood roof frame

c. Toilet and shower room building

Floor : Cement mortar steel trowel w/hardner
Wall : Ceramic tile on cement mortar
Pillar/beam : Emulsion paint on fair-faced concrete
Ceiling : Exposed wood roof frame

d. Fish processing area

Floor : Concrete steel trowel finish
Column/beam : Fair-faced concrete
Ceiling : Exposed wood roof frame
Sink/work table : Concrete w/ceramic tile finish

4-3-6 Facilities plan

1) Water supply system

Since there is no city water supply system, rainwater will be used as the same as other island's house. Rainwater will be used for ice making, drink, washing and shower. Sea water will be used to wash fish to reduce the consumption of freshwater.

Estimated amount of water supply

[Paget Farm]

Utilization of rainwater	Amount used/day
• Ice making	2,000 l
• Fisheries center building (5 people/50 l)	250 l
• Welfare building (40 people x 50 l x 7 days/months ÷ 30 days) = 466.7	470 l
	2,720 l/day

Utilization of sea water

• Fish processing/washing (4 faucets x 600 l/hour x 5 hours)	12,000 l/day

[Clifton]

Utilization of rainwater	Amount used/day
• Ice making	1,000 l
• Fisheries center building (5 people/50 l)	250 l
• Welfare building (30 people x 50 l x 7 days/months ÷ 30 days) = 350.0	350 l
	1,600 l/day

Utilization of sea water

• Fish processing/washing (4 faucets x 600 l/hour x 5 hours)	12,000 l/day

[Area required for rainwater collection]

For rainwater collection, using the roof and roof top of the building is better than using the ground as catchment area because the degree of contamination of the collected water is low; and the processing is much more simple. As the area to collect rainwater is larger, rainwater use efficiency becomes higher. Therefore, in this project, the roof area shall be designed as larger as possible.

Effective Paget Farm roof area : 620m^2
Effective Clifton roof area : 550m^2
Total water storage

The water tank which can hold about for 2 month worth water shall be provided for both Paget Farm and Clifton.
Paget Farm water storage : 150m^3
Clifton water storage : 120m^3
Water supply system

[Rainwater supply]

Rainwater stored in the water tank is pumped up to the elevated water tank by a pump, then, supplied to each building using gravity system. The filter and chlorine disinfecting device shall be installed between the pump and elevated water tank.

[Sea water supply]

A shallow well shall be dug and pump up sea water to the elevated water tank and store. The stored sea water is supplied to each faucet of processing area with gravity-type system.

2) Drainage facility

Waste water shall be divided inside the building, then shall be merged to the gutter outside and led to the treatment tank; then, drained to the sea at under the waste water quality standard value.

Since fish sometimes gutted on the boat before landing, water won't be polluted by fish fluid in the fish processing area. Therefore, used water will be removed pieces of meat, bones, etc. using filter, then the clear layer at the top of the water is drained to the sea.

3) Sanitary fixture

Closet toilet stall and urinals, lavatory bowls and lavatory sinks shall be installed. The water heater installed at the sink shall be electric type. Showers, closet bowls, urinal stalls and lavatory bowls shall be installed in the toilet /shower building.

4) Ventilation facility

Air-conditioning system shall not be provided, instead, natural ventilation will be used. Ceiling fans shall be installed in each office, the manager room, meeting room.

5) Purification tank

To treat waste water, the contact aeration method treatment tank shall be installed inside the complex. Final effluent quality shall be BOD 25 ppm or less.

[Amount of water to be treated]

Paget Farm : 1.75m^3 /day

Clifton : 1.25m^3 /day

6) Electrical facility

This facility has ice making and refrigeration machine, thus needs the lead in factory power line. Also, since power supply condition is unstable, it may stop due to maintenance, one stand-by power generator shall be provided in order to operate the refrigerator during power stoppage. Required capacity of electricity for each fisheries center is as follows.

Paget Farm (power load 26.75KW, single-phase circuit 17.91KW, total 44.66KW and 20KVA power generator)

Clifton (power load 27.25KW, single-phase circuit 15.93KW, total 43.18KW and 20KVA power generator)

4-3-7 Expansion of the facility of New Kingstown Fish Market (NKFM)

1) Background

As explained before, Kingstown fish market has been operating for 4 years since it opened, and the amount of handling of fish has been steadily increasing. Amount of handling per day is 1,500kg - 2,000kg average and some time it reaches maximum 3,000kg. Especially, during the season of pelagic fish (Feb. - May), large amount of fish is landed in consecutive days, as a result, the current capacity of the refrigerator becomes insufficient frequently. Furthermore, there is only one ice making machine and the demand is more than its capacity. Newly introduced long liner has a about 2 m^3 fish hold and can load about 1.0 ton of ice in full capacity for one sail. Currently, 2 ships use ice but in the future 4 ships will always use ice. In addition, the fish transport boats call at the port to buy ice and longliners of Barbados and Martinique frequently call at the port to load ice. For this reason, even ice is made in full-capacity but the demand is not satisfied and sometime transport boats have to buy cube ice in outside of the market.

2) Scale and specification

(1) Refrigerator

The dolphin fish and robin fish season is concentrated in about 4 months (Feb. - May). The refrigerator is used to preserve the surplus fish caught during this reason for the off season from August - December. Existing refrigerator shall preserve skip jack, bonito and yellow fin tuna and new refrigerator shall be used according to fish kind to facilitate inventory control such as storing and sorting. The capacity of the new refrigerator shall be 50%, about 12.5 tons of the existing refrigerator.

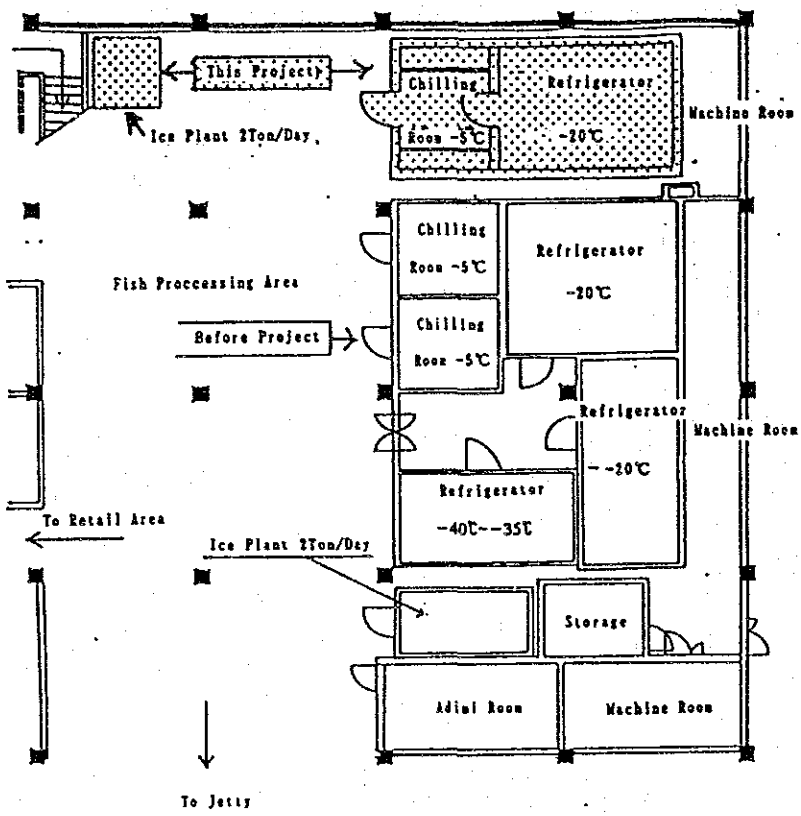
Throughout a year, the chilling room is being used to preserve fish with ice landed the day before. Currently, the amount of small pelagic fish such as horse mackerel and halfbeak have increased and at its peak time 10 tons or more fish have to be preserved.

For this reason, the current capacity, i.e. 10 tons is not sufficient and it has become necessary to manage fish according to species and preserve fish depending on reasons such as for the leftover of retailers, for consignment fish of fishermen, for NKFM, etc. Taking current increase in volume, a 5-ton or bigger chilling room is necessary.

As explained above, the existing ice making machine cannot meet the demand now. NKFM has requested a plate ice making machine because plate ice lasts longer and convenient for the use of fishing boats. However, according to the measurement the height of the ceiling is 4.5m and this space is not enough to install the plate ice making machine. Therefore, the newly installed ice making machines shall be flake ice type which is the same type of now. For the current demand, 3 tons/day or more ice making capacity is needed but for space limitation, it shall be 2 tons/day.

3) Layout of refrigerator and ice making machine

When building the NKFM, space was secured for the facility extension by foreseeing the future increase in demand. However, the rate of increase in demand is mush more greater than expected and the limited space, the facilities to be extended this time should as shown in the figure below.



The layout of the refrigerating related machines shall be the same as that of the current one to facilitate maintenance. The new ice making machine shall be installed next to the stairs for convenience of accessing to the fish retail market through the shipping processing area. Since the location of the existing ice making machine offers convenient to access to the pier it shall be used for the supply of ice to fishing boats.

Since there is not enough space to use the chilling room and refrigerator independently, the front room of the refrigerator shall be used as chilling room.

4-4 Equipment and material plan

1) Insulated fish box

Insulated fish box is used to carry the fish preserved with ice at each center and transport to Kingstown fish market. Since this box with fish and ice will be manually loaded and unloaded to/from track and ferry on the way by two adults, the box shall be light in weight and movable size (140 L). The box is managed by Kingstown market and is delivered to each center, then is hauled to the market with fish in it. Boxes shall be made so that they can be piled up so as not to occupy a large space. For durability, it shall be FRP made.

[Number of boxes needed]

Paget Farm : 2,000Kg/one time x 2 (the amount of fish and ice) ÷ 140(L) x 2 (turnover of box) = 58 boxes

Clifton : 1,500Kg/one time x 2 (the amount of fish and ice) ÷ 140(L) x 2 (turnover of box) = 43 boxes

Total : 101 boxes

2) Work boat (with outboard engine)

This boat will be used by Fisheries Division to collect statistics data by going around the fish landing place around Fisheries Center. In addition to it, it will be used to test fishing tools or spreading of fishing technologies.

Quantity : 2 boats

Type : Small sized boat equipped with a outboard engine, no deck, single chain. Because the boat will navigate areas where the boat directly receives wind and wave of open sea, the boat shall be strong to waves and highly stable with maximized shear strength of the bow part.

Body material : Reinforced plastic

Main body size : Approx. 7m long
Approx. 1.8m width
Approx. 0.8m depth

Outboard engine : Gasoline outboard engine, approx. 25 hp, one engine/boat

Fuel tank : Plastic, about 25 liters

Auxiliaries : Mooring rope, anchor, anchor chain and rope, other

3) Pick-up truck

This vehicle will be used to transport the fish preserved at Fisheries Center to the ferry terminal. It shall be equipped with a canvas hood to prevent insulated fish boxes from being exposed by direct sun ray.

Quantity : 2 trucks

Type : Small sized pick-up track

Diesel engine, double sheets, for 6 people with hood

Body size : Approx. 4.7m long

Approx. 1.8m width

Approx. 1.8m height

Loading capacity : Approx. 600Kg

Auxiliaries : Spare parts, spare tire

4) Trolley

Two trolleys for each center will be provided to handle fish box in landing place to packing area.

5) Radio communication equipment

For communication of the Fisheries Division one each radio telephone will be provided to each center. Six channels VHF equipped with programmable frequency compatible to existing communication system.

6) Quality check device

(1) Purpose of introduction

A simple laboratory for marine products inspection has been provided in a corner of the 2nd floor of Kingstown fish market built in 1989 with the Japan's grant aid project. General equipment have already installed but there are not sufficient testing and analytical devices for marine products, as a result, the hygienic testing have to rely on organoleptic testing.

The amount of catch in St. Vincent tends to increase in order to respond to high domestic demand on marine products. In addition, the country is trying to increase the export of high quality demersal fish such as grouper and snapper and kinds of tuna. Accompanying this, Kingstown, the most biggest fish and shellfish accumulation place in the country, has become more and more handling fresh fish and frozen fish by installing refrigerator and establishing distribution system. Under this circumstances, Fisheries

Division has to establish necessary testing system to control quality of products so that their people can be provided with safe and high quality marine products and also exported marine products can be maintained its international standard
Also export of tuna requires mercury analysis to monitor the accumulation of mercury in tuna meat.

Furthermore, Fisheries Division is planning to develop various processing products in order to use small pelagic fish which can be caught in large quantities at once along the coast line of the country. The material for this processing development must undergo quality check up and nutritional analysis.

(2) Basic principle for selecting equipment

a) Equipment to be selected shall at least perform freshness check (K value, volatile basic nitrogen, pH, aseptic testing) for fresh fish and frozen fish, and nutritional analysis (crude protein, crude fat, etc.) for processed product development and mercury analysis.

b) Since all equipment in the existing laboratory are operable condition, only equipment required for the above mentioned testing and analysis shall be introduced.

c) Since the existing laboratory is small, desk top type equipment which can be placed in the limited space without problems in faction shall be introduced.

d) Enough number of periodically replaced parts such as glass instruments, etc. shall be stocked so as not to cause inconvenience in maintenance of equipment because it takes time to obtain those parts.

e) The processing machine will be used to further promote the development of salt dried processed product using shark meat. Especially, processing of the frozen meat and packing are essential to distribute products to super markets. The fish meat separator will be used for processing development of small pelagic fish such as horse mackerel and mackerel, etc. Both machines will be installed in NKFM.

(3) Necessary equipment

a) Quality control devices

K value measuring instrument	Judges freshness of fish	1 device
Conway unit	Analyzes volatile basic nitrogen	1 unit
Automatic titration device	For quanitative analysis, same as above	1 device
Kjeldahl nitrogen analyzer	Measures amount of crude protein	1 device
Fat analyzer	Measures amount of fat and judges degree of oxidation	1 device
pH	Measures degree of acidity of fish (at site)	3 device
Thermister thermometer	Measures center temperature of frozen fish	1 device
Mercury analyzer	Measures concentration of mercury in fish meat	1 device

b) Processing machines (for experiment)

Band Saw (small)	1 machine
Vacuum packaging machine (low speed)	1 machine
Fish meat separator (low speed)	1 machine

(1) Existing devices can be used for bacteria check (incubator, colony counter, microscope, etc.).

(2) Other existing general devices (sample creation and pre-processing devices such as analytical balance, dryer, etc.)

(4) Operator

Fisheries Division has one qualified engineer who was trained in Canada and Japan for food analysis technology; thus, there is no problem in operating devices to be introduced.

7) Incinerator

A small sized incinerator shall be installed to handle leftover of fish and garbage generated in the center.

8) Cylinder fill-up facility

Fishermen of both sites catch lobster and bottom fish by diving fishing. Since there is no facility to fill cylinders, fishermen go to private aqua-lung shops. In this project, the filling up facility will be installed in the centers for efficient and safe fishing activities. The facility consists of an air compressor, high-pressure tank of filling up and odor removing filter and the installation of a safety barrier wall is legally required.

4-5 Implementation Plan

(1) Implementation policy

1) Implementation policy

Implementation of the construction for this project will be executed in conformity with the following policy.

a. To use local work force, local materials and equipment as much as possible.
b. To pay special attention to the conservation of the environment.
c. To keep close contact with the local community to prevent trouble.
d. To respect the culture and the tradition of St. Vincent.

2) Scope of the works

The scope of the works of this project is as follows.

s. To secure the lot for the project.
b. To construct the fisheries centers, to install refregiration equipment to Kingstown fish market and provide quality control equipment to Fisheries Division.
c. To procure equipment and material for fisheries centers.
d. To execute the work and to provide the services accompanying the supervision of the work.
e. To carry out the formalities and to obtain permission to execute the previously-mentioned steps of work.

3) Responsibilities of the governments of Japan and St. Vincent and Grenadines

The governments of the two countries in connection with the execution of this project are as follows.

{Responsibilities of the government of St. Vincent}

a. To secure the construction lot and to remove all obstacles existing in the lot, those ones in the water areas concerned.
b. To execute reclamation of the proposed site.
c. To provide rock quarry for procuring stone for contruction and provide the yard for concrete work.
d. To provide landscape work and construct perimeter fance if necessary.
e. To take the steps required to exempt the custom clearance formalities and the custom duties for import the equipment and materials to be used.
f. To take the steps required to exempt taxes and other charges aplicable to Japanese citizens in St. Vincent in connection with the provision of construction equipment as well as services involved in the execution of the project.
g. To exempt the Japanese parties concerned from the permits and the like required to execute the project, and to give and grant them other required rights.
h. To carry effective operation and maintenance of the facilities constructed under the auspices of the grant-in-aid.

{Responsibilities of the government of Japan}

a. To procure all equipment, materials and work force required for the construction works.
b. To secure the sea and land transportation of the imported equipment and materials required for the construction works and to bear the cost of the export insurance.
c. To provide consulting services related to the executive plan, to the execution of the tender, to the supervision of the construction works, etc.

(2) The Responsibility of Government of Japan

a. The procurement of all materials and labor needed for construction;
b. The sea and inland transport cost for the materials necessary for construction and the payment of export insurance;
c. Consultant service for the detail design, tender assistance and supervision of the construction.

2) Matters important to execution of the project

As this project will be prosecuted the place where it is remote and there is little rainfall, attention shall be paid to the procurement of water for mixing cement and other construction purposes. Water is being sold in the vicinity of the proposed sites but there are problems with the quality of the low-priced water which make it unsuitable for use in mixing cement. Therefore it is necessary to transport water from the main island.

Concerning marine construction, there is little effect from hurricanes, but from December to January the open sea swell is cause for concern. At Paget Farm large stones are needed as materials for building breakwaters. There is a stone quarry where dynamite is used to quarry stone and stone is sorted, graded and transported, but care must be paid for the safety of the residents in the vicinity.

As for land construction, temperature and rainfall have a big influence on the quality of concrete so it will be necessary to ensure that the temperature of the concrete does not exceed a set temperature (37°C) by doing the following:

a. Monitoring the temperature of the materials (cement, sand, gravel and water).
b. Monitoring the temperature of the concrete at the time it is laid.
c. While the concrete is setting it is necessary to monitor the temperature and to prevent drying by sprinkling it with water. When the concrete is laid outdoors, in the event of rain, measures will have to be taken to prevent exposure.

Because the construction materials will be brought in from the main island or other countries, it will be necessary to provide a large yard for stocking construction materials, storing heavy equipment, equipment repair and the manufacture of ferro concrete and concrete. As it is difficult to obtain on site, soil will have to be procured nearby.

As the proposed sites are divided into three different areas, it is necessary to get the appropriate supervisory personnel, and machinery in place and implement a work schedule then refine the project to minimize mistakes.

(3) Plan for supervision of the construction work

After the signature of the design and supervision contract with the Government of St. Vincent, the consultant will carry out the field survey and the final discussions with the local authorities in charge, and after that, the consultant will prepare such materials as the detailed plans, the structural calculation documents, the bill of materials, the work specifications and other documents required for bids. After the completion of the tender documents, the contractor, that will be in charge of the construction, will be selected

through such steps as the approval of the plan, prequalification, tendering and evaluation of the bids.

After the signature of the construction work contract, the consultant will carry out such steps as checking the working diagrams to be submitted by the contractor, supervision of the manufacture of the processed component parts, witnessing of the quality inspection of the exported products and materials, and inspecition of the shipment. When the construction works starts in St. Vincent, the consultant will dispatch a supervision engineer who will be incharge of such matters as coordination of the reception of the shipped items by the contractor, control of the construction work, the execution of the quality control tests, the inspection of the work progress, etc., and will submit the relevant reports.

(4) Equipment procurement

Necessary materials for construction of the project facilities are sand, bone, cement, bricks, steel (ferro concrete and molded steel) and building materials (roofing materials, blocks, bricks, paint, glass, sanitary (porcelain) fixtures and plumbing). As for on-site building materials, sand and insulating stone can be supplied, but because of environmental protection measures in St. Vincent and the Grenadines, quarrying of local sand, stone and other materials is generally prohibited. In the case of this project, only insulating stone can be supplied from the island and the rest of the necessary materials will have to be obtained elsewhere. Therefore construction costs will be comparatively higher than on the main island.

As for heavy machinery for construction and the means for transporting it, because locally available machinery is limited in type and volume there is no other alternative but to ship them in from nearby countries; only when absolutely necessary will we procure some of them domestically.

(5) Work schedule

We plan that this project will take 4 months for design, 12 months for construction.

The details of each phase of construction are included below. Table 4-6 shows the work schedule.

(6) Construction costs to be borne by the St. Vincent side

Construction costs tobe borne by the St. Vincent side is estimated as being 500,000EC$. At the implementation stage, both side shall make arange the construction schedule for each part. The breakdown of the costs is as follows :

Land reclamation (site & access road)	: 350,000EC$
Power supply work	: 50,000EC$
miscellanious work	: 100,000EC$
Total	: 500,000EC$

Time table　　Table 4－6

(Month)	1	2	3	4	5	6	7	8	9	10	11	12
Detail Design Stage	Site Survey											
		Drawing(Domestic)										Completion *
			Tendering,Evaluation									
Construction Stage	Paget Farm											
		Civil Work										
					Building Work				Equipment			
	Clifton											
					Civil Work							
								Building Work			Equipment	
	NKFM											
						Ice Plant,Refrigerator						
Equipment	Equipment											
					Procurement			Transportation		Installation		
St.Vincent Side Work	Paget Farm		Reclamation							Supplementaly Work		
	Clifton									Supplementaly Work		

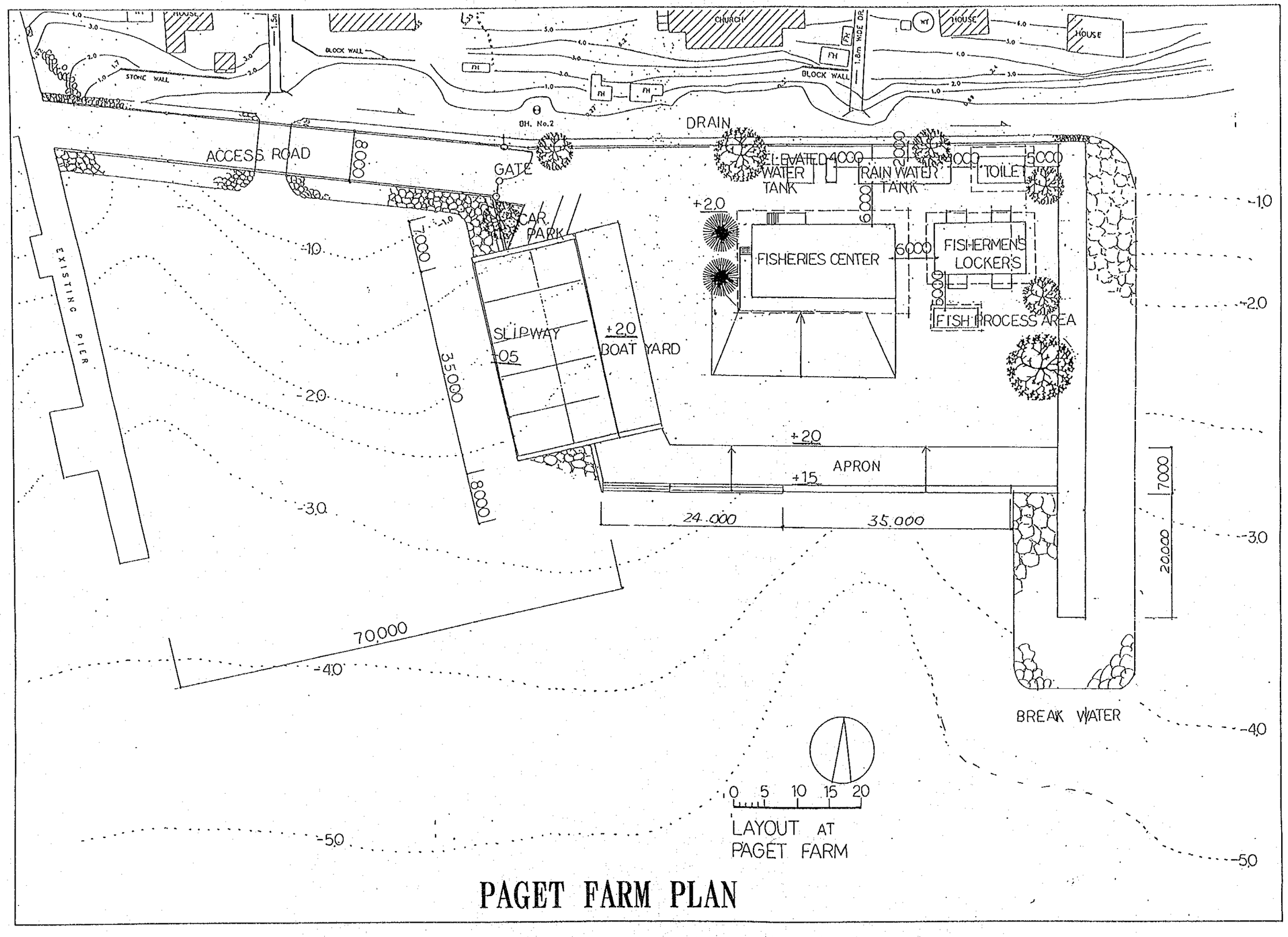
4-6 Environmental impact

Fisheries is the mean of production closely related to natural environmental condition. Therefore the success of this project is deeply related to the conservation of natural sea condition of the fishing ground. In this aspect the project has been designed taking into consideration of such factors.

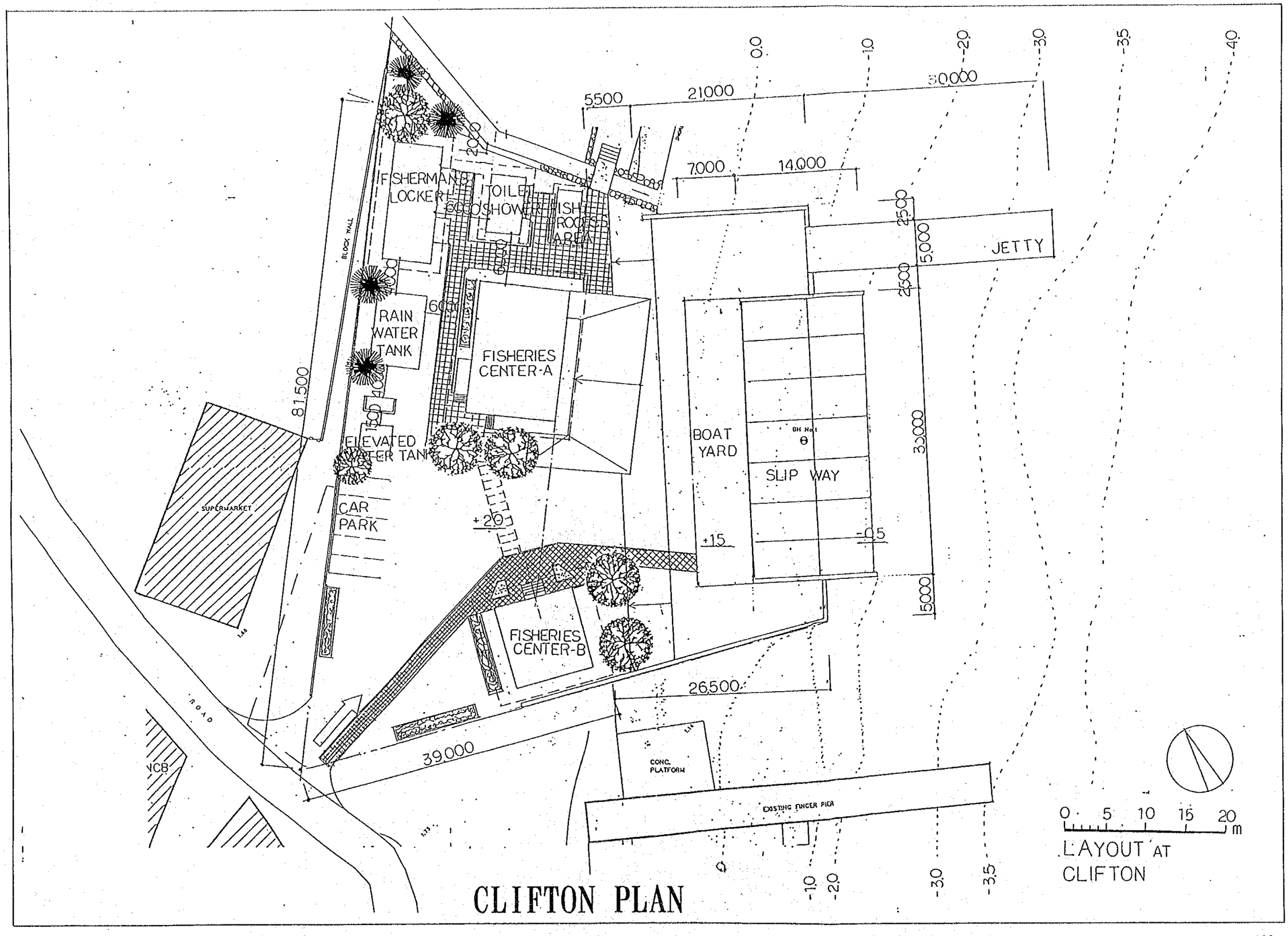
The project is envisaged that the increase of fishermen and fishing boats is not anticipated but the increase of fish production would be attained by development of fishing technology of fishermen and the fishing area and operation day is increased by the establishment of the two centers. The increase of fishing efforts derived by the project is mainly from those factors that the environment impact born from the project is small and quite limited.

In Paget Farm site, the land would be constructed by the reclamation of sea area (approx. 45m x 60m). The sea bottom of the proposed area have not live coral and sea weed vegetation is poorly growing by the observation made during the survey. There would be not any harmful effect to the surrounding area caused by the reclamation work because the bottom soil is solid and would not cause siltation by the current and tide after effect of land reclamatio However, during construction period attention shall be paid to provide siltation prevention fence in order not to cause out flow of silt to surrounding sea.

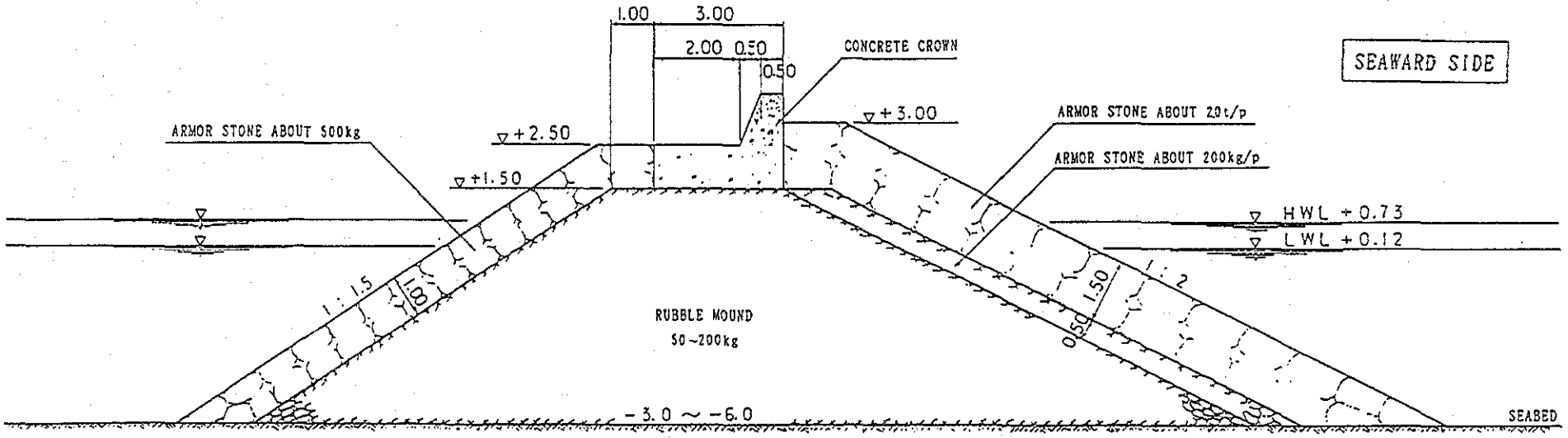
In Clifton site, enough space is provided for buildings and only small sea works is anticipated. The civil engineering works is limited to piling of jetty and slipway construction on the shore line. These works would not cause any harmful effect to the environment.
The buildings are designed to harmonized with landscape of the surrounding area. The machines installed in the centers are small refrigeration machines and compressors, and low noise and low vibration type machines would be selected. Special attention shall be paid to sanitary insects prevention, such as fly and mosquito, by installing incinerator for garbage and discarded fish gut. The waste water is treated by sedimentation tank and then discharged to sea. The waste water quality shall be clear the national regulation, 50 ppm.



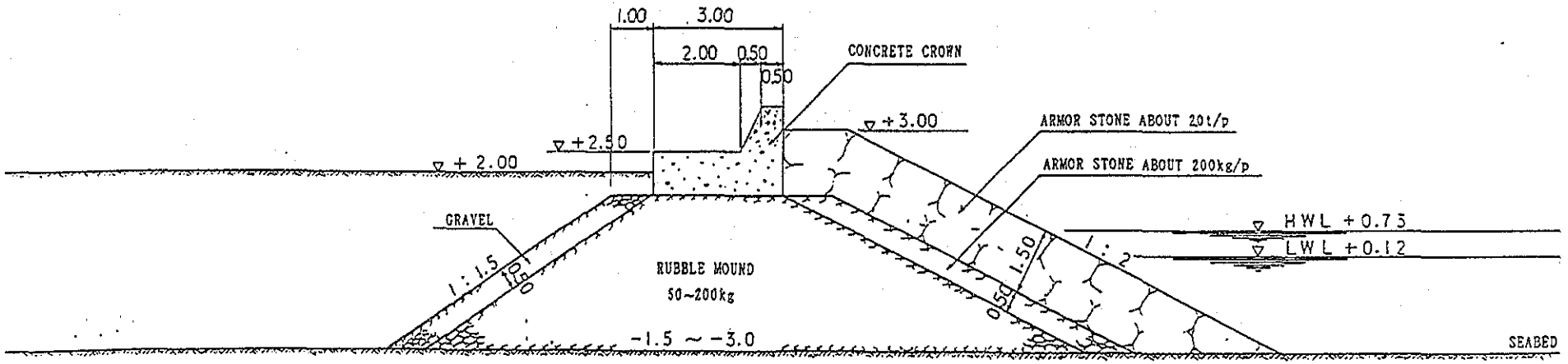
PAGET FARM PLAN



CLIFTON PLAN

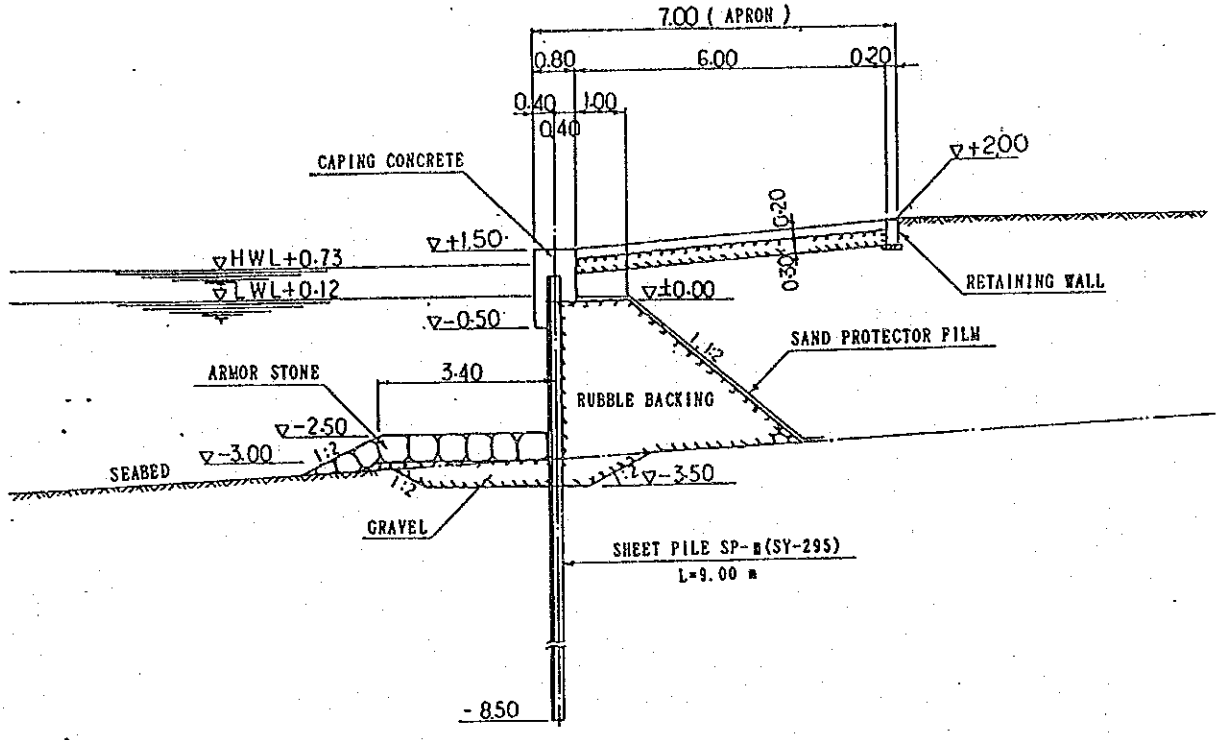


SECTION OF BREAK WATER

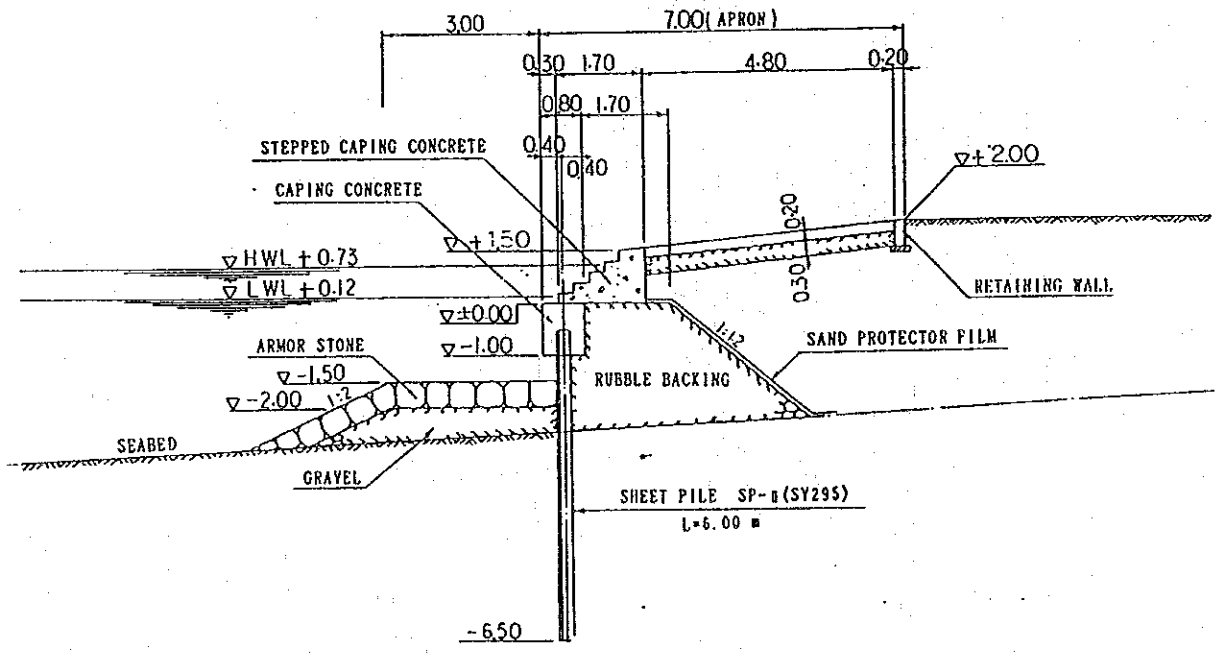


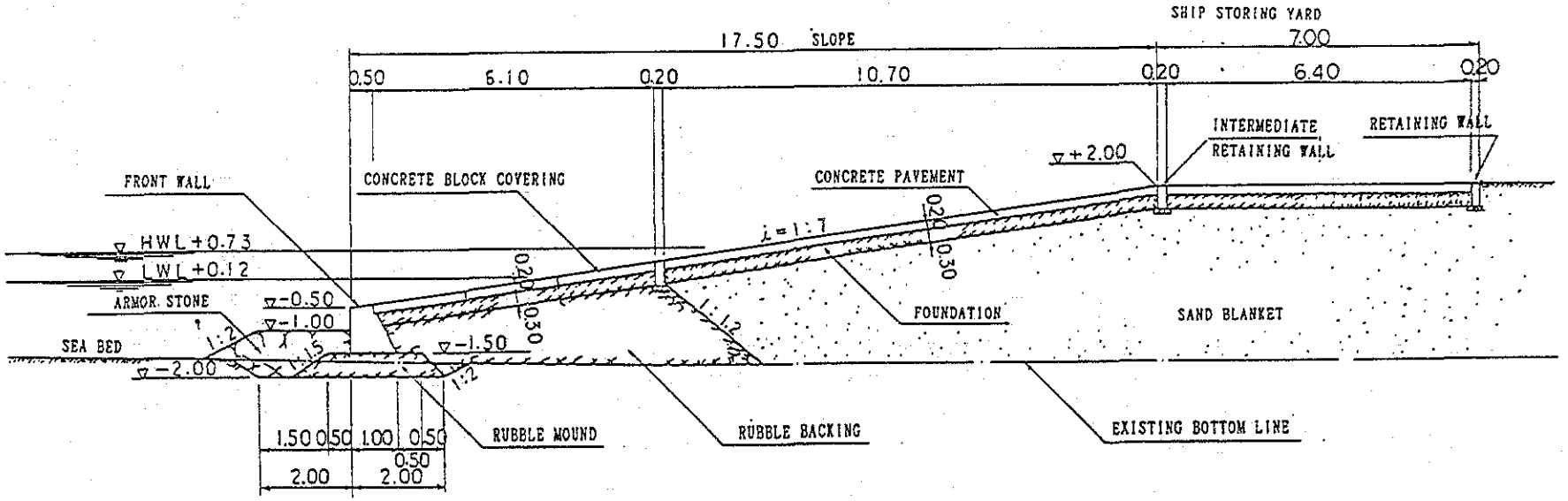
SECTION OF SLOPE PROTECTION (PAGET FARM)

SECTION OF WHARF FOR MIDDLE BOAT

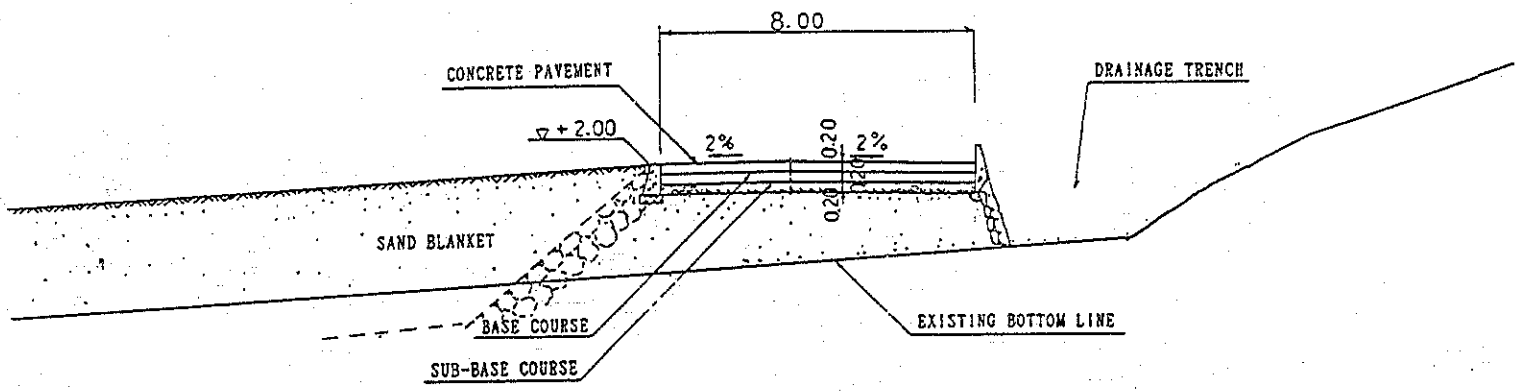


SECTION OF WHARF FOR SMALL BOAT





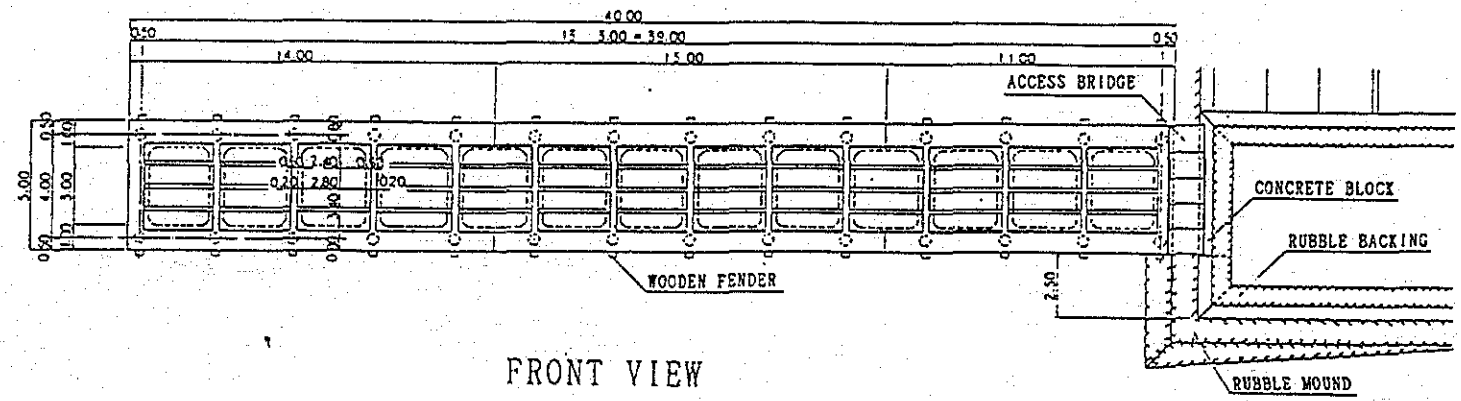
SECTION OF SLIP WAY
(PAGET FARM)



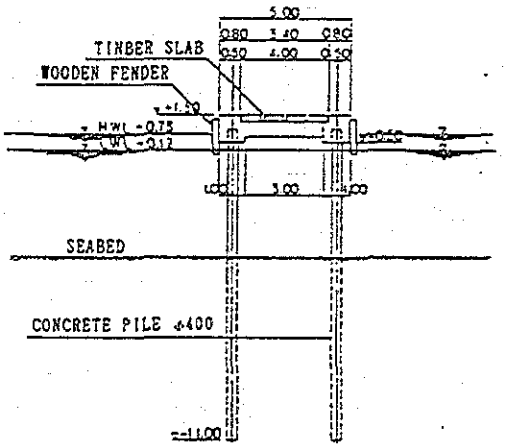
SECTION OF ACCESS ROAD (PAGET FARM)

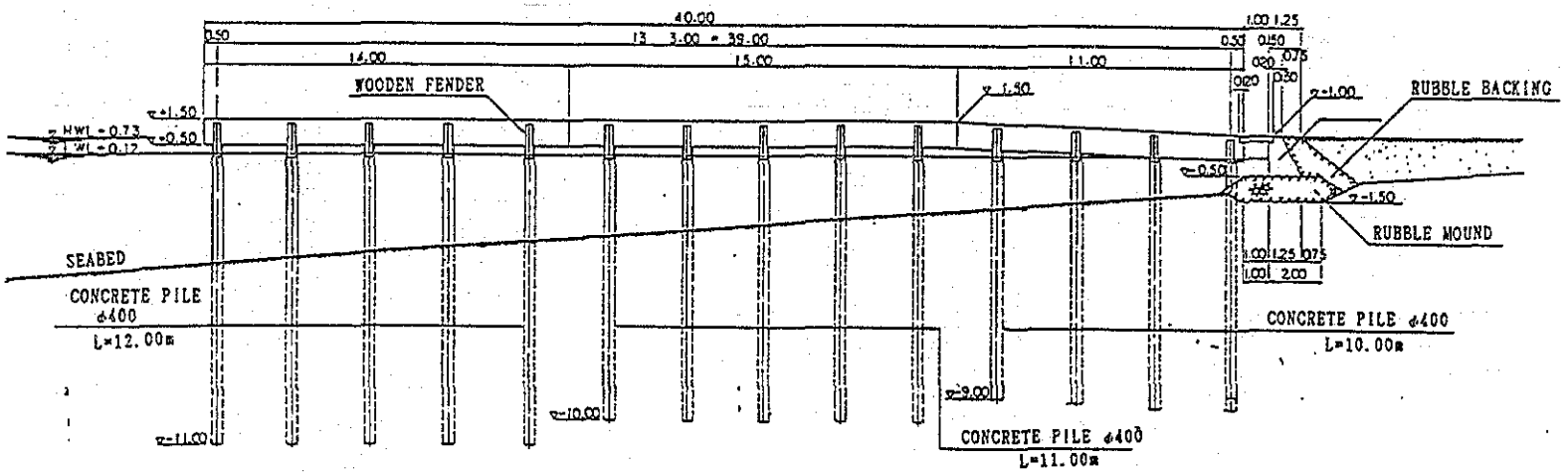
CLIFTON

PLAN



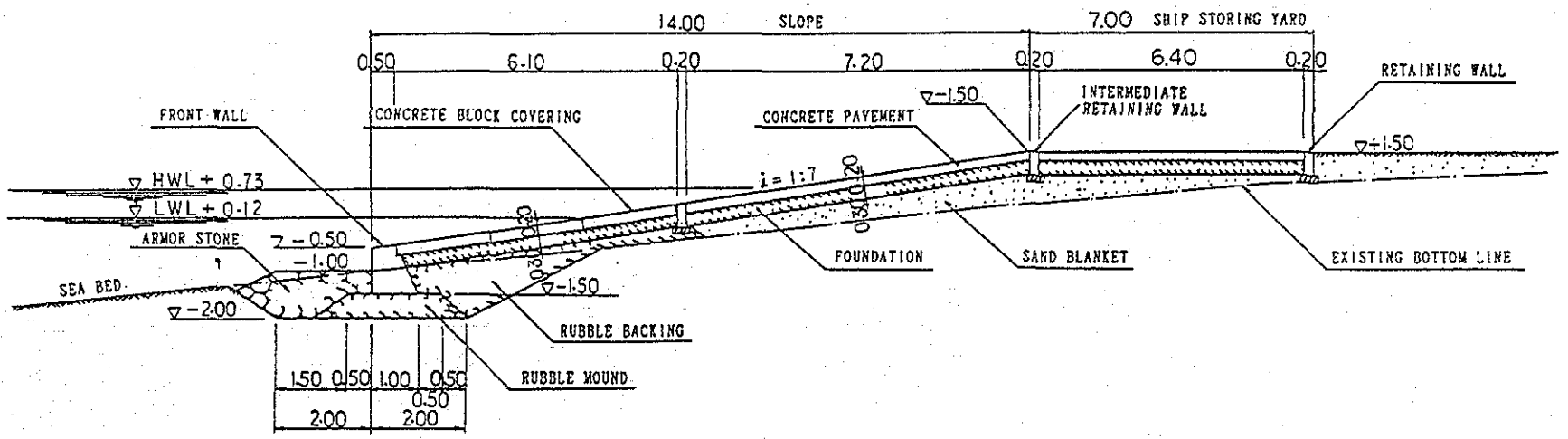
FRONT VIEW



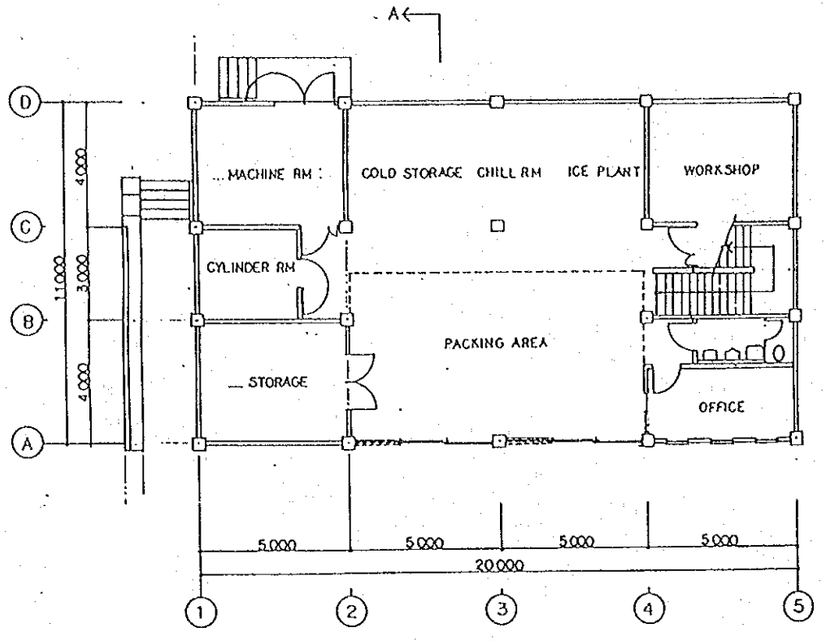


SECTION OF JETTY (CLIFTON)

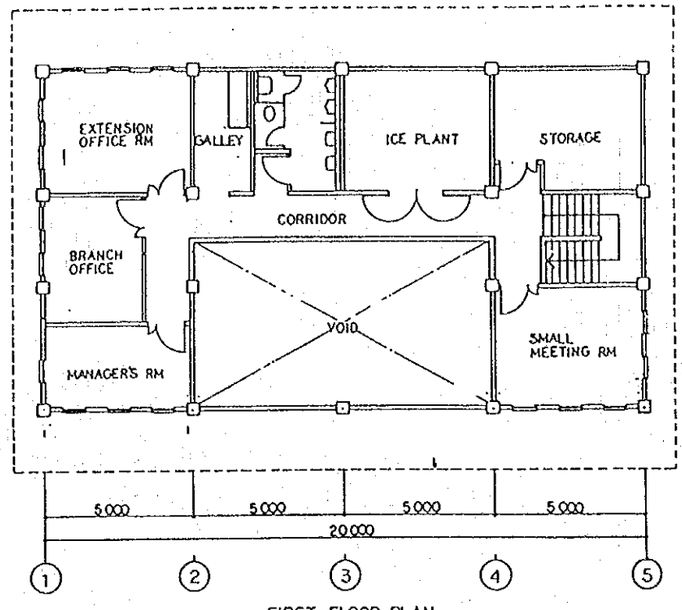
CLIFTON



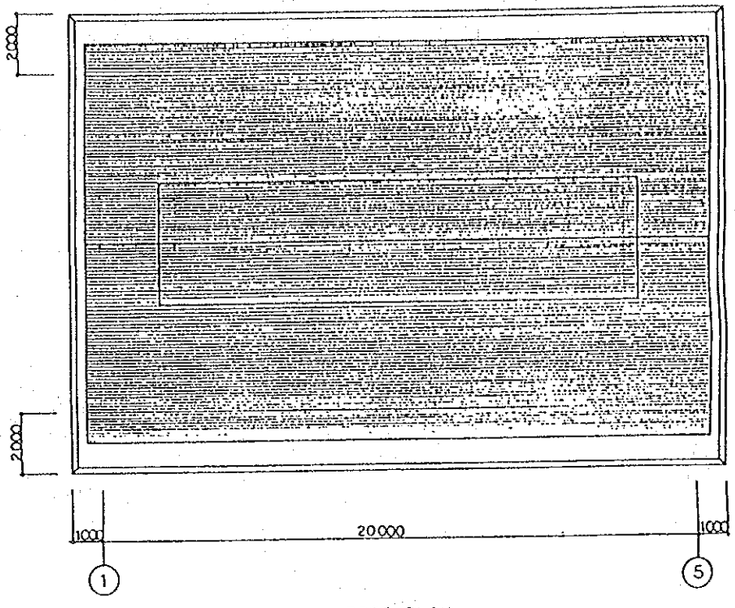
SECTION OF SLIP WAY
(CLIFTON)



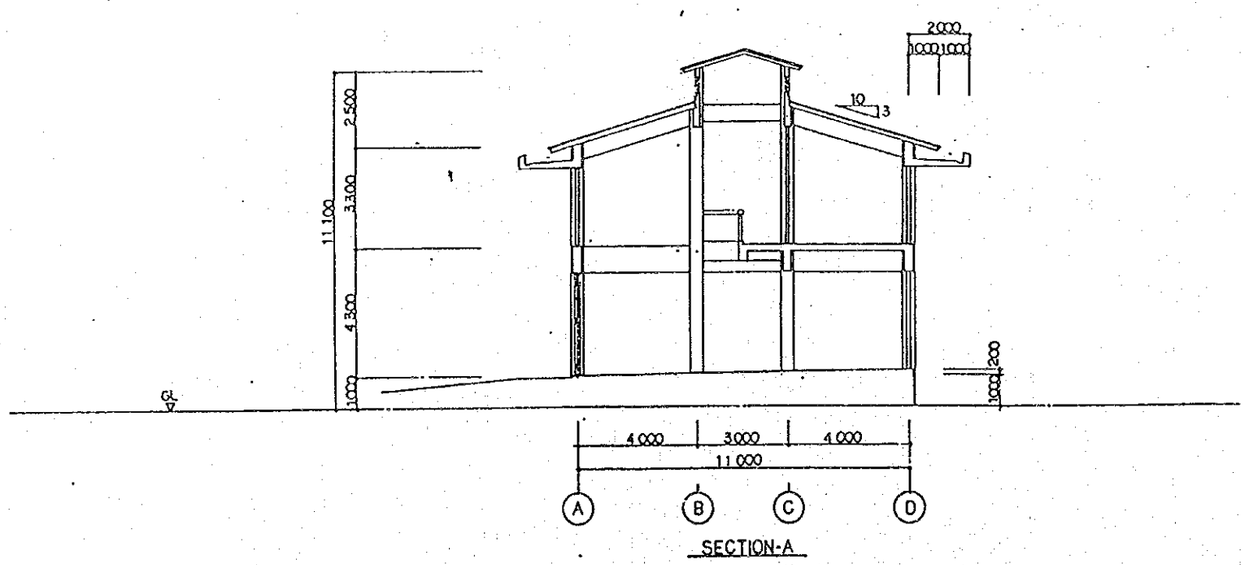
GROUND FLOOR PLAN



FIRST FLOOR PLAN



ROOF PLAN

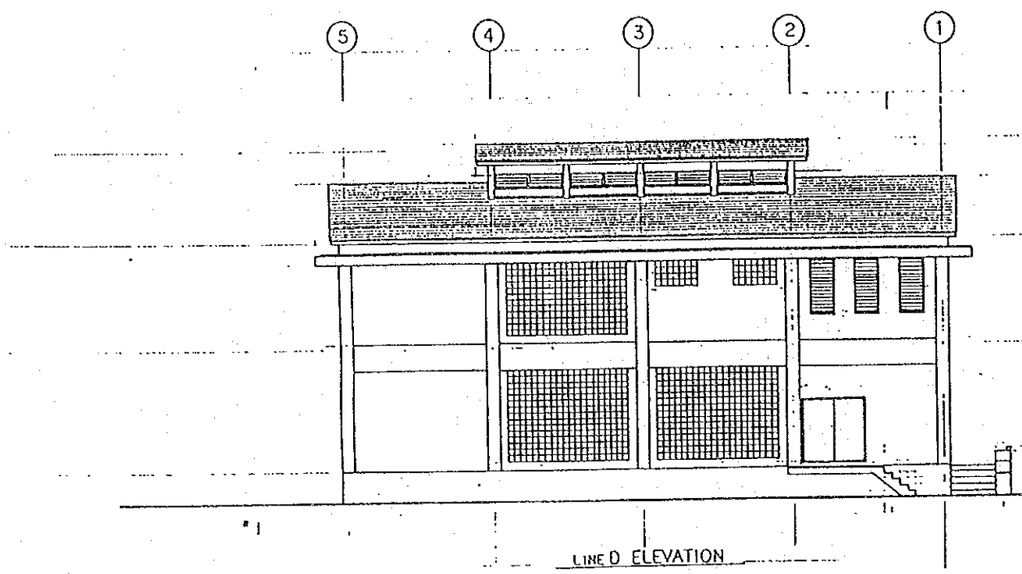


SECTION-A

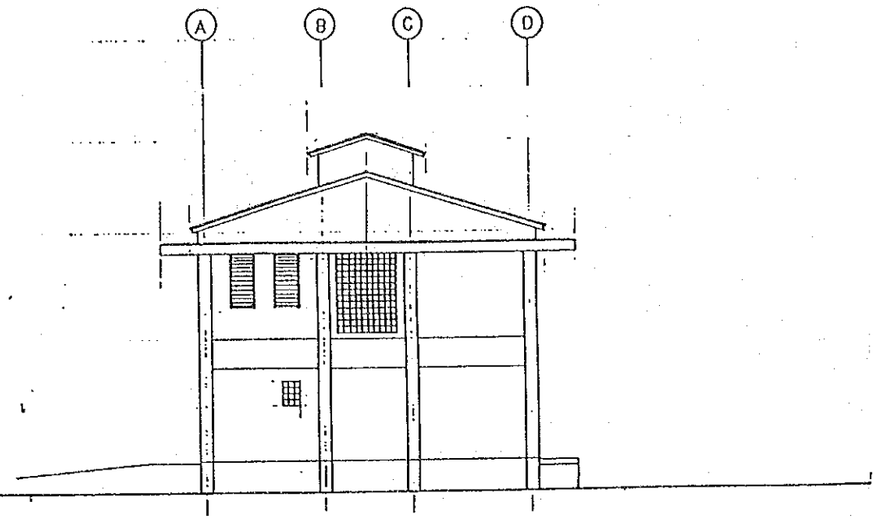
FISHERIES CENTER (PAGET FARM)

PAGET FARM

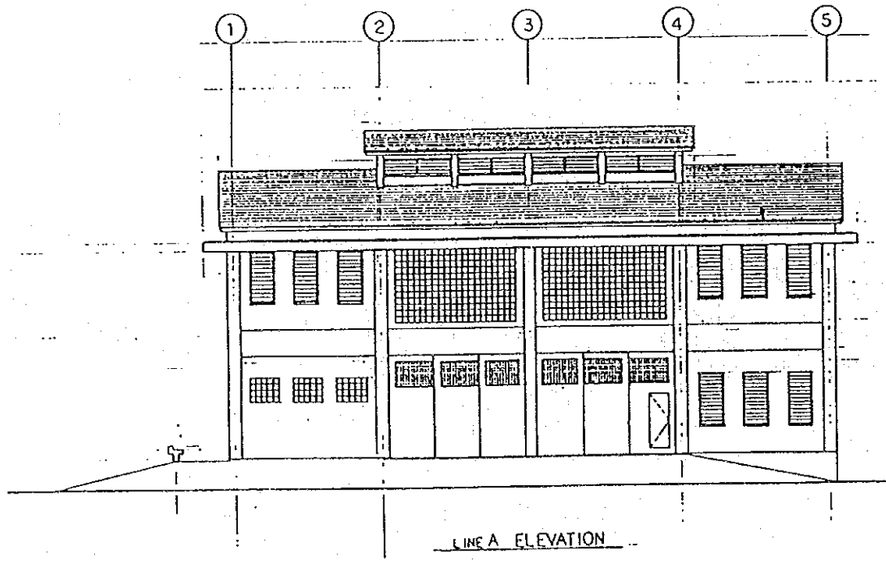
FISHERIES CENTER 1/100



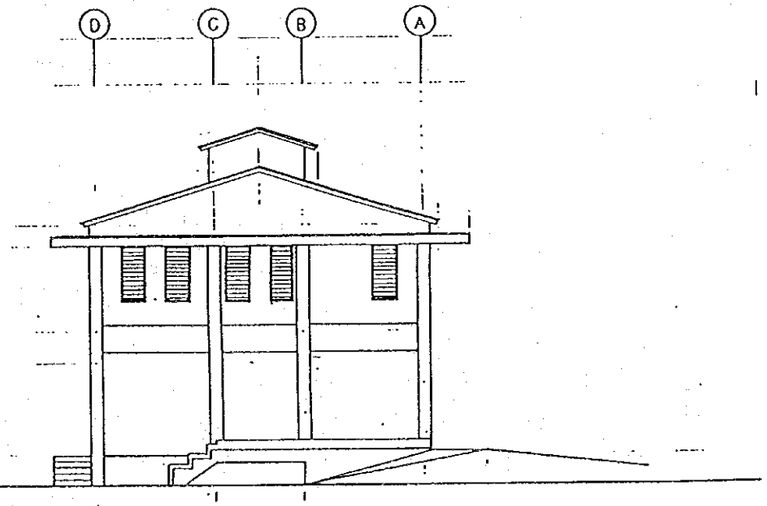
LINE D ELEVATION



LINE 5 ELEVATION



LINE A ELEVATION

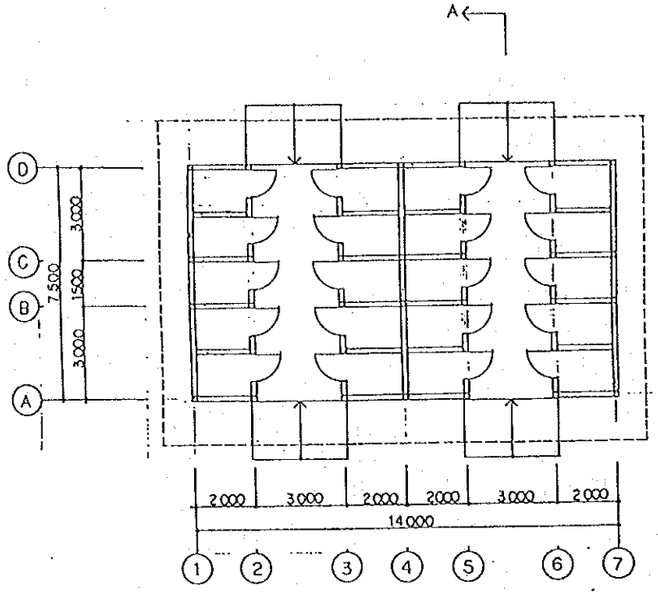


LINE 1 ELEVATION

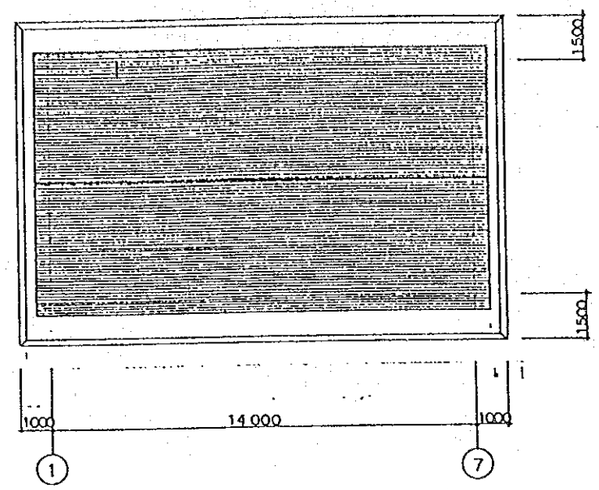
FISHERIES CENTER (PAGET FARM)

PAGET FARM

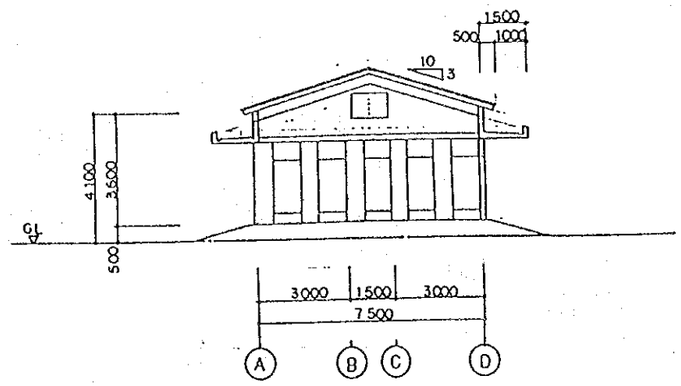
FISHERIES CENTER 1/100



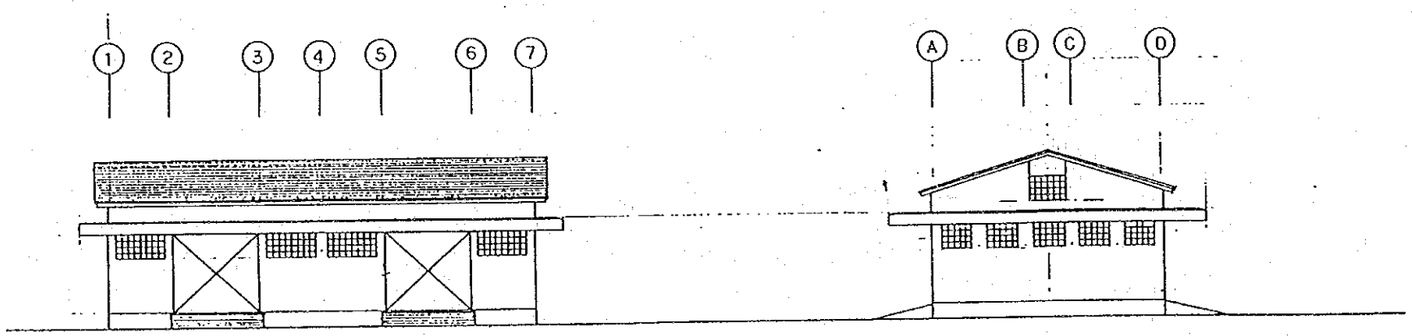
PLAN



ROOF PLAN



SECTION-A



LINE A ELEVATION

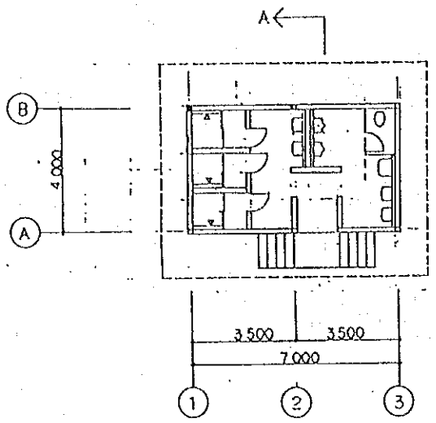
LINE 1 ELEVATION

FISHERMEN'S LOCKER (PAGET FARM)

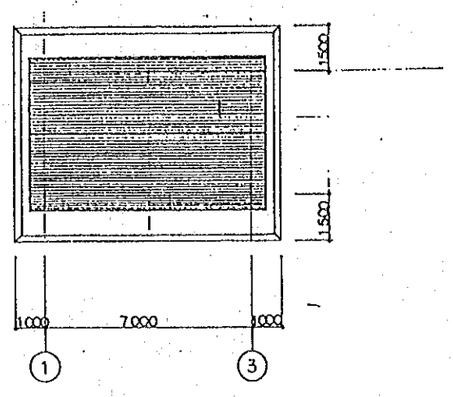
PAGET FARM

FISHERMEN'S LOCKERS 1/100

TOILET / SHOWER ROOM



PLAN



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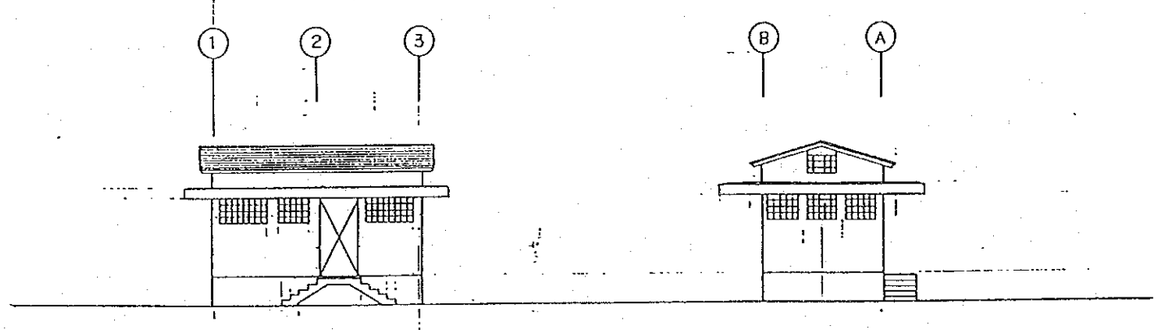
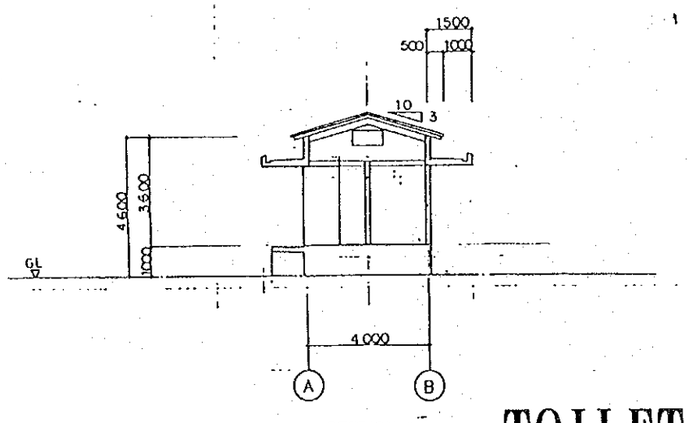
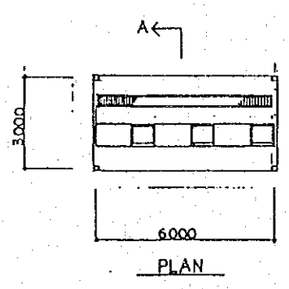


LINE A ELEVATION　　LINE 1 ELEVATION

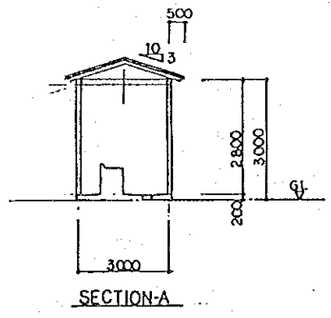


SECTION-A

FISH PROCESS AREA



PLAN



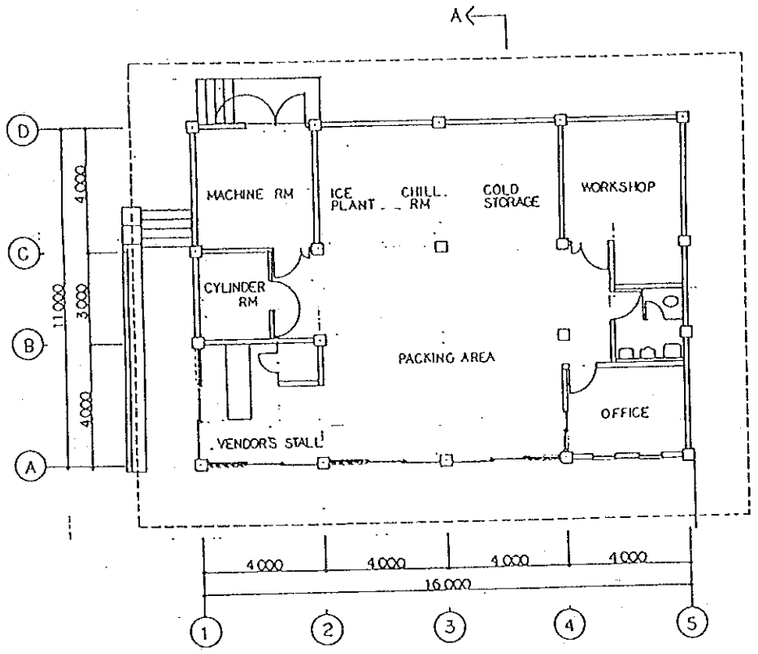
SECTION-A

TOILET/SHOWER, FISH PROCESS (PAGET FARM)

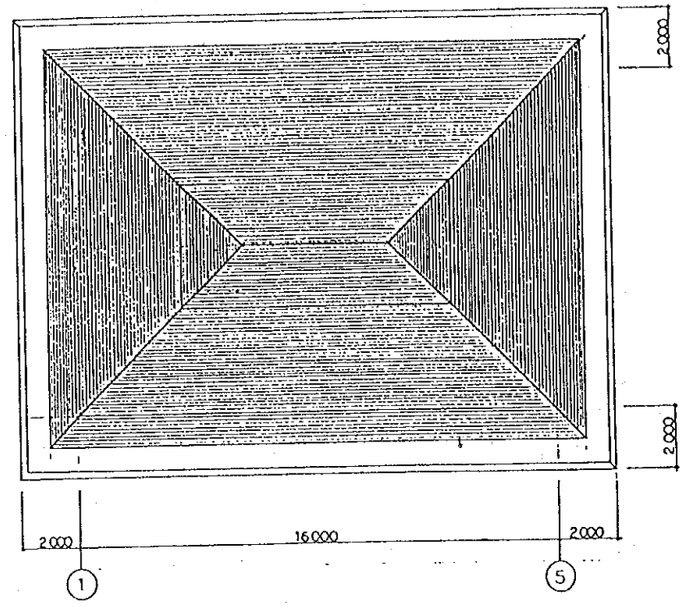
PAGET FARM

TOILET / SHOWER ROOM

FISH. PROCESS AREA



PLAN



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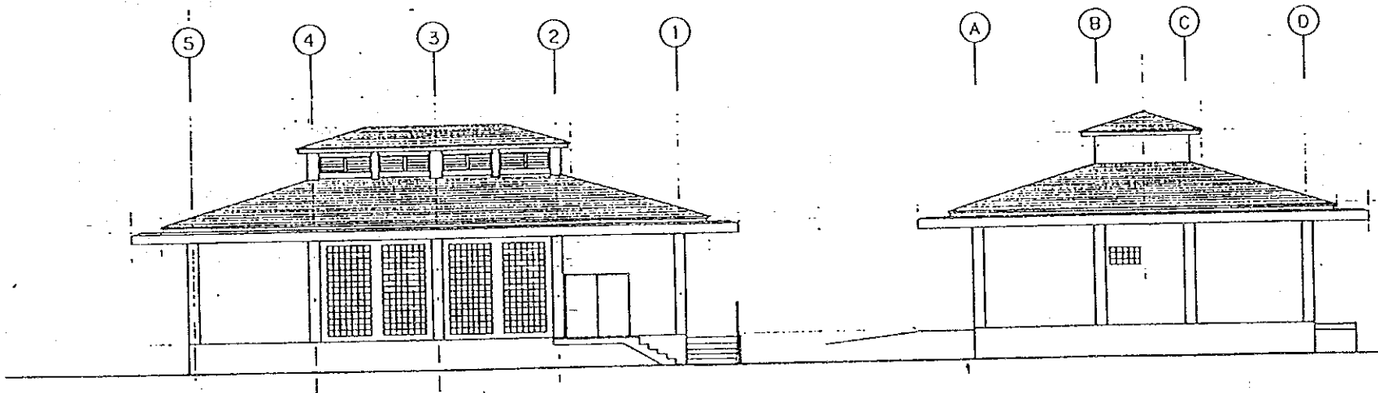
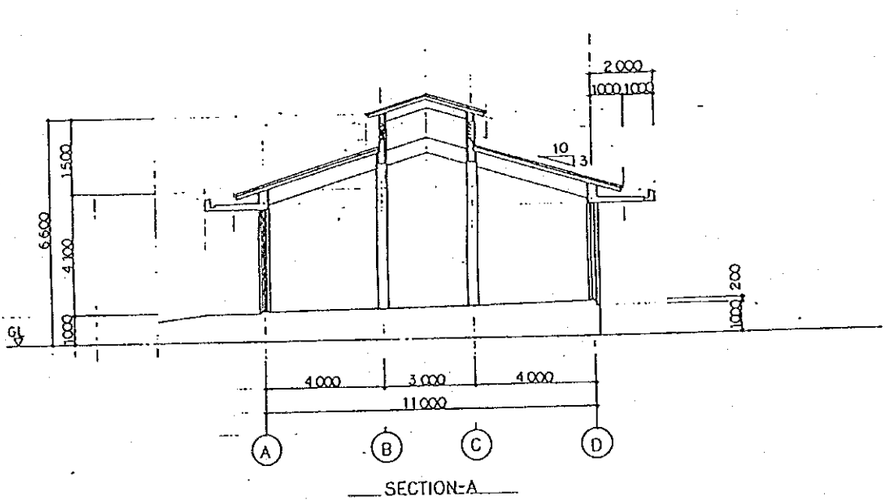
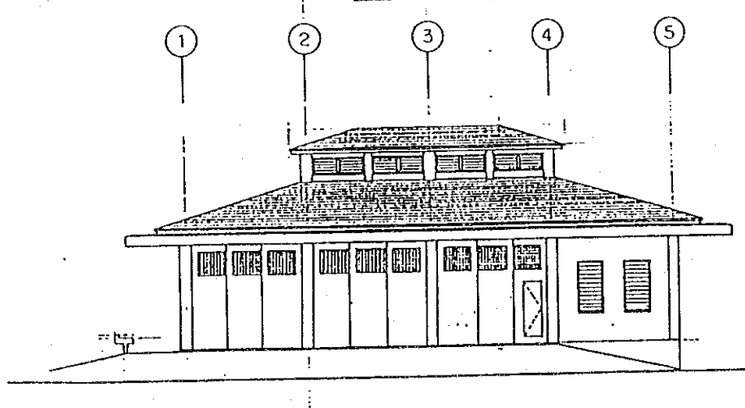


LINE D ELEVATION

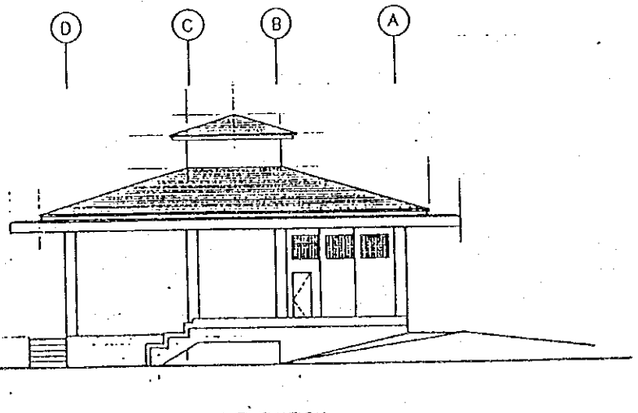
LINE 5 ELEVATION



SECTION-A



LINE A ELEVATION



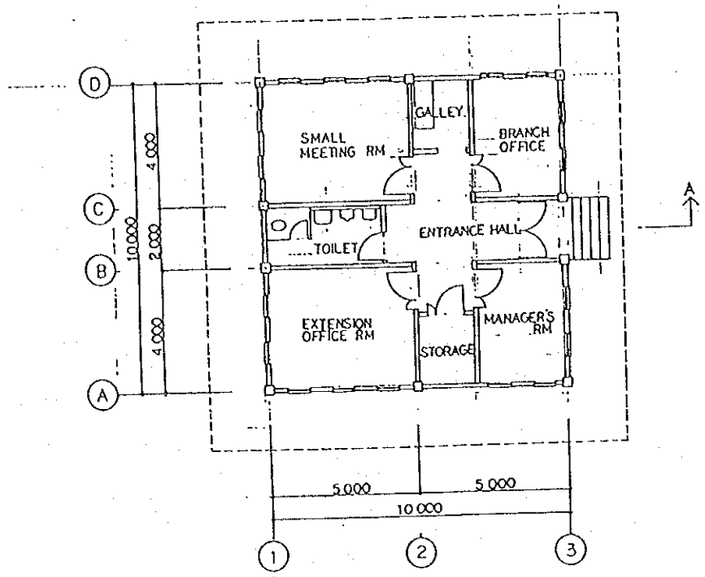
LINE 1 ELEVATION

FISHERIES CENTER A

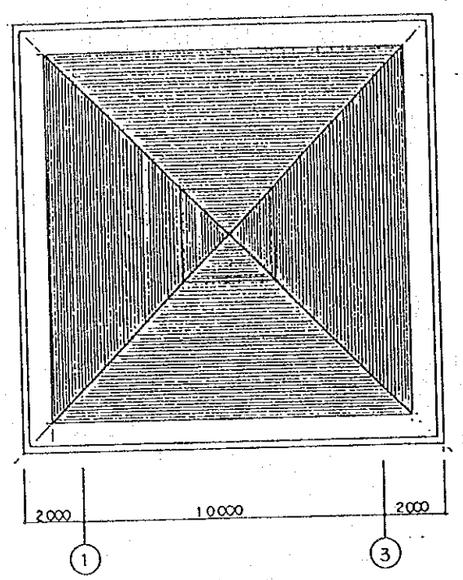
(CLIFTON)

CLIFTON

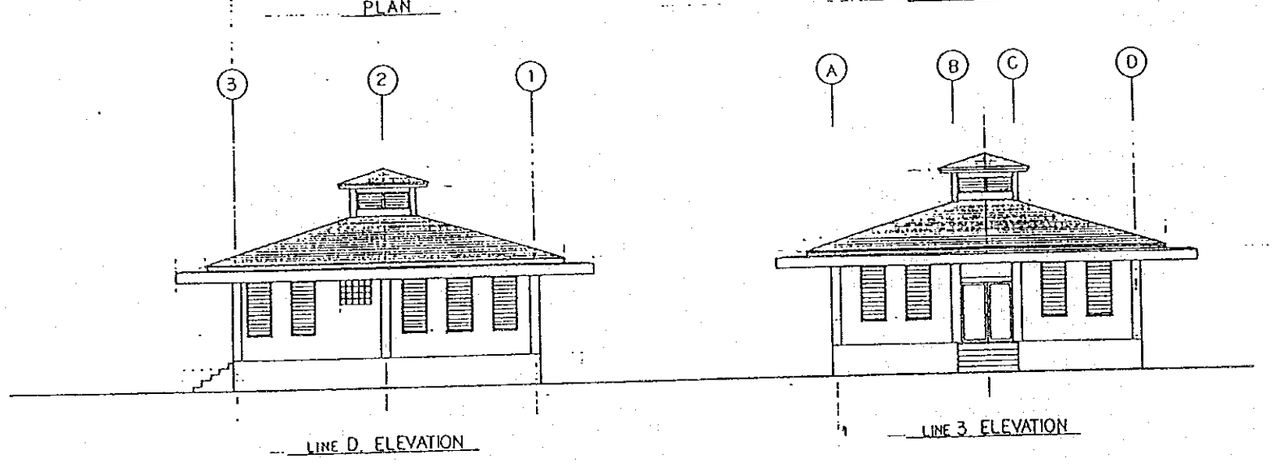
FISHERIES CENTER - A 1/100



PLAN

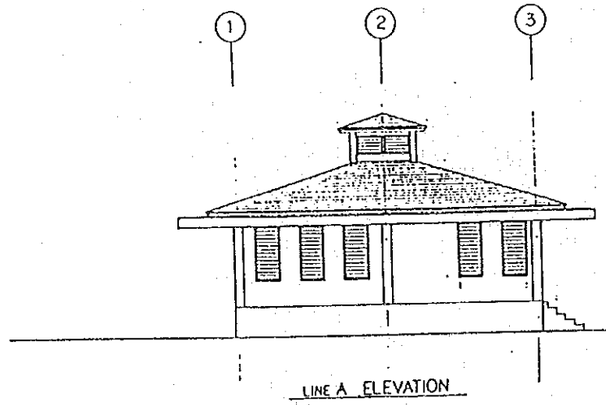


ROOF PLAN

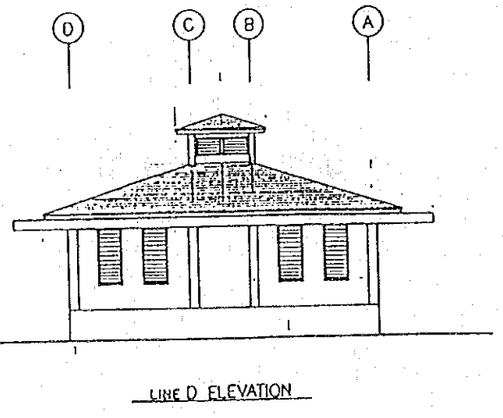


LINE D. ELEVATION

LINE 3 ELEVATION



LINE A ELEVATION



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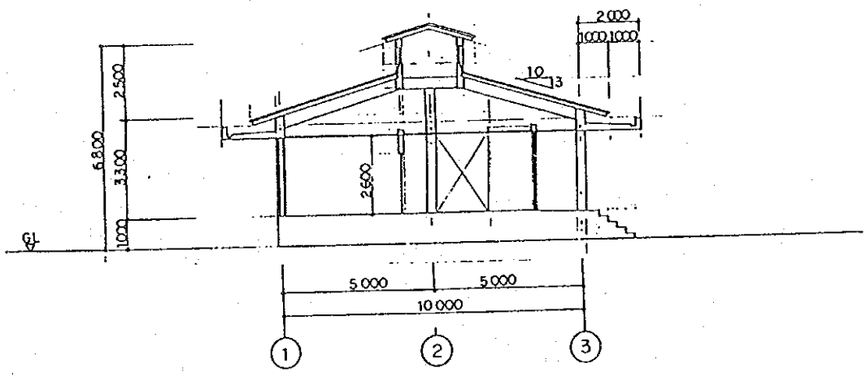
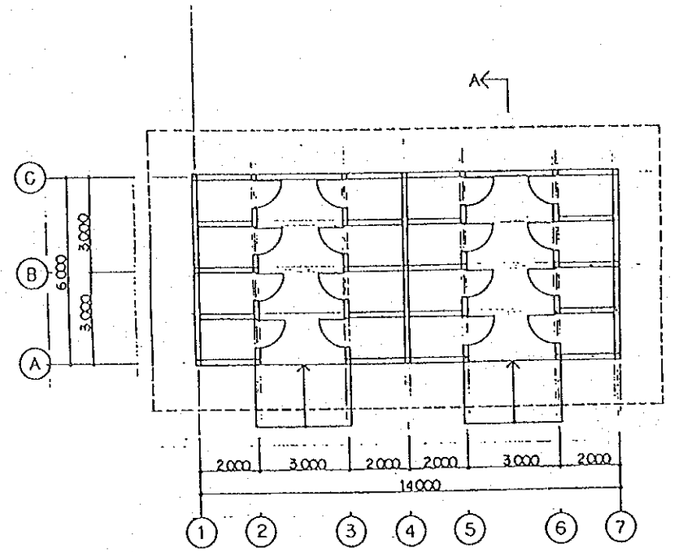


SECTION-A

FISHERIES CENTER B (CLIFTON)

CLIFTON

FISHERIES CENTER - B 1/100



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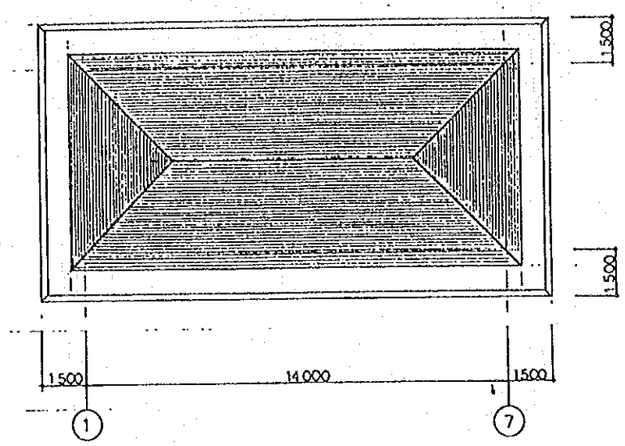

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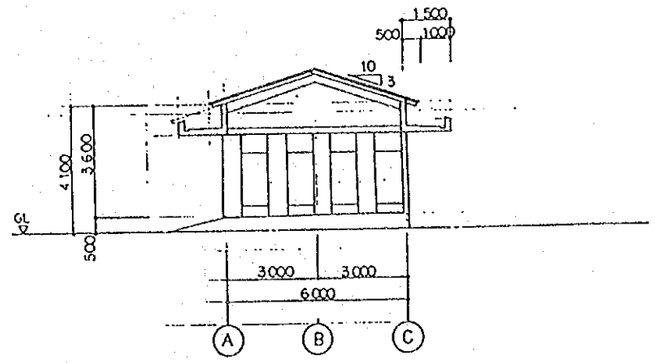
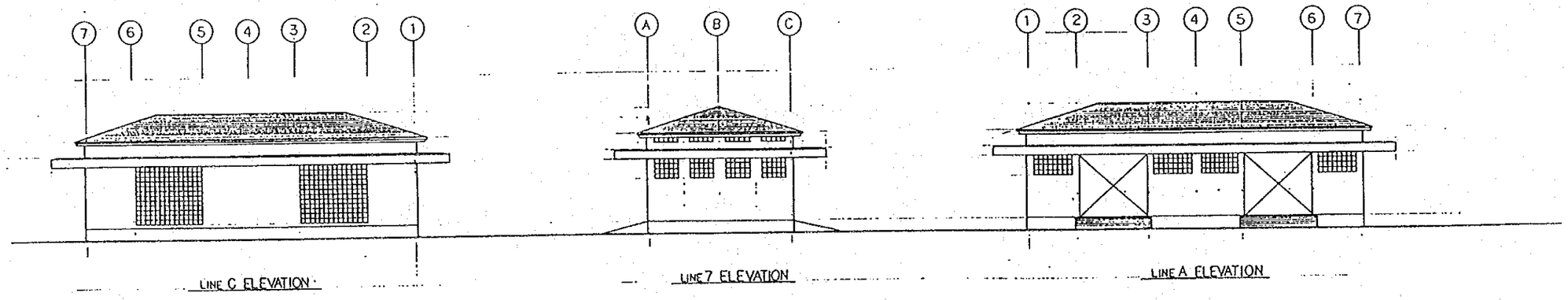


SECTION-A



LINE C ELEVATION

LINE 7 ELEVATION

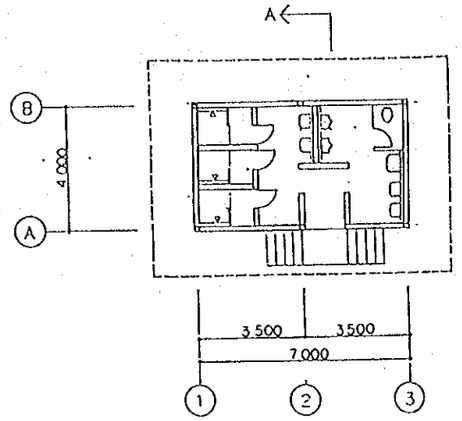
LINE A ELEVATION

FISHERMEN'S LOCKER (CLIFTON)

CLIFTON

FISHERMEN'S LOCKERS 1/100

TOILET / SHOWER ROOM



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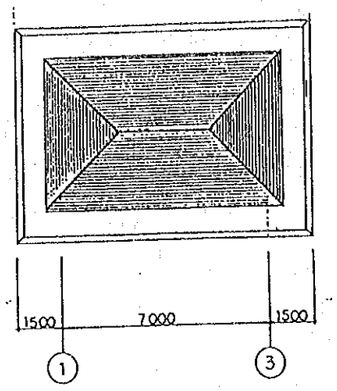

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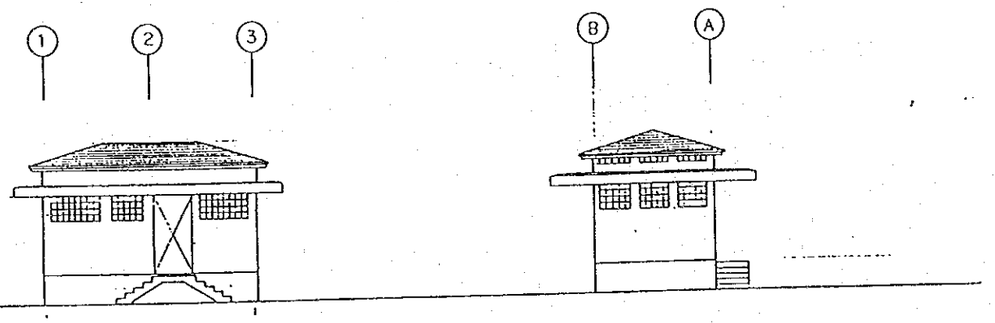
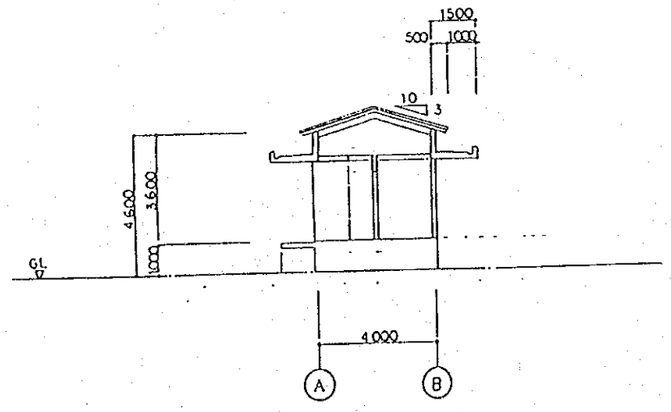


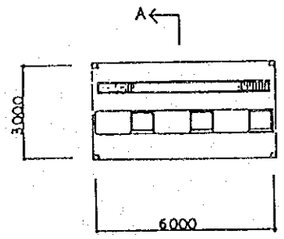
LINE A ELEVATION

LINE 1 ELEVATION



SECTION-A

FISH PROCESS AREA



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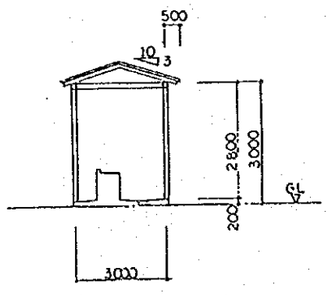
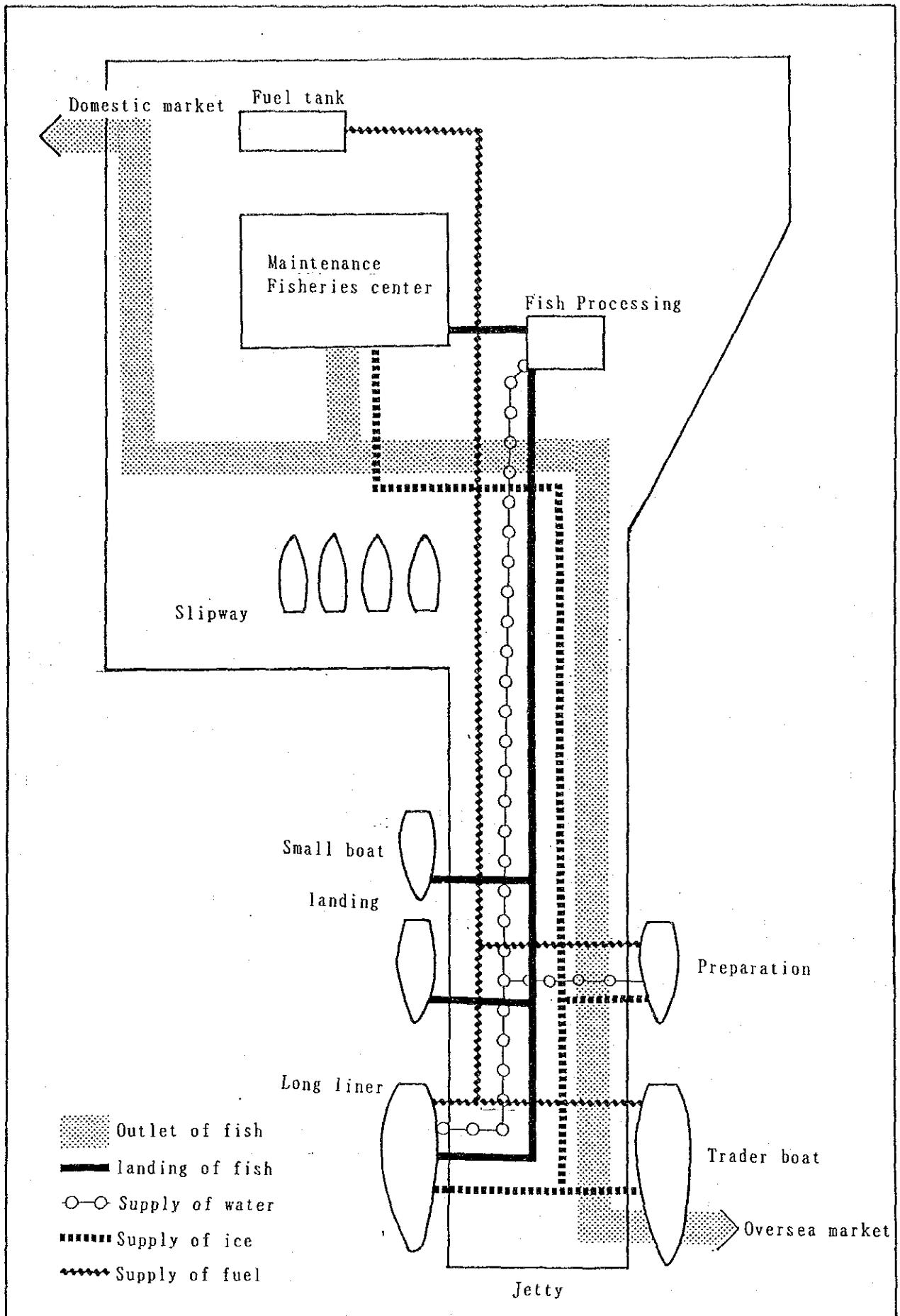


SECTION-A

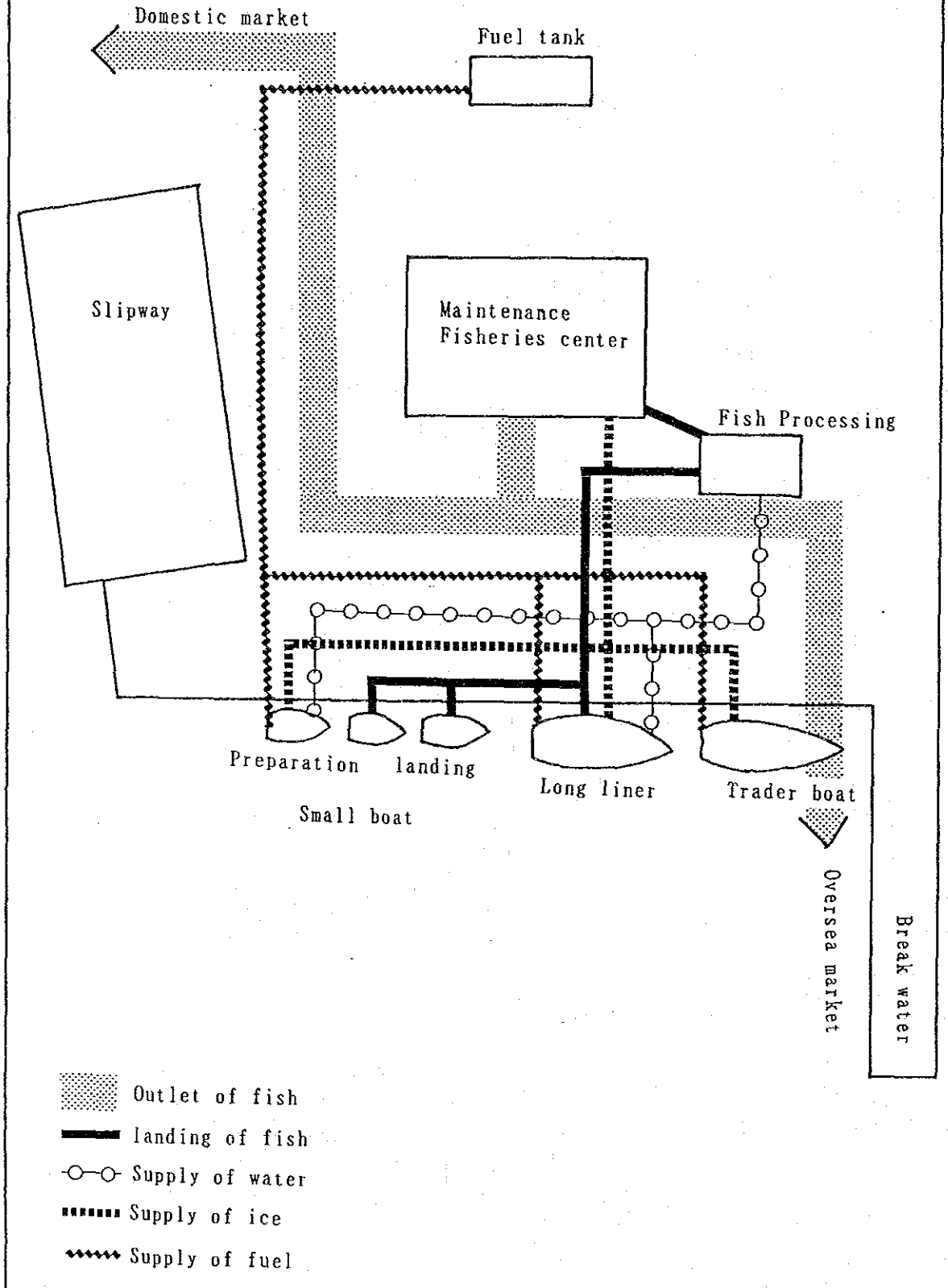
TOILET/SHOWER, FISH PROCESS (CLIFTON)

TOILET / SHOWER ROOM —124—

FISH PROCESS AREA 1/100



Flow plan of Clifton



Flow plan of Paget Farm

CHAPTER 5 PROJECT RESULTS AND CONCLUSIONS

1) Results and Improvements due to this project

Existing conditions and problem areas	Countermeasures to be taken by this project	Results and improvements
(Fisheries Center) The country is planning economic development by diversifying primary industries. Within industrial sectors, having unutilized resources, fisheries industry development is one of the most prospective field for the nation. However development is hindered by an infrastructure which is not fully equipped.	Establish fisheries centers to consolidate the local infrastructure.	It would be hoped that the fisheries industry's productivity would rise and that fishermen's incomes would increase. It is estimated that 5 years after the centers become operational, production will increase by more than 300 tons.
Due to slow development of technology, productivity is low in the fisheries industry.	Make it possible for extension officer to be dispatched to the Fisheries Centers.	Fisheries technology and the living standard of fishermen will improve.
The fishery is unstable and uncertain due to the lack of fish preservation facilities and dependence on the schedule of fish collection boat visit in this area	Equip fisheries centers with ice making and cold storage equipment to reduce reliance on the fish collection boat	It will become possible for fishermen to act independently to increase their areas of operation and the number of days on which fish can be transported. This will make it possible for marketing fish to the St. Vincent and also there would be the possibility of export by air transport.
The supply is insufficient to increase consumption of fish in the St. Vincent.	To establish new distribution channels from the Grenadines islands to the main island.	Shipment of about 200 tons of fish from the fishermen's centers to the main island would be actualized.

Existing conditions and problem areas	Countermeasures to be taken by this project	Results and improvements
Safety of fisheries operations is not maintained, giving rise to accidents at sea.	Increase safety standards and promote safety technology at the fisheries centers. Disseminate safety information, and to educate fishermen on safety.	Less accidents at sea and fisheries established as a safe occupation. The establishment of two fisheries centers will develop coastal fisheries on the outlying islands and in the end will benefit the following population: Fishermen 270 Islanders 6,700
A lack of adequate fisheries statistics hinders planning.	Collect statistics and data on fishermen organizations.	Move toward managed fisheries by strengthening the fishermen's cooperative and also protect resources and the environment.
(New Kingstown Fish Market) Ice demand is high but capacity is limited Cold storage capacity is limited.	Install ice making equipment. Increase cold storage space.	Better quality fish would be attained Economical operations would be realized
A lack of fish quality inspection equipment.	Install inspection equipment and provide guidance on its use.	Reliability of quality products for export will rise
New product development is hindered by a lack of the necessary equipment.	Introduction of machinery for processing and experimentation.	To economize by developing import alternatives of dried salt cod by research and development of new products such as dried salt shark and smoked products.

2) Conclusions and Proposal

By the implementation of the project impressive results such as those mentioned above are derived. The fisheries can become one of most important primary industry of this country by increasing production and establishing well organized market and distribution channels. Because this is an island country, on-land resources and arable land are limited. Through the implementation of this project an infrastructure that will actively exploit the benefits of renewable marine resources can be put in place, and this will be a great contribution to the national economy. Also by the rural development of remote islands we can hope that fishermen, who now occupy a low level in society, would experience an improvement in living

conditions. Therefore, we conclude that implementation of this project with the Grant Aid assistance is sincerely appropriate and timely. This project features a gradual achievement of aims for operations and management. Budget allocation have already been made to allow to start for the construction of St. Vincent & Grenadines's responsible portion. Sufficient overseeing personnel, technology and funds are in place, so smooth operations can be expected.

However, to further ensure good results, we propose that the following recommendation would be considered for execution of operation.

(1) The Fisheries Division shall assign staff based on the implementation design proposed in this report from the initial stages for the operation of the centers. Concerning newly hired branch staff and extension officer, because they will work jointly with the people of the Fishery cooperative, it is especially important to hire qualified person who can fully understand the contents and role of the facility and who can guide other people. Therefore, when hiring people, it is important to spend sufficient time for selection and training so that efficient operation will be attained later.

(2) At present the fishermen's cooperative is weak but through the operation of the facilities it will be strengthened and training of leaders will take place. Therefore, care must be paid in choosing permanent staff, especially for managers and technicians and capable, well liked people must be recruited. At the inception of this project especially, it is essential that excellent people with resolve and executive ability be in place to troubleshoot and make the necessary decisions. The members of the fishermen's cooperative have little experience in group action or decision making and are unaccustomed to having a common goal. Therefore big changes are necessary within the association. Further, care must be taken that the facility be communal and that profits are shared among all members. Finding someone with leadership skills matched to these challenges will be difficult but we must try very hard to put a capable person in place.

(3) Resource capital is necessary for this project. To begin operations it will be necessary to borrow start up funds from the public development corporations, but with sales providing a constant cash flow the loans should be paid back as soon as possible and in order to do this operations must be conducted in a financially sound manner.

By the strict management in the operation of the sales of ice and fish in this project future gains can be expected. A cash management system that provides for prompt repair and

replacement of machinery is necessary, and for this purpose the government must audit accounts and give guidance and advice. Also the allotment of profits should be carefully controlled to avoid unfair distribution among an inner group. This will strengthen the cooperative and increase resource capital.

(4) The plan is for the catch from the fisheries centers to be shipped via the Kingstown fish market to the island of St. Vincent and be sold at the fish market there. Fish consumption has risen in Kingstown since the completion of the fish market there but in order for the demand for fish shipped in from the Grenadine islands to go smoothly, retail sales and distribution systems must be quickly put in place, and reliable, fresh products must be made available to the consumer. The Fisheries Division is planning inland marketing and distribution systems but also coordination with this project by NKFM and its speedy implementation is necessary.

Further, it is the province of the private sector to export fish to neighboring countries, but it would be desirable for the Fisheries Division to collect information for export marketing and give advice on improving product quality and maintaining freshness and to otherwise indirectly assist export development. Using the advantage that the both centers locate near by airports, it is very possible that fresh fish could be exported by air. However, it is necessary to make it a priority, in future research and development, to determine such factors as which types of packaging and transport systems would be most appropriate.

APPENDIX

BASIC DESIGN TEAM MEMBERS LIST

Team Leader	Mr. Kanji Kitazawa	Assistant Director, Ministry of Foreign Affairs, Department of Economic Cooperation, Grant Aid Division
Fisheries Policy	Mr. Hitoshi Fujita	Chief fisheries officer, Ministry of Agriculture, Forestry and Fisheries International Cooperation Office, Oceanic Fishery Department
Grant Aid Cooperation	Mr. Kazuhiro Okamoto	Japan International Cooperation Agency Fisheries Cooperation Division
Fisheries Development Planning	Mr. Yasuo Ishimoto	Overseas Agro-Fisheries Consultants Co., Ltd. (OAFIC)
Fishing port Engineer	Mr. Mamoru Namiki	Ditto
Facility Design	Mr. Masato Araya	Ditto
Natural Conditions Survey	Mr. Akiyoshi Takahashi	Ditto
Operations & Computations	Mr. Masami Tsuchiya	Ditto

DRAFT FINAL

Leader	Mr. Hitoshi Fujita	Chief Fisheries Officer, Office of the Overseas Fisheries Cooperation, Fisheries Agency
Grant Aid Planner	Mr. Yoshio Ishiyama	Associate Specialist on Fisheries, Second Basic Design Study Division, Grant Aid Study & Design Department, JICA
Fisheries Development Planner	Mr. Yasuo Ishimoto	Overseas Agro-Fisheries Consultants, Co., Ltd.
Facilities Designer	Mr. Masato Araya	Ditto

STUDY SCHEDULE

1/10	(Sun)	Consultants depart Tokyo, arrive New York
1/11	(Mon)	Depart New York, arrive Kingstown
1/12	(Tue)	Finance and Planning Ministries, joint session
1/13	(Wed)	Fisheries Bureau consultation (fisheries overview), Main Island, Western Region fish resource survey
1/14	(Thu)	Project preparation survey (Union, Bequia, and Kingstown fish markets
1/15	(Fri)	Public Works Ministry, Weather Station, Kingstown fish market survey
1/16	(Sat)	Main island, Eastern Region, coastal survey
1/17	(Sun)	Move to Union Island, prepare for survey
1/18	(Mon)	Boring, begin tide, water current survey, Japanese government delegation departs Japan, arrives New York
1/19	(Tue)	Fisheries Bureau personnel and fish cooperative hearing, government delegation departs New York, arrives Trinidad
1/20	(Wed)	Government delegation visits Embassy, arrives Kingstown. Consultants link-up
1/21	(Thu)	Meet Prime Minister. Finance, Planning and Agriculture Ministries joint session, (Grant Aid planning, schedule confirmation)
1/22	(Fri)	Government delegation site survey (Union, Bequia), Union survey complete
1/23	(Sat)	Mustique Island fish resource survey
1/24	(Sun)	Group internal meeting, Main Island, Western Region fish resource survey, 2 consultants go to Barbados
1/25	(Mon)	Joint session of participating ministries, begin Bequia boring, tide, current survey; Barbados fish market survey
1/26	(Tue)	Minutes signing, Barbados construction related matters survey, JICA-sponsored party
1/27	(Wed)	Government delegation departs Kingstown, arrives Trinidad, reports results to Embassy
1/28	(Thu)	Fishermen's hearing fish resources survey
1/29	(Fri)	Bottom survey, inland construction related matters survey
1/30	(Sat)	Bequia survey complete
1/31	(Sun)	Group internal conference, resource consolidation
2/1	(Mon)	Consultants survey conditions pertaining to Grenada fisheries

2/2	(Tue)	Finance & Planning Ministries consultations, ocean construction on-site inspection
2/3	(Wed)	Union Island complementary survey, consultation with Fisheries Bureau
2/4	(Thu)	Fisheries Bureau consultation
2/5	(Fri)	2 people depart Kingstown, arrive Trinidad, report to Embassy
2/6	(Sat)	Construction survey
2/7	(Sun)	Group internal meeting, resource consolidation
2/8	(Mon)	Bequia Island complementary survey
2/9	(Tue)	Marine transport company survey
2/10	(Wed)	Fisheries bureau consultant
2/11	(Thu)	Depart Kingstown, arrive Trinidad
2/12	(Fri)	Soil inspection tests session
2/13	(Sat)	Research of conditions pertaining to Trinidad construction
2/14	(Sun)	Resource analysis adjustment
2/15	(Mon)	Survey, confirmation of outcomes of geological and other reports
2/16	(Tue)	Depart Trinidad, arrive New York
2/17	(Wed)	Depart New York
2/18	(Thu)	Arrive Narita

DRAFT FINAL

4/17	(Sat)	Depart Tokyo, Arrive New York
4/18	(Sun)	Depart New York, Arrive Kingstown
4/19	(Mon)	Coutesy Call to Ministry of Agriculture, Industry and Labour, Fishery Division. Explanation of Draft Report
4/20	(Tue)	Joint sission for Draft Report
4/21	(Wed)	Site survey (Union, Bequia, Kingstown) singing of minutes
4/22	(Thu)	Joint session with Fishery Division
4/23	(Fri)	Depart Kingstown, arrive Port of Spain. Reports results to Embassy
4/24	(Sat)	Depart of Port of Spain, arrive New York
4/25	(Sun)	Depart of New York
4/26	(Mon)	Arrive Tokyo

INTERVIEWEE LIST

Prime Minister	The Hon. J.F. Mitchell
Ministry of Agriculture, Industry & Labor	
Cabinet Member	Allan Cruickshank
Permanent Secretary	Carlton O. Samuel
Chief Fisheries Officer	Kerwyn L. Morris
Fisheries Officer	Raymond J. Ryan
Fisheries Officer	Franklin Murphy
Extension Officer	Winston Moulraine
Chief Surveyor	Clifford Williams
Central Planning Division	
Parmanent Secretary	Maurice Edwards
Chief Planning Officer	Randolph S. Cato
Planning Officer	Bentoley Browne
Planning Officer	Colin S. Jones
Ministry of Foreign Affairs and Tourism	
Permanent Secretary	Senator Stuart Nanton
Ministry of Public Works	
Technical Department Chief	Jeffrey Cato
Technical Officer	Andrew Ramgolam
Ministry of Transport	
Technical Officer	Ronald E. Browne
Ministry of Housing, Community Development	
Permanent Secretary	Mr. Young
Division Chief	Mr. Morgan
Water & Sewer Services Public Corporation	
Technical Officer	Garth Saunders

Coastguard	
Commander	Mr. Jageer
Organization of Eastern Caribbean States (OECS) fisheries department	
Room Chief	David V. Robin
Manager	Peter A. Murray
Statistics Manager	Alva L. Lynch
Housing Cooperative Association	
Technical Officer	Alwyn Cupid
Marketing Corporation	
Kingstown Fish Market Head	Maurice Horne
Japanese Expert to Fisheries Division	
Fishing gear and method	Yukichi Kimura
Marine Engineer	Keiji Okabe
In Grenada	
Ministry of Agriculture, Lands, Forestry and Fisheries	
Vice Minister Fisheries Bureau	Denis S.O. Noel
Chief Fisheries Officer	James Finlay
AFDP Manager	Randolph Mcintosh
Japanese expert	Kazuo Senga
Japanese expert	Tomishige Kondo
In Barbados	
Bridgetown Fish Market Manager	Henderson R. Greaves
In Trinidad and Tobago	
Embassy of Japan	
Japanese Ambassador	Mitsuru Eguchi
First Secretary	Kenichi Namimatsu
Second Secretary	Masami Moriyoshi

1. Flake Ice Making Machine Income and Expenditure Forecast (for manufacture of 2 tons ice)

Operations costs

A. Electric power use

Condenser unit	5.50 KWH
Scraper motor	0.40 KWH
Water pump	0.04 KWH
Lighting	0.30 KWH
Nominal consumption of electrical power	6.24 KWH
EC$0.44 x 6.24 x KWH x 24 x 200 =	EC$13,179
EC$12 x 6.24 x KWH x 12 months =	898
Total	EC$14,078

B. Water costs

None

C. Maintenance costs

EC$190,000x3%=EC$5,700

D. Depreciation (5 years)

EC$190,000/5 =EC$38,000

Operation Cost Total EC$23,578

Returns

A. Ice sales amounts

Daily production amt : 2,000kg/day=4,400lb/day
Operating Days : 200 days
Yearly production : 4,400/dayx200days=880,000lbs

Sales configuration

Peak fishing season (6 mos)	The full amount produced will be for fisheries use (selling price EC$0.14/lb)
Off season (6 mos)	70% of production for fisheries use, 30% for public use (selling price EC$0.30lb)

Furthermore, 85% of yearly production will be for fisheries use, 15% for public use.

Fisheries use sales amount	880,000x0.85xEC$0.14*	=	EC$ 104,720
Public use	880,000x0.15xEC$0.30	=	EC$ 39,600
	Yearly sales amount		EC$ 144,320

* St. Vincent Fish Market Price

Balance = EC$ 120,742

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY ON THE COASTAL FISHERIES DEVELOPMENT PROJECT IN ST. VINCENT AND THE GRENADINES

In response to a request from the Government of St. Vincent and the Grenadines, the Government of Japan decided to conduct a basic design study on the Project for the coastal fisheries development in St. Vincent and the Grenadines (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to St. Vincent and the Grenadines a study team, which is headed by Mr. Kanji Kitazawa, Assistant Director of Grant Aid Division, Ministry of Foreign Affairs, and is scheduled to stay in the country from 11 January to 12 February, 1993.

The study team held discussions with the officials concerned of the Government of St. Vincent and the Grenadines, and conducted a field survey at the study area.

In the course of discussions and field survey, both parties have confirmed the main items described on the attached sheets. The study team will proceed to further works and prepare the basic design study report.

Kingstown, 26 January 1993

Mr. Kanji Kitazawa
Leader
Basic Design Study Team
JICA

Mr. Randolph S. Cato
Director of Planning,
Ministry of Finance and Planning
Government of
St. Vincent and the Grenadines

ATTACHMENT

1. OBJECTIVES

The objectives of the Project are 1) the establishment of fisheries centers in the Grenadines islands, and 2) the expansion of marketing facilities of New Kingstown Fish Market, in order to promote national fisheries activities.

2. PROJECT SITES

The Project sites are;

1)Paget Farm on Bequia(shown in "Annex I")

2)Clifton on Union island(shown in "Annex I")

3)New Kingstown Fish Market on St.Vincent.

3. EXECUTING AGENCY

The Ministry of Agriculture, Industry and Labour through the Fisheries Division is responsible for the administration and execution of the Project.

4. ITEMS REQUESTED BY THE GOVERNMENT OF ST.VINCENT AND THE GRENADINES

After discussions with the study team, the items shown in "Annex II" were finally requested by the Government of St.Vincent and the Grenadines. However, the final components of the Project will be decided after further studies.

5. JAPAN'S GRANT AID SYSTEM

(1)The Government of St.Vincent and the Grenadines has understood the system of Japanese Grant Aid explained by the team.

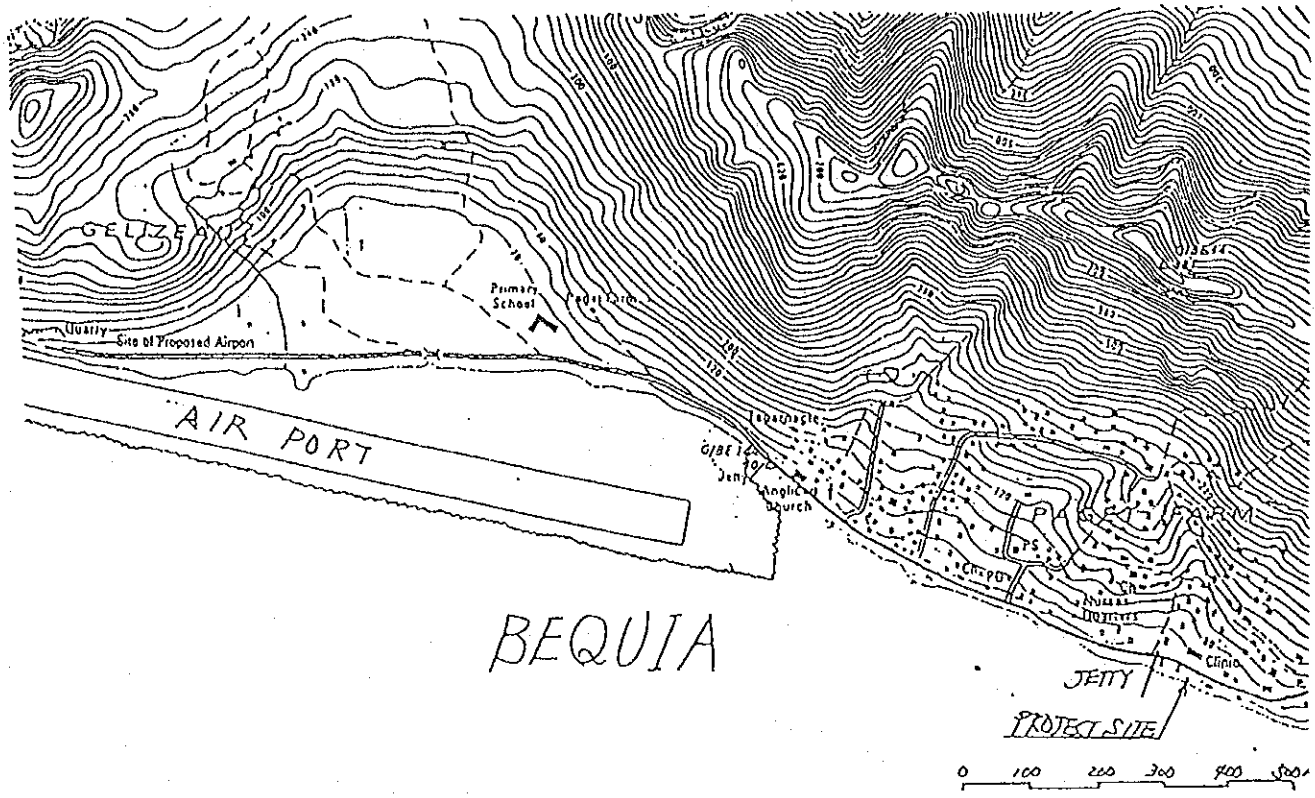
(2)The Government of St.Vincent and the Grenadines will take necessary measures, described in "Annex III" for smooth implementation of the Project, on condition that Grant Aid Assistance by the Government of Japan is extended to the Project.

6. SCHEDULE OF THE STUDY

(1)The consultants will proceed to further studies in St.Vincent and the Grenadines until 12 February 1993.

(2)Based on the Minutes of Discussions and technical examination of the study results, JICA will complete the final report and send it to the Government of St.Vincent and the Grenadines by the end of May 1993.

ANNEX I



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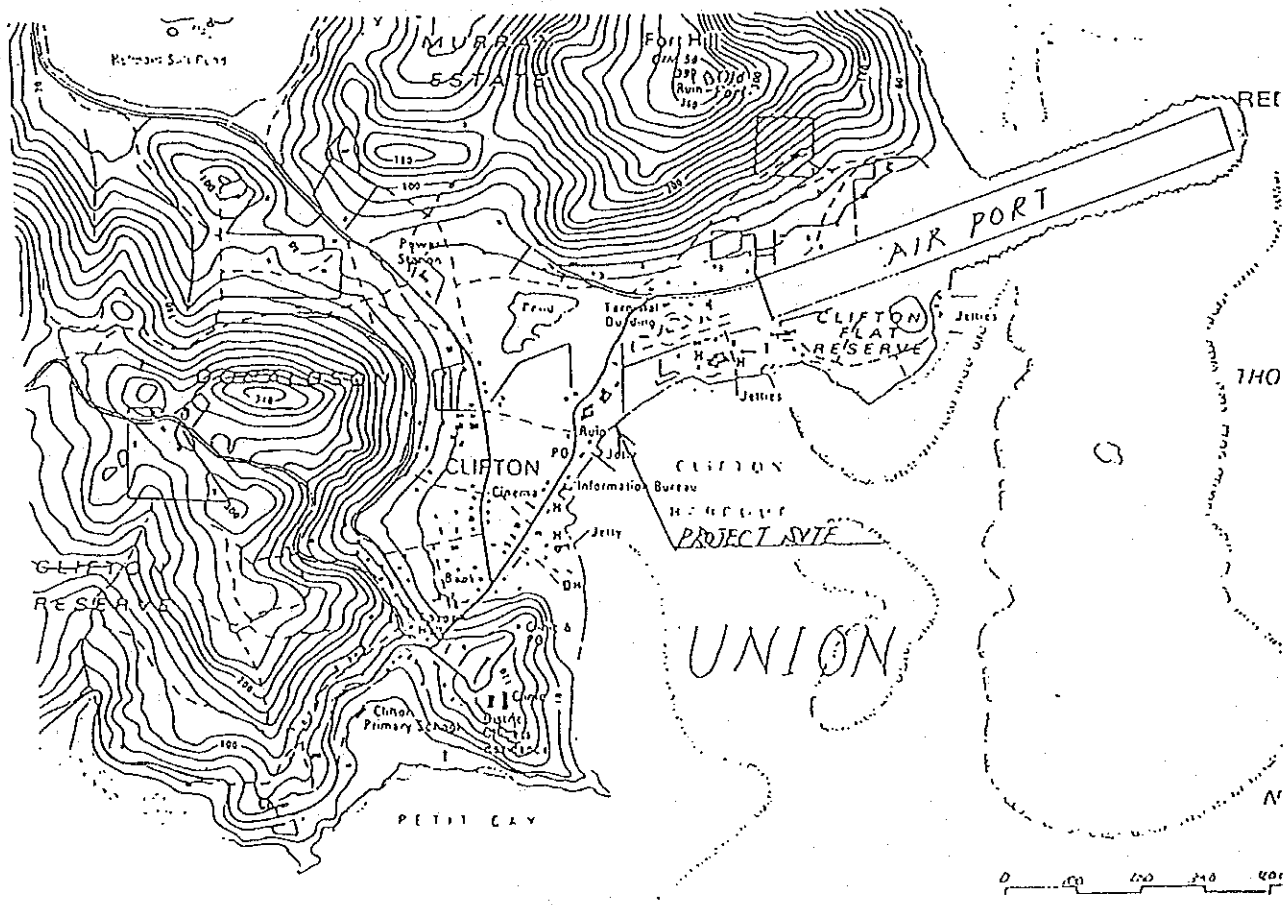

ANNEX II

Items requested by the Govenment of St. Vincent and the Grenadines (in order of priority)

A. Fisheries Centers in Bequia and Union Island
   1)Fish landing facilities(wharf, slipway, jetty and breakwater)
   2)Fish preservation and marketing facilities(ice plant, cold storage, and vendor's stall)
   3)Fisheries extension and supportive facilities(fisheries branch office, administrative room, fishermen's locker and work shop)
   4)Utilities(electricity, water, sewage and fuel supply)
   5)Supportive equipment(work boat, delivery truck, radio etc.)

B. New Kingstown Fish Market
   1)Fish preservation facilities(ice plant, cold storage)
   2)Fish quality assurance equipment
   3)Fish processing equipment

ANNEX III

Nnecessary measures to be taken by the Government of St. Vincent and the Grenadines in case Japan's Grant Aid is executed.

1. To secure the site for the Project.
2. To clear, level and reclaim the site prior to commencement of the construction.
3. To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the site.
4. To construct the access road to the site prior to commencement of the construction.
5. To provide facilities for distribution of electricity, water supply, telephone, drainage, sewage and other incidental facilities to the Project site.
   1)Electricity distribution line to the site.
   2)Telephone trunk line to the main distribution panel of building.
   3)General furniture such as carpets, curtains, tables, chairs and others.
6. To bear commissions to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement.
7. To exempt taxes and to take necessary measures for custom clearance of the materials and equipment brought for the Project at the port of disembarkation.
8. To accord Japanese Nationals whose services may be required in connection with the supply of products and the services under the verified contract such facilities as may be necessary for their work.
9. To maintain and use properly and effectively the facilities constructed and equipment purchased under the Grant.
10. To bear all the expenses other than those to be borne by the Grant, necessary for construction of the facilities as well as for the internal transportation and the installation of the equipment.

MINUTES OF DISCUSSIONS
BASIC DESIGN STUDY ON THE COASTAL FISHERIES
DEVELOPMENT PROJECT IN ST. VINCENT AND THE GRENADINES
(CONSULTATION ON DRAFT REPORT)

In January 1993, the Japan International Cooperation Agency (JICA) dispatched the basic design study team on the Coastal Fisheries Development Project (hereinafter referred to as "the Project") to St. Vincent and the Grenadines, and through discussions, field surveys, technical examinations and analyses, has prepared the draft report of the study in Japan.

In order to explain and to consult St. Vincent and the Grenadines on the components of the draft report, JICA sent to St. Vincent and the Grenadines a study team, headed by Mr. Hitoshi Fujita, Chief Fisheries Officer, Office of the Overseas Fisheries Cooperation, Fisheries Agency. The team is scheduled to stay in the country from 18 April to 23, 1993.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

Kingstown, 21 April 1993.

Hitoshi Fujita

Mr. Hitoshi Fujita
Leader
Basic Design Study Team,
Japan International
Cooperation Agency

Mr. Carlton Samuel
Permanent Secretary
Ministry of Agriculture,
Industry and Labour
Government of Saint Vincent
and the Grenadines.

ATTACHMENT

1. Components of draft report

The Government of St. Vincent and the Grenadines has agreed and accepted in principle the components of the draft report proposed by the basic design study team.

2. Japan's Grant Aid System

The Government of St. Vincent and the Grenadines has understood Japan's Grant Aid system, and reconfirmed the measures to be taken by the St. Vincent side for the realization of the project as agreed upon in the Minutes of Discussions dated 26 January 1993.

3. Further schedule

The team will make the final report in accordance with the confirmed items, and send it to the Government of St. Vincent and the Grenadines by the end of July 1993.

4. Recommendations for undertakings by the Government of St. Vincent and the Grenadines in case Japan's Grant Aid is executed

The Government of St. Vincent and the Grenadines agreed to request the related authorities to take the following measures for successfully accomplishing the objectives of the Project and for maximizing the positive effects of the Project.

(1) Construction work

The Government of St. Vincent and the Grenadines shall start reclamation work on the Bequia project site immediately after the signing of the Exchange of Notes between the Governments of St. Vincent and the Grenadines and Japan. The said reclamation work comply with the specifications prepared by the Japanese consultant.

(2) Management of the Fisheries Centers

1) Fisheries Division/Ministry of Agriculture, Industry and Labour shall appoint qualified fishery officers and extension officers to assist in the cooperative development of the two project sites. The Fisheries Division/Ministry of Agriculture, Industry and Labour shall take necessary measures in order that the fisheries cooperatives in Clifton and Paget Farm could start smooth management and operation of the facilities upon completion of the construction.