2.6 Basic Design of Fish Landing Wharf

2.6.1 Appropriate Scale of Fish Landing Wharf

(1) Length of Fish Landing Wharf

The fish landing wharf is provided for medium boats. The number of medium boats using Banda Beach is 251. The results of a survey carried out for four months by DCC from November 1998 to January 1999 on the fish landing time of medium boats are shown in Table 2.6.1. It shows that the average number of medium boats normally unloading fish at Banda Beach is 16 units with a peak hour at 7 in the morning.

Table 2.6.1 Fish Landing Time of Medium Boats at Banda Beach

Time	Nov. 1998	Dec. 1998	Jan. 1999	Average
6:00	2.9	1.0	2.4	2.1
7:00	8.8	12.5	8.0	9.8
8:00	0.1	2.1	0.8	1.0
9:00	0.5	1.1	1.7	1.1
10:00	0.0	0.0	0.0	0.0
11:00	0.0	0.2	0.0	0.1
12:00	0.2	0.1	0.1	0.1
13:00	0.1	1.0	0.2	0.4
14:00	1.0	1.1	0.6	0.9
15:00	0.9	0.0	0.3	0.4
16:00	0.1	0.0	0.1	0.1
Total	14.7 Units	19.1 Units	14.2 Units	16.0 Units

Source: DCC Daily Work Book

In the peak hour at 7:00, an average of 10 medium boats approach the site and average unloading time is 1.8 hours per boat. It is assumed that the unloading time will be reduced to half or one hour due to high efficiency of fish landing. It is planned to provide 5 berths at the landing wharf with which all boats will have access to the fish market can unload their fish within two hours, though a certain waiting time will be caused.

Number of Berth = Number of Boats Unloading during Peak Hour (10 units) / Total Unloading Time (2 Hours) / Unloading Time per Boat (1 Hour) = 5 Berths

The length of one berth is determined at 10.2 m which is 8.9 m of average length of medium boat plus berthing allowance of 1.3 m. Thus total berth length is:

Total Berth Length = 10.2 m x 5 berths = 51.0 m

(2) Crown Height of Fish Landing Wharf

According to the standard, the crown height of the fish landing wharf is determined taking into account HWL and users' convenience. In addition, the quantity of overtopping waves should be considered in determining the crown height to prevent the damage to the wholesale auction hall which is situated behind the fish landing wharf.

1) Optimum crown height by utilization

The size of the fishing boats is approximately 3GT and the tide range is 3.3 m on average during the spring tide. Therefore, as shown in Table 2.6.2, 0.2m should be added to HWL for the crown height.

Optimum Crown Height for Utilization = HWL + 0.2 m
= 3.2 m + 0.2 m
= DL +3.4 m

Table 2.6.2 Crown Height of Wharf (above HWL)

Tidal Range (HWL – LWL)	Fishing Boat (GT)
	0~20
0~1.0	0.7 m
3.0~3.2	0.3 m
More than 3.2	0.2 m

Source: Design Standards for Fishing Port Facilities in Japan

2) Crown height by overtopping waves

The allowable quantity of overtopping waves is shown in Table 2.6.3, depending on the importance of onshore facilities. Since the public facilities such as wholesale auction hall and wholesale market will be constructed approximately 10 m behind the fish landing wharf, the allowable quantity of overtopping waves should be less than 0.02 m^3/m/sec. The crown height is computed DL+5.0 m with the allowable the quantity of overtopping 0.02 m^3/m/sec.

Table 2.6.3 Allowable Quantity of Overtopping by Importance of Behind Area

Houses and public facilities are crowded Expected critical damages by overtopping waves and splash.	(m^3/m/sec) Approx. 0.01
Other important area	Approx. 0.02
Other area	Approx. 0.02 ~0.06

Source: Technical Standards for Port and Harbor Facilities in Japan

(3) Stair Type Wharf

Considering the difference between the sea level and the crown height of the fish landing wharf, it is recommended that a stair type wharf be adopted as the tidal range is more than 3 m and the size of fishing boats is rather small with a maximum of about 3 GT.

The above indicates that unloading caught fish from fishing boats is conducted only during HWL. In addition, 0.7 m is the height of the bow deck from the sea level, according to the results of a hearing at the site.

There are two types of the stairs, namely 1) vertical to the landing wharf line and 2) parallel to the landing wharf line. The structure of fishing boats is not suitable to the vertical type. The quantity of overtopping waves would increase in case of the vertical type. Therefore, a parallel type is selected.

(4) Depth of Fish Landing Wharf

The depth of the fish landing wharf will be determined considering the maximum draft of designed fishing boat and some allowance.

Planned depth = max. draft of designed fishing boat + allowance

= 1.5 m + 0.5 m

= 2.0 m (Design Standards for Fishing Port Facilities)

Hence, the depth is determined to be 2.0 m. However, considering the scouring by waves, the toe protection should be provided with a level of DL-3.0m.

(5) Apron Width

The apron width of the fish landing wharf will be determined in accordance with Table 2.6.4.

Table 2.6.4 Apron Width

Classified		Apron width (m)
Landing wharf	All caught fish brought to the shed	3.0
	Transported by mobile from the apron directly	10.0
Preparations wharf for fishing		10.0
Resting wharf		6.0

Source: Design Standards for Fishing Port Facilities in Japan

The apron width was determined to be 10 m since the wharf is planned to land caught fish.

The apron slope is standardized as 1/30 ~ 1/50 according to the standard. On the other hand, the auction hall and wholesale market will be constructed on DL +5.5 m level. Considering the distance between the auction hall and the landing wharf, the apron slope is set at 1/40.

2.6.2 Structural Design

The structural design for the fish landing wharf has been compared for selection of the optimum structural type.

Since the fish landing wharf will be constructed in front of the reclaimed land, it should be designed as a function of revetment. Therefore, the structures should be designed in consideration of its convenience. The following structural types of the fish landing wharf were compared.

Type 1: Steel Pipe Pile type + Stair type

Type 2: Steel Sheet Pile type + Stair type

Type 3: Gravity type + Stair type

As a result of the comparison in Table 2.6.5, the steel pipe pile type with stairs has been selected as the most optimum one.

2.6.3 Dredging

In order to guarantee a designed water depth of –3.0m, the front area of the fish landing wharf which is approximately 900 m^2 will be dredged. Since the seabed is coarse grained sand, it is suitable for reclamation material. Therefore, the dredged materials will be effectively used as a portion of the reclamation.

Dredging area : approximately 900 m^2

Dredging volume: approximately 1,800 m^3

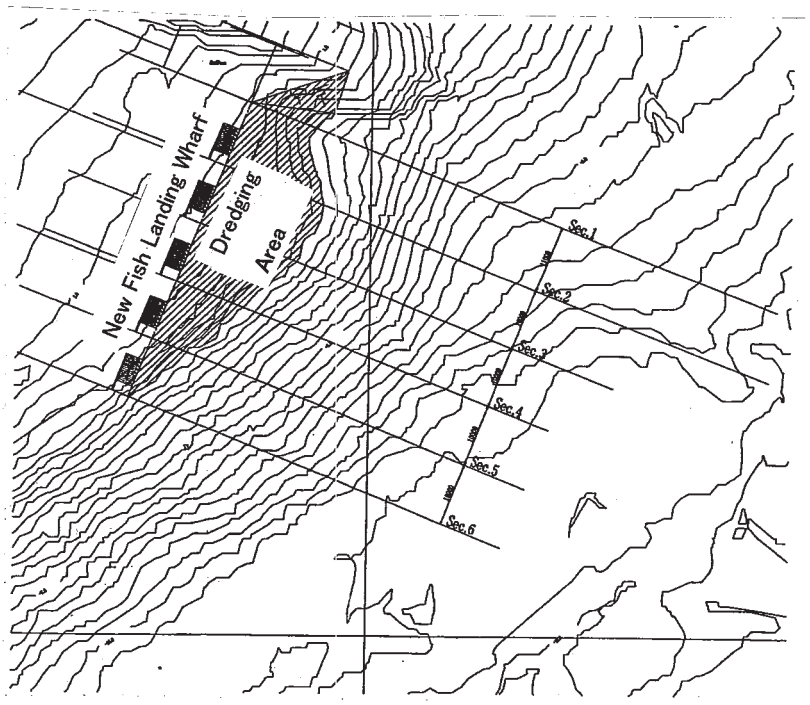
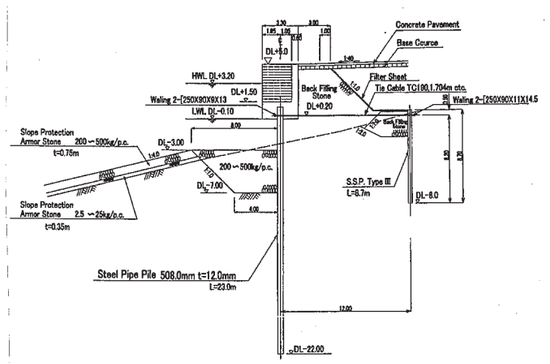
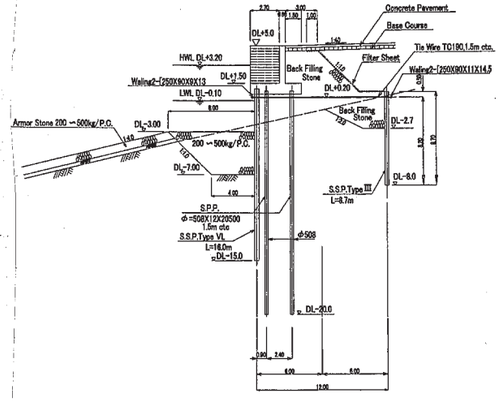
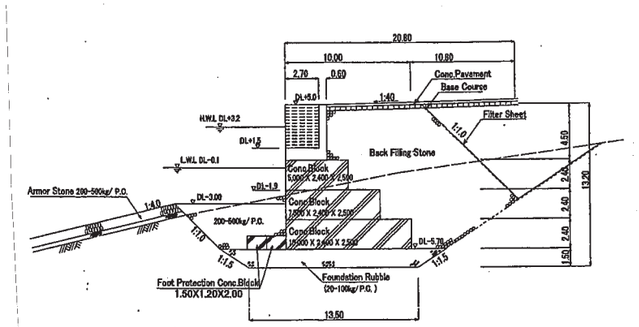


Figure 2.6.1 Dredging Plan

Table 2.6.5 Structural Comparison for Fish Landing Wharf

Item \ Type		Type 1 Steel Pipe Pile Type	Type 2 Steel Sheet Pile Type	Type 3 Gravity (Block) Type
Typical Cross Section				
Advan -tage & Disadvan -tage	Advan -tage	• Structurally simple, high safety against scour, accurate in work. • Dead weight is small, less concerned of differential settlement. • Maintenance and inspection is easy. • Watertightness of joints is good. • Excavation and backfilling volume is small.	• Structurally more simple than steel pipe pile, high safety against scour, accurate in work. • Dead weight is very small, less concerned of differential settlement. • Maintenance and inspection is easy. • Watertightness of joints is good. • Excavation and backfilling volume is small.	• The major materials can be provided in locally. • Corrosion control is not necessary. • Rigidity, weight is bigger, and durable.
	Dis-advan -tage	• The major materials and equipment shall be imported. • Anticorrosion treatment shall be done.	• Major materials and equipment should be imported. • Anticorrosion treatment should be done. • The construction time is rather long compare with steel pipe pile type due to so many complicated items.	• Works of excavation, rip rapping, installation of the blocks are mainly carried out under the sea, so it is difficult to carry out by local contractors. • Differential settlement might occur because the block is extremely heavy and the weak cohesive is expected under the blocks. • The structure might collapse by the circular slip because the weak cohesive is expected under the blocks. • Difficult to correspond for the seabed slope, stability might spoil by the scouring, in addition the structures might collapse. • Difficult to carry out by the temporary deck, the working vessels such as crane barge would be imported. • The project site is adjacent to the navigation channel so that the works maybe limited by anchorage of the working vessels. • The block fabrication yard is necessary. • Excavation and backfilling volume are big.
Approx. Quantity (for 10m)		Reinforced concrete 89.80m³ Steel pipe pile φ 508 x 12 mm, L=23m (piece) 17.77 Tie wire TC190 L=13 m (piece) 5.95 Anchor pile type III×8.7m (piece) 25 Impermeable sheet 87.60m² Back filling stone 312.50m³	Reinforced concrete 104.80m³ Steel sheet pile type V_L×16m (piece) 20.00 Tie wire TC190 L=13 m (piece) 8.33 Anchor pile type III×8.7m (piece) 25 Steel pipe pile φ 508 x 12 mm, L=23m (piece) 16.67 Impermeable sheet 88.00m² Back filling stone 350.00m³	Reinforced concrete 89.80m³ Concrete 354.00m³ Foundation material 654.40m³ Impermeable sheet 200.00m² Backing filling stone 852.40m³ Removal of existing foundation 1,397.70m³ Placing of toe protection blocks (piece) 15
Relative Construction Time		100 %	150%	120%
Relative Construction Cost		100 %	107%	110%
Evaluation		Recommend	Fair	Poor

2.7 Basic Design of Land Reclamation and Revetment

2.7.1 Reclamation Plan

(1) Appropriate Scale of Reclamation and Revetment

The reclamation and revetment planning are major components of the Project. Regarding the revetment, as described in the previous section, the structural type for revetment should be consistent with that of the fish landing wharf.

The following will be examined mainly for design of the reclamation.

The reclamation should be planned on the condition that onshore facilities will be constructed a few months after the reclamation. Therefore, the reclamation should be designed taking into account that significant consolidation settlement would not occur, since the most suitable materials should be dumped inside of the revetment by an adequate reclamation method economically and safely.

The procedures are listed as follows:

- easiness of supplying reclamation materials
- quality of the reclamation material should not be remarkably different
- content ratio of silt and cohesive soil should be low in the materials
- free from environmental damage caused by the supply of the materials
- dredging materials should be utilized for the materials
- free from the turbidities by the reclamation work
- consolidation should be made as much as possible during the reclamation to prevent from the collapse of the ground after the completion of the Project
- reclamation work should be completed within the construction period
- reclamation work can be done by conventional construction machines

The reclamation area is located east of Ocean Road with a reclamation volume of 8,400m^2 as shown in Figure 2.7.1.

(2) Reclamation Planning

The planned reclamation height is determined considering the following items.

- Elevation of the existing roads is DL+5.5 ~ +5.7m
- Crown height of the temporary ferry ramp is DL+5.5 m
- Since the public facilities will be constructed after the completion of the reclamation, undulations on the pavement should be minimized.
- The crown height of the fish landing wharf is determined to be DL+5.0 m

The reclamation height should be determined considering the above factors, topography, natural conditions, utilization and convenience.

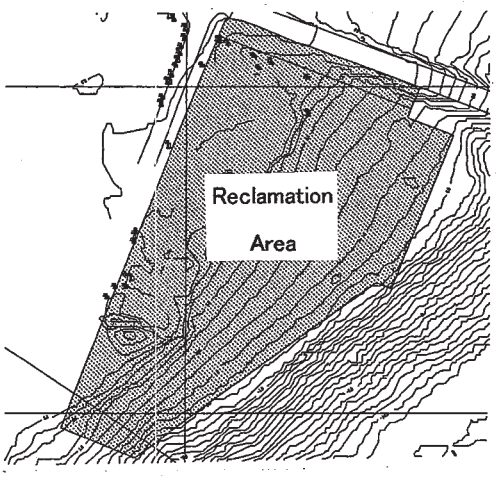


Figure 2.7.1 Reclamation Area

2.7.2 Revetment Plan

(1) Comparison of Structural Type

The three structural types of the revetment are as follows and a comparison is shown in Table 2.7.1.

Type 1: Steel Pipe Pile type

Type 2: Steel Sheet Pile type

Type 3: Gravity type

As indicated in Table 2.7.1, the steel sheet pile type of revetment was selected considering cost and construction planning.

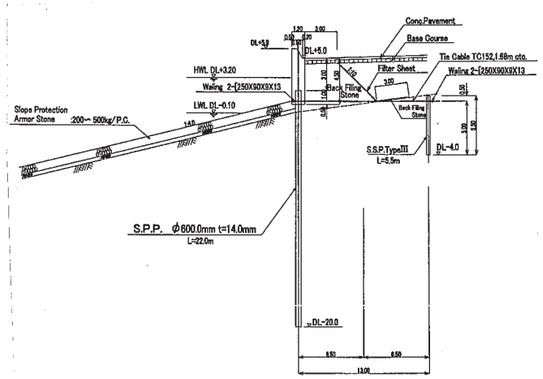
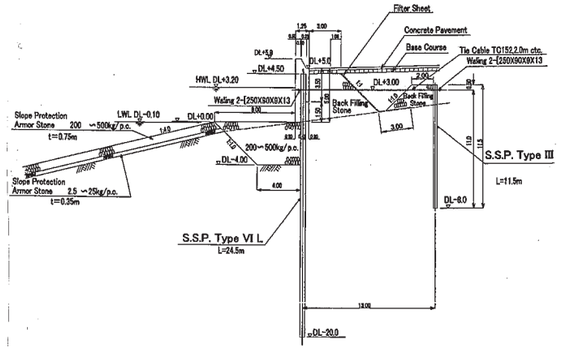
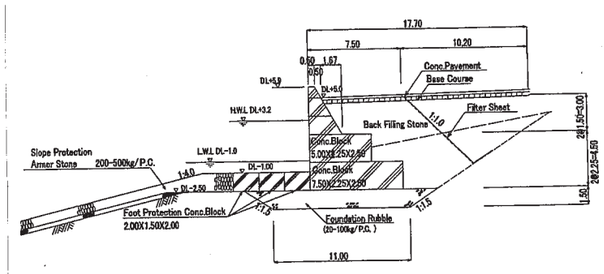
(2) Parapet

The public facilities such as fish process and retail general stores will be constructed behind the revetment. Therefore, the allowable quantity of overtopping waves should be retained 0.01 m^3/m/sec due to the area considered as "houses and public facilities are crowded" according to Table 2.7.1.

The crown height is computed DL+5.9 m with the allowable quantity of overtopping 0.01m^3/m/sec in accordance with the design wave.

On the other hand, the reclamation height is determined to be DL+5.5 m in landside, and the crown height of landing wharf is designed to be DL+5.0 m. The revetment will be on the extended line of the landing wharf. Therefore, a 90 cm high parapet should be constructed over the revetment to reach DL+5.9 m in height in order to satisfy the allowable quantity of overtopping.

Table 2.7.1 Structural Comparison for Revetment

Item \ Type		Type 1 Steel Pipe Pile Type	Type 2 Steel Sheet Pile Type	Type 3 Gravity (Block) Type
Typical Cross Section				
Advan -tage & Disadvan -tage	Advan -tage	• Structurally simple, high safety against scouring, accurate in work. • Dead weight is small, less concerned of differential settlement. • Maintenance and inspection is easy. • Watertightness of joints is good. • Excavation and backfilling volume is small.	• Structurally more simple than steel pipe pile, high safety against scour, accurate in work. • Dead weight is very small, less concerned of differential settlement. • Maintenance and inspection is easy. • Watertightness of joints is good. • Excavation and backfilling volume is small.	• The major materials can be provided in locally. • Corrosion control is not necessary. • Rigidity, weight is bigger, and durable.
	Dis -advan -tage	• The major materials and equipment should be imported. • Anticorrosion treatment should be done.	• Major materials and equipment should be imported. • Anticorrosion treatment should be done.	• Works of excavation, rip rapping, installation of blocks are mainly carried out under the sea, so it is difficult to carry out by local contractors. • Differential settlement might occur because the block is extremely heavy and the weak cohesive is expected under the blocks. • The structure might collapse by the circular slip because the weak cohesive is expected under the blocks. • Difficult to correspond for the seabed slope, stability might spoil by the scouring, in addition the structures might collapse. • Difficult to carry out by the temporary deck, the working vessels such as crane barge would be imported. • The project site is adjacent to the navigation channel so that the works maybe limited by anchorage of the working vessels. • The block fabrication yard is necessary. • Excavation and backfilling volume are big.
Approx. Quantity (for 10m)		Reinforced concrete 47.81m³ Steel pipe pile φ 600 x 14 mm, L=22.0m (piece) 17.77 Tie wire TC152 L=14 m (piece) 5.95 Anchor pile type III×5.5m (piece) 25 Impermeable sheet 89.65m² Armor stone 480.75m³	Reinforced concrete 55.25m³ Steel sheet pile Type VIL×24.5m (piece) 20.00 Tie wire TC152 L=14 m (piece) 5 Anchor pile type III×11.5m (piece) 25 Impermeable sheet 89.65m² Armor stone 480.75m³	Concrete 498.53m³ Foundation material 743.70m³ Impermeable sheet 160.00m² Rubble backing 482.80m³ Armor stone 480.75m³ Placing toe protection blocks (piece) 15
Relative Construction Time		120 %	100 %	120 %
Relative Construction Cost		180 %	100 %	161 %
Evaluation		Fair	Recommend	Poor

2.8 Basic Design of Auction Hall Complex

2.8.1 Auction Hall Complex

(1) Auction Hall

1) Size of facilities

The area for the auction and fish handling based on maintaining the existing style of fish transactions, is calculated according to the following procedure.

a. Area of the auction during the peak hours

Currently, the fish landed from fishing boats are auctioned off immediately in basket and bucket units so all fish are not displayed. As a result, when the fish catch is large, the auction and fish landing activities are carried out simultaneously; and, the area occupied by the auction site tends to be larger than the area used for display and temporary placement. During the peak hours, 100 people attend auctions in four or five locations and smaller auctions with 15 people are held in five locations. Based on the premise that the smaller auctions will continue to be carried out at the beach, the plan will allocate space for the larger auctions to be held in four locations simultaneously. Figure 2.8.1 shows the area required for the auctions according to the existing practice and aisles were included for the four auction area which will cover a total area of 400m^2.

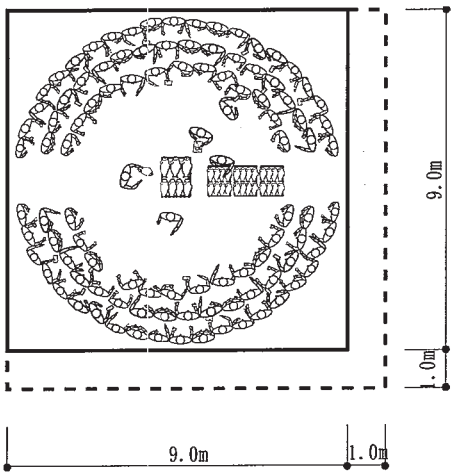


Figure 2.8.1 Diagram of Auctioning Area

b. Fish handling space

Since the catch is auctioned immediately as it is landed, little space needs to be allocated for fish handling if the volume of fish is small. The peak of fish landing is at 07:00 and therefore, the space calculated for sales activities will be the area of the fish handling. Based on the process shown below, the area was calculated at 240m^2.

• Fish landing volume:	18 tons landed in one hour starting at 07:00 (60 % of 30 tons)
• Auction transactions:	Auctions are carried out at four sites; the auction volume of one transaction is 20kg; the time for one transaction is 30 seconds; the volume of fish sold in one hour is 9.6 tons (4 auctions×20kg x 60 min×2)
• Handling volume at the market:	18–9.6=8.4 tons
• Method of arrangement:	Stacked boxes
• Handling volume per unit area:	70kg/m2 (fish container 70cm×40cm; 20kg capacity)
• Number of rotations:	1
• Occupation ratio:	0.5 (in order to secure working space)
• Required area:	9,600kg/70kg/1/0.5=240 (m^2)

Hence the area of the auction hall together with the auction and fish handling mentioned above is 600 m^2.

2) Facilities plan

The auction floor will be 20m×20m and the fish handling floor will be 20m×10m. In view of the incoming and outgoing transport of the fish from the existing fish landing site and the fish landing wharf, the sales site will be located on the fish landing wharf side next to the auction site. The passage will be 2m wide and will enable two-way passage of push carts and carts. A diagram of the auction site is given below.

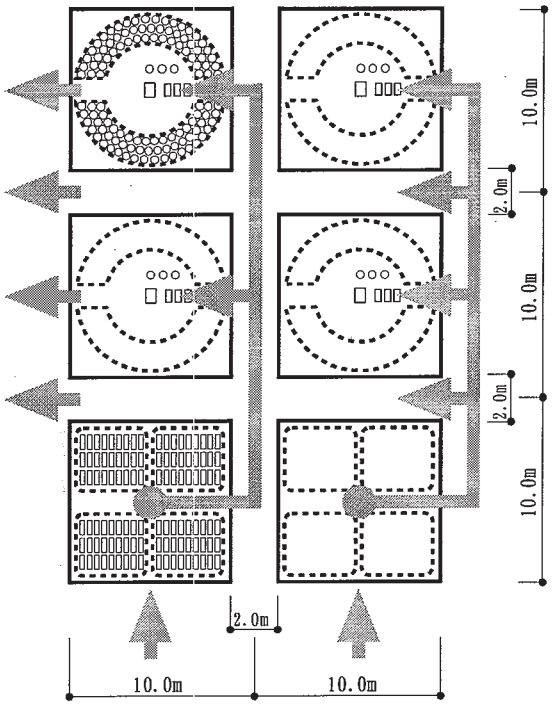


Figure 2.8.2 Floor Plan of Auction Hall

The auction hall will be a two-level structure to enable ventilation since the structure will be the focal gathering point for a large group of people. Due to the tropical heat, buildings in Tanzania generally have a floor height of 3.6m to 4.0m for ventilation purposes. Therefore, the planned facilities will also be a two-level structure with a floor height of 3.6m for each level with a total height of 7.2m.

(2) Ice Storage Space

1) Size of facility

The volume of ice used at the current market is about 200 blocks (6,000kg)/day and based on the amount of ice purchased from the producer and effective refrigeration, the ice storage facilities will be installed with a two-day storage capacity of 400 blocks. There are about ten ice retail shops in the existing market. In order to effectively utilize the facilities, it is recommended to share the facilities with present traders. Therefore, it will have five rooms with a storage volume of 80 blocks each (2,400kg).

2) Facility plan

An ice storage space, 2 m wide and 3 m deep, to accommodate five rooms will be

installed next to the auction hall. Space for in/out transport and retail activities will be allocated in front of the ice storage. A freezer machine will not be installed with the ice storage in order to reduce maintenance costs. The room will be made of a durable, metal covered insulation panel, which can be assembled at the site. For inner protection, wooden siding and wooden drain board will be installed. A plastic curtain will be installed behind the door to the ice storage facilities.

The ice storage will have a floor height of 3.6m for ventilation purposes.

(3) Fish Storage Space

1) Size of facility

Currently, fish leftover from the auction and frozen fish purchased from trawling boats are temporarily stored at the existing auction hall. The fish are stored in 15 to 20 storage boxes and the maximum volume of fish that is stored is estimated to be 10 tons. The Project plans to install a storage facility capable of accommodating this capacity in keeping with the present mode of transactions. Therefore, in order to improve fish storage capabilities, 15 insulated boxes of 600kg capacity each and each covering an area of 1.3m^2 will be procured. Each insulatged box is estimated to occupy one lot (2×2m); therefore, 60m^2 of space will be prepared.

2) Facility plan

The fish storage space will be located next to the auction hall and an area 10m× 10m will be allocated. Each lot will be accessible from the outside and the side of the auction hall from a 2 m wide passage.

The fish storage site will also have a floor height of 3.6m similar to the ice storage space. A diagram of the ice and fish storage space is shown below.

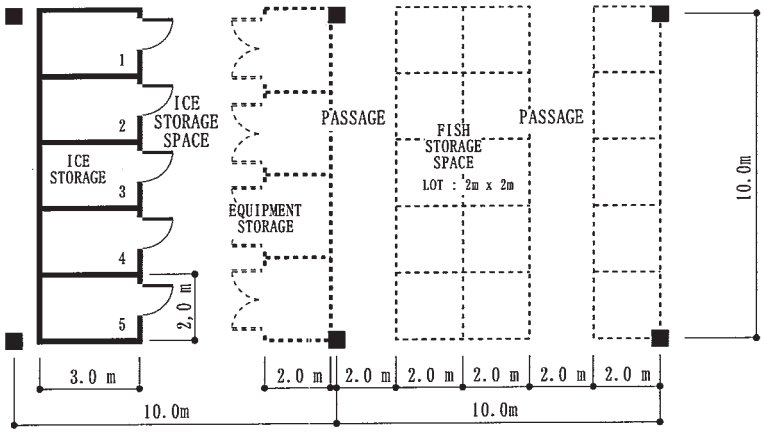


Figure 2.8.3 Floor Plan of Ice and Fish Storage Space

(4) Administrative Office

1) Size of facilities

The administrative office will be located on the second floor of the auction hall complex and the layout of the rooms and capacity of the facilities will enable the management and operations of the market. A total of 42 members comprised of one administrative director, 30 staff members of private company, and 11 DCC fishery members will occupy the administration office. At present, three associations (Vusha, Wasui, and Seashells) maintain their office at the existing market with permanent staff members. After opening the new market, a user's committee will be created from all market related personnel. Therefore, four offices for the associations and this committee will be provided at this hall. The total area of the administrative office, including the association offices is calculated to be 400m^2. The calculation is based on the composition of the room, their capacity, use, and the amount of required furniture. A summary of the calculations is given in Table 2.8.1.

Table 2.8.1 Outline of Administration Office

	Size W×D (m)	Staff	Occupancy (m^2/men)	Standard* (m^2/men)	Furniture
Management office					
-Director's room	4.0×3.6	1	14.4	18.0-25.0	Desk and chair 1 each
-Waiting space	3.0×3.6	-	-		Bench
-DCC office, storage	8.0×4.6	5	7.3		Counter, desk(5), chair(5)
-Director (Private company)	4.0×3.6	1	14.4	18.0-25.0	Desk and chair 1 each
-Accountant room	8.0×4.6	3	12.2		Counter, desk(3), chair(3)
-Secretary room	4.0×3.6	1	7.2	4.5-7.0	Desk and chair 1 each
-Worker's room	2.4×8.0	-	-		Locker (16)
-Meeting room, storage	8.0×4.6	20	1.8		Meeting table, chair
-kitchenette, storage	4.0×2.2	-	-		Shelf, sink
-Storage	3.0×3.6	-	-		Book shelf (2)
-Toilet	4.0×2.2	-	-		Man(1), woman(1)
-Passage	W1.8-2.0	-	-		
Association office	57.6	12	4.8		3rooms, desk and chair(3)

*Standard occupancy is followed

Table 2.8.2 Frequency and Type of Meeting Room in New Market

Type of meeting	Purpose	Attendant	Frequency
Management meeting (committee member meeting)	Meeting on market operation	Committee member and director, head of each section, 17 members	Weekly
Staff meeting	Staff meeting	Staff of company 30 staff	Monthly
Explanatory meeting	Explanation of market rules, regulation	Market user 30 person/time	Initially 3 times/weeks
User's committee meeting	General affairs	Committee member 15members	2 times/month
Association's meeting	Liaison meeting	7 cooperatives 15 member	7 times/month
General training, lecture	Lecture by expert	Market staff, user 15 person/time	Irregularly

2) Facilities plan

Due to the site constraints, the administrative office will be located on the second floor of the auction hall complex. In order to enable the desk work to be carried out continuously, each room will face the open air for ventilation purposes. A center passage of 1.6m and 1.8m wide that will connect each room. The association offices and accountant room of the DCC fisheries which are anticipated to have many visitors and staff members should be located near the main entrance. The offices of the administrative director and operations director will be located near the sub entrance. The standard floor height of 3.6m will be secured.

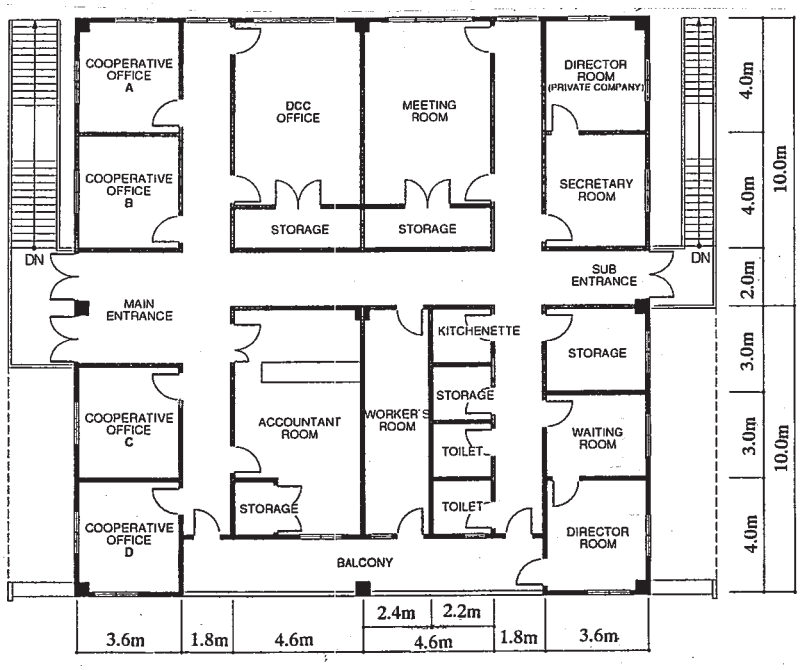


Figure 2.8.4 Floor Plan of Administration Office

2.8.2 Structural Plan of Auction Hall Complex

A pile foundation (supporting strength of 23 tons) will be used to prevent settlement of the two-storied auction hall complex which will be constructed on reclaimed land of the ocean side. A summary of the planned structure is given below.

Facilities	Story	Roof Structure	Super Structure	Foundation
Auction hall complex	2	Concrete Slab + Wooden Truss	Reinforced Concrete Rigid Structure	Pre-cast Concrete Pile (400×400, l=8 m)

2.8.3 Finishing Schedule of Auction Hall Complex

The following policy will be applied in the selection of the finishing schedule for the auction hall complex.

- Priority will be given to a finishing schedule that is resistant to salt damage since the facilities will be located on the beach.
- Priority will be given to materials that can be purchased or replaced locally.
- Priority will be given to relatively stable materials that are used in traditional construction methods.

The exterior and interior finish of each section of the major buildings in the Project, in accordance with the selection policy, are shown as follows.

<Exterior Finish>

• Roof	Metal Roofing Sheet Tile, Gable: Wooden Siding
• Eaves	Water Proofing Material
• Column & Beam	Fair faced Concrete, Mortar, Paint finish
• Wall	Concrete Block (C.B) Thk.150mm, Paint finish Ventilation C.B.Thk.150mm, Paint finish
• Doors & Windows	Window: Aluminum Sliding Door: Aluminum Frame Door
• Stair Case	Handrail: Fair-face Concrete, Mortar、Paint finish Step: Mortar Steel Trowelled・Non-slip Tile

<Interior Finish>

Floor	Room	Floor	Column & Beam	Wall	Ceiling	Others
Ground Floor	Auction Hall	Concrete with hardener coating	Fair faced Concrete, Mortar, Paint finish	-	Fair faced Concrete, Paint finish	
1st Floor	Office	Terrazzo Tile	-Same	C.B.Thk. 150mm, Paint finish	-Same-	Wooden Door: Paint finish

2.9 Basic Design of Fish Retail Market

2.9.1 Fish Retail Building/Fish Preparation Building

(1) Size of Facilities

1) Fish retail building

One hundred twenty-two lots, which is almost the same as the total number of fresh fish retailers at the existing market, will be accommodated in the fish retail building. The area of one sales lot will correspond to the size of the existing shops at Banda Beach and other markets in Dar es Salaam. Therefore, one lot will be 1.5m×2.4m (3.6m^2).

Table 2.9.1 Size of Retail Shops in Major Market in DSM

	Sales table	Space of shop	Remarks
1.Banda beach market	Avg. 120×85cm	3~4 m^2	
2.Kariakow market	150×130cm	4.5 m^2 (1.5×3.0m)	
3.Makonbusho market	150×90cm	2.9 m^2(1.5×1.9m)	Working space is hold in common
4.Ilala market	150×90cm	3.2 m^2 (1.5×2.1m)	

Source: Measured by Study Team, July 1999

2) Fish preparation building

An area that will accommodate 300 retailers and buyers engaged in the task of preparing fish during the peak hours will be planned. The work area per person was estimated at 0.9m×0.9m and a total of 250m^2 will be allocated. The facilities will have 72 lots and each lot will be the same standard of 1.5m×2.4m, the same as other retail shops, for administration control.

(2) Facilities Plan

The width of the building will be 4.8m. A summary of the number of buildings and lots of the fish retail market is shown below.

Table 2.9.2 Outline of Fish Retail Building and Fish Preparation Building in New Market

Buildings	Lot W×D(m)	Space/lot (m^2)	No. of lots	No. of building	Major facilities
1.Fresh fish retail building	1.5×2.4	3.6	122	5.5	Concrete sales table with lower cabinet
2.Fish preparation building	1.5×2.4	3.6	72	4	Concrete floor, some pallet for cutting

Each building will be roofed without walls as much as possible due to ventilation and

lighting considerations. In the case that a sales lot requires a separation wall, its height will be limited to up to 1m. The passages between the buildings will not be completely roofed, but will be left open in some areas. A 3m wide passage is planned between the buildings and the floor height of the building will be 3.3m for ventilation purposes. The flooring of the passages will be concrete and drainage slope (1/50) will be provided.

1) Fish retail buildings

The fresh fish retail market will be located on the south side of the auction hall complex since the fish will be brought in from the auction hall. Due to the number of lots (122 lots), the market will be comprised of 5.5 buildings (18m×4.8m each) and it will be located parallel to Ocean Road. Each building will contain 22 lots (one lot: 1.5m×2.4m) and a through passageway (1.5m wide) is planned. Each lot will contain a selling table (1.5m×0.9m) and a low partition wall, 1.2m high, will be installed at the rear. The sales table will be tiled for sanitation purposes.

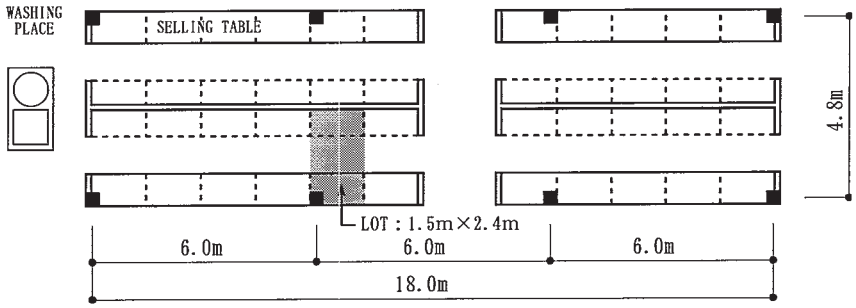


Figure 2.9.1 Floor Plan of Fish Retail Building

2) Fish preparation buildings

The fish preparation buildings will be located on the south side of the auction hall complex since the fish will be directly transported from the auction hall. Due to the number of lots that are planned (72 lots, 4-5 person capacity/lot), the fish preparation site will be comprised of three buildings (18m×4.8m) and each building will contain 24 lots (lot size: 1.5m×2.4m). One lot will accommodate four to five workers and the three buildings combined will accommodate 300 people. A plan of the fish preparation site is shown below.

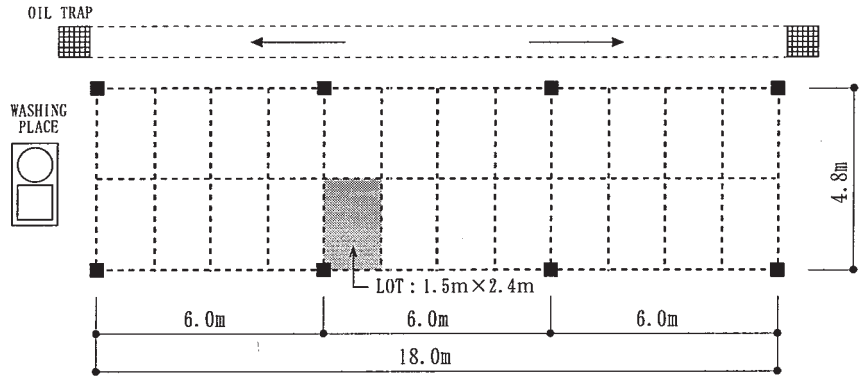


Figure 2.9.2 Floor Plan of Fish Preparation Buildings

(3) Structural Plan

In order to keep the one-storied fish retail market as light in weight as possible, wooden truss will be used for the roofs and the foundation structure will be a spread foundation with a bearing capacity of 3 tons/m^2 since the site will be located on the reclaimed land on the ocean side. A summary of the facilities structure is shown below.

Facilities	Story	Roof Structure	Super Structure	Foundation
Fish Retail Market -Fish retail bldg.	1	Wooden Truss	Reinforced Concrete Rigid Structure	Reinforced Concrete Spread Foundation
-Fish preparation bldg.	1	Same as above	Same as above	Same as above

(4) Finishing Schedule

Based on the selection policy, the exterior and interior finish of each lot of the major facilities planned in the Project are given below.

<Exterior Finish>

• Roof	Metal Roofing Sheet Tile, Gable: Wooden Siding
• Eaves	Water Proofing Material
• Column & Beam	Fair faced Concrete, Mortar, Paint finish
• Wall	Concrete Block (C.B) Thk.150mm, Paint finish Ventilation C.B.Thk.150mm, Paint finish

<Interior Finish>

Room	Floor	Column & Beam	Low Partition Wall (Fish Retail Bldg.)	Ceiling	Others (Fish Retail Bldg.)
Sales Lot	Concrete with hardener coating	Fair faced Concrete, Mortar, Paint finish	C.B.Thk. 150mm, Paint finish	-	Selling Table: Concrete, Tile finish with Low Cabinet, Low Partition

2.10 Basic Design of Related Retail Market Plan

2.10.1 Fried Fish Processing Building

(1) Size of Facility

The existing market contains 50 fried fish processors in two locations. Fried fish is the most common marketing style in Dar es Salaam and one fried fish processing shop has an average of 15.9 customers/day. It is estimated that totally, there are 800 customers/day, making it an important market facility. Subsequently, 48 lots will be planned at the new market to accommodate all of the current processors.

Based on the size of each shop at the current market (6-12 m^2), one lot will be allocated 7.2m^2 (3m×2.4m) to enable minimum working space as shown in the figure below. As a cost effective means among processors, shared use of facilities and equipment are recommended. Therefore, shared use will be promoted in order to effectively utilize the land.

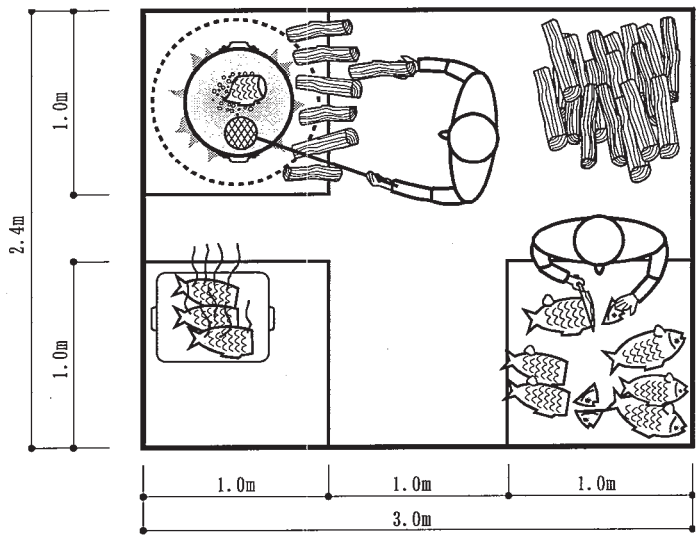


Figure 2.10.1 Utilization Plan of Fried Fish Processing Lot

(2) Facilities Plan

The facility will be located on the west side of the inland area where the majority of the current processors are accommodated. Considering the transport of fried fish products from the processing facility, it also will be located beside a bus stop. Each building (18×4.8m) will contain 12 lots (one lot: 3.0m×2.4m) and four buildings will be built to house 48 lots. Each lot will be equipped with a concrete oven (1m x 1m). The structure of the buildings will be the same as the fresh fish retail buildings.

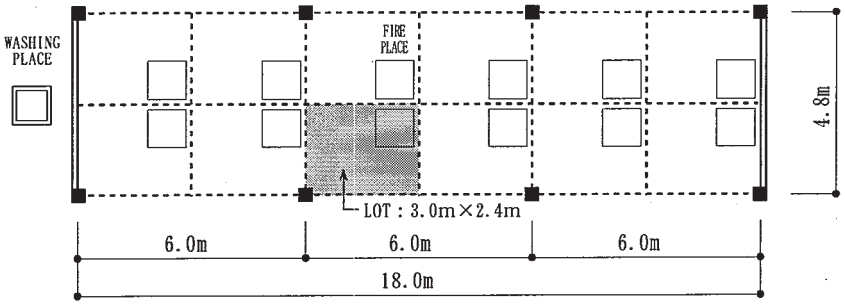


Figure 2.10.2 Floor Plan of Fried Fish Processing Buildings

2.10.2 Vegetables/Grocery Buildings and Fuel Retail Building

(1) Size of Facility

There are presently 170 shops, including the outdoor shops, at the existing market. The majority are fruits/vegetable shops numbering 90, followed by sundry shops (50), oil retail shops for fried fish processing (20), and firewood/charcoal shops (10). Due to the new market site constraints, about 75 % of these shops or 153 lots will be included in the Project. Since the retail operations of these shops are similar, with the exception of the fuel shops, the basic size for each lot has been set at 1.5m×2.4m. However, a flexible design will be adopted in order to accommodate changes in the number of shops and their structure.

(2) Facilities Plan

The vegetable and grocery building will be comprised of the fruits/vegetables/food retail shops and the grocery retail shops. The building will be 4.8m wide and it will contain the sales lots. The number of lots and the number of buildings are shown as follows:

Table 2.10.1 Outline of Vegetable, Grocery Building

Shops	Size/lot W×D(m)	Space/ lot (m^2)	No. of lots	No. of Building	Major facilities
1.Vegetable, grocery building	1.5×2.4	3.6	144	6	Concrete sales table, cabinet (back wall)
2. Fuel retail building					
-Fire wood	3.0×4.8	14.4	7	1	Low partition wall
-Charcoal	3.0×2.4	7.2	2		Low partition wall

The vegetable and grocery buildings will be located in the center of the inland side of the Project site considering their correlation to similar facilities. However, the grocery shops (24 lots) that are related to the fish retail market such as knifes, basket shops will be located on the ocean side of the Project site.

Based on the number of lots that are planned for the inland side of the site (1.5m×2.4m×120 lots), four buildings (each 18m×4.8m) will be built. One building will contain 22 lots and a through passage (1.5m wide). Due to the number of lots on the ocean side (24 lots: 1.5m×2.4m) and the land constraints, two buildings will be constructed, one 12m×4.8m structure (16 lots) and one 6m×4.8m structure (8 lots). They will be located next to the fish preparation building and the cafeteria building.

The sectional structure of the buildings will be the same as the fresh fish retail building to allow for ventilation. Each lot will be equipped with a concrete sales table (1.5m×0.9m), a storage cabinet will be installed at the rear, and a low partition 1.2m in height will be planned.

In addition, the fuel retail shops which sell firewood and charcoal will be located next to the fried fish processing buildings. One building (24m×4.8m) will be constructed based on the number of lots (firewood booth: 3.0m×4.8m×5 lots; charcoal booth: 3.0m×2.4m×2 lots).

2.10.3 Cafeteria Building

(1) Size of Facility

The cafeterias depend on the business of fishermen and market related personnel for their existence. In view of the fact that the small-scale retailers are women, it was considered appropriate that facilities improvements to the market take this factor into consideration. The current cafeterias range from large operations supplied with tap water provisions ($30m^2$ large) to small operations encompassing an area of $6m^2$. In order to accommodate as many cafeterias as possible, 18 small lots (3.0m×2.4m) and 4 medium lots (3.0m×4.8m) are planned on the reclaimed area of the market site.

(2) Facilities Plan

The cafeteria building will be located on the south side of the fish retail building on the ocean side of the site. Based on the number of lots (4 medium lots: 3.0m×4.8m; 18 small lots: 3.0m×2.4m), one cafeteria building containing the medium lots will be 12m×4.8m and the other cafeteria building containing the small lots will be 18m×4.8m and will be comprised of one and one-half buildings.

The medium lots will be equipped with a table capable of accommodating 14 people and a service counter. The small lots will be equipped with a table capable of seating

8 people and a service counter. Each booth will be divided by a low wall with a height of 2m and 1.2m.

The sectional structure of the building will be the same as the fresh fish retail building for ventilation purposes.

Table 2.10.2 Outline of Cafeteria Buildings

Shops	Size/lot W×D(m)	Space/ lot (m^2)	No. of lots	No. of building	Major facilities
Cafeteria building			22	2.5	
Medium size	3.0×4.8	14.4	4	1	Concrete sales table, cabinet, partition wall
Small size	3.0×2.4	7.2	18	1.5	Same above

2.10.4 Structural Plan of Related Retail Market

Due to the same operational conditions as the fish retail building, the related retail market buildings will be the same type of structure. A summary of the structure of the facilities is given below.

Facilities	Story	Roof Structure	Super Structure	Foundation
Related Retail Market -Fry Processing Bldg. -Vegetable / Grocery Bldg. -Cafeteria Bldg.	1	Wooden Truss	Reinforced Concrete Rigid Structure	Reinforced Concrete Spread Foundation

2.10.5 Finishing Schedule for Related Retail Market

Based on the selection policy, the exterior/interior finishing of each lot of the major facilities are shown below.

<Exterior Finish>

• Roof	Metal Roofing Sheet Tile, Gable: Wooden Siding
• Eaves	Water Proofing Material
• Column & Beam	Fair faced Concrete, Mortar, Paint finish
• Wall	Gable: Concrete Block (C.B) Thk.150mm, Paint finish Partition: C.B.Thk.150mm, Paint finish

<Interior Finish>

Room	Floor	Column & Beam	Partition Wall	Ceiling	Others
Lot	Concrete with hardener coating	Fair faced Concrete, Mortar, Paint finish	C.B.Thk. 150mm, Paint finish	-	Selling Table: Concrete, Mortar finish , Low Cabinet, Low Partition