Ministry of Livestock and Fisheries
Revolutionary Government of Zanzibar
The United Republic of Tanzania

PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR DEVELOPMENT OF MALINDI FISH LANDING AND MARKETING FACILITIES IN ZANZIBAR

February 2014

Japan International Cooperation Agency

Fisheries Engineering Co.,Ltd.

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey on the project for development of Malindi fish landing and marketing facilities in Zanzibar in the United Republic of Tanzania, and entrust the survey to Fisheries Engineering Co., Ltd.

The survey team held a series of discussions with the officials concerned of the Government of Zanzibar, and conducted field investigations. As a result of further studies in Japan, the present report was finalized.

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

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Zanzibar for their close cooperation extended to the survey team.

February, 2014

KUMASHIRO Teruyoshi

Director General,

Rural Development Department

Japan International Cooperation Agency

SUMMARY

(1) Overview of country

Zanzibar is located off the eastern coast of the United Republic of Tanzania in the Indian Ocean, consists of the islands of Pemba and Unguja in the order from the north, and has a total area of 2,654 km^2. Zanzibar has a tropical climate and is greatly influenced by the south-eastern monsoon (April to October) and the north-eastern monsoon (November to March). Zanzibar City has an average annual temperature of 25.7 °C and an average annual rainfall of 1,564 mm with the rainy season around March through May.

The population of Zanzibar is about 1.30 million, about 2.9% of the population of the United Republic of Tanzania, 44.93 million. The island of Unguja, where the capital city is located, has about 69% of the population of Zanzibar. Swahili Africans dominate, followed by Arabic, Indian, and Persian people. Roughly 95% of the population consists of Muslims and the remaining 5% are Christians.

The main industry in Zanzibar consists of agriculture, forestry and fisheries with a focus on clove cultivation. Agriculture, forestry and fisheries account for 30.2% (including fisheries for 7.1%), technical industry for 11.7%, service industry for 45.3% (including hotels and restaurants for 6.5%), and subsistence economy for 12.8% (in 2012).

The Zanzibar economy steadily grew at an average annual growth rate of 6.3% from 2007 to 2012. In 2012, GDP reached Tsh (Tanzanian Shilling) one trillion 354.2 billion, 2.3 times that of 2007, improving the per-capita GDP to Tsh 1,003 thousand (US$ 638). However, poverty is widespread throughout Zanzibar, and the ratios of the poor segment of the population who cannot meet the basic needs are 50.7% in the rural areas, 35.9% in the urban areas, and 44.4% in the entire country. The ratios of the poor segment of the population below the food poverty line, who are in a more serious state, are 17% in the rural areas, 8.1% in the urban areas, and 13% in the entire country (MKUZA II, Oct 2010). Tanzania has a GDP of Tsh 32 trillion 293.5 billion (US$ 2.29 billion) and a per-capita GDP of Tsh 720,174 (US$ 511) (in 2010).

(2) Background, circumstances, and overview of project

The long-term development plan of Zanzibar, “Zanzibar Vision 2020,” has the goal of achieving sustainable human development and poverty alleviation by ensuring food security and increasing the incomes of farmers and fishers using strategies for increasing food production and productivity and improving the transport infrastructure in pursuit of smooth and efficient distribution of farm and fish products from the production areas to the consumer markets. Furthermore, the Zanzibar Strategy for Growth and Reduction of Poverty 2010-2015, MKUZA II, specifies such goals as creation of an environment for growth, sustainable assistance for the poor, promotion of wide-ranging growth, and poverty alleviation, and achievement of overall food security. To attain these goals, MKUZA II specifies

modernization and commercialization of agriculture and fishery to increase the production amount and productivity of them, thus ensuring food security and increasing the incomes of farmers and fishers.

The household expenditure survey found that food accounts for 50% or more of the monthly household consumption. In the food expenses for households below the food poverty line, fish accounts for as high a ratio as 7% of the monthly food expenses, second only to rice. Low-cost and stable supply of fish is an important issue in terms of poverty alleviation strategies and food security. Therefore, it is considered necessary to improve the infrastructures for transport, distribution, telecommunications, etc. in order to ensure smooth distribution of farm and fish products from the production areas to the consumer markets. The important issues in the fishery sector are specified to be construction of at least one fishing port, improvement of local markets, and processing and domestic distribution of marine products.

The fisheries sub-sector is considered as the mainstay of the Zanzibar national economy. Fishery production in Zanzibar in 2012 was 29,411 tons, worth Tsh 103.18 billion and accounting for 7.1% of the GDP. The fishery is also important in terms of employment. The ratios of the workforce whose major economic activities are agriculture, forestry, and fisheries are 43.4% in the rural areas, 5.5% in the urban areas, and 26.1% on the average in the entire country. If those who are engaged in related works such as fish trading and auctioning, which belong to service businesses, are included, 25% of the population in Zanzibar work as fishers and related workers.

The Malindi landing site is not only the island's largest landing site to which artisanal fishing boats come from a wide range of fishing villages (including 392 boats registered in the Urban District) but also the fish distribution hub and wholesale market in Zanzibar City (the Urban District with a population of 220 thousand as of 2012), the largest consumption area, contributing also to the income and employment of artisanal fishers and related workers. Improvement of the Malindi landing site should be addressed in the context of the development of the fishing industry in Zanzibar.

At the said landing site, which has a collapsed revetment, 22 boats are moored at a time and about 1,400 buyers and porters gather at the water's edge at peak hours. At dawn when landing starts, people carry fish and traverse across an unilluminated and pitted concrete surface. Many people slip or take a misstep and are injured, and about 95% of landing site users have got injured. The collapsed revetment is deteriorating further and posing a danger to users.

The fish trading area is visited by an approximate total of 6,500 users per day or about 1,100 users at any one time at peak hours. They engage in bargaining, wholesaling, auctioning, vending, and fish gutting and cleaning on mud flats under the scorching sun. The retail tables for selling fish amount to 120 at peak times, 50 of which are only sheets placed directly on the ground, selling fish which have been scorched by the sun and are significantly deteriorating. The fish gutting and cleaning produces an estimated 600 kg of fish residue, which is disposed of in the seawater in front. Due to the lack of water supply and drainage system, however,

users have no choice but to wash the fish and tables with contaminated seawater scooped from the sea in front. Furthermore, marine products to be auctioned are laid directly on the sand beach until trading. In sum, these activities are performed in an exceedingly insanitary condition.

The limited space above the collapsed revetment, which is four meters in width and about 100 meters in length, is congested by fish vendors laying makeshift tables on both sides and by porters carrying fish, making the area chaotic and the work efficiency exceedingly low. On the beach, people conduct their activities in moving the tables and auction places following the shoreline change due to a tidal level difference of three to four meters. At high tide, this area of a mere 600 m^2 is crowded with several hundred people and bicycles for transportation, forcing them to work very inefficiently.

To improve these circumstances, in February 2010, the Zanzibar government requested the Japanese government for grant aid cooperation regarding the project for development of Malindi fish landing and marketing facilities.

In response to this request, the Japanese government determined to conduct a preliminary study, and the Japan International Cooperation Agency (JICA) dispatched a study team for preparatory survey (preliminary study) to Zanzibar to confirm the validity and necessity of the request.

(3)Overview of study results and description of project (overview of outline design and facility/equipment plan)

Based on the result of the preliminary study, the Japanese government determined to conduct a preparatory survey, and JICA dispatched a study team from May 18 to June 29 and from August 31 to September 7, 2013. The study team and the Zanzibar side also discussed about the details of the outline design and the obligations to be fulfilled by Zanzibar and reached a mutual agreement.

As a result of the field survey, it was found that the development of a fishing port and fish marketing facilities at Malindi is urgent and necessary because of the following reasons: that a large part of the fishery production and distribution in Zanzibar is carried out by artisanal fishers and related workers, that their activities at Malindi are providing them with important opportunities for cash income, and that the facility environment at Malindi is insufficiently maintained in terms of safety, sanitary, and efficiency and has problems to be solved in terms of production, distribution, and consumption. The initially requested ice machine, ice storage, refrigerator, and emergency generator will be supplied by the Ministry of Livestock and Fisheries and therefore were excluded from the scope of this project except for the installation space; the fishing gear and OBM spare parts shop was excluded from the scope of this project because the conclusion was that it can be substituted with a nearby private facility. On the other hand, a soft component for technical assistance regarding the launch of an operation and maintenance system was requested and was added to the scope of this project because it was considered necessary to ensure early establishment of the operation system. The existing

deteriorated fish marketing facilities, after the new facilities start to be used to handle fish, will be reformed to serve such functions as refrigeration of marine products and sale of related goods.

In sum, the project aims to improve the Malindi fish landing site and marketing facilities to provide a safe, sanitary, and efficient work environment for fishers, fish porters, brokers, auctioneers, retailers, vendors, etc., thus contributing to stable supply of fish with higher quality to the Zanzibar public. The scope of this grant aid project covers the construction of a landing quay, seawall, and fish marketing facilities and the soft components related to the operation, maintenance, and management of these facilities.

The design overview is as shown below.

Item	Structure, specifications, etc.	Scale
1) Civil engineering facilities		
Landing quay	Structure type: (Tip) Counterfort sheet piling quay (Apron) Gentle sloping precast concrete block	Length: 78.8 m - Straight part: 50.0 m - Arc part: 28.8 m
Seawall	Structure type: Gentle sloping step-like precast concrete block Concrete block pavement, quay installation part	Length: 51.5 m
Apron pavement	Mooring rings, curbs	Pavement part: 445.8 m^2
Ancillary facilities		
2) Buildings		
Fish market building	Two-story reinforced concrete structure (Ground floor) Auction hall, Dagaa trading hall, fish processing area, fish retail market, electricity room, area for ice plant and storage, equipment storage, circulation and loading space (First floor) Manager's room, other management rooms, meeting room, toilets, canteen & waiting space, etc.	Floor area: 2,402.5 m^2
Annex building	Reinforced concrete structure (partly concrete block structure) with a tower (for elevated water tank) (Ground floor) Public toilets for men and women, management room, pump room, generator room	Floor area: 167.0 m^2 Tower height: 11.6 m
Guard post	Single-story concrete block structure	Floor area: 6.2 m^2

Item	Structure, Specifications, etc.	Scale
Garbage depository	Single-story concrete block structure	Floor area: 15.4 m^2
Improvement of the existing fish retail market	Repair of roof, ceiling, floor, and walls and installation of partition walls	Floor area: 270 m^2
Exterior works	Parking space, apron pavement (market periphery), improved fish retail market walk-through, premises pavement, etc.	
3) Equipment Equipment for market	Insulated fish box, fish box, handcart, deep freezer, suspension dial scale, platform dial scale, high-pressure washer, water tank, drain board, portable table, trash box, and chopping board	One set
4) Soft component	Technical assistance for establishment of an operation, maintenance, and management system and launch of an operating organization	

(4) Project term and approximate project cost

The required overall project term consists of 6.5 months of detailed design and tender operations and 19 months of facility construction.

The approximate project cost required to implement this project is estimated to be JPY 24.3 million for the Zanzibar side.

(5) Project evaluation

The implementation of this project will restore the functionality of the landing quay that has collapsed at Malindi and provide a safe, sanitary, and efficient work environment to fishery-related workers such as fishers, fish porters, brokers, auctioneers, and retailers and also maintain the quality of fish. Consequently, it is expected to contribute to the fishery-sector development plan (The Zanzibar Strategy for Growth and Reduction of Poverty: MKUZA II/2010-2015) of the Zanzibar government that aims at improving the domestic distribution from production to consumption by upgrading fishing ports and local markets. The facility improvement is an urgent issue because the existing quay is in such a critical condition that it causes injury to users and the beach where trading and other work are carried out is an unpaved area with poor sanitary conditions. Therefore, it is concluded that the implementation of this project by Japan's grant aid cooperation has a high validity.

The direct beneficiary population of this project will be approximately 43,000 persons including fishermen in the Urban District and related service providers (such as brokers, auctioneers, retailers, and fish porters). Furthermore, about 900 thousand consumers on the island of Unguja will indirectly receive benefit from this project.

This project is considered to have a sufficiently high effectiveness in view of the expected effects described below.

■ Quantitative effects

[Hygiene]

(1) Approximately 120 stands that carry out unhygienic fish retailing and gutting/cleaning on the open-air beach and street will decrease to 12 (10%) or less because fish will be handled inside a hygienic permanent building.

(2) Fish wastes after treatment with removal of gills and internal organs of landed fish (about 600 kg per day) that are dumped on the beach or in the bay will decrease to 60 kg (10%) or less because they will be accumulated in the garbage depository and properly collected and disposed of.

[Efficiency]

(1) The 120-meter path for carrying fish from the landing site, crowded with fish retailers, etc., to the permanent retail area (existing fish market) is shortened to a path about 50 meters long specialized for fish distribution.

(2) All of the 392 artisanal fishing boats that use the port, which cannot come alongside the quay for fish landing due to the collapse of it, can do so except during low tide.

[Safety]

(1) The fish landing and carrying by about 1400 workers per day at a dangerous collapsed quay will be eliminated because they will work at a safe improved quay.

(2) The dangerous fish landing at a collapsed quay by about 392 artisanal fishing boats (about 70 per day) will be eliminated because they will use a safe improved quay.

■ Qualitative effects

(1) The management facilities for fish landing and distribution will be improved to enhance the public management system such as statistical data management and hygiene control.

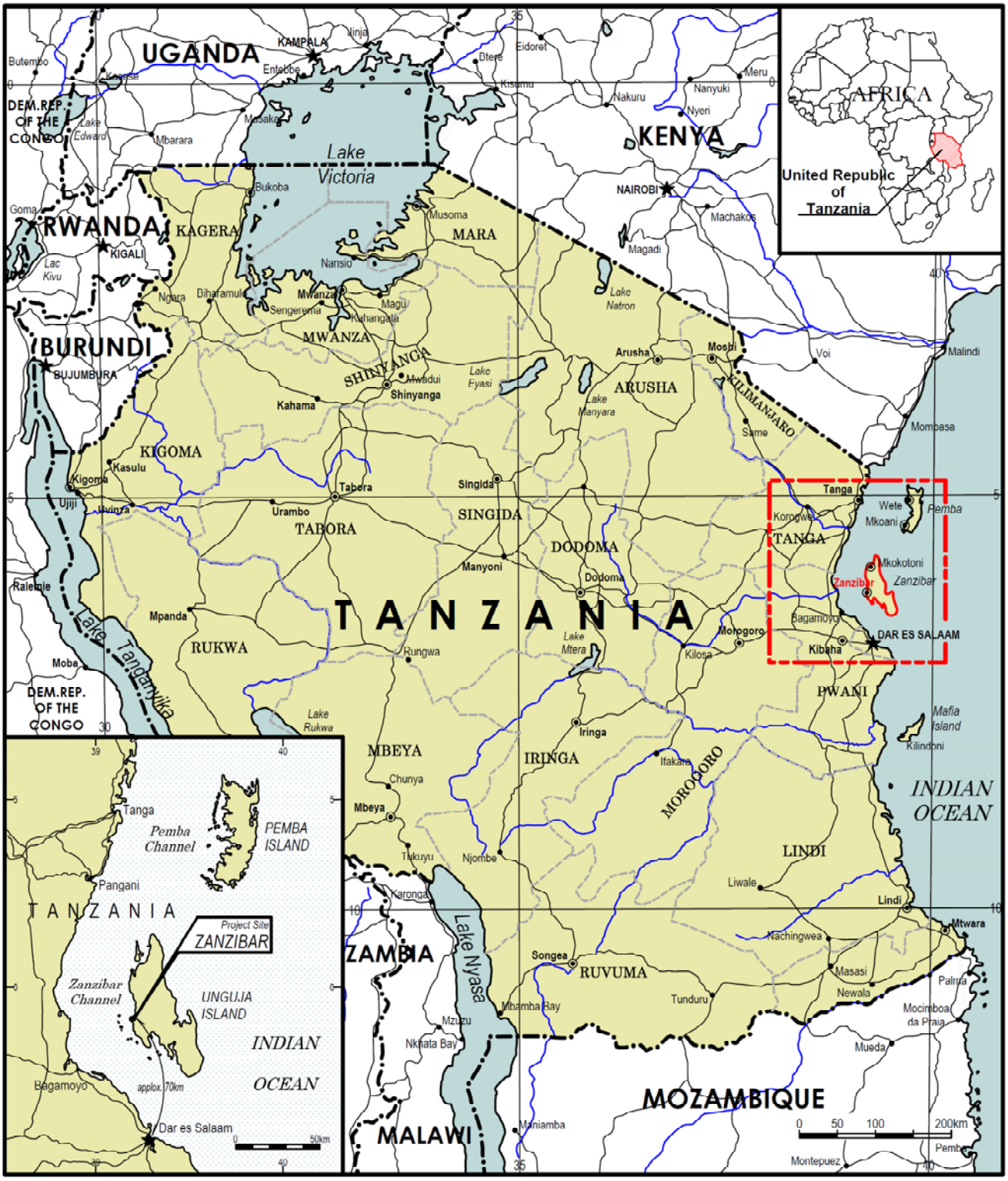
(2) The meeting and administrative spaces for fishers and users will be improved to invigorate organizing of users of the Malindi landing site and activities by fisheries cooperatives.

(3) The unified management of the landing quay by the Ministry of Livestock and Fisheries will clarify the division of use between the carrying vessels of charcoal and lumber and the fishing boats that unload fish, ensuring safety of moving vessels and hygiene control for landing facilities.

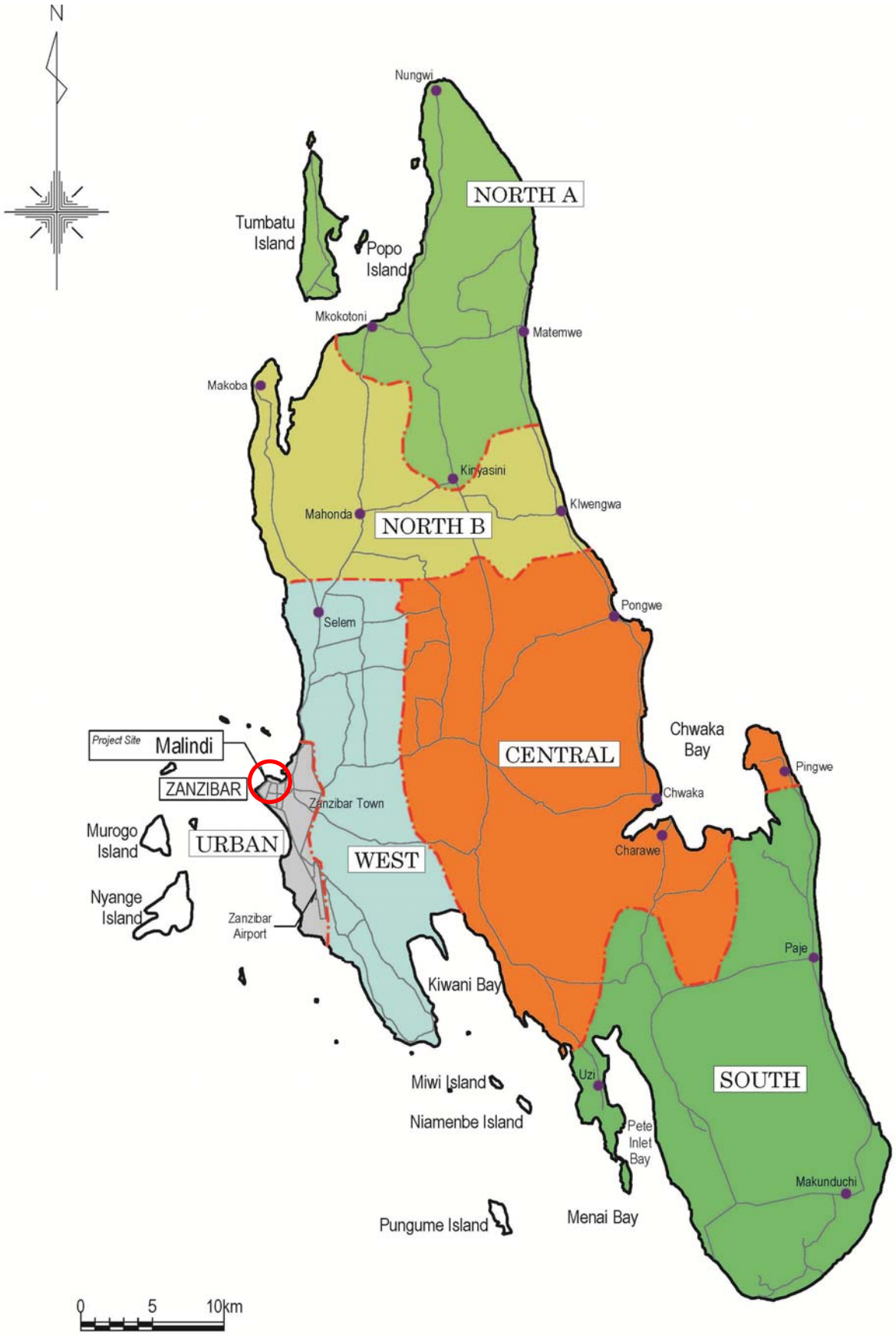
(4) The soft components for improvement of the operation system will enhance the capacity of the Ministry of Livestock and Fisheries for operation, maintenance, and management of its fisheries facilities.

CONTENTS

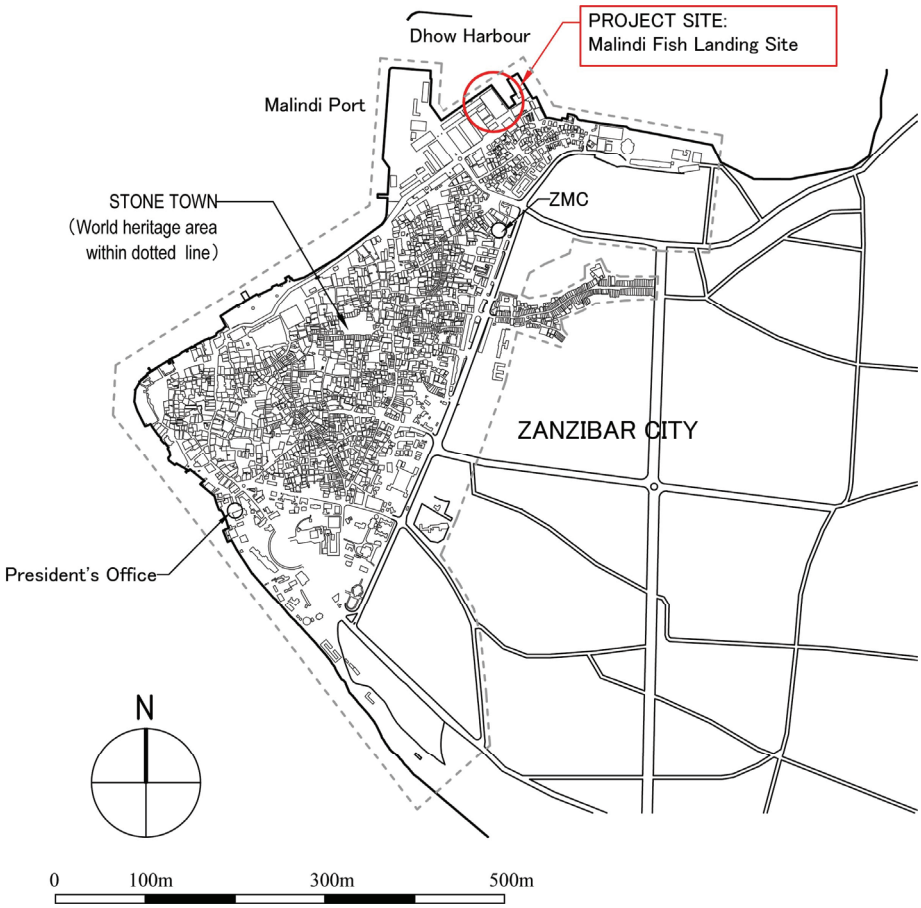
[APPENDICES]



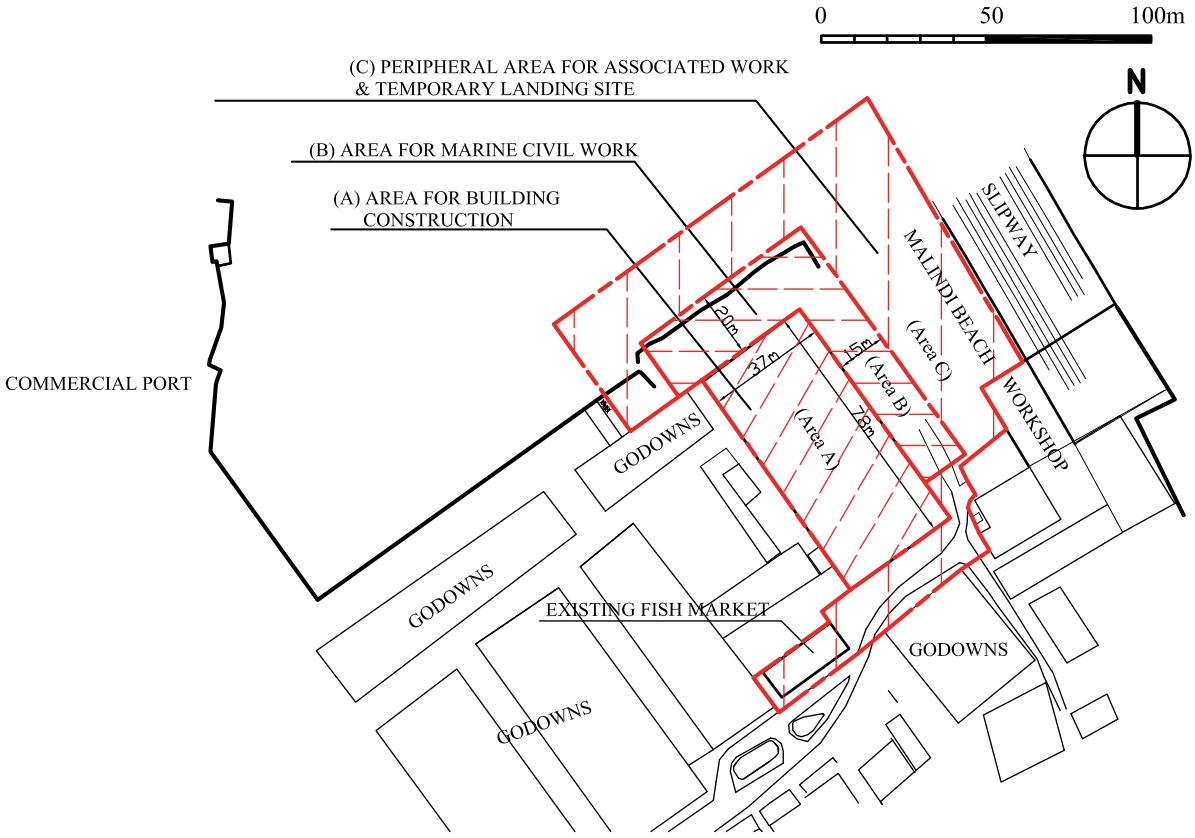
MAP OF THE UNITED REPUBLIC OF TANZANIA



MAP OF UNGUJA ISLAND

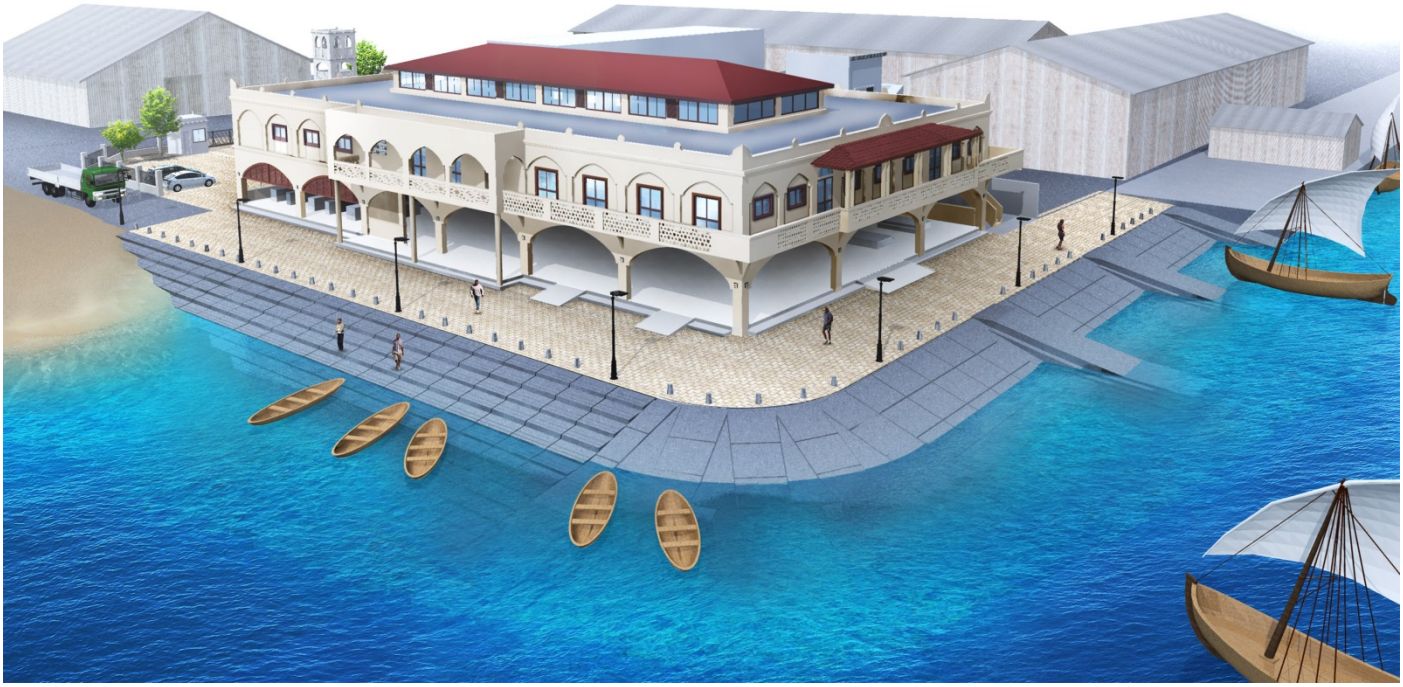


MAP OF ZANZIBAR CITY



SITE MAP

PERSPECTIVES



VIEW FROM HARBOR

VIEW FROM STONE TOWN

LSIT OF TABLES AND FIGURES

ABBREVIATIONS

AfDB	African Development Bank
DFD	Department of Fisheries Development
CDL	Chart Datum Level
DoE	Department of Environment
EL	Elevation Level
E/N	Exchange of Notes
EIA	Environmental Impact Assessment
G/A	Grant Agreement
GL	Ground Level
HIA	Heritage Impact Assessment
HWL	High Water Level
ICOMOS	International Council Of Monuments and Sites
IEE	Initial Environment Examination
JICA	Japan International Cooperation Agency
LWL	Low Water Level
MACEMP	Marine & Coastal Environment Management Project
MLF	Ministry of Livestock and Fisheries
MLHWE	Ministry of Lands, Housing, Water and Energy
MOF	Ministry of Finance
NGO	Non-Government Organization
PPP	Public Private Partnership
POFEDP	President's Office, Finance, Economy and Development Planning
STCDA	Stone Town Conservation and Development Authority
STCP	Stone Town Community Police
TOR	Terms of Reference
Tsh.	Tanzanian shilling
UNESCO	United Nations Educational, Scientific, and Cultural Organization
ZAWA	Zanzibar Water Authority
ZECO	Zanzibar Electricity Corporation
ZMC	Zanzibar Municipal Council
ZPC	Zanzibar Ports Corporation

CHAPTER1. BACKGROUND OF THE PROJECT

CHAPTER 1. BACKGROUND OF THE PROJECT

1-1 Background of the Project

Fishery production in Zanzibar in 2011 was 28,759 tons, worth 85.67 billion Tsh. (2011) and accounting for 7.2% of the GDP of Zanzibar[1]. Therefore, the fisheries are considered as the main stay of the Zanzibar national economy. The number of fishers is on the rise from 23,000 (1997) to 34,000 (2007) and so is the number of registered fishing boats from about 5,000 (1997) to about 7,000 (2007). Some 25% of the work force in Zanzibar engages in fishing or related works such as fish trading and auctioning[2] so the fisheries sub-sector plays a major role in terms of employment. In the Urban District with Zanzibar City at the center, in particular, fishery (57.3%) and tourism (40.2%) are the main economic activities for local population[3]. The per-capita consumption of fish products in Zanzibar is about 20 kg per annum (about 10 kg per annum in mainland Tanzania), accounting for 80% of animal protein intake in Zanzibar (about 30% in mainland Tanzania). On the other hand, the fishery in Zanzibar is mostly artisanal coastal fishery and the fish catches are chronically insufficient for the demand of fish product consumption. Furthermore, deprivation of fish landing facilities and lack of preserving facilities make the sanitary conditions of handling of fish products appalling.

To improve these circumstances, in February 2010, the Zanzibar government requested the Japanese government for grant aid cooperation regarding the project for development of Malindi fish landing and marketing facilities. Requested component is as follows.

Table 1-1 : Items initially requested by the Zanzibar Government in the application of the grant aid (Feb. 2010)

Fish landing facilities & Buildings	
Engineering works	Landing wharf(60m), Seawall(90m)
Architectural works	
Fish market building and Administration office	Auction Hall(400m2), Processing area and Fish retail market(630m2), Ice plant and cold storage(108m2), Fishing gear and OBM spare parts shop(54m2), Storage(18m2), Toilet for Officers(36m2), Administration office(80m2)
Other facilities	Generator house(28m2), Toilet for public(40m2), Garbage area(16m2), Underground septic tank, Exterior works, Improvement of existing fish retail market
Equipment	
Ice making plant(3t x 2), Ice storage(6t x 1), Cold storage(3t x 1), Insulated fish box(20pcs), Fish box(50pcs), Emergency Generator(75KVA x 1), Handcart(10pcs)	

In response to this request, the Japanese government determined to conduct a preliminary study, and JICA dispatched a study team for preparatory survey (preliminary study) to Zanzibar to confirm the validity and necessity of the request. Main contents of Minutes of

[1] Zanzibar Statistical Abstract 2011
[2] The Status of Zanzibar Coastal Resources, Dep. of Environment, April 2009
[3] ditto

meetings on the preliminary study are as follows.

【Items conformed on the Minutes of meetings on the preliminary study】

1) Issues to be addressed

The team carefully studied current conditions of the Malindi fish landing site and fish landing/marketing operations in the area and confirmed that those listed below are major issues to be addressed by the project.

・Damaged wharf and collapsed landing slopes inhibit safe and efficient unloading of fish as well as fishing trip preparation work.
・Limited availability of unloading area, together with mixed use of the area by fishing vessels and commercial merchandise boats, causes serious congestion, which pose a safety risk and operational difficulties to crew members and fish transporters working in the area.
・Access path to the unloading area is very narrow and overcrowded during the peak landing time.
・Clearing and sorting of fish are conducted on the ground of open arcas by using unhysienic seawater. Auction and retailing of fish are also conducted in the adjacent sand beach and the access path, which often block the traffic of the visitors.
・The area used for above-mentioned activities is neither paved nor covered with shade for protection. Sewage water and organic waste of fish are discharged untreated. These together deteriorate the general hygienic conditions of the area.
・Fish are handled without proper preservation efforts (e.g. use of ice), which accelerate deterioration of fish quality.

2) Objective of the project

The project is primarily aimed at addressing the above-mentioned issues through improvement of fish landing and marketing facilities. It is expected that a large number of fishers, fish transporters, middlepersons, auctioneers, fish retailers and women peddlers are benefited from the project.

3) Project site

① Site allocation for the project

The project site was initially noted from Zanzibar side. It was, however, noted after preliminary assessment of the site that the rectangular-shaped site has relatively narrow width toward the sea and hence has some intrinsic limitation in terms of ensuring required access for landing and rooms for smooth movement of facilitiy users. The site also offers limited opportunities for future expansion/development of related facilities. Furethermore, construction of fisheries facilities in the site inevitably interferes with the planned construction work of the adjacent site. As such, it is understood that implementation of the project in the proposed site may not generate best outcomes in terms of addressing

avobe-mentioned issues.

In this connection, Zanzibar side agreed to explore the possibility of designating new project site by re-arranging area allocations within the Malindi port for the project and other purposes.

② Site clearance

It was also conformed that removal of any remaining objects/structures in the project site and proper clearance of the land surface are a responsibility of the Zanzibar side, and will be composed prior to the construction of the facilities. The site clearance in this case includes removal of sunken boats in front of the project site.

4) Responsible and implementing agencies

The Ministry of Livestock and Fisheries (MLF) is the responsible agency of the project and Department of Fisheries Development (DFD) will take change of the implementation of the project.

5) Items requested by Zanzibar

After consultation with the team, the Zanzibar government made a revised list of requested items. JICA will assess the appropriateness of the request and will report the findings to the Japanese government.

6) Japan's Grant Aid Scheme

The Zanzibar government understood the Japan's Grant Aid Scheme explained by the team.

7) Other relevant issues

① Environmental and social considerations

The team explained in details the "JICA Guidelines for Environmental and Social Considerations" and the Zanzibar side informed the team of the procedure of Environment Impact Assessment (EIA) in Zanzibar. The Zanzibar side understood that it is an essential requirement for the project to fully comply with both environmental regulations in Zanzibar and JICA's socio-environmenatl guidelines. Zanzibar side agreed to complete required EIA procedure if the project is approved and the basic desin of the project is drawn.

② Initial Environmental Examination

The Zanzibar side informed that the rapid environmental impact assessment was conducted for the project, the report of which was submitted to the team. As a requirement of Japan's grant aid project, an Initial Environmental Examination (IEE) of the project will need to be conducted to supplement the above effort. The result of the IEE shall be reported to the team and reflected in the basic design study of the project.

③ Consensus-building among stakeholders

The first stakeholder consultation meeting was held on 21st February 2012, with the

participation of fishers, middlepersons, auctioneers, representatives of local fish committees, representatives of local adminiatration and so on. It was reported that the meeting participants had given their general consent for the construction of the fishery facilities in Malindi landing site and there were no objections observed during the meeting.

④ Operation and Management Plan

The Zanzibar side informed the team that the new fishery facilities in Malindi will be jointly managed by the Department of Fisheries and the Zanzibar Municipal Council. The Zanzibar side agreed to prepare the preliminary plan of operation and maintenance of the new fishery facilities, which contains such information as the assignment plan of management/maintenance staff, income/expenditure analysis, and recruitment and technical training for the staff.

Based on the result of the preliminary study and the subimitted letter from the Zanzibar side dated 3rd June 2012 regarding exchange of initial proposed site with the adjacent new site agreed with the concerned parties, the Japanese government determined to conduct a preparatory survey, and JICA dispatched a study team to Zanzibar from May 18 to June 29 and from August 31 to September 7, 2013.

The study team and the Zanzibar side also discussed about the details of the outline design and the obligations to be fulfilled by Zanzibar and reached a mutual agreement. The initially requested ice machine, ice storage, refrigerator, and emergency generator will be supplied by MLF and therefore were excluded from the request, except the installation space; the fishing gear and OBM spare parts shop was excluded from the request because the conclusion was that it can be substituted with nearby private facilities. Improvement of the existing deteriorated fish marketing facilities to serve as shops related to, but not duplicating the function of the new facilities, was requested. Moreover, a soft component (technical assistance) regarding launch of an operation and maintenance system was requested. Detail of requested component is outlined in the following table.

Table 1-2 : Items requested by the Zanzibar Government confirmed on the Minutes of Discussions

No.	**Items requested**	**Priority**		
		A	**B**	**C**
1	Fish landing facilities			
1)	Landing wharf	●		
2)	Seawall	●		
2	Buildings (Fish market building and administration office)			
1)	Auction hall	●		
2)	Fish retail market	●		
3)	Area for fish gutting and cleaning	●		
4)	Housing for ice plant and cold storage		●	
5)	Fishing gear and OBM spare parts shop			●

6)	Storage	●		
7)	Toilet for officers	●		
8)	Administration office	●		
3	Other Facilities			
1)	Generator house	●		
2)	Toilet for public	●		
3)	Garbage area	●		
4)	Sewage treatment systems for toilet and waste water	●		
4	Improvement of existing fish retail market		●	
5	Exterior works			
1)	Pavement including parking space		●	
2)	Drainage and water distribution	●		
3)	Lighting facilities	●		
6	Equipment			
1)	Ice making plant			●
2)	Ice storage			●
3)	Cold storage			●
4)	Insulated fish box		●	
5)	Fish box		●	
6)	Emergency Generator			●
7)	Handcart		●	
8)	Chest freezers		●	
7	Technical assistance (Soft-component)			
1)	Fish landing and market facility management, operation and maintenance	●		

A: Considered essential (First priority)

B: Considered necessary (Second priority)

C: Unjustifiable as a grant aid project component or given the lowest priority

1-2 Natural Conditions

1-2-1 Geographic Location

The project site is located eastern part of the Marindi port, which is located in northern part of Zanzibar City, the center of west coast in Unguja Island at 6°09' south and 39°11' east.

The project site is located in an area where sand has been accumulated on a wide and shallow reef flat and small islets off the coast of the port surround Zanzibar City.

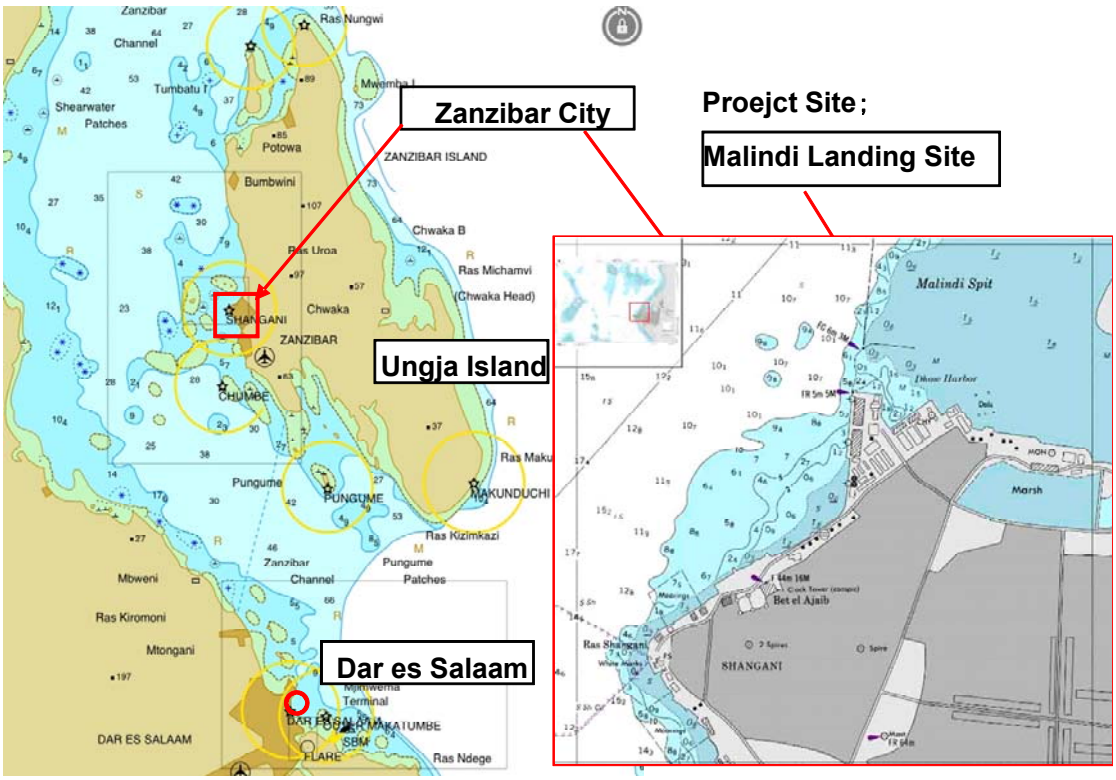
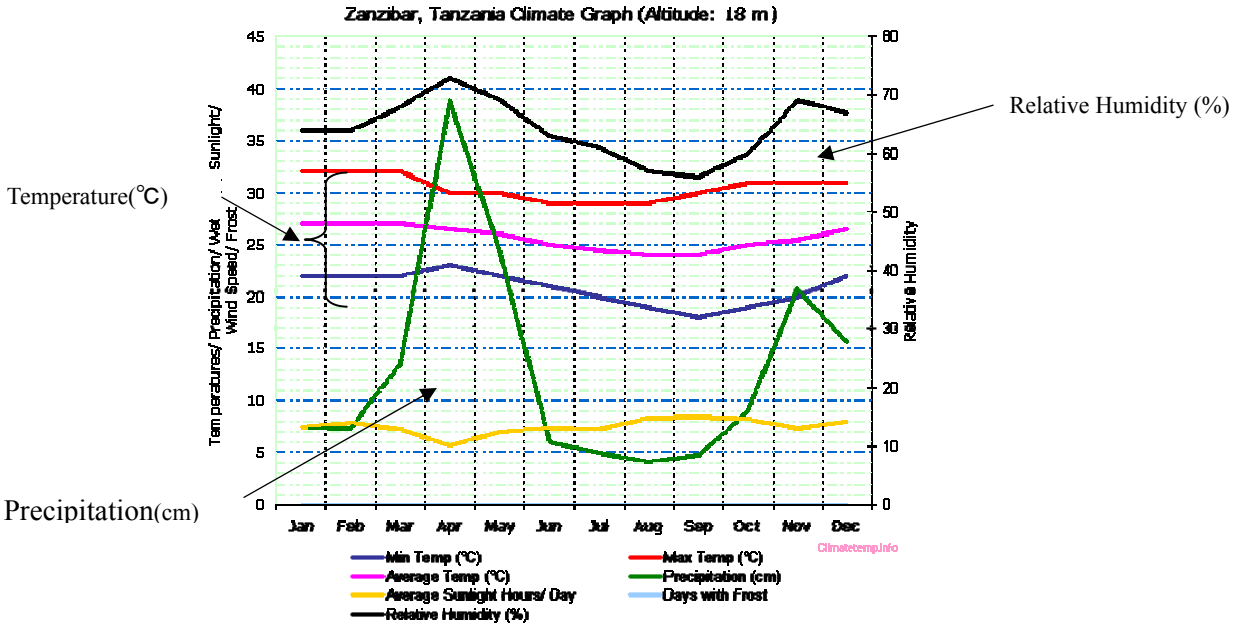


Figure 1-1 : Location of the Project site (Marindi port)

1-2-2 Meteorological condition

1-2-2-1 Temperature and precipitation

Unguja Island has a tropical climate and is heavily affected by the southeast monsoon (from April to October) and the northeast monsoon (from November to March).



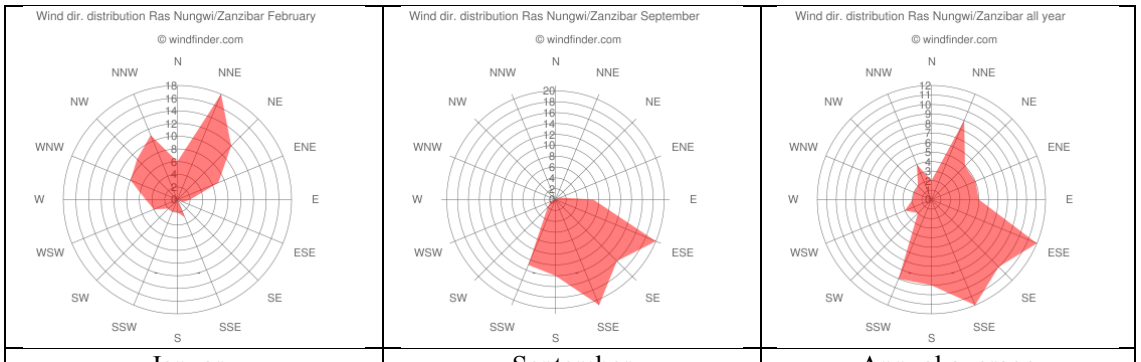
(Source： http://www.climatetemp.info/tanzania/zanzibar.html)

Figure 1-2：Temperature and precipitation in Zanzibar

- Average annual temperature＝25.7 °C
- Average annual precipitation＝1564 mm, Monthly precipitation in Dry season (August) ＝41mm、Monthly precipitation in wet season (April)＝388mm
- Average annual relative humidity＝64.3%、56% in September～73% in April

1-2-2-2 Wind

There are two predominant wind directions in Zanzibar, one is the northeasterly monsoon (from November to March) and another is the southeasterly monsoon (from April to October). Strong wind blow in January and July to October.



January	September	Annual average

(Source： http://www.windfinder.com/windstats/windstatistic_ras_nungwi_zanzibar.htm#)

Figure 1-3：Wind direction in Zanzibar (Ras Nungwi)

1-2-3 Oceanography

1-2-3-1 Tides and Data of Tidal Levels

Semi-diurnal tides are observed at the Port of Zanzibar.

The table below shows the data of the tidal levels at the Port of Zanzibar and their elevations relative to the datum planes of the marine charts and land survey.

Table 1-3：Relation between Chart Datum and Land Survey Datum

Tidal designation	Relative to Chart Datum (m CD)	Relative to Land Survey Datum (LSD) also MSL
HAT(Highest astronomical tide)	4.3 (approx.)	2.22 (estimated)
MHWS(Mean high-water springs)	3.6	1.52
MHWN(Mean high-water neaps)	2.5	0.42
MSL(Mean sea level)	2.08	0.00
MLWN(Mean low-water neaps)	1.5	-0.58
MLWS(Mean low-water springs)	0.4	-1.68
LAT(Lowest astronomical tide)	0 (approx.)	-2.08 (estimated)

（Source：Design Premise for Construction of a New Seawall Mizingani Sea Front, Stone Town, Zanzibar, Client :The Aga Khan Cultural Services, Zanzibar　Consultant: WML Coast (Pty) Ltd,　6 May 2010）

1-2-3-2 Tidal currents

The maximum depth and the width of the Zanzibar Channel are 80 m and approx. 40 km, respectively. The Zanzibar Current flows northward through the strait. There is another large circular current in the strait. Wind and tidal currents have strong influence on the flow of this current.

The sea off Malindi is shallow to the depth of approx. 40 m, even in the strait. There are numerous cays 8 km offshore from Malindi and the entire sea between the shore of Malindi and the cays is shallow. As the cays and shallow sea shelter this sea area from ocean waves, it is a relatively calm sea area.

The wind in the strait has strong influence on the waves which hit the shore of Malindi. The southeasterly monsoon prevails in the period between April and October and the northeasterly monsoon prevails in the period between November and March. There are also transitional periods between these two periods.

Although there is no measured observation data of the current around the Port of Malindi, in which the project site is located, it is considered to be relatively slow at the level of 0.2 to 0.3 m/second at the maximum.

1-2-3-3 Waves

Since the project site is sheltered from swells from the open sea of the Indian Ocean because of its location in the mid-western part and on the side of the strait of the Island of Zanzibar, the sea at the project site is always calmer than the sea on the eastern shore.

In the study report for the renovation of the Port of Zanzibar, wind data at the site was used for wave prediction in the absence of the wave observation data and the parameters for the

design wave hitting the West Wharf of the Port of Malindi were established as follows:

- Significant wave height = 0.4 m (10 – 18 days in a year), 0.5 m (5 – 10 days in a year)
- Period = 4 – 6 seconds
- Wave direction = NW (285 – 345°), WSW (225 – 255°)

Waves coming into the port from the western and eastern sides of the breakwater, which is located 200 m offshore north of the Dhow Harbor, have to be considered in the study of waves hitting the project site. During the season of the northeasterly monsoon, the waves coming around the western side of the breakwater, as well as those coming directly from the eastern side, enter the port. During the season of the southeasterly monsoon, diffracted and refracted waves enter the port from its western entrance.

The waves entering the port from the eastern side of the breakwater have little effect on the port except for the time of high tide, as the energy of such wind waves is attenuated greatly by the wide and shallow reef flat to the north and east of the breakwater.

On the other hand, the wind waves entering the port from the western entrance in the season of the southeasterly monsoon reach the anchorage in the port after being diffracted and refracted off the North Berth without being blocked by the breakwater, as the water depth is still at least 4 m at the entrance despite the fact that the depth has been gradually reduced. As the water depth decreases drastically in the central part of the port, wave height increases. Because of these phenomena, the wave height at the anchorage sometimes reaches approx. 70 cm.

1-2-4 Topography and Sub soil Conditions

1-2-4-1 Topography

Although Zanzibar City is adjacent to the inland part of Zanzibar City at present, a land mass formed by elongated peninsular spit (the present-day Stone Town District) and the inland part were separated by a creek and connected with a sandy beach in the southwestern part of the Stone Town until the beginning of the 20th Century.

The edge of the spit extends eastward at the northern edge of the Stone Town, where the Malindi Port is located. Almost the entire land part of the existing commercial port is on artificial ground created by reclamation.

A wide and shallow sea area with sand sedimentation is found to the north and east of the landing site in the Malindi Port in the project site.

The water depth in front of the wharf near the landing site is D.L. -1.2 to -1.5 m on the chart. However, the bathymetry conducted in this study has revealed that sand has accumulated to the level close to the ground level of the wide and shallow sandy beach (approx. at L.W.L.) in the eastern two thirds of the water area surrounded by the breakwater in the Dhow Harbor, excluding the area off the West Wharf.

Since the water depth of D.L. -1.0 m is not maintained in front of the collapsed sloped wharf in front of the project site, the wharf concerned has lost its function as an ordinary

mooring wharf which should be available for mooring 24 hours a day regardless of the tidal level.

1-2-4-2 Erosion and Sedimentation

There is no serious concern over coastal erosion. Judging from the current conditions of the seabed level and waves in the area with sand sedimentation on the reef flat off the northern shore of Malindi, sand has already been accumulated on the seabed in the Dhow Harbor (especially in the western side where the slipway is located) to the level close to the seabed level before the construction of the harbor in the 1920's. Thus, no further large-scale sedimentation is expected in the harbor.

1-2-4-3 Geotechnical Conditions

A total of three boreholes (about 33m deep) were drilled for the boring survey and a dynamic cone penetration test was carried out at four locations.

Based on the results of the boring survey, it is estimated that the land site was reclaimed with sand sediment around the port when the port was built in the 1920s. The survey revealed that uniform sandy soil of the same particle size as the compacted sea bottom deposits exists. Also, at present, fragments of concrete slabs of a grade from when the quay and the seawall were built as well as stone materials and fine sand that are assumed to have been brought from the inland area of Zanzibar Island are observed on the ground surface of the collapsed quay and seawall. In the layer below them, there is sedimentation of a compacted sand layer of the same particle size as the sea bottom deposits. With respect to the N value, it is 6 for the slope of the collapsed seawall and from the sea bottom to E. L. -10m, there is a compacted sand layer whose N value ranges between 12 and 25.

At around 27m below the ground surface of the current land site, coral gravel containing cohesive soil appears and it is estimated that a limestone layer deriving from coral exists below that.

A compacted sand layer with N value 20 to 30 was observed up to G.L-27m. A coral reef appeared at -27m and a coral rock layer continued from -32m. The boring results correspond well to those of the adjacent commercial port. A compact sand layer of the N value between 20 and 30 was found to the depth of G.L. -27 m. Coral gravel was found between G.L. -27 m and G.L. -32 m. A coral rock layer was found below G.L. -32 m. These boring results are in good accordance with the results of the boring at the adjacent commercial port.

<Foundation ground in the Stone Town>

The following are the summaries of the existing documents on the foundation ground of Stone Town collected in the study.

◆ Summary of the ground conditions for the renovation of the commercial port (North Wharf)

・ Loose to intermediately compact layer of grey clayey sand mixed with shells between the

seabed and E.L. -20 m

- Soft to hard clay layer mixed with sand below the sand layer between E.L. -20 m and E.L. -25 m
- Limestone unit with many openings and cavities (as often found in layers of limestone derived from corals) below E.L. -25 m

◆ Summary of the ground conditions for the construction of a seawall on a seaside road (Mizingni Road) (to the south of the Malindi Commercial Port)

- An intermediately compact sand layer to the depth of 8 to 11 m below the surface layer and a limestone unit below the sand layer
- The N values of the surface layer to the depth of approx. 3 m at 20 – 30.
- The angle of internal friction (φ) = 39 – 40º
-

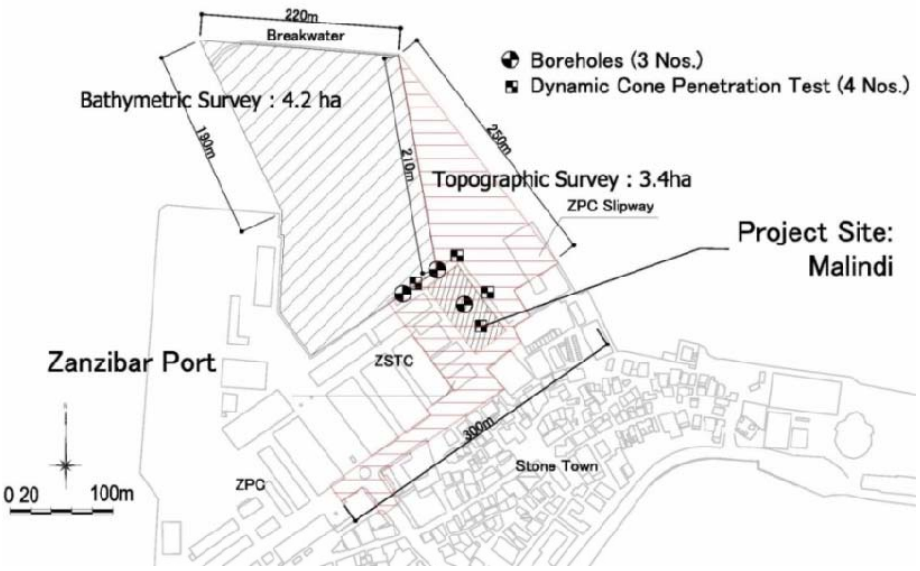


Figure 1-4 : Location of the survey

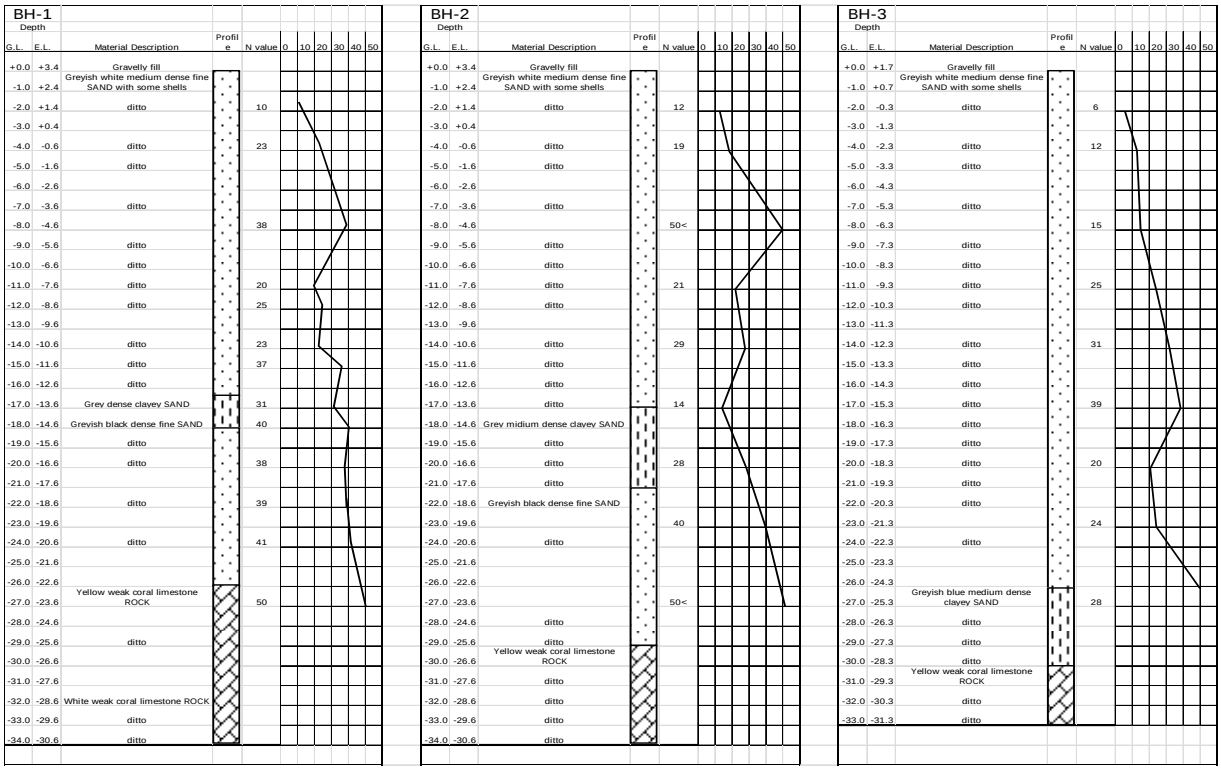


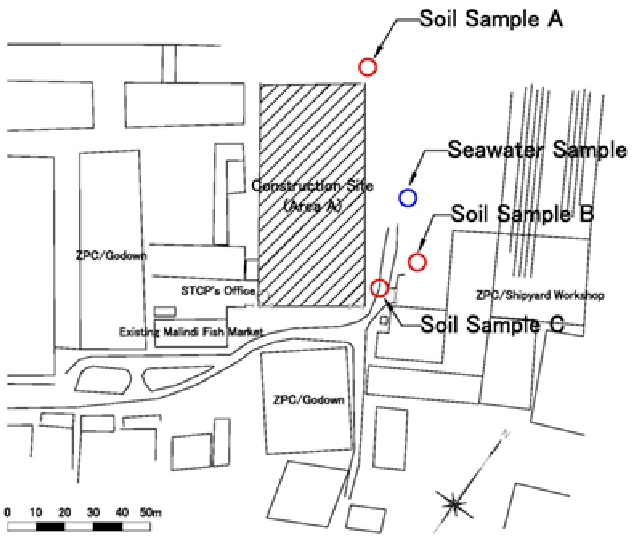
Figure 1-5 : Log of borings

1-2-5 Earthquake

According to the earthquake database by USGS (US Geological Survey) since 1977, 11 earthquakes within the area covered by a 200 km radius circle centered at Stone town. Of these, there was one earthquake of M5.2, originated at 159 km from Stone town. The earthquake nearest area to the project site was the one of M5.0 that occurred 18km to the north of Stone town and the epicenter at a depth of about 10 kilometers on January 15, 2005.

1-2-6 Soil quality analyses

The soil surveys were made at three points within the project site. The sample for the water quality survey was corrected at one point near the project site and was analyzed by IMS (Institute of Marine Science, University of Dar es Salaam).



Point A	Part of Landing wharf （Here is the main place to land small pelagics, namely Dagaa）
Point B	Part of beach （Here is the main place to use for auctions of demersal fishes, etc.）
Point C	Part of entrance （Here is the main place to use for fish retails）
Point of seawater sample	near Point B

Figure 1-6：Points of sample correction

The analysis has revealed the TC count of 10 × 104 and FC count of approx. 4.0 × 103 in a gram of soil and the TC count of 9.0 × 104, FC count of 4.8 × 104 and BOD5 of 17.8 mg in a liter of sea water taken at all the sampling sites. These values obtained in the analysis have confirmed that the planned construction site is in an extremely unhygienic condition.

1-2-7 Analysis of the Quality of Water in the Surrounding Sea Area

The water quality analysis has revealed that COD values in the water in the sea area around the project site are within the range between 21.00 mg/L and 29.42 mg/L. As the Environmental Quality Standards for Conservation of the Living Environment (Coastal Waters) of Japan provide COD of 8 mg/L or below as the COD value of sea areas for the "conservation of the environment," the result of the analysis has revealed that the water in the sea area is significantly polluted. Extremely high values of total phosphorus, total coliform count and fecal coliform counts have also been obtained from the samples taken at the same sampling sites as those for the COD analysis.

A sewer outlet is located near the site. It is obvious that the quality of the water around the project site is strongly compromised by the untreated sewage discharged from the outlet. Measures will have to be taken in the facilities where food items are to be handled to minimize adverse effect of the seawater and soil in the surrounding area as the project site is in an area with very poor hygienic and environmental conditions.

Table 1-4：Results of Water quality survey near project site

ID.	A1	A2	B1	B2
Place to correct each sample	Central part of Malindi Port 6.153955°S, 39.193242°E (521380 m E, 9319773 m N)		In front of Existing wharf 6.154787°S, 39.194825°E (521555 m E, 9319681 m N)	
Time to correct each sample	8/Jun/2013 12:00 mean spring tide high water (High tide)	8/Jun/2013 16:00 spring tide high water (Slack water)	8/Jun/2013 12:15 mean spring tide high water (High tide)	8/Jun/2013 16:20 spring tide high water (Slack water)
Coliform group	29 x 10^2 (cfu/100mL)	23 x 10^2 (cfu/100mL)	32 x 10^2 (cfu/100mL)	26 x10^2 (cfu/100mL)
Fecal coliform group	12 x 10^2 (cfu/100mL)	9 x 10^2 (cfu/100mL)	15 x 10^2 (cfu/100mL)	7 x10^2 (cfu/100mL)
pH	7.30	7.10	7.20	7.00
Total phosphorus	4.98 (mg/L)	4.80 (mg/L)	5.58 (mg/L)	5.84 (mg/L)
Chemical oxygen demand (COD)	23.45 (mg/L)	21.00 (mg/L)	29.42 (mg/L)	27.55 (mg/L)
Suspended solids (SS)	17.42 (mg/L)	18.20 (mg/L)	26.00 (mg/L)	22.30 (mg/L)

1-3 Environmental and social considerations

1-3-1 Environmental Impact Assessment

1-3-1-1 Overview of Project Components with Environmental and Social Impacts

The objective of the Project is that fishers and other users at the Malindi landing site conduct their landing/marketing operations more efficiently in a safer and more hygienic working condition, thus promoting stable supply of quality fish to the people of Zanzibar.
The following benefits will be achieved by the project.

- A landing quay is constructed where 392 artisanal fishing vessels registered in Urban district and vessels from suburban area can land fish, as well as 1,400 workers who unload and transport fish in a safer condition.
- About 6,500 users a day of Malindi fish landing site can have a hygienic and appropriate place for trading and selling fish.
- About 6,500 users a day of Malindi fish landing site can work in an efficient condition

The components of the project are detailed in the Chapter 2.

(1) **Project site**

The project site is located eastern part of the Malindi port, which is located in northern part of Zanzibar City, the center of west coast in Unguja Island at 6°09' south and 39°11' east.
The site consists of three areas, namely building construction area (Area A), civil work area (Area B) and peripheral area (Area C) for associated work and temporary landing site as

shown on the SITE MAP shown on the beginning of this report..

1-3-1-2 Environmental and Social Conditions Used as Basis

(1) **Outline of social and environmental conditions**

1) Administration

Unguja contains three administrative regions, namely Zanzibar Urban/West, Zanzibar Central/South, and Zanzibar North. As Zanzibar is classified as a semi-autonomous part of Tanzania it has its own government, the Revolutionary Government of Zanzibar. The Government consists of the Revolutionary Council and House of Representatives. The composition of the House of Representatives is similar to that of the National Assembly of Tanzania.

2) Population and demography

Total area of Zanzibar is about 2,654 km^2 and population is about 1,300,000 (2012). Zanzibar's population originates from different locations, consisting mainly of African people with a minority of Asians from India and Arab countries. Zanzibar's population was just under one million in 2002 when the last census was conducted, and had an annual growth rate of 3.1% (remaining fairly steady for some years). Roughly two third of this population (some 600,000) inhabits Unguja Island, the greatest proportion of which is settled in the densely populated west. Stone Town constitutes the largest settlement in Zanzibar, with approximately 223,000 inhabitants. Other smaller towns on the island include Bambi, Chaani, Makunduchi and Mahonda. Outside of the towns, most people live in small villages and sustain themselves through subsistence farming and fishing (United Republic of Tanzania National Website, 2009). The average household size has decreased from 6.2 members in 1991, to 5.5 members in 2005 (Household Budget Survey, 2005). Household size is higher in urban areas (5.9 members) than rural areas (5.3 members). The district of Mjini, where Stone Town is located, has an average household size of 6.1 members.

3) Ethnicity, religion and language

The population of Zanzibar comprises considerable ethnic diversity, reflecting the islands' unique history. Swahili dominates, after that Arabic, Indian, Persian. Islam is the most widely practiced religion on Zanzibar with roughly 95% of the population following Islamic laws. The religious traditions of Zanzibar have greatly been influenced by the Persians, Portuguese, British, Arabs and the African mainland, dating back to the original Arab settlers. A combination of Hindu and Christian make up the remaining 5%. Main language is Swahili (locally referred to as KiSwahili).

4) Economy and industry

Ratios of industrial production to GDP are 30.2%, 11.7 % and45.3 % for primary, secondary and third industry, respectively (2012). In Zanzibar agriculture including crops, forestry and fisheries, is the most important sector of the economy, over two-thirds of labor force and the largest part of foreign exchange. The fisheries sector in Zanzibar is the largest available source of income and the most common source of dietary animal protein to the country's population with an estimated per capita fish consumption of 20kg per year. At the annually recorded fish landing of 29,411 tons (2012), the fisheries industry supports an estimated 30,000 artisanal fishermen and about 2,500 fish mongers contributing to about 3% of the total GDP. However, the Zanzibar fisheries industry is predominantly traditional and largely supplemented by local artisan fishermen. This has created immense pressure on the delivery services of the fisheries sector across Zanzibar. The density of fishermen in the country has recently increased due to increase in the number of the general population. Zanzibar is blessed with plenty of tourist resources such as marine resorts and Stone Town as a World Heritage Site and prominent tourist spot in Tanzania having more than 14 thousands tourists annually.

5) Land use

Inland area land is mostly used for livestock (mainly cows) and vegetable field. Other land is used for cultivating coconuts, mangos, cassavas, sweet potatoes and sugar cane. The largest area of mature forest remains largely protected in Zanzibar's only National Park, the Jozani National Park. Commercial agricultural crops are dominated by fragrant and aromatic spices, such as cloves, nutmeg, ginger, chilies, black pepper and cinnamon. Subsistence farming dominates other arable areas.

6) Cultural and historical properties

Zanzibar's multi-ethnic Stone Town currently hosts 51 Mosques, 6 Hindu Temples, a Catholic and an Anglican Cathedral. There are a number of burial sites along the outskirts of Stone Town, with intriguing graves and headstones. Stone Town is prominent historical and artistic importance in East Africa. Its architecture, mostly dating back to the 19th century, reflects the diverse influences underlying the Swahili culture, with a unique mixture of Moorish, Arab, Persian, Indian and European elements.

7) Social infrastructure

Zanzibar contains an overall road network of 1,600 km of road, 85% of which is asphalt surfaced or partially surfaced. Gravel roads make up the rest of the road infrastructure and these are often rehabilitated in order to make them passable throughout the year. Currently, the government in Zanzibar does not own any of the public transport (which is mostly run by individual members of the public); the only kind of transport privately owned is locally

referred to as Dalala (originating from the Swahili word dala – which refers to the price of public transport during the 1970s and 80s)

The most common toilet facility used in urban Zanzibar is the pit latrine (67% of households), followed by flush toilets (26%). Nearly half of the urban households obtain their drinking water from a private pipe in their residence, while just more than a quarter obtain their water from a private pipe outside their residence, and just more than 10% of households obtain water from a community pipe.

8) Social services

Zanzibar had 207 government schools and 118 privately owned schools in 2000. It also hosts two universities, namely Zanzibar University and State University of Zanzibar (SUZA). The primary and secondary educational systems in Zanzibar are somewhat different from that of the mainland of Tanzania. On the mainland, education is only compulsory for primary school (7years), while on Zanzibar an additional three years of secondary education is both free and compulsory.

9) Diseases and HIV/AIDS

According to outpatient data provided by the Ministry of Health (HMIS Bulletin 2009), major diseases in 2009 include respiratory diseases (29.0%), diarrhea (8.4%), pneumonia (7.8%), dermatosis (6.5%), headache/neck pain (6.5%), malaria (5.6%), parasitosis (4.4%), eye diseases (3.5%), urinary system diseases (3.0%), and others (12.9%).

As for the ratios of inpatients from 2006 to 2009, patients with infectious diseases such as malaria have sharply decreased in recent years whereas hypertensive patients are increasing in ratio.

The ratio of HIV/AIDS patients to the population of Zanzibar is 0.6% (2002), the lowest level in the sub-Saharan countries. This low level has been maintained since then due to the Zanzibar government's countermeasures against HIV/AIDS such as prevention, education, medical examination, and treatment of the disease.

10) Poverty status

According to the household budget survey 2009/2010, 44% of the Zanzibar population falls below the basic needs poverty line, with 13% falling below the food poverty line. In rural areas, in particular, the ratios of the population below these poverty lines are 51% and 17%, respectively, both higher than in urban areas. The ratios are also higher on the island of Pemba than on Unguja.

GDP per capita in Zanzibar in 2012 is US$638 (Socio-Economic Survey 2013), still low compared with developed countries. According to the household budget survey, 6.8% of households in Zanzibar rely on fishing as their main source of income, and fishing plays a significant role in the household income of the Zanzibar population. The households that rely on fishing as their main source of income also have a high poverty ratio of 60.5%.

11) Flora, fauna and biodiversity

Dominant species seen around Malindi Port premises include Mango trees (*Mangifera indica*); Muarobani (*Azadirrachta indica*). Rain Tree (*Samanea Saman*), *Acacia spp*, *Peltphorum spp*., etc. On the opposite of the Funguni creek, about two kilometers away, are Mangroves. No record of animals of IUCN importance was observed during the field survey of the proposed sits. Only avifauna such as Indian Crows and Cattle Egrets were documented.

(2) **Environmental pollution**

1) Air pollution

There is no major stationary emission source such as big factory and major mobile emission from vehicles. Especially PM and NOx emission can be foreseen from vehicles in case of traffic congestion in Stone Town area. However, at present there is neither establishment of air quality standards nor environmental monitoring.

2) Water pollution

A sewer outlet is located near the site. It is obvious that the quality of the water around the project site is strongly compromised by the untreated sewage discharged from the outlet. The harbor water around the fish landing site is generally polluted, partly because there are no proper sewage treatment mechanisms inside the Port and also because the area near fish landing site is a tidal mud flat carrying municipal discharges. The water quality analysis has revealed that COD values in the water in the sea area around the project site are within the range between 21.00 mg/L and 29.42 mg/L.

3) Bottom sediment contamination

Near the berth for dhows, the bottom sediment consists of clean medium/fine sand that contains little fine particles such as clay and silt and much quartz sand. On this sand beach, despite many years of fish landing and removal and disposal of gills and guts, there is little noticeably foul smell due to decomposition of organic matter.

4) Waste

Regarding the collection and transportation of waste in the Stone Town area, there is a lack of handcarts, trash bins, and skips in the old town area and garbage trucks and waste dumps in the new town area. Consequently, illegal dumping of waste in vacant lots and rainwater drainage systems has become commonplace. In addition, industrial waste from factories and waste from tourist hotels is a problem. Furthermore, the Jumbi waste disposal site currently in use is surrounded by residential areas, raising concern about its effect on the health of people living in the vicinity.

1-3-1-3 Policies, Legislative and Institutional Framework related Environmental and Social Considerations

(1) **Environmental Laws and Regulation**

1) National Environmental Policy

Major Laws and Regulations relevant to environmental and social considerations are shown in the table below.

Table 1-5 : Major Laws and Regulations Relevant to Environmental and Social Considerations

	Regulations	Year
1	Zanzibar National Environmental Policy	1992
2	Zanzibar Environmental Management Act for Sustainable Development	1996
3	Establishment of Zanzibar Nature Conservation Areas Management Unit Act	1999
4	National Forestry Policy	1999
5	Forest Resources Management and Conservation Act	1996
6	Zanzibar Fisheries Policy	1985
7	Fisheries Act	1968 (2010 Amended)
8	Fisheries Regulations	2003
9	Stone Town Act No.3 of 1994	1994
10	Stone Town Conservation and Development Authority Act	2010

2) Environmental Standards and Emission Standards

In Zanzibar at present national environmental standards such as air quality, water quality and noise are not established.

According to the Department of Environment, however, the environmental standards and emission standards of the World Health Organization (WHO) or Tanzania are used as the reference standards when comparisons are required.

The table below shows the Tanzanian effluent standards and environmental standards regarding water quality.

Table 1-6 : Effluent Standards and Environmental Standards Regarding Water Quality (Tanzania)

Category	Unit	Effluent standards		Environment standards			
		TL*	MPC**	TL*	MPC-1***	MPC-2***	MPC-3***
pH	-	-	6.5-8.5	-	6.5-8.5	6.5-8.5	6.5-9.0
TDS	mg/l	2,500	3,000	1,700	2,000	2,000	2,000
TSS	mg/l	60	100	-	-	-	-
Conductivity	$\mu S/cm^3$	400	-	-	-	-	-
BOD	mg/l	25	30	3.5	5	5	10

Category	Unit	Effluent standards		Environment standards			
		TL*	MPC**	TL*	MPC-1***	MPC-2***	MPC-3***
COD	mg/l	45	60	-	-	-	-
Chloride -CL	mg/l	650	800	170	200	200	400
Sulfate-SO_4	mg/l	600	600	500	200	200	200
NH_3-N	mg/l	7.5	10	0.35	0.5	0.5	0.5
NO_3-N	mg/l	50	80	35	50	50	100
PO4	mg/l	6	0.5	-	-	-	-
CN total	mg/l	0.1	0.01	0.035	0.5	0.5	0.1
Oil & Grease	mg/l	1	5	0.35	0.5	0.5	5
Phenol	mg/l	0.2	0.1	0.0015	0.002	0.002	0.1
Total hydrocarbons	mg/l						
As	mg/l	0.1	0.1	0.04	0.5	0.05	0.1
Cd	mg/l	0.1	0.1	0.04	0.5	0.05	0.2
Cd (total)	mg/l	0.1	0.1				
Cr^{+6}	mg/l	0.1	2.0	0.04	0.05	0.05	0.1
Cu	mg/l	0.1	1	2.5	3	3	4
Fe (total)	mg/l	3	5	0.75	1	1	1.5
Pb	mg/l	0.02	0.02	0.75	1	1	1.5
Hg	mg/l	0.005	0.005	0.00075	0.001	0.001	0.002
Ni	mg/l	0.2	0.5	0.4	0.05	0.05	0.1
Zn	mg/l	1	0	0.15	0.2	0.2	0.5

Note 1: * TL = Trigger Level (A survey for problem identification and countermeasures for the problem are required if the criteria value is exceeded.)

Note 2: ** MPC = Maximum Permissible Concentration (Criteria value for permissible emission levels of domestic wastewater and industrial effluent in the Water Utilization - Control and Regulation Amended Act 1981)

MPC 1 : Category 1 (used for drinking, swimming pools, soft drinks, food industry, pharmaceutical industry, etc.), MPC 2: Category 2 (used for livestock breeding, fish culture, recreation, etc.), MPC 3: Category 3 (used for irrigation and general industrial purposes).

(Source: JICA (2011) Tanzania Environmental and Social Consideration Profile, etc.)

(2) **Laws and Regulations Relevant to EIA**

1) Laws and Regulations Relevant to EIA

In Environmental Management for Sustainable Development Act, 1996 EIA requirements for EIA activities in Zanzibar are stipulated in Chapter V (Article 38 to 62) and Schedules 1 and 2 as shown in the following tables.

Table 1-7 : Criteria for determining activities which require an EIS

	Activities
1	Use major amounts of resources, either living or nonliving
2	Result in the production of waste which would be in major quantities or of a hazardous nature
3	Modify the environment, especially the coastal area on a major scale
4	Influence population shifts in major ways
5	Affect environmentally sensitive areas
6	Embody such other characteristics as may be prescribed under the Act

Source: The Environmental Management for Sustainable Development Act, 1996 (Article 54)

Table 1-8：Activities which require an EIS

	Activities
1	Developing a major residential area
2	Operating a manufacturing industry with hazardous waste and by-products
3	Operating a power generating plant
4	Operating an oil refinery
5	Operating a sewage treatment and disposal system
6	Operating a water supply system
7	Operating a solid waste disposal system
8	Developing an area in a port, harbour or marina
9	Reclaiming land
10	Developing hotels or resorts of 100 beds or more
11	Engaging in irrigated agriculture of 20 hectares or more
12	Engaging in aquaculture
13	Developing environmentally sensitive areas including forests, mangroves, small islets and water catchments
14	Degazetting an existing area protected under the laws of Zanzibar

Source: The Environmental Management for Sustainable Development Act, 1996 (Schedule 2)

Table 1-9：Activities which do not require EIA certificate

	Activities
1	Any domestic, private and non-commercial activity
2	Operating a small-scale shop
3	Operating a small-scale business employing lower than 10 people
4	Operating tours, other than dives, and travel agencies
5	Engaging in rainwater agriculture over an area of less than 10 hectares
6	Operating a small-scale warehouse for storage of non-hazardous substances
7	Providing commercial cleaning and forwarding services
8	providing office and professional services
9	Operating an air charter service
10	Maintaining roads if the work does not involve upgrading or expansion of road

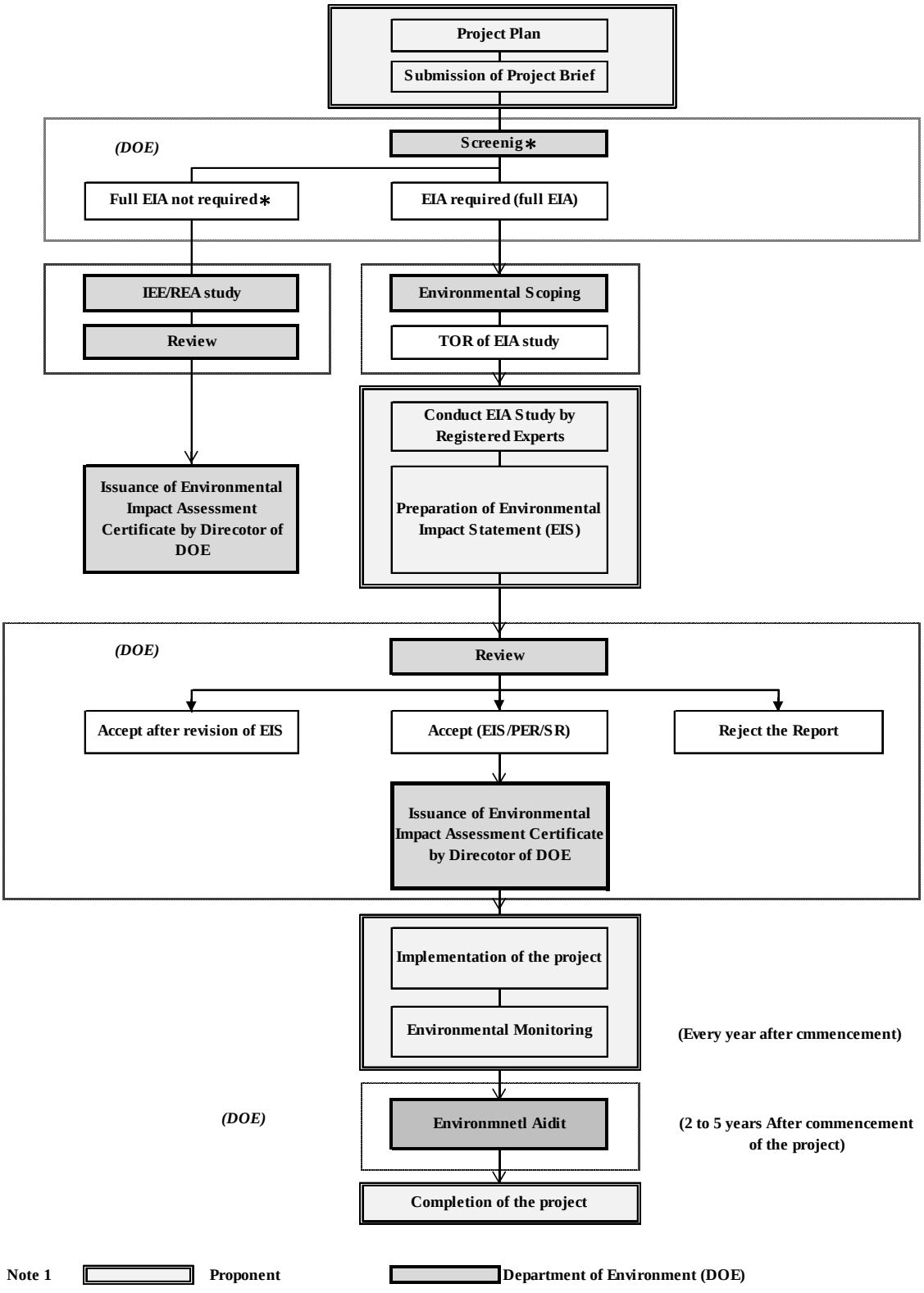
Source: The Environmental Management for Sustainable Development Act, 1996 (Schedule 1)

2) Procedures of EIA and Environmental Certificate

EIA process to get Environmental certificate in Zanzibar is shown in the table and the figure below.

Table 1-10 : Procedures for Conducting EIA in Zanzibar

	Step	Timeline	Responsibility
1	Registration for EIA (Submit to Project Brief to DOE)	At the start of the EIA Process	Proponent
2	Screening - (1) EIA required, (2) More information requested, (3) Project proposal rejected, (4) Approval (EIA not required)	Within 10 days after the registration for EIA	DOE
3	Screening statement will be produce to reflect the results of screening)	Within 10 days after the screening	DOE
4	Scoping TOR (draft) production if EIA is needed after screening	Several days after TOR (draft) submission	DOE
5	TOR confirmation	Within 10 days after acceptance of TOR	DOE
6	Submission of CV of 3 consulting firms and experts	Within 10 days after submission	Proponent to DOE
7	Expert evaluation	Within 6 months	DOE
8	EIS achievement	Within 5 days after submission	Proponent
9	Disclosure of Environmental Impact Statement (EIS)	Within 20 to 30 days after EIS submission	DOE
10	Comments	Within 5 days after assessment	DOE
11	EIS assessment	Within 30 days after comments	DOE
12	Required additional information	Within 5 days after assessment	DOE
13	Additional information required for agencies responsible for environment	Within 20 days after request	Proponent
14	Decision-making on EIA approval	Within 10 days after assessment	DOE

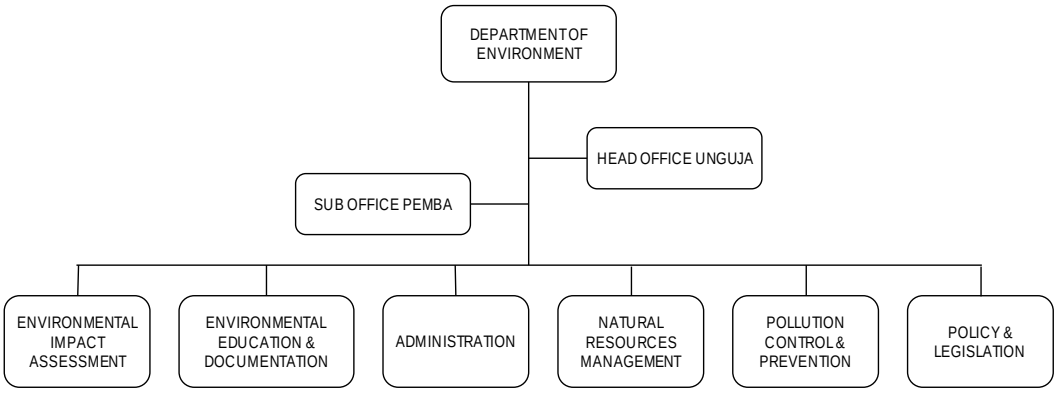


Note 2: At present basically all the projects are required to IEE and/or REA study after submission of the project plan to DOE. (Department of Environment (2009) Environmental Impact Assessment - Guidelines and Procedure (Draft))

Figure 1-7 : Procedures of Obtaining Environmental Approval

3) Institutional Arrangement of EIA

The Department of Environment (DOE) is under the First Vice President's Office and the institution responsible for all matters pertaining to environment in Zanzibar. Organization Chart of DOE is shown below. In the DOE, Environmental Assessment Section is in charge of EIA matters.



Source: DOE

Figure 1-8 : Organization Chart of Department of Environment (DOE)

4) Acquisition of Environmental Certificate from Department of Environment

For the Project for Development of Malindi Fish Landing and Marketing Facilities, in March 2011 the Zanzibar Department of Environment (DOE) issued an environmental certificate (Environmental and Social Impact Assessment Certificate issued on 2 March 2011) based on the Rapid Environmental Analysis (REA). However, the Environmental Impact Assessment Certificate was reissued o based on the draft proposal of this project in September 4, 2013 because more than two years had elapsed since the issuing of the previous certificate and the target site had been changed to an adjacent area.

1-3-1-4 Examination of Alternatives (Including Zero Option)

(1) **Examination of Alternatives to Facility Improvement Plan**

The alternatives to the improvement plan for the existing fish marketing facilities are renovation in the same place and the option of no action.

1) Maintaining the Status Quo (No-Action Case)

① Further deterioration and degradation of facilities

The current Malindi fish landing site is located in a small area in the concentration of deteriorated buildings and facilities on the eastern side of Zanzibar Port which was developed some 50 years ago. However, the site is in a landing area that is not properly managed, with problems in sanitary conditions, so improvement of the fish marketing

facilities is urgently required. Furthermore, the adjacent facilities related to fishery are no longer in use because, after the pullout of the government-run fishing corporation, the main machines were sold and the facilities deteriorated.

② Increase of dangers and risks in work environment

At the quay where the existing fish landing site has collapsed, fishing boats cannot come alongside the quay so the porters go into the sea and carry the catches in buckets and plastic bags from the fishing boats to the land. The collapsed quay is slippery and about 90% or more of users have experience of being injured according to a hearing survey, so the dangers and risks have the possibility of increasing.

③ Apprehension about deterioration of sanitary conditions and adverse impacts on the health of people engaged in fishery activities

At present, the following problems in the sanitary environment in landing, auctioning, fish cutting, retailing, etc. exist.

At high tide, a flat area cannot be easily secured so fish for auction are placed directly on the ground in a narrow place until the auction is over. Large fish that have been sold are scaled, gilled, gutted and cut into slices according to the demands of customers, but all the work is done in an unsanitary environment including the washing of cut fish in seawater in the port where rubbish floats. Fish residues are dumped near the workbenches so they are carried away by the rise and fall of the tide, further deteriorating the environment. Unless the contaminated water and fish residues generated by fish gutting and sewage from the public toilets are properly processed and treated, the sanitary environment may deteriorate further.

2) Plan in This Project

① Avoidance or reduction of adverse impacts of no action

When the project is implemented, adverse impacts expected in the no-action case will either be avoided or reduced.

② Development and improvement of fishing activity sites

- The landing quay will be improved to ensure safe landing for 392 artisanal fishing vessels registered with the Urban District and vessels from suburban areas, as well as 1,400 workers who unload and carry fish.
- A sanitary place for trading and selling fish will be provided for 6,500 users a day of Malindi fish landing site.
- An efficient work environment will be provided for 6,500 users a day of Malindi fish landing site.

③ Sustainable growth of fishing in Zanzibar

After the improvement of the Malindi fish landing site which plays a major role in the fishery production of Zanzibar, safer and more sanitary marine products can be stably provided, contributing to economic development and maintenance of the health of people who depend on fish as their main source of protein.

(2) **Examination of Alternatives to Fish Landing Site and Fish Marketing Facilities during Construction**

As temporary relocation space to be used during construction to improve the fish landing site, ZPC suggested the possibility of using the Kizingo and Maruhubi landing sites which are under the control of MLF because they have the equivalent water depth, tranquility, and range as the Malindi landing site. The conclusion reached after examination of the alternatives was that it would be appropriate to use part of the existing Malindi landing site, despite limitations in space, by taking into consideration the construction schedule and methods.

Since Kizingo already serves as an existing landing site and is also used by the fishing vessels that normally use the Malindi landing site depending on the wind conditions and seasons, it can continue to be used as a landing site.

MARUHUBI LANDING SITE

KIZINGO LANDING SITE

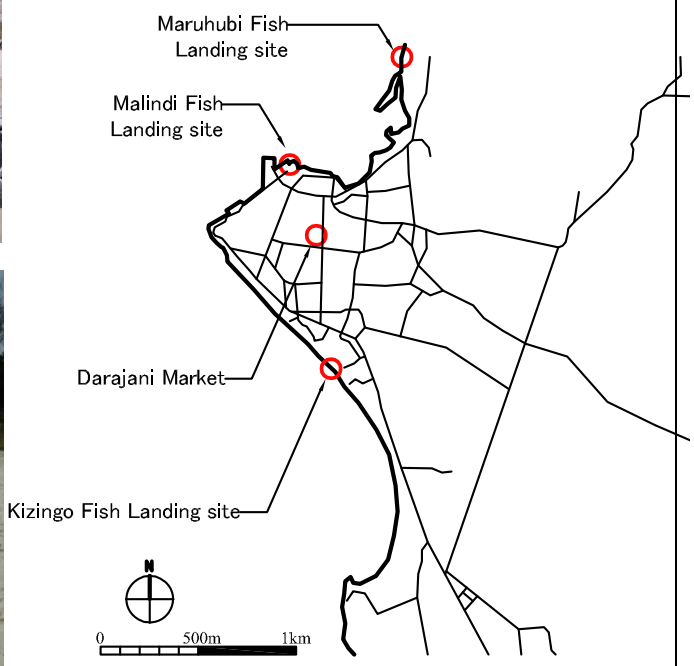


Figure 1-9 : Alternative Landing Sites

Table 1-11 : Comparison of Alternative Temporary Relocation Sites for Fish Landing Site

Evaluation item	Malindi landing site	Maruhubi landing site	Kizingo landing site
Location	In the project site	About 3 km north of the project site	About 1 km south of the project site
Geographic feature, etc.	Beach adjacent to the existing landing site. Despite being a small area, its use can be coordinated with the improvement work through adjustment of the construction schedule and methods.	Sufficient water depth for fishing vessels to come alongside the quay. The tidal flats include a mangrove forest.	Shallow water with many rocks, making it difficult for fishing vessels to come alongside the quay.
Current usage status	Auxiliary space for the existing landing site	Smoking of marine products is also carried out.	Landing site for small fishing boats
Problems, etc.	Small area. However, coordination with improvement work is possible through adjustment of the construction schedule and methods.	Its continued use conflicts with the future port development plan.	Due to geological reasons, it is difficult for fishing vessels to come alongside the quay at low tide.
General evaluation	◎ **(Appropriate)**	△ **(Not appropriate)**	○ **(Appropriate)**

1-3-1-5 Methods and Procedures of Initial Environmental Examination (IEE)

(1) **Policies on Environmental Impact Forecast and Evaluation**

The preparatory survey (preliminary study) conducted in February 2012 identified this project as "Category B" in the project category classification based on the JICA Guidelines. Thus, Category B IEE was conducted.

As complementary and corrective work for IEE at the time of the preliminary study, this study was conducted to forecast and evaluate the environmental impacts of implementation of the project for development of fish marketing facilities, examine mitigation measures against expected negative impacts, and create an environmental management plan and monitoring plan. Furthermore, the results and the environment-related approvals and licenses and progress of explanations were checked against the JICA Environmental Checklist.

The following shows the procedures of IEE-level environmental and social considerations.

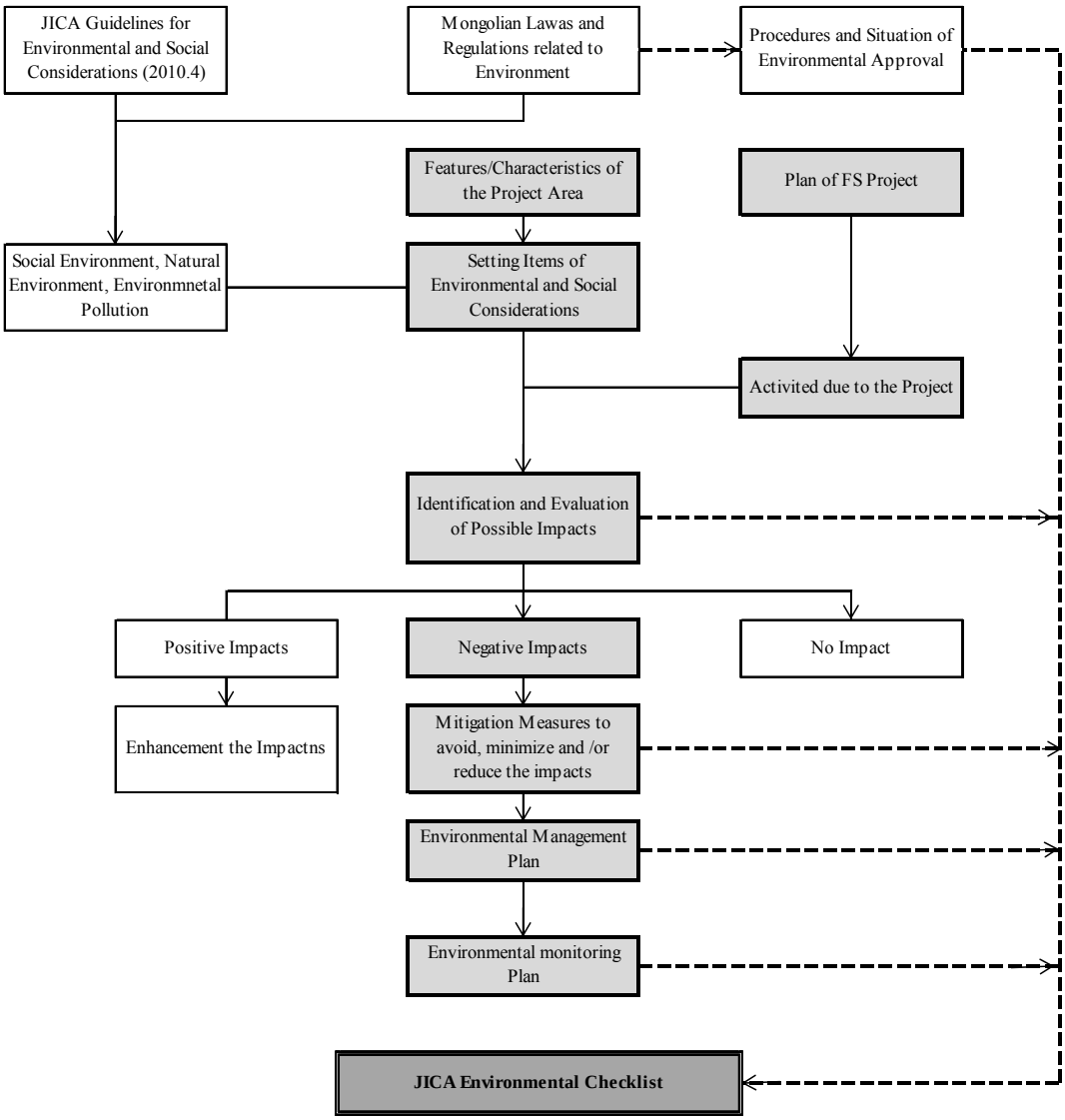


Figure 1-10：Procedures of IEE level Study

(2) **Setting of Environmental Components and Items**

In this examination by taking into consideration the JICA Guidelines for Environmental and Social Considerations, and laws and regulations of Zanzibar Government, especially the Environmental Management for Sustainable Development Act, 1996 together with environmental condition of Zanzibar as indicators expressing environmental and social conditions following the three environmental components, as shown below, are chosen and the components are sub-divided into a total of 33 environmental items (Social Environment 15, Natural environment 10, and Environmental pollution 8).

(3) **Project-related Development Actions**

The presence and degree of project-related environmental impacts were forecast and evaluated by comparing the project-related development actions with the corresponding

environmental and social considerations using a matrix. The development actions are classified and shown in the planning, construction, and in-service stages in correspondence to the components of this project.

Table 1-12 : Development Actions Related to the Malindi Port Improvement Project

Phase	Development action	Project components					
		1) Improvement and use of the existing fish landing site	2) Construction and use of fish marketing facilities and	3) Construction, improvement, and use of other facilities	4) Improvement and use of the existing fish marketing facilities	5) Fish landing and marketing activities at a temporary relocation site	6) Operation and management of fish landing site and
Planning	Acquisition of land for fish marketing and other facilities	○	○			○	
	Change in land and resource uses	○	○			○	
Construction	Civil engineering of ground, banking, etc.	○	○	○			
	Use of construction machines, vehicles, plants, etc.	○	○	○	○		
	Construction of material yard, workers' living quarters, construction office, etc.	○	○	○	○		
	Improvement of fish landing and marketing facilities	○	○	○	○		
	Fish landing and marketing activities at a temporary relocation site					○	
In-use	Use of fish landing and marketing facilities	○	○	○	○		○
	Presence of space in fish landing and marketing facilities	○	○	○	○		○

Note: ○ means items are applicable to project components.

(4) **Forecast and Evaluation Methods**

Positive and negative impacts that may be caused by the project were forecast and evaluated.

A (+/-) : Significant positive/negative impacts are expected.
B (+/-) : Not significant but some positive/negative impacts are expected.
C (+/-) : The degree of positive/negative impacts is unknown (Further examination is needed. Some impacts may become clear as the study progresses.)
D : No impact. IEE or EIA is not required.

(5) **Forecast and Evaluation of Environmental Impacts**

The following table shows the results of forecast and evaluation of the impacts expected to be caused by the development actions related to the above Project for Development of

Malindi Fish Landing and Marketing Facilities for each of the 33 environmental items, corresponding to stages until project implementation (I. Planning, II. Construction, and III In-use stages), and in comparison with the results of scoping in the preliminary phase.

Table 1-13 : Identification and Evaluation of Possible Impacts

Environment Item	Rating				Reasons
	Scoping		Survey Finding		
	I/II	III	I/II	III	
(1) Social Environment					
1) Involuntary resettlement	D		D		Land for the project site is owned by the government and the right of use is transferred to DFD from a private company. Project site is located within existing fish landing area where there are no inhabitants and houses. Thus, land acquisition and resettlement is not expected.
	C-		B-		As the existing fish landing and marketing activities continue during construction stage, the construction work may disturb fish landing and fish marketing activities as well as other business activities such as vendors.
	D		D		Space of temporary site for construction office, storage of construction materials and waste are available in the site.
	D		D		Construction materials can be procured from Tanzania mainland. No quarry or borrow pit needs to be newly developed.
	D			D	Land acquisition and resettlement are not expected.
2) Local economy such as employment and livelihood etc.	B+		B+		Beneficial impacts are expected on local economy and living condition of people by creation of employment opportunity for construction work
		B+		B+	Improvement of fish landing and marketing facilities may upgrade livelihood and income of people engaged in fishing activities such as artisan fishermen and fishmongers, and at the same time improve living condition of people by taking more easily fish food.
3) Land use and utilization of local resources	D		D		Right of land use is registered under DFD.
	B-		D		Water and electricity for construction works and operation of the facilities will be supplied by ZAWA and ZECO, respectively. Sewage and wastewater are connected to sewer lines after primary treatment.
		B+		B+	Improvement of fish landing and marketing facilities will bring about effective and sustainable utilization of fish resources.
4) Social institutions such as social infrastructure & local decision-making institutions, a split of communities	C-	C-	B-	B-	Information disclosure regarding the project is necessary, and procedures and public participation should be properly conducted throughout the every step of the project.
5) Existing social infrastructures and services	B-		B-		Traffic of construction vehicles may temporarily cause traffic congestion along the access road.
	C-		D		Water for construction works is supplied by ZAWA
		B+		B+	Rehabilitation of collapsed fish landing site and construction fish marketing facilities will bring about significant functional improvement of fish landing and fish marketing.
6) The poor, indigenous of ethnic people	D		D		There are no indigenous of ethnic group in the project area.
	B+		B+		The project is to contribute to creation of employment opportunity for construction during construction stage and to improve living condition of people
	B+			B+	According to Household economy survey, for households whose incomes come mostly from fishery activities, the ratio of poverty level is as high as about 63.5%. Rehabilitation of fish landing and fish marketing facilities may bring about an increase of income and upgrading standard level of living and result in improvement of poverty situation of the peoples. In addition, enhancement of fishery

					activities may materialize an increase in intake of animal protein for the poor, because low income peoples in Zanzibar mostly take animal protein 98% through fishes.
7) Misdistribution of benefit and damage	C-	C-	B-	B-	According to the results of stakeholder meeting held on June 13th and of 2013, peoples engaging in fishery activities and local residents agreed with the project plan, which will bring about beneficial impacts are expected on local economy and living condition of people. However, there is some possibility of occurrence of misdistribution of benefit and damage, if information disclosure regarding the project plan, and procedures and public participation are not properly conducted.
	C-		B-		Local residents and peoples of business activities (hotels, restaurants and vendors) have possibility of disturbance and nuisance such as traffic congestion by construction vehicles and noise of construction works.
	D			D	There are several fish landing sites other than Malindi Port, although in smaller scale, and they established their own distribution channels of fishes in the area. Thus, it is hardly expected that fish landing may concentrate to Malindi site, which results in misdistribution of benefit among fishery business activities.
8) Local conflict of interests	C-	C-	B-	B-	According to the results of stakeholder meeting held on June 13th and of 2013, peoples engaging in fishery activities and local residents agreed with the project plan, which will bring about beneficial impacts are expected on local economy and living condition of people. However, there is some possibility of occurrence of misdistribution of benefit and damage, if information disclosure regarding the project plan, and procedures and public participation are not properly conducted.
9) Cultural property and heritage	B-	B-	B-	B-	Project site is located in the part of the Zanzibar Stone Town Conservation Areas of UNESCO World Heritage Site. Thus, the project is required to obey relevant regulations for protecting World Heritage Site in all stage.
10) Fishing Rights, Water Rights and Rights of Common	D	D	D	D	Water right is owned by the Government, fishery right is owned by fishery people, and rights of common are not known in the area.
11) Public health and Sanitation	C-		B-		Wastewater from construction work will be settled and supernatant will be discharged to sewer line of the city. Toilets are installed and collect human waste and is pumped out by a vacuum truck and transported to final disposal site of the city periodically. Solid wastes will be properly segregated on the spot, stored in containers and transported to waste disposal site. In addition, Thus, expected impacts on water pollution will be minimized. However, if the above measures are not properly conducted and air pollutants and solid waste generation, deterioration of sanitary condition, which may affect public health.
				B+	At present following insanitary conditions are often observed at fish landing and marketing site These conditions will be greatly improved by rehabilitation.
					Landed fish are contaminated in containers with polluted sea water.
		B+			Fish are often treated directly on the dirty ground.
					Fish are washed with polluted sea water and fish guts are left on the spot until removed by tidal wave.
		C-		B-	If the planned measures are not properly implemented, deterioration of sanitary condition may occur.
12) Infectious diseases such as HIV/AIDS	C-		B-		In many countries infection of HIV/AIDS were often reported due to contact of migrating workers with HIV/AIDS affected people. There is a possibility of occurrence of similar case even in small scale.
		D		D	Presence of migrating construction workers is temporary. Thus, it is not expected during operation stage.
13) Working condition including occupational	B-		B-		Safety and health condition of the workers may be jeopardized due to construction work, if they are not controlled as planned.
		B+		B+	Rehabilitation of collapsed seawall and fish marketing facilities will result in more safety and healthy working condition.

safety					
14) Hazard/risk (disaster)	C-			C-	Although the project activities will not cause any hazard and risks, migration of workers from other areas may result in insecurity and anxiety for peoples.
		D		D	The project activities will not cause any hazard and risks.
15) Accidents	B-			B-	Occurrence of accidents is expected some due to construction work and traffic of construction vehicles.
		B+		B+	From interview more than 90 % of peoples dealing with fish landing and fish marketing activities have experiences of injuries with slipping and falling due to contact with concrete debris from collapsed seawall and inclined seawall. Rehabilitation of fish landing site will make sure of safe unloading work.
(2) Natural Environment					
16) Topography and Geology	D	D	D	D	Scope of the project is rehabilitation of existing facility in the existing port area. Thus, no large scale alteration of ground, which may give rise to a change in topography and geology, is expected.
17) Soil erosion	D	D	D	D	No large scale excavation, cutting and filling, which may give rise to soil erosion, is expected.
18) Groundwater	C-	C-	D	D	Water for construction works and operation of the facilities will be supplied by ZAWA.
19) Oceanography /Hydrologic condition	C-	C-	D	D	No change of sea water flow in coastal area is expected. In addition, around the site there is no river run-off and the pond is located about 200m apart from the site, any change in flow and level of sea water is not expected.
20) Coastal zone	C-	C-	D	D	Neither coastal erosion nor sedimentation of sand is expected. Around Malindi port, sites of mangrove forests and coral reefs are located more than 1 km away from the project site, inter-tidal flats of Funguni Creek spreads over. However, the Creek is already polluted due to run-off of untreated wastewater and port activities. Thus, fish landing and marketing activities pose no environmental harm to mangroves or fish spawning areas.
21) Protected areas (National Parks, Bird Sanctuaries etc.)	B-	B-	B-	B-	In Malindi Port area, port activities have been continuing since 1920s. In 2000 Stone Town Area including Malindi Port area was designated as Stone Town World Heritage Site by UNESCO. Thus, facilities and structures in the Stone Town Conservation Area are required to comply with laws and regulations addressed to the World Heritage Site. In outline design phase, the project plan including design of facilities has been submitted to STCDA for obtaining permit from STCDA. Regarding Changuu-Bawe Marine Conservation Area (CHABAMCA), in which Malindi area is included, investigation was conducted to protect habitats and to allow for the sustainable utilization of resources.
22) Flora, Fauna and Biodiversity	D		D		Mangroves are located more than 1 km away from the site separated by Funguni Creek. No record of animals of IUCN importance was reported. Only avifauna such as Indian Crows and Cattle Egrets were documented. Thus, impacts on flora, fauna and ecosystem are hardly expected.
		C-		B-	1) Wastewater from washing treated fish bodies (heading, cutting, slicing, removal of guts and scales, etc.) and washing floor will be discharged to municipal sewer line after passing through waste trap and septic tanks. Sewage is also discharged to municipal sewer line after treatment with septic tank. Thus, expected impacts on flora, fauna and ecosystem are negligible. 2) Marine area including Malindi Port is a matter of concerns with marine conservation in future as Changuu-Bawe Marine Conservation Area (CHABAMCA). Thus, continuous considerations and efforts are necessary to preserve and to make sustainable use of marine ecosystem in the area from now on.
23) Landscape	B-	B-	B-	B-	Project site is located in the Stone Town World Heritage Site. Thus, facilities and structures are required to comply with laws and regulations addressed to the World Heritage Site. The facility design including exterior appearance, color, construction materials, etc. should be submitted to STCDA for obtaining approval of Heritage Impact Assessment.
24) Micro	D	D	D	D	No large-scale topographical alteration, which may give rise to a

Climate					change in the micro-climate, is expected.
25) Global Warming	D		D		Generation of greenhouse gases (GHG) such as CO2 which may affect global warming are expected to be negligible.
		D		D	Generation of greenhouse gases (GHG) is expected to be negligible.
(3) Environmental Pollution					
26) Air pollution	C-		B-		Air pollutants such as dust (PM) and NOx will be generated somewhat from construction plants, vehicles and machines. However, they can be easily dispersed resulting in negligible effect by wind.
		D		D	Fish processing devices such as fumigation for smoked fish and heat treatment for fish paste will not be planned. Thus, air pollutants generation is hardly expected.
27) Water pollution (Coastal and marine water)	B-		B-		Wastewater from construction work will be settled and supernatant will be discharged to sewer line of the city. (2) Install a toilet, which collect human waste, and is pumped out by a vacuum truck and transported to final disposal site of the city periodically.
		C-		B-	Wastewater from washing treated fish bodies (heading, cutting, slicing, removal of guts and scales, etc.) and washing floor will be discharged to municipal sewer line after passing through waste trap and septic tanks. Sewage is also discharged to municipal sewer line after treatment with septic tank.
28) Soil contamination	C-			C-	There is little possibility of soil contamination due to spill over of toxic materials such as lubricant oils, asphalt emulsifiers, heavy metals etc.
		D		D	Toxic substances which may cause soil contamination are hardly expected.
29) Bottom sediment contamination	C-		B-		Wastewater or solid waste from construction work may contaminate the bottom sediment.
		B-		B-	Residue from the fish processing or toilets may contaminate the bottom sediment.
30) Waste	C-		B-		Generation of various types of wastes are expected due to construction works: (1) construction waste from demolition of collapsed seawall and removal of concrete debris, (2) construction waste from construction of new fish landing and fish marketing facilities, (3) general waste from worker's camp and construction office. According to the project plan, however, these wastes will be properly segregated on the spot, stored in containers and transported to waste disposal site. In addition, concrete debris will be reutilized as much as possible. Thus, environmental impact due to waste is expected to be some but not significant.
	C-			B-	(a) Waste from fish processing is segregated from non-biodegradable waste such as plastics from other vending services or offices, collected in waste bins with lids, stored and transported to final disposal site every day. Thus, expected impact on contamination is negligible.
31) Noise and Vibration	C-		B-		Noise and vibration are expected to be generated from construction machines and vehicles utilized in construction works including demolition of collapsed seawall and construction of new facilities.
		D		D	Potential noise source will arise from auction activities and loading and unloading of fish. However, they will be sheltered by two storied building of fish marketing facility.
32) Ground Subsidence	D		D		Pumping up of underground water is not planned. Thus, ground subsidence is not expected.
		D		D	No influence is expected.
33) Offensive odor	D		D		No influence is expected.
		C-		B-	Bad odor will be generated from fish wastes after processing. Fish wastes are stored in closed containers and/or plastic bags, and transported to final disposal site. Thus, impact of odor is expected little.

Note 1: I – Planning Stage, II – Construction Stage, III – Operation Stage

Note 2: Rating (Magnitude of impacts); In general, both positive impact (+) and negative impact (-) are expected due to the project activities. A (+/-) - Significant (or major impact) is expected, B (+/-) - Not significant but some impact (or moderate) is expected, C (+/-) - Extent of impact is unknown or not clear (Further examination is needed. It should be taken into consideration that impacts may become clear as study progresses, D - Negligible or No impact is expected.

As shown in the table above, the expected "negative impacts" on the environment do not include any impacts corresponding to expected "significant negative impacts" (rated A-), but all impacts are "not significant but some negative impacts are expected (rated B-)."

1-3-1-6 Mitigation Measures and Environmental Management Plan

Among them negative impacts, which mentioned in the previous section, are selected and mitigation measures, which may avoid, minimize, eliminate and/or reduce possible negative impacts, are examined in order that the project can achieve intended objectives with minimizing accompanied environmental impacts. In addition, Environmental Management Plan (EMP) was prepared by incorporating mitigation measures and monitoring as well as the roles of implementing, supervising and responsible organizations as shown below.

- Items to be subject to mitigation measures

The items having negative impacts with rating of (A-) and (B-) are subject to mitigation measures.

- Prepare and describe by stage

Mitigation measures and EMP are described for planning, construction and operation stages. However, items relevant to overall stages are described separately.

- Mitigation measures

Prepare and describe mitigation measures to avoid, minimize, eliminate and/or reduce possible negative impacts as well as environmental monitoring and further studies, if necessary.

- Institutional arrangement

Make clear roles and responsibilities of organizations in charge of implementing, supervising and auditing mitigation measures.

Table 1-14 : Mitigation Measures and Environmental Management Plan

Environment Item*	Rating	Reasons	Mitigation Measures including environmental monitoring	Implementation*	Responsibility/ Audit*
(II) Construction Stage **					
(1) **Social Environment**					
1) Involuntary Resettlement and migration of population	B-	As the existing fish landing and marketing activities continue during construction stage, the construction work may disturb fish landing and fish marketing activities as well as other business activities such as vendors.	1) (1) Relocate temporary space for continuing existing fish landing and fish marketing activities within the site. (2) Practice safety management for construction works and countermeasures not disturbing fish landing and fish marketing activities as well as other business activities such as vendors. Thus, it is expected to conduct continuously business activities 2)Information disclosure and public participation should be fully considered for all the stakeholders from early stage of planning in order to obtain a thorough understanding of the project including construction works and schedule as well as measures for environmental protection, and to get consensus of the people and communities. 2) To arrange the plan and manage temporary relocated space for fish landing and fish marketing activities without disturbance and inconvenience to due to construction work whenever activities are carried out.	CT	DFD,DOE, ZMC, ZPC
4) Social infrastructure and social services	B-	Traffic of construction vehicles may temporarily cause traffic congestion along the access road.	To avoid or minimize traffic disturbance and nuisance to local people and communities, following measures are necessary: (1) Prior to construction work, inform contents of the construction work and schedule, (2) Time shift of construction work, (3) Education of traffic safety and manner to construction workers and drivers, (4) Raise the traffic signal on approach road, (5) Setting up complaint section and officer, if necessary.	CT	DFD,DOE, ZMC, ZPC
7)Misdistribution of benefit and damage	B-	Local residents and peoples of business activities (hotels, restaurants and vendors) have possibility of disturbance and nuisance such as traffic congestion by construction vehicles and noise of construction works.	1) Information disclosure and public participation should be fully considered for all the local residents and people engaging in commercial activities in and around the site to obtain a thorough understanding of the construction works and schedule as well as measures for environmental protection. 2) To arrange the plan and manage temporary relocated space for fish landing and fish marketing activities without disturbance and inconvenience to due to construction work.	CT	DFD,DOE, ZMC, ZPC
11) Public health and Sanitation	B-	Wastewater from construction work will be settled and supernatant will be discharged to sewer line of the city. Install a toilet, which collect human	1) Condition of air pollution, wastewater and sewage treatment and waste management should be monitored. 2) If sanitary condition is likely to worsen, revise the measures for	CT	DFD,DOE, ZMC, ZPC

		waste, and is pumped out by a vacuum truck and transported to final disposal site of the city periodically. (3) Solid wastes will be properly segregated on the spot, stored in containers and transported to waste disposal site. In addition, Thus, expected impacts on water pollution will be minimized. However, if the above measures are not properly conducted and air pollutants and solid waste generation, deterioration of sanitary condition, which may affect public health, somewhat expected.	the environmental protection and improve environmental education to workers.		
12) Infectious diseases such as HIV/AIDS	B-	In many developing countries infection of HIV/AIDS were often reported due to contact of migrating workers with HIV/AIDS affected people. There is a possibility of occurrence of similar case even in small scale.	1) Education of and campaign of prevention and cure of HIV/AIDS to residents and construction workers. 2) To follow the instructions by the authority, if necessary.	CT	DFD,DOE, ZMC, ZPC
13) Working condition including occupational safety	B-	Safety and health condition of the workers may be jeopardized due to construction work, if they are not controlled as planned.	1) Any workers who enter into construction sites have to bear safety shoes, hats and earplugs. 2) Site manager of the contractor must conduct morning assembly by collecting all the laborers and give instructions to them on safety control of construction site.	CT	DFD,DOE, ZMC, ZPC
14) Hazard/risk (disaster, drainage patterns)	B-	Although the project activities will not cause any hazard and risks, migration of workers from other areas may result in insecurity and anxiety for peoples.	To consult with the police Jami together with local government and residents periodically for precaution measures against security and disaster.	CT	DFD,DOE, ZMC, ZPC
15) Accidents	B-	Occurrence of accidents is expected some due to demolition and construction works and traffic of construction vehicles.	Suitable planning and management over construction work to prevent and minimize the number and consequences of accidents. Enlighten workers and local residents to prevent accidents by training and adequate notice.	CT	DFD,DOE, ZMC, ZPC
(3) Environmental Pollution					
26) Air pollution	B-	Air pollutants such as dust (PM) and NOx will be generated somewhat from construction plants, vehicles and machines. However, they can be easily dispersed.	1) Use construction machines and vehicles equipped with good exhaust emission system and filled with good quality fuel and oil. 2) Enlightenment and education of operators for prevention or minimize air pollutants generation. 3) To set up a window service for complaints 4) Monitoring stagnation of air pollutants.	CT	DFD,DOE, ZMC, ZPC
27) Water pollution (Coastal and marine water)	B-	(1) Wastewater from construction work will be settled and supernatant will be discharged to sewer line of the city. (2) Install a toilet, which collect human waste, and is pumped out by a vacuum truck and transported to final disposal site of the city periodically. Thus, expected impacts on water pollution will be	To monitor the water treatment situation and feedback the result to the plan of environmental mitigation and education to workers, in case sewage be a matter of critical importance.	CT	DFD,DOE, ZMC, ZPC

		minimized.			
28) Soil contamination	B-	There is little possibility of soil contamination due to spill over of toxic materials such as lubricant oils, asphalt emulsifiers, heavy metals etc.	To install storage tank for preventing spill and leakage of lubricating oil and grease, etc., Training of workers for proper handling of toxic materials.	CT	DFD,DOE, ZMC, ZPC
29) Bottom sediment contamination	B-	Wastewater or solid waste from construction work may contaminate the bottom sediment.	Measures against the water pollution shall be applied.		
30) Waste	B-	Generation of various types of wastes are expected due to construction works: (1) construction waste from demolition of collapsed seawall and removal of concrete debris, (2) construction waste from construction of new fish landing and fish marketing facilities, (3) general waste from construction office. These wastes will be properly segregated on the spot, stored in containers and transported to waste disposal site. In addition, concrete debris will be reutilized Thus, environmental impact due to waste is expected to be some but not significant.	1) Consider ways to minimize waste generation in the construction work plan. 2) Enlightenment and education of construction workers for waste management based on 3R principle (reduce, reuse, recycle). 3) Daily monitoring of construction waste for proper segregation, collection, transportation and final disposal by physical observation and/or record of work.	CT	DFD,DOE, ZMC, ZPC
31) Noise and Vibration	B-	Noise and vibration are expected to be generated from construction machines and vehicles utilized in construction works including demolition of collapsed seawall and construction of new facilities. They are likely to cause some impacts nearby residential areas.	To use equipment with low-noise and vibration. To install sound proof walls /acoustic enclosures.	CT	DFD,DOE, ZMC, ZPC
(III) Operation Stage					
(1) **Social Environment**					
11) Public health and Sanitation	B-	If the planned sewage measures are not properly implemented, deterioration of sanitary condition may occur.	Regular inspection whether proper treatment of wastewater from fish processing and sewage in the site is carried out or not. If it is likely to deteriorate sanitary condition, revise and /or improve the plan of environmental protection.	DFD, MFMMO	DOE, ZMC, ZPC, MOH
(3) Environmental Pollution					
27) Water pollution	B-	Wastewater from fish processing (heading, cutting, slicing, removal of guts and scales, etc.) and washing floor will be discharged to municipal sewer line after passing through waste trap and septic tanks. Sewage is also discharged to municipal sewer line after treatment with septic tank. If the planned sewage measures are not properly implemented, deterioration of sanitary condition may occur.	Marine water quality monitoring before and after operation periodically.	DFD, MFMMO	DOE, ZMC, ZPC
29) sediment pollution		Residue from the fish processing or toilets may	Regular monitoring of bottom sediment.		

		contaminate the bottom sediment.			
30) Waste	B-	(a) Waste from fish processing is segregated from non-biodegradable waste such as plastics from other vending services or offices, collected in waste bins with lids, stored and transported to final disposal site every day. Thus, expected impact on contamination is negligible.	Regular monitoring of waste for proper segregation, collection, transportation and final disposal by physical observation and/or record of work.	DFD, MFM MO	DOE, ZMC, ZPC
33) Offensive odor	B-	Bad odor will be generated from fish wastes after processing. Fish wastes are stored in closed containers and/or plastic bags, and transported to final disposal site. Thus, impact of odor is expected little.	Regular check. If there is complaints from residents, revise and /or improve the plan of environmental protection.	DFD, MFM MO	DOE, ZMC, ZPC
(IV) Overall Stages					
(1) Social Environment					
4) Social institutions such as social capital and local decision-making institutions, a split of communities	B-	If information disclosure regarding the project and procedures and public participation are not properly conducted, anxieties and complaints may spread over the people and a split of communities, resulting in difficulties for obtaining thorough understanding of the project and consensus with them.	1) Information disclosure and public participation should be fully considered for all the stakeholders including fishermen, fish mongers and local residents from planning stage to operation stage for obtaining thorough understanding and consensus of the people and communities. 2) Set up a section in charge of complaints from people.	CT, DFD, MFM MO	DFD,DOE, ZMC, ZPC
7) Equality of benefits and losses and equality in the development process	B-	there is some possibility of occurring misdistribution of benefit and damage, if information disclosure regarding the project plan, and procedures and public participation are not properly conducted	1) Consultation with stakeholders including fishermen, fishmongers, community organizations etc., should be planned from an early stage to obtain understanding and consent among the stakeholders in order to share equally benefits and damage.2) Consider preference of employment to local residents and the poor for construction works. 3) Set up a section in charge of complaints from people.	CT, DFD, MFM MO	DFD,DOE, ZMC, ZPC
8) Local conflicts of interest	B-	there is some possibility of occurring local conflict of interests, if information disclosure regarding the project plan, and procedures and public participation are not properly conducted	1) Consultation with stakeholders including fishermen, fishmongers, community organizations etc., should be planned from an early stage to obtain understanding and consent among the stakeholders in order to avoid local conflict of interests.2) Consider preference of employment to local residents and the poor for construction works. 3) Set up a section in charge of complaints from people.	CT, DFD, MFM MO	DFD,DOE, ZMC, ZPC
9) Cultural property and heritage site	B-	The project is required to comply with relevant regulations for protecting World Heritage Site in all stage.	1) In September 2013 the design of the facilities containing exterior appearance, color, construction materials, etc. together with IEE reports has been submitted to STCDA and approved. 2) To instruct DFD and the relevant organizations to construction and development to comply with the regulations.	CT, DFD, MFM MO	STCDA, DOE,ZMC
(2) **Natural Environment**					

21) Protected areas (National Parks, Bird Sanctuaries etc.)	B-	The project is required to comply with relevant regulations for protecting World Heritage Site in all stage. Regarding Changuu-Bawe Marine Conservation Area (CHABAMCA), in which Malindi Port area is included, investigation was conducted to protect habitats and to allow for the sustainable utilization of resources	1) In September 2013 the design of the facilities containing exterior appearance, color, construction materials, etc. together with IEE reports has been submitted to STCDA and approved. 2) To instruct DFD and the relevant organizations to construction and development to comply with the regulations. 3) Watch new environmental management plan by the Government for regulation of Changuu-Bawe Marine Conservation Area (CHABAMCA), if any.	CT, DFD, MFMMO	STCDA, DOE,ZMC
21) Flora, Fauna and Ecosystem	B-	1) Wastewater from washing treated fish bodies (heading, cutting, slicing, removal of guts and scales, etc.) and washing floor will be discharged to municipal sewer line after passing through waste trap and septic tanks. Sewage is also discharged to municipal sewer line after treatment with septic tank. Thus, expected impacts on flora, fauna and ecosystem are negligible. 2) Marine area including Malindi Port is a matter of concerns with marine conservation in future as Changuu-Bawe Marine Conservation Area (CHABAMCA). Thus, continuous considerations and efforts are necessary to preserve and to make sustainable use of marine ecosystem in the area from now on.	1) Monitoring change in marine environment including polluted Funguni Creek and mangrove forest 1 km away from the project site. 2) Watch new environmental management plan by the Government for regulation of Changuu-Bawe Marine Conservation Area (CHABAMCA), if any.	DFD, MFMMO	STCDA, DOE,ZMC
23) Landscape	B-	The project is required to comply with relevant regulations for protecting World Heritage Site in all stage.	1) In September 2013 the design of the facilities containing exterior appearance, color, construction materials, etc. together with IEE reports has been submitted to STCDA and approved. 2) To instruct DFD and the relevant organizations to construction and development to comply with the regulations.	CT, DFD, MFMMO	STCDA, DOE,ZMC

Note 1: Rating – Same as Table 1-13
Note 2 : CS – Consultant, CT – Contractor, DFD - Department of Fishery Development, DOE - Department of Environment, MFMMO - Malindi Fish Market Management Organization, ZM - Zanzibar Municipal Council, ZPC- Zanzibar Port Corporation, MoH - Ministry of Health

1-3-1-7 Environmental Monitoring Plan

(1) Role of environmental monitoring

Outline of environmental monitoring plan is shown in Table 1-15 based on the above mentioned mitigation measures against possible and negative impacts and EMP (Table 1-14). Environmental monitoring plan describes basic contents regarding monitoring occurrence of possible negative impacts with related items, the extent, situation, etc. Information and data obtained in the monitoring should be recorded one by one and fed back to implementing organization for revision of the project plan and measures, and to responsible and auditing organization for supervising the project implementation with a comprehensive view, depending on items, timing and place, etc. one by one or regularly.

The table below shows the contents of the environmental monitoring plan.

Table 1-15 : Environmental Monitoring Plan

Item	Indicator	Method/ Relevant Standards	Location	Time/ Frequency	Implementing organization	Supervising & Auditing organization
(1) Planning Stage						
(1) **Social Environment**						
No item is applicable.						
(2) **Natural Environment**						
No item is applicable.						
(3) **Environmental Pollution**						
1) Water quality (sea water)	pH 、 SS 、 COD, T-N、 T-P, coliform group	Water sampling and analysis, check by an international standards	3 stations (near shoreline, within and outer side of breakwater)	Once before construction stage	DFD	DOE, ZMC
2) Bottom sediment	pH, ignition loss, T-N. T-P, *E. Coli*	Sediment sampling and analysis, check by an international standards	3 stations (near shoreline, within and outer side of breakwater)	Once before construction stage	DFD	DOE, ZMC
(II) **Construction Stage**						
(1) **Social Environment**						
1) Nuisance/ disturbance of living conditions of local residents and business activities of surrounding area	Physical inspection and Complaint	Interview survey on residents and people	Around the Project site	Daily	CT	DFD, DOE, ZM
2) Disturbance and inconvenience of fish landing and marketing activities at temporary relocating site	Physical inspection and Complaint	Interview survey on fishermen and fishmongers	Project site	Daily	CT	DFD, DOE, ZMC
3) Public health	Complaints and cases of illness	Symptom of workers and inhabitants within and around construction site of Malindi fishery port	In and around the project site	As required	CT	DOE, ZM, MoH
4) Infection of	Medical	Medical	In and around	Before and	CT	DFD,

HIV/AIDS	examination record of workers, who may be infected with HIV/AIDS	examination of construction workers and peoples making contact with HIV/AIDS sufferers, if any	the project site	after construction stage		DOE, ZM, MoH
5) Working condition (occupational safety)	Cases of workers	Symptom of workers in the construction site	Project site	Daily	CT	DOE, ZMC, MoH
6) Accidents	Cases of accidents	Report and record of accidents	Project site	Daily	CT	ZMC, MoH
(2) Natural Environment						
No item is applicable.						
(3) Environmental Pollution						
1) Wastewater from construction work and worker's camp	Wastewater quality (pH、SS, COD)	Water sampling and analysis	Outlet point of sewage	Every quarter	CT	DFD, ZPC, ZMC
2) Solid waste treatment and disposal	Collection, treatment and disposal	Record of collection, transportation and disposal	In and around the project site	Every quarter	CT	DFD, DOE, ZMC
3) Noise	Public nuisance due to noise	Collection of complaints	In and around the project site	Every quarter	CT	DFD, DOE, ZMC
(III) **Operation Stage**						
(1) **Social Environment**						
Pubic health of residents and peoples relating to fish landing and fish marketing activities	Complaints and cases of illness	Symptom of workers and inhabitants within and around construction site of Malindi fishery port	In and around the project site	As required	DFD, MO	DOE, ZMC, MoH
(2) **Natural Environment**						
No item is applicable.						
(3) **Environmental Pollution**						
1) Water quality (sea water)	pH、SS, COD, T-N, T-P, Coliforms	Sampling and analysis	3 stations (near shoreline, within and outer side of breakwater)	Every trimester	DFD, MO	DOE, ZPC, ZM
2) Water quality (wastewater)	pH, SS, COD, BOD	Physical observation and BOD analysis	Effluent after filtering with rubbish trap	Every trimester	DFD, MO	DOE, ZPC, ZM
3) Water quality (sewage)	Proper operation and maintenance of public toilet equipped with septic tank	Physical observation and BOD analysis	Effluent from septic tank	Every trimester	DFD, MO	DOE, ZPC, ZM
4) Solid waste	Collection, treatment and disposal	Record of transportation and disposal	In and around the project site	As required	DFD, MO	DOE, ZPC, ZM
5) Noise	Public nuisance due to noise	Collection of complaints	In and around the project site	As required	DFD, MO	DOE, ZPC, ZM
6) Mal odor	Bad smell due to fishes and their residues	Collection of complaints	In and around the project site	As required	DFD, MO	DOE, ZPC, ZM

(IV) **Overall Stages**						
(1) S**ocial Environment**						
1) Acceptability of the project	Stakeholders, especially people engaging in fishery and citizens	1) Collection of complaints by people, 2) Interview survey, if necessary	Around the project site	At least once a year	DFD, MO	DOE, ZMC
2) Cultural property and heritage site	Requirement of World Heritage Site	Consultation with STCDA	In and around the project site	At least once a year	DFD, MO	STCDA, DOE, ZPC, ZM
(2) Natural Environment						
1) Landscape and seascape consistency with Stone Town World Heritage Site	Views from the Town area and sea	Actual survey on scenery due to building/structures for fish marketing facilities	In and around the project site	Before & after construction stage	DFD, MO	STCDA, DOE, ZPC, ZMC
(3) **Environmental Pollution**						
No item is applicable.						

Note : CS – Consultant, CT – Contractor, DFD - Department of Fishery Development, DOE - Department of Environment, MFMMO - Malindi Fish Market Management Organization, ZM - Zanzibar Municipal Council, ZPC- Zanzibar Port Corporation, MoH - Ministry of Health

Cost for the monitoring is estimated as follows: (1) Per-Construction Stage: $1,374, (2) Construction Stage: $3,072, (3) Operation Stage: $14,400/year

1-3-1-8 Results of Stakeholder Consultation

Stakeholder consultation meetings were held on 21 February and 13th June, 2013 by inviting representatives from fishing communities, fish wholesalers/retailers, NGOs and relevant government authorities. In the meeting, participants were informed of the proposed development plan of the Malindi landing site, which could involve temporary relocation of landing and wholesale/retail areas during the construction work.

Participants had given their general consent for the proposed plan and there was no objection voiced during the meeting.

1-3-2 Land Acquisition and Resettlement

1-3-2-1 Necessity of Land Acquisition and Resettlement (Examination of Alternatives)

As described above, the land for the planned site is owned by the government and managed by ZPC, having been transferred from a cooking oil warehouse operator to MLF. Therefore, it can be used by DFD of MLF as land for a project. Note that no land acquisition or resettlement is needed because there are no inhabitants or houses, etc. on this land.

Under the plan, the construction area at the site is divided to secure areas for fish landing and trading/selling as a means of ensuring safety and preventing interference with the fishing and business activities of related operators. Therefore, it is expected that business activities can be continued without any change even during construction.

1-3-2-2 Laws and regulations relevant to involuntary resettlement

In Zanzibar, all land is owned by the government. The government has the final authority and responsibility for management, use planning, and habitation of land. The government

organization with jurisdiction over the ownership, usage, acquisition, transfer, compensation, and other matters concerning land is the Ministry of Water, Construction, Energy and Lands.

Major laws relevant to land matters are shown in the table below.

Table 1-16：Laws and Regulations relating to Land Acquisition and Resettlement in Zanzibar

	Regulations	Year
1	Land Acquisition Decree, Cap. 95	1909
2	Town and Country Planning Decree, Cap. 85	1955
3	Registered Land Act, No. 10	1990
4	Land Survey Act, No. 9	1989
5	Land Adjudication Act, No.8	1989
6	Land Tenure Act, No.12	1992 (2003Amended)
7	Land Allocation Regulations	2008
8	Land Transfer Act, No.8	1994 (2007Amended)
9	The Land Tribunal Act, No.7	1994
10	The Land Tribunal Act, No.1, Amended	2008
11	Zanzibar Environmental Policy of 1992	1992
12	Zanzibar Environmental Management for Sustainable Development Act	1996

1-3-3 Others

1-3-3-1 Assessment of Impacts on World Heritage Site

For development projects in a world heritage site, ICOMOS (International Council on Monuments and Sites), an international non-government organization for protection of world cultural heritage, requires that a "Heritage Impact Assessment" is conducted to forecast and evaluate in advance the impacts caused by the development plan on the "Outstanding Universal Value (OUV)" of the world heritage site. According to the ICOMOS guidelines, the operator must contract a specialist registered with the World Heritage Center of UNESCO to conduct a Heritage Impact Assessment and create a report, which is to be submitted to the World Heritage Center for judgment.

For this project, it was necessary to conduct a Heritage Impact Assessment and seek judgment by the World Heritage Center of UNESCO. However, this project does not cause any change to the facilities, land, or structures in the heritage site. Therefore, the IEE report mentioned above and a plan that specified the design, materials, and other factors of the target facilities were submitted to STCDA in September 2013, resulting in the granting of a building permit based only on judgment by the said department, without judgment by the World Heritage Center.

1-3-3-2 Tree Cutting and Transplanting in Construction Area at Project Site

For conservation of the landscape in Stone Town, any tree cutting and transplanting must be notified to STCDA. Only one five-meter tree in the south-western corner of the site needs to be conserved. However, it can be conserved without any problem according to the facility and construction plans, and so there are no trees that need to be cut or transplanted.

1-3-4 Confirmation of JICA Environmental Checklist

The results of confirmation of environmental and social considerations by JICA Environmental Checklist are shown in the table below.

Table 1-17：Confirmation of JICA Environmental Checklist (Fishery Project)

Category	Environmental Item	Main Check Items	Yes/ No	Reasons
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process?	Y	1) Rapid Environmental Analysis was conducted on February 2011 and the report (Rapid Environmental Analysis for the Improvement of the Malindi Fish Landing and Marketing Facilities in Zanzibar, 2011.2) was prepared by Department of Environment Zanzibar. (certificate updated on 4 Sept. 2013)
		(b) Have EIA reports been approved by authorities of the host country's government?	Y	1) Certification document by Department of Environment issued on 2 March, 2011 is even now valid with regard to the project plan. Document was obtained from DOE. It was informed that the Environmental and Social Impact Assessment Certificate has been obtained for the Project after conducting a rapid environmental impact assessment by Department of Environment in March 2011. 2) However, in the Minutes of Discussion between Zanzibar Government and JICA Preparatory Survey Team on 20 June 2013, it was recognized that this certificate needs to be renewed so as to compliance with EIA guidelines of both sides. Certificate was updated on 4 Sept. 2013 based on the draft outline design presented by the Japanese consultant.
		(c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?	Y	Environment Management Plan (EMP) and Monitoring Plan need to be formulated for the Project.
		(d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	Y	Following permit/approval are required: a): (i) Permission of land use (Lot B) - Official letter from the Zanzibar government dated on 6th June, 2012 informing JICA of the acceptance of exchange of lot A and B. Zanzibar side informed that another development project previously planned at the Project site has been declined by STCDA due to inadequate compliance to the heritage conservation requirements. Department of Land issues after approval by STCDA. (Land title given on 2 Aug. 2013) (ii) Development permission (building permission) of project within Stone Town World Heritage Site - conceptual design of the project facilities together with IEE report (JICA &DOE) were submitted to STCDA for reviewing. STCDA approved the design on 15 Sep. 2013. (iii) Construction permit - The Zanzibar side obtains the construction permission prior to the implementation of the Project.

	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders?	Y	A stakeholder consultation meeting was held on 13th June, 2013 at the Hotel Bwawani by inviting representatives from fishing communities, fish wholesalers/retailers, NGOs and relevant government authorities. In the meeting, participants were informed of the proposed development plan of the Malindi landing site, which could involve temporary relocation of landing and wholesale/retail areas during the construction work. Participants had given their general consent for the proposed plan and there was no objection voiced during the meeting.
		(b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	Y	Comments from stakeholders for securing safer and sanitary environment of fish landing and fish marketing facilities will be reflected to the design.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	Y	No action and the implementation of the project are examined. Alternative comparison of temporary fish landing sites during construction stage are examined for Malindi, Kizingo and Maruhubi areas.
2 Pollution Control	(1) Air Quality	(a) Do air pollutants, such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust emitted from ships, vehicles and project equipment comply with the country's emission standards? Are any mitigating measures taken?	Y	(a) 1) Air quality standards are not established in Zanzibar. 2) Air pollutants such as dust (PM) and NOx will be generated somewhat from construction plants, vehicles and machines. However, they can be easily dispersed resulting in negligible effect, because the site of construction works is surrounded by open space and windy coastal area. 3) Following mitigation measures will be taken: (i) Use construction machines and vehicles equipped with good exhaust emission system and filled with good quality fuel and oil. (ii) Enlightenment and education of construction workers for prevention or minimize air pollutants generation. (iii) service window for complaints.
	(2) Water Quality	(a) Are considerations given to water pollution of the surrounding water areas by effluents, such as fish pond effluents? Are adequate standards for the use of feeds and agents/antibiotics established? Is a framework established to increase awareness of these standards?	Y	(a) (b): 1) At present neither effluent nor ambient water quality standards are not established in Zanzibar. 2) According to the project plan, following measures are prepared: (1) Wastewater from washing fish and floor , as well as sewage from toilets will be discharged to municipal sewer line after passing through septic treatment. Thus, expected impacts on water pollution will be minimized. No national standard exists.
		(b) Do effluents from various sources, such as fish ponds, processing facilities, and fishing boats, and water quality of the surrounding water bodies comply with the country's effluent standards and the country's ambient water quality standards?	Y	
		(c) Does the project prepare any measures to prevent leakages of oils and toxicants?	Y	1) There is little possibility of soil contamination due to spill over of toxic materials such as lubricant oils, asphalt emulsifiers, heavy metals etc. Following measures should be implemented: To keep clean storage sites of construction equipment, To install storage tank for preventing spill and leakage of lubricating oil and grease, etc., 2) leakages of oils and toxicants are not expected.
		(d) Does the project cause any alterations in coastal lines and disappearance/appearance of surface water to change water temperature or quality by decrease of water exchange or changes in flow regimes?	Y	(d) (e) 1) Scope of the project is rehabilitation of existing facility in the same port area. Thus, neither coastal erosion nor sedimentation of sand is expected. 2) Around the Malindi port sites of mangrove forests and coral reefs are located more than 1 km away and northern side of the project

		(e) Does the project prepare any measures to prevent polluting surface, sea or underground water by the penetration from reclaimed lands?	Y	site, inter-tidal flats of Funguni Creek spreads over. However, the Creek is already polluted due to run-off of untreated wastewater, and port activities and fishing boats. In addition, sites of mangrove forests and coral reefs are located more than 1 km away. Thus, fish landing and fish marketing activities poses no environmental harm to those mangroves or as fish spawning areas.
	(3) Bottom Sediment	(a) Does the project prepare any measures to prevent polluting bottom sediment by ships or facilities?	N	(a) 1) Same measures shall be taken as the measures for the water pollution.
	(4) Wastes	(a) Are wastes generated from the ships and other project facilities properly treated and disposed of in accordance with the country's regulations (especially fish processing facilities)?	Y	(a) 1) Generation of various types of wastes are expected due to operation of fish landing and fish marketing facilities: (1) Fish waste from treatment of fish bodies (cutting, slicing and removal of gills and internal organs, etc.) (2) Food waste and other general wastes including plastic bags from office and vendors. 2) According to the project plan, however, fish and food waste are segregated from non-biodegradable waste such as plastics, collected in closed plastic bags, stored in containers and transported to final disposal site every day. Thus, impact due to waste will be minimized.
		(b) Is offshore dumping of dredged soil properly disposed in accordance with the country's regulations?	Y	(b) Dredging of soil is not planned in the project.
		(c) Does the project prepare any measures to avoid dumping or discharge toxicants?	Y	(c) 1) Generation of various types of wastes are expected due to operation of fish landing and fish marketing facilities: (1) Fish waste from treatment of fish bodies (cutting, slicing and removal of gills and internal organs, etc.) (2) Food waste and other general wastes including plastic bags from office and vendors. 2) According to the project plan, however, fish and food waste are segregated from non-biodegradable waste such as plastics, collected in closed plastic bags, stored in containers and transported to final disposal site every day. Thus, dumping or discharged toxicants is not expected.
	(5) Sediment	(a) Are adequate measures taken to prevent contamination of sediments by discharges or dumping of hazardous materials from the ships and related facilities?	Y	1) According to the project plan, following measures are prepared for construction stage. (1) wastewater from construction work will be settled and supernatant will be discharged to sewer line of the city. (2) Install a toilet, which collect human waste, and is pumped out by a vacuum truck and transported to final disposal site of the city periodically. (3) Construction waste will be properly segregated, stored and transported to final disposal site. 2) According to the project plan, following measures are prepared for operation stage.: (1) wastewater from washing treated fish bodies (cutting and slicing, removal of gills and internal organs, etc.) and soiled concrete floor will be discharged to municipal sewer line after passing through waste trap equipped under the floor. (2) Sewage is also discharged to municipal sewer line after treatment with septic tank. (3) Fish and food waste are segregated from non-biodegradable waste such as

				plastics, collected in closed plastic bags, stored in containers and transported to final disposal site every day. Thus, expected impact on bottom sediment contamination is negligible.
	(6) Noise and Vibration	(a) Do noise and vibrations comply with the country's standards (especially fish processing facilities)?	Y	(a) Fish processing facilities are not included in the project plan. In addition, potential noise source will arise from auction activities and loading and unloading of fish. However, they will be sheltered by two storied building of fish marketing facility.
	(7) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	Y	City water will be supplied by ZAWA and pumping up of underground water is not planned. Thus, ground subsidence is not expected.
	(8) Odor	(a) Are there any odor sources? Are adequate odor control measures taken (especially fish processing facilities)?	Y	Bad odor will be generated from fish wastes after treatment with cutting, slicing, removal of gills and internal organs, etc. According to the project plan, fish wastes are stored in closed containers and/or plastic bags, and transported to final disposal site. In addition, fish processing facilities are not planned. Thus, impact of odor is expected little.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	Y	1) In Malindi Port area, where the project site is located, port activities have been continuing since 1920s. In 2000 Stone Town Area including Malindi Port area was designated as Stone Town World Heritage Site by UNESCO. Thus, facilities and structures in the Stone Town Conservation Area are required to comply with laws and regulations addressed to the World Heritage Site 2) In outline design phase the project plan including design of facilities will be submitted to STCDA for obtaining building permit from STCDA. 3) Regarding Changuu-Bawe Marine Conservation Area (CHABAMCA), in which Malindi Port area is included, investigation was conducted to protect habitats and to allow for the sustainable utilization of resources by Global Environment Facility and World Bank.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?	Y	(a) The project site does not encompass primeval forests, tropical rain forests, and ecologically valuable habitats.
		(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?	Y	(b) The project site does not encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions.
		(c) Is there a possibility that changes in localized micro-meteorological conditions, such as solar radiation, temperature, and humidity due to a large-scale timber harvesting will affect the surrounding vegetation?	Y	No large-scale topographical alteration, which may give rise to a change in local micro-meteorological conditions, is expected.

		(d) Is there a possibility that the project will adversely affect aquatic organisms? If significant impacts are anticipated, are adequate protection measures taken to reduce the impacts on aquatic organisms?	Y	Proposed activity aims at improving the existing fish landing and fish marketing facility, and is similar to the current on-going fish landing and fish marketing activity. Therefore, adverse impacts on marine ecosystem, aquatic organisms and fish are not expected.
		(e) Is there a possibility that the project will adversely affect vegetation and wildlife? If significant impacts are anticipated, are adequate measures taken to reduce the impacts on vegetation and wildlife?	Y	(e) 1) Activities due to rehabilitation of fish landing and marketing facilities may not cause adverse impacts on vegetation and wildlife. 2) According to STCDA it is necessary to obtain permission from STCDA, if cutting or replanting trees within Stone Town Heritage Site are planned. Fortunately, however, there is only one mango tree near the gate of the site and no plan of cutting it.
		(f) Is there a possibility that aquatic organisms and fish will be overexploited? Are fishery practices that reduce impacts on ecosystems employed? Is there a possibility that lost or discarded fishing nets, traps and other fishing gear will adversely affect ecosystems?	Y	Proposed activity aims at improving the existing fish landing and fish marketing facility, and is similar to the current on-going fish landing and fish marketing activity. Therefore, adverse impacts on marine ecosystem, aquatic organisms and fish are not expected.
		(g) Is there a possibility that the feeding associated with aquaculture activities will cause eutrophication of water bodies and result in red tide blooms? Are adequate measures for eutrophication considered?	Y	(g) Aquaculture activities are not included in the project.
		(h) Is there a possibility that introduction of exotic species (non-native invasive species) and migration of disease-carrying pests will disturb ecosystems? Are adequate pest control measures considered?	Y	(h) The project activities may not cause neither introduction of exotic species or migration of disease-carrying pests.
	(3) Hydrology	(a) Is there a possibility that hydrologic changes due to installation of facilities, such as fish ponds in inland and coastal areas will adversely affect surface water and groundwater flows?	Y	Proposed activity is similar to the current on-going fish landing and fish marketing activity and activities such as dredging and reclamation, which may cause adverse impacts on hydrologic changes, are not planned. In addition, installation of facilities such as fish ponds is not included in the plan.
	(4) Topography and Geology	(a) Is there a possibility that development in coastal zones will cause a large-scale of alteration of topographic features and geologic structures, subsidence and elimination of natural beaches?	Y	Scope of the project is rehabilitation of existing facility in the same port area. Neither dredging of sea bottom nor reclamation of land is planned. Thus, no large scale alteration of ground, which may give rise to a change in topography and geology, is expected.
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?	Y	1) Land for project site will be transferred to ownership under DFD from Zanzibar Port Corporation. 2) Project site is located within existing fish landing and marketing areas where there are no inhabitants and houses. Thus, occurrence of land acquisition and resettlement is not expected.
		(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?	Y	A stakeholder consultation meeting was held on 13th June, 2013 at the Hotel Bwawani by inviting representatives from fishing communities, fish wholesalers/retailers, NGOs and relevant government authorities. In the meeting, participants were informed of the proposed development plan of the Malindi landing site, which could involve temporary relocation of landing and wholesale/retail areas during the

				construction work. Participants had given their general consent for the proposed plan and there was no objection voiced during the meeting.
		(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?	Y	(c) to (j): Occurrence of land acquisition and resettlement is not expected. Thus (c) to (j) are not applicable.
		(d) Are the compensations going to be paid prior to the resettlement?	Y	
		(e) Are the compensation policies prepared in document?	Y	
		(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?	Y	
		(g) Are agreements with the affected people obtained prior to resettlement?	Y	
		(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?	Y	
		(i) Are any plans developed to monitor the impacts of resettlement?	Y	
		(j) Is the grievance redress mechanism established?	Y	
	(2) Living and Livelihood	(a)Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? Is particular attention paid to the inhabitants whose livelihoods are based on primary industries, such as farming, raising livestock, or hunting and gathering in the forests?	Y	(a) Improvement of fish landing and marketing facilities may upgrade livelihood and income of people engaged in fishing activities such as artisan fishermen and fishmongers, and at the same time improve living condition of people by taking more easily fish food, which contains plenty of food protein and minerals.
		(b)Are proper allotments for rights to water area use (e.g. fishing rights) made?	Y	(b) Water for construction works and operation of the facilities will be supplied by ZAWA.
		(c)Is there a possibility that water-borne or water-related diseases (e.g., schistosomiasis, malaria, filariasis) will be introduced? Is adequate consideration given to public health education, if necessary?	Y	(c) The project activities may not cause water-borne or water-related diseases.
		(d) Is there a possibility that port and harbor facilities will adversely affect the existing water traffic and road traffic in the surrounding areas?	Y	(d) Port and harbor facilities are not included in the project.
		(e) Is there a possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the construction work of the project? Are considerations given to public health, if necessary?	Y	(e) 1) In many developing countries infection of HIV/AIDS were often reported due to contact of migrating workers with HIV/AIDS affected people. There is a possibility of occurrence of similar case even in small scale. 2) Following measures will be taken: (i) Education of and campaign of prevention and cure of HIV/AIDS to residents and construction workers. (ii) Monitoring of cases of HIV/AIDS before, during and after the construction stage, if necessary

	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	No	(a) 1) Project site is located in the part of the Zanzibar Stone Town Conservation Areas, which was designated UNESCO World Heritage Site for its architecture, reflecting the diverse influences underlying the Swahili culture, with a unique mixture of Moorish, Arab, Persian, Indian and European elements in 2000. Thus, the project is required to obey relevant regulations for protecting World Heritage Site in all stage. 2) Procedures of obtaining approval of Heritage Impact Assessment from UNESCO World Heritage Center are as follows: (i) In September of 2013 the design of fish landing and fish marketing facilities containing exterior appearance, color, construction materials, etc. together with IEE reports will be submitted to STCDA for reviewing. (ii) After confirmation the consistency of the documents with requirement of Heritage Impact Assessment, STCDA will send the documents to UNESCO World Heritage Center. (iii) The Center will comment, if any.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	No	(a) 1) Project site is located in the Stone Town World Heritage Site. Thus, facilities and structures in the Stone Town Conservation Area are required to comply with laws and regulations addressed to the World Heritage Site. 2) There is a possibility of deterioration aesthetic value of landscape by spatial occupancy of fish landing and fish marketing facilities depending on the project plan. Thus, the facility design including exterior appearance, color, construction materials, etc. should be submitted to UNESCO World Heritage Center for obtaining approval of Heritage Impact Assessment through STCDA.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?	No	(a)- (b): There are no indigenous of ethnic group in the project area.
		(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	No	
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?	No	(a) Mitigation measures to abide Law on labor and Law on Occupational Health and safety will be taken.
		(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?	No	(b) (i) Any worker and personnel who enter into construction sites have to bear safety shoes and hats for construction works. (ii) Site manager of the contractor must conduct morning assembly every day by collecting all the laborers and give instructions to them on safety control of construction site and thoroughly conduct safety management of the site. (iii) In the construction site where heavy machines for construction are operated, intrusiveness except concerned parties should be banned. (iv) Consider safety handling and storage in airtight containers of hazardous and dangerous materials.

		(c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?	No	(c) Preparation of environmental and safety management plan, and conducting education of traffic safety and public and occupational health to workers and staff. (d) Proper management and education of guards and/or relevant personnel not to infringe safety and security of residents and staff and workers
		(d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	No	At the beginning of 2013 defense police (Police Jami) was organized with more than 200 peoples in Stone Town area and resides the place close to Malindi Port and guards 24 hours. Thus, it is necessary to consult with the defense police periodically for precaution measures against security.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?	No	1) Noise and vibration are expected to be generated from construction machines and vehicles utilized in construction works including demolition of collapsed seawall and construction of new facilities. They are likely to cause some impacts nearby residential areas. 2) Following measures will be taken: (i) Blowers and pumps should be installed in buildings. (ii) Working during sensitive hours and locating construction machines close to sensitive receptors shall be avoided. (iii) Use equipment with low-noise and vibration. (iv) Installation of soundproof walls/acoustic enclosures and provision of buffer zones.
		(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?	No	Impact on the natural environment is not expected.
		(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	Y	(c) 1) Wastewater from construction work will be settled and supernatant will be discharged to sewer line of the city. Install a toilet, which collect human waste, and is pumped out by a vacuum truck and transported to final disposal site of the city periodically. 2) Solid wastes will be properly segregated on the spot, stored in containers and transported to waste disposal site. Monitoring the situation of discharged water, air pollution and waste treatment. If it is likely to deteriorate sanitary condition, revise and/or improve the plan of environmental protection and education to the workers.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?		(a) DFD will develop and monitoring program for items having expected negative impacts by consultation with DOE. (Refer to 7. Environmental monitoring)
		(b) What are the items, methods and frequencies of the monitoring program?		(b) In the environmental monitoring, items relating to expected negative impacts as well as necessary permissions are selected and indicator, methods and frequencies as well as responsible institutions are described.
		(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?	Y	Institutional arrangement for implementation of monitoring. DFD is preparing to establish responsible section with personnel and adequate budget as well as a scheme subcontracting to certificate experts.

		(d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	Y	Environment monitoring and audit procedures are stipulated in Article 57-59 of Environmental Management for Sustainable Development Act, 1996.
6 Note	Reference to Checklist of Other Sectors	(a)For processing and storage facilities, where necessary, pertinent items described in the Mining and Industry checklist should also be checked.	No	Not necessary.
		(b) Where necessary, pertinent items described in the Ports and Harbors checklist should also be checked (e.g., projects including construction of ports and harbor facilities).	No	Not necessary.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to trans-boundary or global issues should be confirmed, (e.g., the project includes factors that may cause problems, such as trans-boundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	No	Not necessary.

CHAPTER2. CONTENTS OF THE PROJECT

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2-1 Basic Concept of The Project

2-1-1 Overall Goals and Project Goals

Consisting of the islands of Unguja and Pemba, Zanzibar is a semi-autonomous part of the United Republic of Tanzania. The population of Zanzibar is about 1.27 million (2010), about 2.9% of the population of Tanzania, 43.19 million (2010)[4]. The island of Unguja, where the capital city is located, accounts for about 64% of the population of Zanzibar.

The development plan of Zanzibar, " Zanzibar Development Vision 2020," has the goal of achieving sustainable human development and poverty alleviation by ensuring food security and increasing the incomes of farmers and fishers using strategies for increasing food production and productivity and improving the transport infrastructure in pursuit of smooth and efficient distribution of farm and fish products from the production areas to the consumer markets. Furthermore, the Zanzibar Strategy for Growth and Reduction of Poverty 2010-2015, MKUZA II, specifies the Core Cluster Strategy in the fisheries sub-sector such as the necessity for construction of at least one fishing dock, improvement of processing and marketing of fish and other marine products in order to contribute to promotion of growth for wide-ranging social segments, alleviate poverty, and ensure food security.

The Malindi landing site is not only the island's largest landing site to which artisanal fishing boats come from a wide range of fishing villages (including 392 boats registered in the Urban District[5]) but also the fish distribution hub and wholesale market in Zanzibar City, the largest consumption area, contributing also to the income and employment of fishers and related workers such as auctioneers and fish peddlers. Improvement of the Malindi landing site should be addressed in the context of the development of the fishing industry in Zanzibar.

At the said landing site which has a collapsed revetment, 22 boats[6] are moored at a time and about 400 buyers and porters[7] gather at the water's edge at peak hours. At dawn when landing starts, porters and buyers carry fish and traverse across unilluminated and pitted concrete surface. Many people slip or take a misstep and are injured in tumbling on exposed iron bars, and about 95% of landing site users[8] have got injured. The collapsed revetment is deteriorating further and posing a danger to users.

The fish trading area is visited by a total of 6,500 users[9] from dawn to early evening or 1,100 users[10] at any one time at peak hours. They engage in bargaining, wholesaling, auctioning, vending, and fish gutting and cleaning on mud flats under the scorching sun. The makeshift tables for selling fish amount to 120 at peak times, 50 of which are only sheets placed directly

[4] Tanzania in Figures 2010, National Bureau of Statistics, the United Republic of Tanzania, June 2011
[5] 2010 census
[6] The maximum number of moored vessels at peak times during the survey period, June 7 to June 16 and September 2 to September 11, 2013
[7] Calculated using the number of landing beach users and the ratio obtained in the hearing survey
[8] Hearing survey of landing laborers
[9] Result of counting people going to and from the landing beach on nine survey days, May 31, June 8, and September 4 to September 7, 2013
[10] Average values at daily peak times in the survey period, June 7 to June 16 and September 2 to September 11, 2013

on the ground, selling fish which has been scorched by the sun and significantly deteriorating. The fish gutting and cleaning produces an estimated 600 kg[11] of fish residue, which is disposed of in the sea water in front. The two existing public toilets are far from the landing site and insufficient in number. Due to the lack of water supply and drainage system, however, users have no choice but to wash the fish and tables with seawater scooped from the sea in front, where the landing site users relieve themselves or dispose of fish residues. Furthermore, marine products to be auctioned are laid directly on the sand beach until trading. In sum, these activities are performed in an exceedingly unhygienic condition.

The limited space above the collapsed revetment, which is four meters in width and about 100 meters in length, is congested by fish vendors laying makeshift tables on both sides and by porters carrying fish, making the area chaotic and the work efficiency exceedingly low. On the beach, people conduct their activities in moving the tables and auction places following the shoreline change due to a tidal level difference of three to four meters. At high tide, this area of a mere 600 m^2 is crowded with several hundred people and bicycles for transportation, forcing their work very inefficiently.

The project aims to improve the Malindi fish landing site and marketing facilities for provide a safe, hygienic, and efficient work environment for fishers, fish porters, wholesalers, brokers, auctioneers, retailers, vendors, thus contributing stable fish supply to the Zanzibar public in better quality.

2-1-2 Objective of the Project

The Project aims to achieve the above mentioned objective by improving Malindi fish landing and marketing facilities.

The following benefits are expected.

- A landing quay is constructed where 392 artisanal fishing boats registered in Urban district and boats from other area can land fish safely, as well as 1,400 workers a day who can unload and transport fish in a safer condition.
- 6,500 users a day of Malindi fish landing site can have a hygienic and appropriate place for trading and vending fish.
- 6,500 users a day of Malindi fish landing site can use in an efficient work condition.

The scope of this grant aid project covers the construction of a landing quay, seawall, and fish marketing facilities and the soft components related to the operation, maintenance, and management of these facilities.

[11] The residue amounts to 8.4% of the seven-ton catch and the one-ton carry-in amount of middle and large fish.

2-1-3 Examination of the Request

The adequacy and the necessity of each of the requested item are evaluated as shown on the following table.

Table 2-1 : Result of Evaluation of Requested Items

No.	Items requested	Priority*	Result	
1. Fish landing facilities				
1)	Landing wharf (Landing Quay)	A	○	To ensure safe landing, restoration of the quay is necessary and urgent
2)	Seawall	A	○	It is necessary to ensure access to the quay and to reinforce the perimeters
2. Buildings (Fish market building and administration offices)				
1)	Auction hall	A	○	It is necessary for auctioning fish in a hygienic space protected from sun and rain
2)	Fish retail market	A	○	It is necessary for vending fish in a hygienic space protected from sun and rain
3)	Area for fish gutting and cleaning	A	○	It is necessary for gutting and cleaning fish in a hygienic space protected from sun and rain
4)	Housing for ice plant and cold storage	B	○	It is necessary for the ice plant to be procured by DFD/MLF, to promote/ diffuse usage of ice for controlling quality and quantity of fish and preserving unsold fresh fish.
5)	Fishing gear and OBM spare parts shop	C	×	Private shops in the vicinity can cover it. It is difficult to plan it within a limited space of the site unless disturbing flow of fresh fish
6)	Storage	A	○	Spaces for storing equipment and furniture
7)	Toilet for officers	A	○	Toilets for staff of the facilities
8)	Administration office	A	○	Offices and a meeting room for operation and maintenance
3. Other Facilities				
1)	Generator house	A	○	Housing for a generator. (Generator for coping with blackout will be procured by DFD/MLF.)
2)	Toilet for public	A	○	Toilets for users of the facilities
3)	Garbage area	A	○	Tentative depository is necessary for disposal of garbage and wastes from processing fish
4)	Sewage treatment systems for toilet and waste water	A	○	Treatment with septic tanks and connection to the main sewage are included to meet ZMC's standard.
4. Improvement of the existing fish retail market		B	○	It is included for revitalizing the existing facility and handling of fresh fish will be concentrated in the new facility in a hygienic way
5. Exterior works				
1)	Pavement including parking space	B	△	Parking is prepared for staff and transportation to the minimum number. The exterior will be refurbished for proper townscape
2)	Drainage and water distribution	A	○	It is necessary for washing and cleaning of fish and the floor.

3)	Lighting facilities	A	○	It is necessary for the operation in the early morning and cloudy weather
6. Equipment				
1)	Ice making plant	C	×	To be installed by DFD/MLF. Excluded from the works of Japanese side
2)	Ice storage	C	×	ditto
3)	Cold storage	C	×	ditto
4)	Insulated fish box	B	○	It is necessary to promote use of ice for fish preservation.
5)	Fish box	B	○	It is necessary to secure hygiene for handling fish
6)	Emergency Generator	C	×	Only a space/ housing is necessary as DFD/MLF procure one.
7)	Handcart	B	○	To be procured by DFD/MLF. A space/ housing is necessary
8)	Chest Freezer (Deep Freezer)	B	○	To meet the demand for refrigerating and preserving fresh fish in a small lot
7. Technical assistance (Soft-component)				
1)	Fish landing & market facility management, operation & maintenance	A	○	It is necessary to establish timely a proper operation and management system, prior to completion of the facilities.

Priority: A: Considered essential (First priority), B: Considered necessary (Second priority) C: Unjustifiable as a grant aid project component or given the lowest priority

2-2 Outline Design of the Japanese Assistance

2-2-1 Design policy

2-2-1-1 Basic Policies for Entire Site

- The site can be divided into three areas, namely building construction area (Area A), civil work area (Area B) and peripheral area (Area C) for associated work and temporary landing site (SITE MAP shown on the beginning of this report).
- The plan covers the facilities and equipment with functions and scales equivalent to the status quo of fish landing, trading, selling, and other activities conducted at the Malindi landing site including number of the fishing boats that use it.
- The project, which will be implemented under the grant aid of Japan, must adopt the structures, materials and equipment, and construction methods based on due consideration of the construction and site conditions on the planned site in pursuit of time-saving and strict observance of the established schedule in addition to saving of costs. The project, when implemented, will utilize as many local resources as possible in consideration of contribution to stimulation of the local economy.
- A plan that facilitates maintenance and management after completion at low management costs must be formulated. Many of the artisanal fishing operators depend on revenues at the landing site and marketing facilities as an important source of cash income. Therefore, a low usage fee must be set to allow as many operators as possible to continue their operations.

- Since the project site is located in the Stone Town landscape conservation area, design shall be prepared in consultation with the Stone Town Conservation and Development Authority (STCDA) which has jurisdiction over construction project in the Stone Town Conservation area, to ensure appropriate planning of landscape conservation and compliance with local regulations.
- In Zanzibar, there is no specific structure norm for quay and land facilities, except the STCDA regulations, so the norm of the U.K. or of a donor country is generally applied. Therefore, Japanese standards and norms will be applied.
- The grades will be set to sufficiently reflect cost efficiency, robustness, durability, and ease of maintenance and management (e.g. local maintenance can be carried out with). To meet the landscape criteria for plans in the designated cultural heritage site, it is necessary to keep an appropriate grade of finish materials and design elements for buildings in the cultural heritage site.
- Consideration will be given to reducing negative impacts on the environment.
- In principle, temporary relocation of the landing site during construction will not be conducted. Consideration will be given to ensuring that activities at the current landing site can be continued as far as possible.

2-2-1-2 Design Policies for Fish Marketing Facilities and Equipment

- The planned site is to be utilized in full to secure and alleviate the current operating activities at the Malindi landing beach as far as possible in the layout plan.
- The plan will facilitate the operation of the installation, facilities and equipment to apply appropriate technologies in consideration of the current work requirements including fish landing, trading, and transportation in Zanzibar.
- The scale plan will basically embrace the current peak-time number of workers and users and volume of fish handled. The plan, as the site is confined, must have a layout and forms that permit flexible use according to time slots and seasonal changes.
- The zoning and flow planning will support future increases in trading volume and number of users as well as the possible future extension and expansion plan by MLF, which may include the use of adjacent land.
- Natural lighting and ventilation will be taken over to reduce maintenance costs, and LED lights will be employed in consideration of minimizing power consumption and replacement costs.
- The facilities and equipment to be procured shall have durable materials and structures. Due to the location on the seashore, attention shall be paid to prevention of salt damage in planning the structures and electrical machines and equipment.
- As a building located in the Stone Town conservation area, appropriate consideration shall be given to the landscape in planning the design, exterior facilities and equipment.
- For maintaining the market clean, it will have a washable floor finish with proper floor drainage.

- The functions of the existing fish market will be changed to demonstrate the division of roles with the new market and to make better use of it. The facilities will be repaired to fulfill the functions to the minimum requirement, and the building will be kept basically at the current grade.
- An ice making machine and a generator set will be procured and installed by the Zanzibar side. Therefore, appropriate space and water and power supply equipment will be incorporated.
- The equipment to be procured will be planned as the minimum configuration required to keep the catch and marketing facilities hygienic, to familiarize the use of ice in fishery and fish distribution, which is promoted by MLF, and to make the existing Malindi fish market active.

2-2-1-3 Design Policies for Landing Site

- For artisanal fishing boats using the current Malindi port, safety and smooth fish landing functions shall be ensured.
- The quay and seawall under the plan will be restored in the same position and scale as the existing collapsed quay, in harmony with the existing facilities and without interfering with the surrounding port functions and the traffic of calling vessels.
- The structure type and layout plan shall be compatible with the port development plan of the Zanzibar Ports Corporation (ZPC) which includes future maintenance dredging and renovation of the adjacent quay.
- Based on the current seafloor topography and oceanographic phenomena such as sea level and tidal variations, economic types and layout with low maintenance and management costs shall be examined, and the necessary water depth and length of the quay will be ensured.
- The structure type will be decided in consideration of safety from ocean waves and sand sedimentation.
- The structure type and construction will be examined to reduce the impact on the environment. The concrete wreckage from the existing collapsed quay will be reused for landfilling or other purpose to reduce the environmental impact and burden.
- During the construction period, the fish landing and trading areas will be secured as much as possible to allow activities in the adjacent area without suspension with due consideration of phasing of the construction area and work scheduling.

2-2-2 Basic Plan (Construction Plan/ Equipment Plan)

2-2-2-1 Conditions of Scale Setting Plan

The field surveys (counting, hearing, etc.) were conducted in June and September at the Malindi landing site. The plan scale will be set according to the results of these surveys.

1) Number of Users

The total number of visitors to the Malindi landing site per day was estimated at about 6,500 including sellers and buyers based on the counted numbers of people entering into and going out of the site. The peak-time number of persons at the site at one time was calculated from the average of the maximum values on the survey days to total about 1,100 around the landing beach.

2) Fish Transaction Volume

The catch of small pelagic fish in the survey period in June and September was 11.3 tons per day at most. According to the DFD statistics, on the other hand, the monthly catch was about 400 tons so, assuming that there were 20 fishing days per month, the daily catch was about 20 tons. For the survey in September, which was before the peak period for pelagic fish, a daily catch of 20 tons shall be assumed for planning purposes.

As for the current volume of fish auctioned, the maximum fish catch excluding small pelagic fish in the June survey was11,492 kg on September 4, followed by 6,992 kg on June 8. Therefore, the daily fish landed excluding small pelagic fish is estimated at about 10 tons.

Furthermore, fish are transported by road to Malindi from other landing sites on the island, traded via auction, and carried to the major markets in Zanzibar City. The major landing sites are Mkokotoni (north) and Chwaka (east), from where marine products are brought in almost daily. The arrival volume is stable at a little less than one ton in total. Therefore, the volume of fish arriving by road is assumed to be about one ton.

Table 2-2 : Results of Survey on Catches at Malindi Landing Site (kg)

Date of Survey 2013	Dagaa	Others				Total
		Demersal	Large Pelagic	Others	sub total	
25 May	407	596	160	275	1,031	1,438
31 May	2,316	483	246	792	1,521	3,837
8 June	7,075	1,513	2,738	2,742	6,992	14,067
16 June	5,940	1,454	3,008	2,331	6,793	12,733
22 June	1,680	1,313	1,504	1,856	4,673	6,353
4 Sept.	11,314	4,159	3,807	3,526	11,492	22,806
5 Sept.	6,375	3,796	4,608	3,286	11,690	18,065
6 Sept.	4,167	1,771	2,744	2,100	6,615	10,782
7 Sept.	6,910	1,864	3,455	2,539	7,858	14,768

3) Numbers and Areas of Blocks for Trading and Selling

Auction is carried out mainly by auctioneers in blocks measuring 50 to 60m^2 at most, and handling lots of about two to four kilograms on average at a time. Six auctions were held simultaneously at most, each participated in by about 60 persons at most per auctioneer. The duration of one auction was approximately one minute. However, the fish catches arrived somewhat intermittently so each auctioneer actually held about 20 to 30 auctions per hour. It

was confirmed that there were 16 auctioneers.

Each fish vender occupies a space of about $2m^2$ to $2.5m^2$ including a makeshift retail stand (board). There were about 110 fish venders at peak time on average during the observation period.

In the existing fish market, 25 shops operated at most and 17 shops operated on average were confirmed.

An average of six stands vending food or goods other than fish was confirmed on the landing beach.

4) Amounts of Fish Residues and Washing Water

The volume of fish residues and washing water used in fish gutting and cleaning by fish cutters were measured. The volume of generated fish residues was about 8.4% of the volume of fish processed. The volume of water used to wash the fish was about 0.72 liters per kilogram of fish[12].

5) Number of Fishing Boats

Fish is landed from around am 6:00 to pm 5:00. The peak time of landing of Dagaa is am 7:00 to am 8:00. Demersal fish is landed from am 8:00. From noon to pm 2:00, the second peak time is observed then gradually decreasing the number of vessels until pm 4:00.

The maximum number of fishing boats observed during the survey was 100/day on 25 May. The number of boats that simultaneously mooring was 22 from am 7:00-am8:00 (7 boats of capacity more than 10 fishers, 15 boats of less than 10 fishers) As small pelagic fish has highly seasonal migration nature, landing volume of pelagic fish varies depending on fishing conditions, and number of fish landing at Malindi in the high season is increasing more than the above. The number of boats, taking into the results of hearings of the number of boats in the high season, shall be therefore planned for simultaneously accommodating 10 boats of more than 10 fishers which operates purse seining fishing. The average time of staying in front of the landing area shall be planned to be 22 minutes on the basis of the observation and hearing from fishermen.

The berth length of the landing quay will be determined, assuming the boats will use the revetment for landing which will be constructed on the waterfront at the current site. The current plan will not cover activities such as preparation for fishing and mooring of fishing vessels, and resting of fishermen, which should be done offshore or at the fishing villages in which they are based as they are at present.

6) Numbers of Parked Bicycles/Motorbikes and Automobiles

The number of bicycles and motorbikes laid or stored at and around the landing site was 394

[12] Average of actual volume generated by three fish cutters in three days in June 2013

(79 at the landing site and 315 in the environs) on average at peak time on each survey day. There were four automobiles at the landing site and 14 in the environs.
These numbers include those by users of the peripheral facilities.

7) Showers, Toilets, etc.

Near the site, there are two existing public toilet blocks, which have 450 to 550 users per day on average, including both users of showers and toilets.

2-2-2-2 Site and Layout Plan

1) Extent of Site

The extent of the project site, as shown in the site map provided at the beginning of this document, includes the planned landing quay, existing Malindi beach, and access area of the fish market. The layout plan shall be a reasonable plan in consideration of mutual linkage and access to each area with a different character.

2) Character of the Target Facilities

The facilities concerned are considered to be characterized by the fact that a wholesale market near fishing zone with a fish landing facility, a wholesale market in a consumption area and a fish retail area are combined in them.

The landing function (quay and seawall) + wholesale function (auction)

+ retailing function

The administration departments and auxiliary facilities which support these market functions shall be considered in the planning.

3) Flow Plan for the Facilities

Flow paths in the facilities shall be made as simple as possible. Flow paths of people, fish and vehicles shall be clearly separated and a buffer zone shall be prepared where two flow paths of different types intersect, in order to minimize congestion and interference. It is also considered in the plan to streamline the two circulation paths of fresh fish, one from the landing facility at the seafront and the other for fish carried in from other landing sites.
The figure below shows the flow path of fresh fish from the landing site into the market. This figure shall be used as the basis of the facility floor planning.

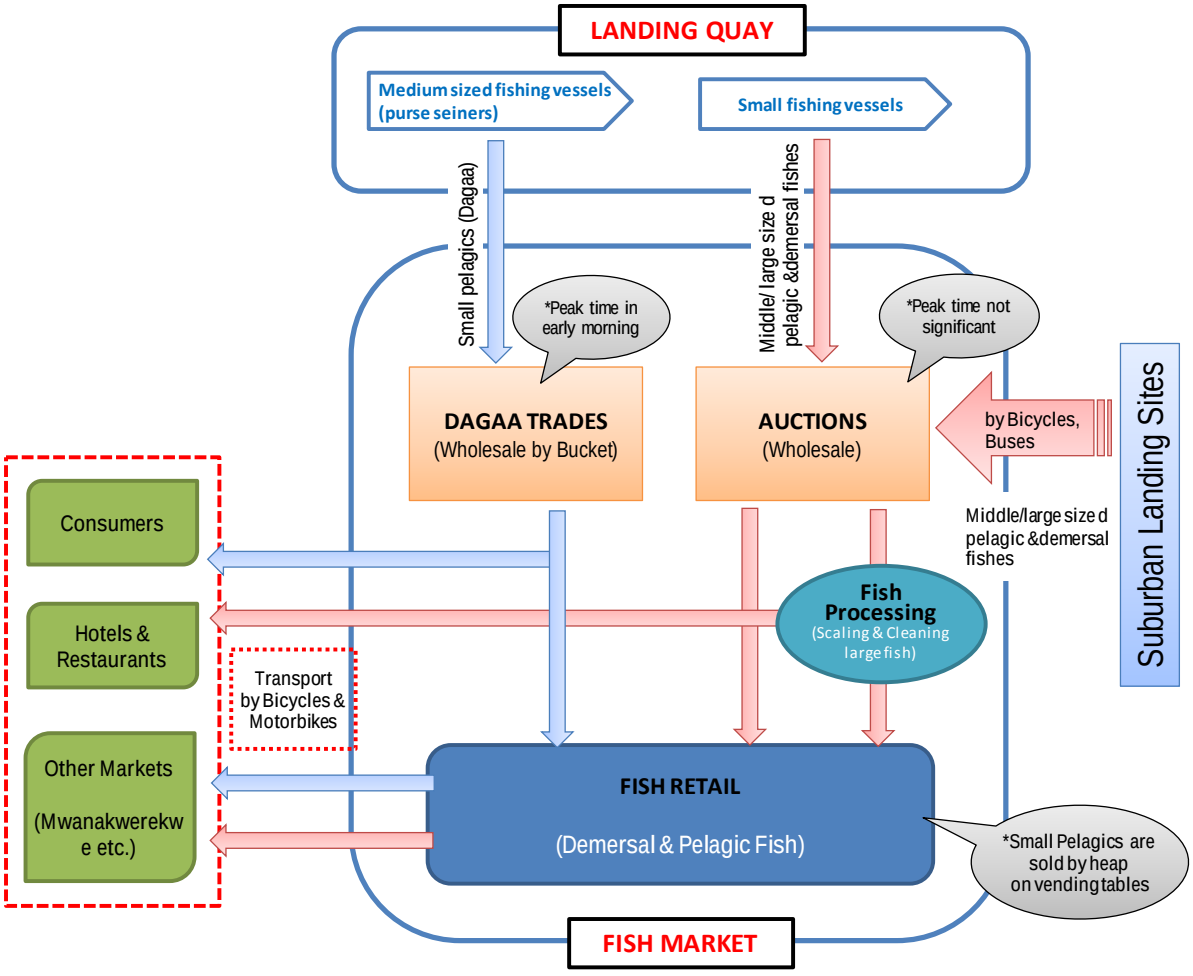


Figure 2-1 : Flow plan for Fish Market

Flow paths within the market and between the market and other facilities shall be prepared with the followings taken into consideration:

- In order to facilitate movement of people and goods in the market, main paths shall be established in the X-Y direction. With this arrangement of the paths, access between facilities can be provided easily at the time of congestion.
- The flow of the ordinary consumers shall be designed to lead them smoothly to the central part of the facility.
- In order to minimize the length of the flow path of fresh fish from landing to retailing, the "auction hall" for medium- to large-sized fish and the "Dagaa trading hall" where wholesale of small pelagic fish by bucket is conducted shall be located close to the landing quay.
- The fish processing area shall be located near the auction hall and the fish retail area.
- Since an ice making machine to be installed by DFD/MLF shall be used in transporting fish within the market, and the ice making machines shall be located at a place facing to the exit path of fish and to the auction hall and Dagaa trading hall.

- Parking spaces for bicycles, which are used as the principal means of transport of fresh fish out of the market, shall be located as close as possible to the flow path of such fish after purchased.

4) Layout Plan for the Market Facilities

An area of 2000m^2 is used for marketing activities such as auctions, wholesaling, and retailing conducted on the existing Malindi beach. In comparison, the land for facility construction is 37m x 78m, i.e. about 2,900m^2 in total, which does not allow much margin in view of parking of automobiles and bikes and market access even if an efficient floor plan is contemplated. Therefore, it is difficult to put each of the market functions, management department, and service department in a one-storied building.

In the layout plan of the project, the core functions of the market, the auction hall, the Dagaa trading hall and the fish retail area, shall be located near the landing quay as a unit of priority facilities and the market administration departments shall be located on the first floor. Utilities including public toilets and elevated water tanks shall be accommodated in an annex separate from the main building because of the similarity in the nature of those facilities. Therefore, the facilities to be constructed in the project shall be accommodated mainly in the two buildings.

Attention shall be paid to the following in the layout planning of the facilities on the basis of the current condition of the site.

- The principal market facilities (the auction hall and Dagaa trading hall) shall be located on the sea side.
- The fish retail area shall be located at the area connected to the auction hall and Dagaa trading hall and on the side of the road in front of the project site which can be accessed and visible easily by ordinary consumers.
- The layout shall be determined so as to improve the utilization ratio of the retail stands, etc. by placing them according to the shopping paths of shoppers to eliminate dead ends. Furthermore, flow paths for the entire area shall be provided to eliminate shopper "unevenness" due to the position of retail stands and consequently to do away with blind corners.
- The existing fish retail market shall have part of the market functions (refrigeration service facilities and grocery stores) after the renovation. A passage (pedestrian walk) shall be constructed between the new market and the existing market as part of the integrated flow plan for the entire facilities.
- The administrative and management functions shall be located on the first floor of the market building, from which one can have a full view of activities in the entire market. Thus the functions and flows are clearly separated and the limited area of the site can be fully utilized.

- Public toilets, a water receiving tank, a housing of a generator and elevated water tanks are planned in the annex building.

Basic layout plan is shown in the Figure 2-2

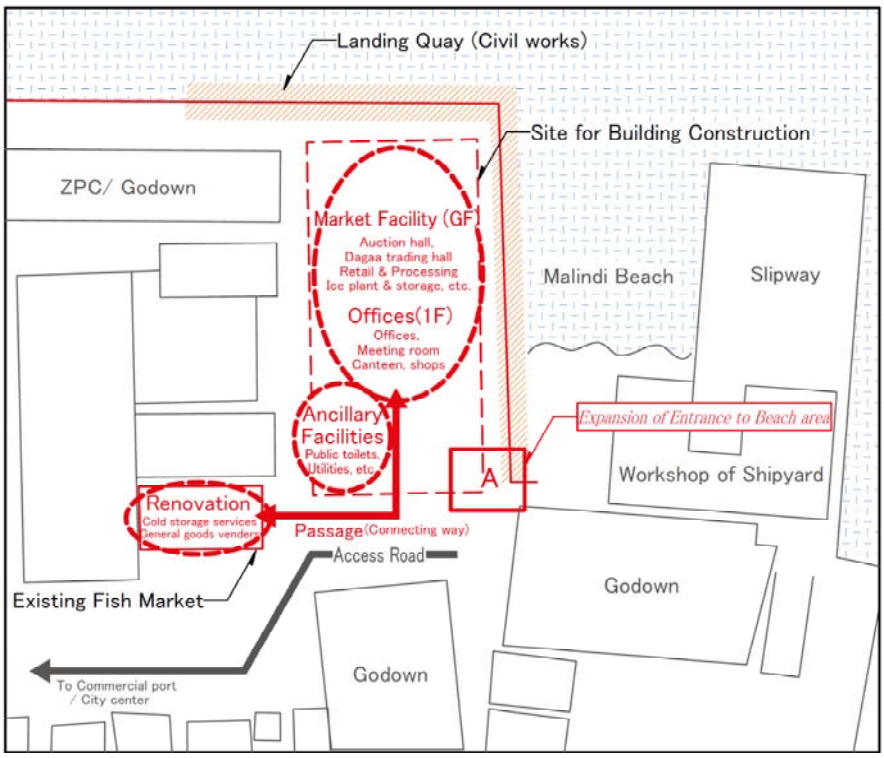


Figure 2-2 : Basic layout plan

Part "A" shown in above figure shall have a sufficient frontage to ensure easier entry of vehicles to the apron along the seawall.

Since the planed facility under the project cannot fully accommodate the existing demand due to lack of space, DFD is requesting the government to secure the adjacent lot for expansion (Figure 2-3). It is therefore necessary to take into consideration the future expansion plan.

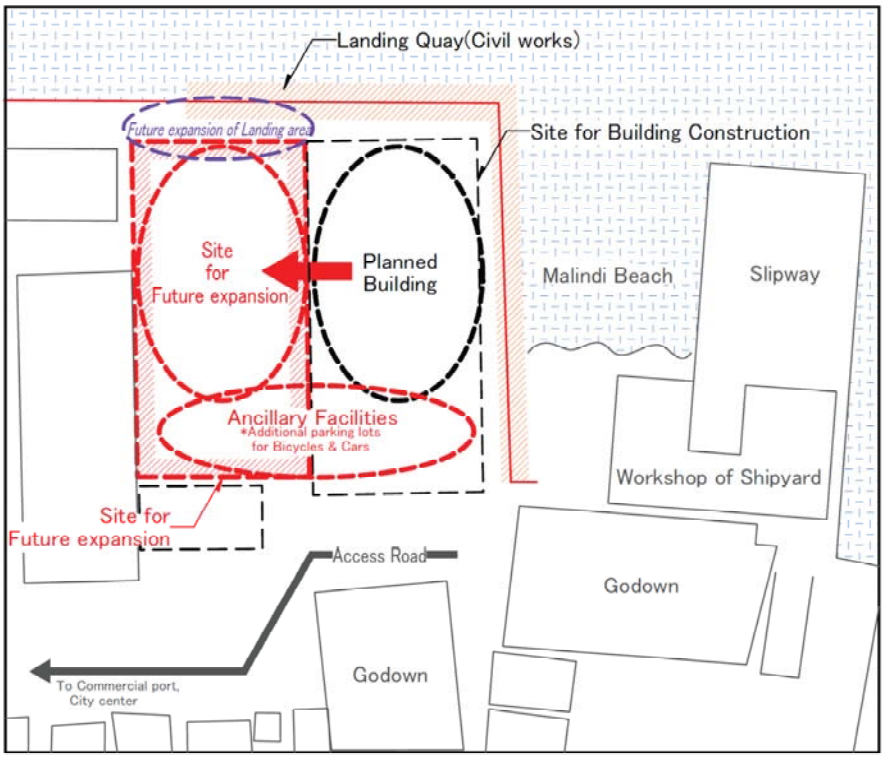


Figure 2-3 : Future expansion plan of the Site

2-2-2-3 Architectural Plan

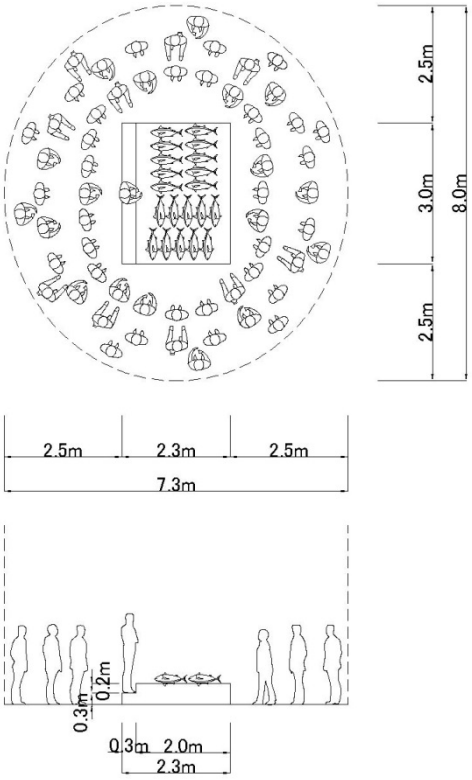
(1) Floor Plan

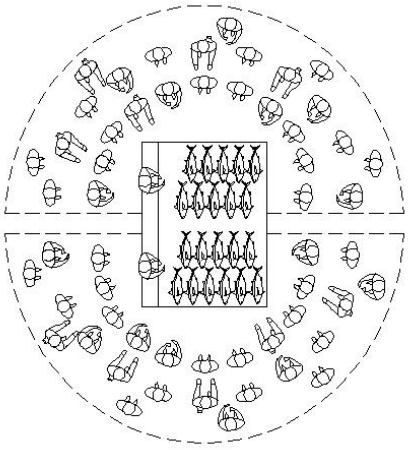
1) Auction hall

Six simultaneous auctions were observed at most, and a total of 16 auctioneers were confirmed. The auction site operates for a relatively long time in the morning and afternoon whenever fish arrive. The area of each auction site needs to be about 50 to 60m^2 because, at present, the small-lot fish which had been laid directly on the beach are auctioned by taking up by hand. However, it must be sufficient to accommodate the 50 to 60 persons at most who gather in at one auction. Since the fish is auctioned in small lots, two or three auctioneers can conduct auctions using one auction table simultaneously at peak time so, for the plan, six auctions are assumed to be held simultaneously as confirmed in the field survey.

Since about 50 to 60 buyers gather in one place, such an area shall be sufficient to accommodate them. The size of the auction table will be about 7m^2 based on examples of similar facilities as shown in Figure 2-4 below. The auction table will have an elevated section at one end to improve the visibility of the auctioneers and ensure smooth auctions.

The required floor area will be about 58m^2 per location including the area for buyers plus the width of the aisle around it. Since each auction lot is small in volume, two or three auctioneers are assumed to conduct auctions at the same time at peak time.





Conducting two auctions
at one auction table simultaneously

Figure 2-4 : Plan of Auction table

2) Dagaa trading hall (wholesale area for small pelagic fish)

Small pelagic fish such as Dagaa are not auctioned but bargained between wholesalers and fishermen. The unit of bargaining is a bucket containing 20 kg of fish.

At present, these transactions are conducted in the narrow path next to the decayed revetment (about 200 to 300m^2). The busy peak of transactions starts at dawn and ends in the early hours. After that, this area is turned into vending place for small pelagic fish. In the facility plan, the area will be changed from near the landing quay to an open space under a roof with easy access.

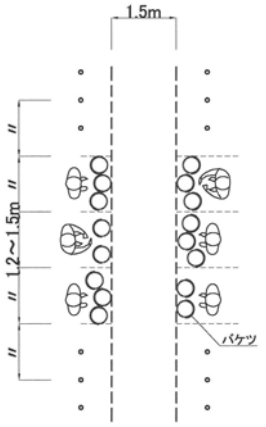


Figure 2-5 : Unit plan of Dagaa trading lot

In order to prevent transactions under the direct sunlight, all the approx. 70 wholesalers confirmed in the field survey shall be accommodated in a market hall. Since DFD has a plan to shift the trading of small pelagic fish from bargaining to auctioning, this possible shift in the mode of transaction shall be taken into consideration in the plan. The Dagaa Trading Hall will be planned in the area with easy access from the landing quay. As the fish is bargained by bucket, the trading area will be in the open space under the roof and the lines will be drawn on the floor to divide an aisle from a bargaining block for maintaining order in the area and

ensuring the efficiency of trading. The plan is to allow the use of the area under the eaves around the fish market or on the quay for the peak demand.

Since the Dagaa trading hall is used exclusively in the early morning, measures shall be taken to allow use of the hall as a fish retail area later in the day.

3) Fish retail area

In the existing Malindi fish market, mainly middle and large fish have been retailed on the fixed concrete tables (each about 1.8m long by 1.0m wide). During the survey, 25 tables at most were operated. On the landing beach, there were 110 vendors on average at peak time. There are two styles of retailing by fish size. Cut fish are sold on the fixed tables and whole fish are sold in piles on plastic sheets or wooden makeshift stands on the beach.

In principle, fixed tables shall be used in the fish retail area. However, the size of area shall be calculated planning mobile retail tables also be utilized to convert the Dagaa trading hall into the retailing area after the bargaining has been ceased and to maintain the occupancy rate of the fixed tables as high as possible. The peak of retailing comes after the peak of bargaining of Dagaa has passed. Therefore, efficient use of the facility shall be achieved with the use of mobile retail tables in the Dagaa trading hall after the wholesale transaction has ceased.

The total number of the retail tables shall be 141, the total number of vendors on the beach and the number of operated tables in the existing market. In order to maintain high occupancy rate of the fixed tables as mentioned above, 76 of them shall be fixed tables and the rest 65 shall be mobile. The mobile tables shall be of pallet type and made of plastics, which makes fish off the floor for hygiene.

The fixed retail tables shall be arranged so that two vendors can use one stand according to the handling volume, thus they can accommodate the demand in the peak fishing season[13]. A space to store the mobile retail tables shall be secured adjacent to the Dagaa trading area.

4) Fish processing area

The fish processing area shall be used mainly for cutting in pieces and gutting medium- to large-sized fish purchased at auction. The standing work of processers covers cutting and removing heads, scaling and gutting of fish, but they do not sell fish. 15 existing wooden processing tables of the size approximately W:1.3m×D:0.8m×H:850, are observed on the beach where 9 tables are regularly operating.

Based on the current operation by the processors, the area equipped with 13 processing tables shall be planed adjacent to the retail area and the auction hall.

The wastewater used for washing fish in the processing area shall be treated together with the wastewater from the fish retail area. The wastewater from the the auction hall and from

[13] The maximum total number of retail stands on the landing beach and in the existing fish market during the survey period was 181. Therefore, the maximum number of retail stands used can be accommodated if the fixed stands are shared between multiple sellers.

Dagaa trading hall, where wastewater is generated solely by the floor washing, shall be treated separately from the area of processing and retailing.

5) Space for ice making facilities and refrigerators

Space for installation of the ice making machines and refrigerators to be procured by MLF shall be included in the design for the facilities. The Japanese contractors shall install the electricity and water outlet to the space and Zanzibar side shall procure and install the equipment.

・Production of ice : 5 tons/day (flake type 1.5-2.2mm thick), attached with an ice storage bin of 2.5 ton

・Required space : Machine size: L 1.8m x W 1.5m x H 1.65m , with maintenance space and clearance

Figure 2-6 : Ice making machine procured by DFD

6) Equipment Storage

The equipment storage for fish handling equipment and cleaning equipment shall be included in the plan.

7) Administration Offices/Toilets for market staffs

Facilities for the market management and operation shall be designed with a scale and composition of the rooms reasonable for the management organization and structure. Toilets for market staff, apart from the public toilets, shall also be planned on the same floor.

The table below shows the composition of the rooms in the Administration Office.

Table 2-3 : Composition of the rooms in the Administration Office

Name of room	No. of psn/room	Function
Manager' room	1 person	Space for office of manager and meeting room.
Accountant' room	2 person	Office for accounting section of market.
Marketing room	3 persons	Office for management staffs
Utilities & Maintenance room	7 persons	Office for maintenance staffs
Revenue collectors' room	10persons	Space for revenue collectors
Statistics/ Hygiene Control room	6 persons	Space for Statistics and Hygiene control staff
Locker room	10 persons	Locker room and lounge

Community office	10 persons	Administration space for fisheries cooperatives
Meeting room	30 persons	Space for regular meetings by users, fisheries cooperatives etc.

In addition to the rooms shown in the table above, a storeroom for the equipment for the conference room, a storeroom for office supplies and documents, and a kitchenette shall be included in the administration area.

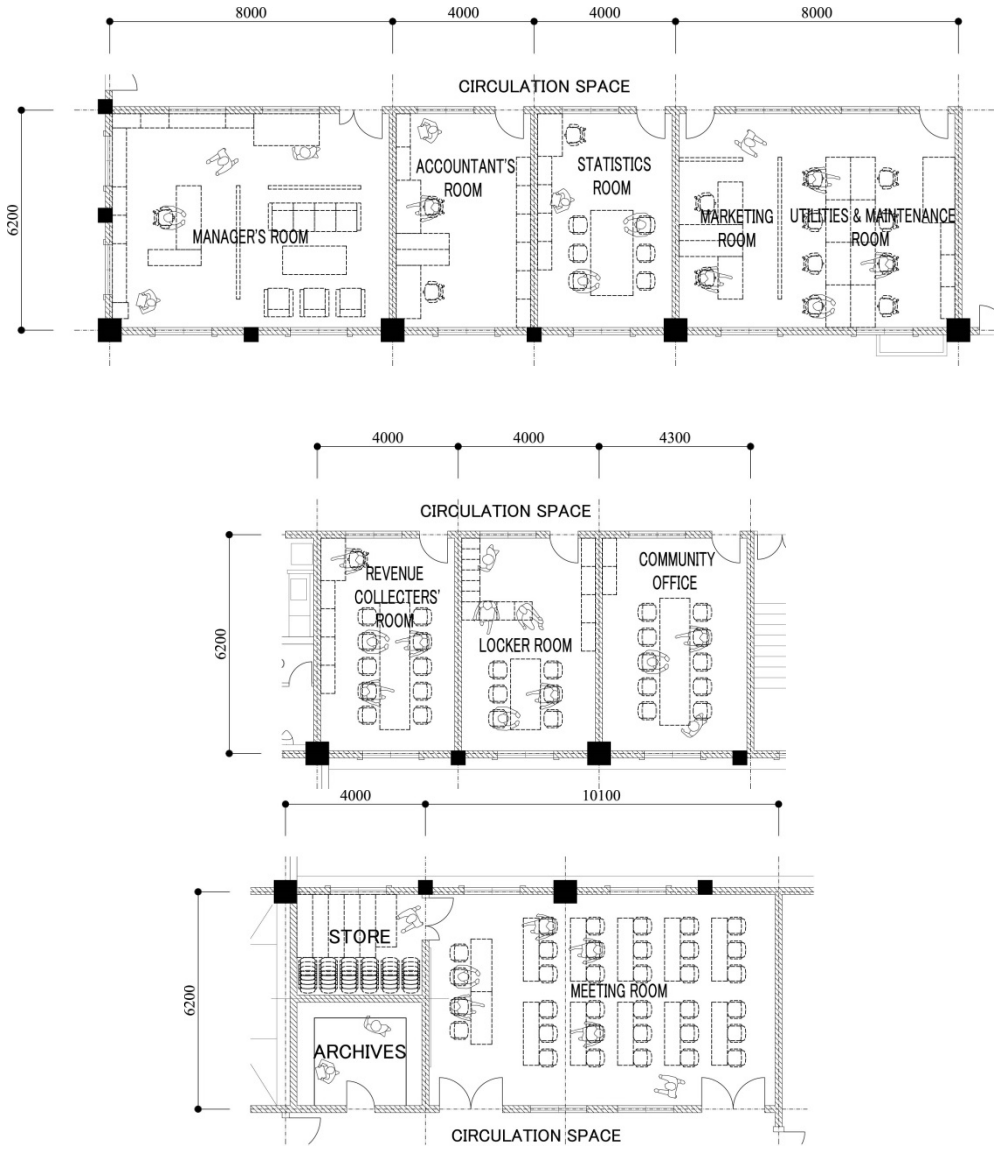


Figure 2-7 : Layout of the offices and the meeting room

8) Generator room

A space for installation of an emergency power generator (135 kVA, W:3,500 x D:1,100 x H:1,500) shall be included in the design. Such a space shall be prepared in a room equipped with a ventilation system in the building as the STCDA Guidelines do not allow exposed

machines. The generator is to be installed by Zanzibar side.

9) Public toilets

A public toilet block for men and for women shall be included in the plan for the users of the market and consumers. The toilets shall be equipped with shower rooms in line with the general local practice. The numbers of sanitary equipment shall be decided on the basis of the total number of visitors on the landing beach in a peak time (approx. 950 in average) and the men/women ratio (15% is women) confirmed in the field study.

When calculated from the above conditions based on the Labor Safety and Health Regulations (for Workplace) in Japan, the number of necessary equipment is 13 booths for men and seven booths for women. Assuming continued use of the four booths for men and the two booths for women attached to the existing fish market, this project site shall have nine booths and urinals for men and five booths for women and five shower booths for men and one shower booth for women. Additionally, the water supply and drainage plan assumes that the toilets are used by 550 persons and the showers by 55 persons per day. Outside of the toilets, a place for washing feet shall be provided, and buckets shall be lent out for washing of hands and feet before and after work or at prayer time.

Table 2-4 : Rooms and Sanitary equipment of the public toilets

Room	Nos. of users	Area	equipment	
Toilets for male	810	73m^2	Toilet	9 booths+urinal
			Shower	5 booths
Toilets for female	140	30 m^2	Toilet	5 booths
			Shower	1 booths
Management room	1	8 m^2		1 room

10) Garbage depository

Garbage disposal is under the jurisdiction of ZMC which owns garbage trucks. Garbage collection is commissioned by ZMC to private companies. Garbage is collected every day from around the project site, and the frequency of collection is adjusted according to the amount of garbage.

A space to separate fish waste from general refuse in accordance with the instruction of the municipal council shall be prepared in the refuse collection site. The site shall be at a location where refuse can be isolated from the flow of fresh fish and which is easily accessible by refuge collection vehicles contracted with the municipal council.

11) Car parking and bicycle storing

Since the existing parking space for vehicles on roads can be used in future, small parking

lots shall be planned in the market premises. As the minimum space required for administrative purposes and transport of fish from other landing sites, a space for parking 5 vehicles shall be included in the design.

The plan is to reserve as much space in the premises as possible for the store of bicycles. However, it will be difficult to secure space large enough to accommodate all bicycles at the peak of activities in the market (when more than 500 bicycles are to be stored) within the limited space available at the project site. Therefore, the existing storage space for bicycles on roads shall be used at the peak of the activities.

However, it is appropriate to include in the plan for additional car parking and bicycle storing spaces in an adjacent area if it can be secured for this purpose in the future.

12) Canteen & waiting space

Venders who sell light meals and beverages to fishery-related workers operate on slightly elevated ground on the beach where is not submerged by seawater even at high tide. The customers of these vendors are fishermen, buyers waiting for fishing boats to unload fish, and porters who transport fish to surrounding regions. This is an indispensable service for them because they cannot leave the landing beach.

A service facility, which serves light meals and beverages to fishery workers, shall be planned on the first floor of the market building at a location with the view of the sea and the market. The facility shall have a floor area of approx. 200 m^2, equivalent to the existing area on the beach.

13) Other auxiliary facilities

To allow circulation spaces to adequately serve as emergency escape routes, corridors will be planned continuously so that they connect in two or more directions and stairs in three directions.

A plan of a passage to connect the flow path of pedestrians between the existing fish market and the new market shall be included in the exterior plan of the project.

Auxiliary facilities including a guard post and an electricity room shall be planned.

Trees which provide shade shall be planted in public area outside the market premises in order to provide market users with resting places, improve the environment in and around the market and to contribute to the environmental conservation.

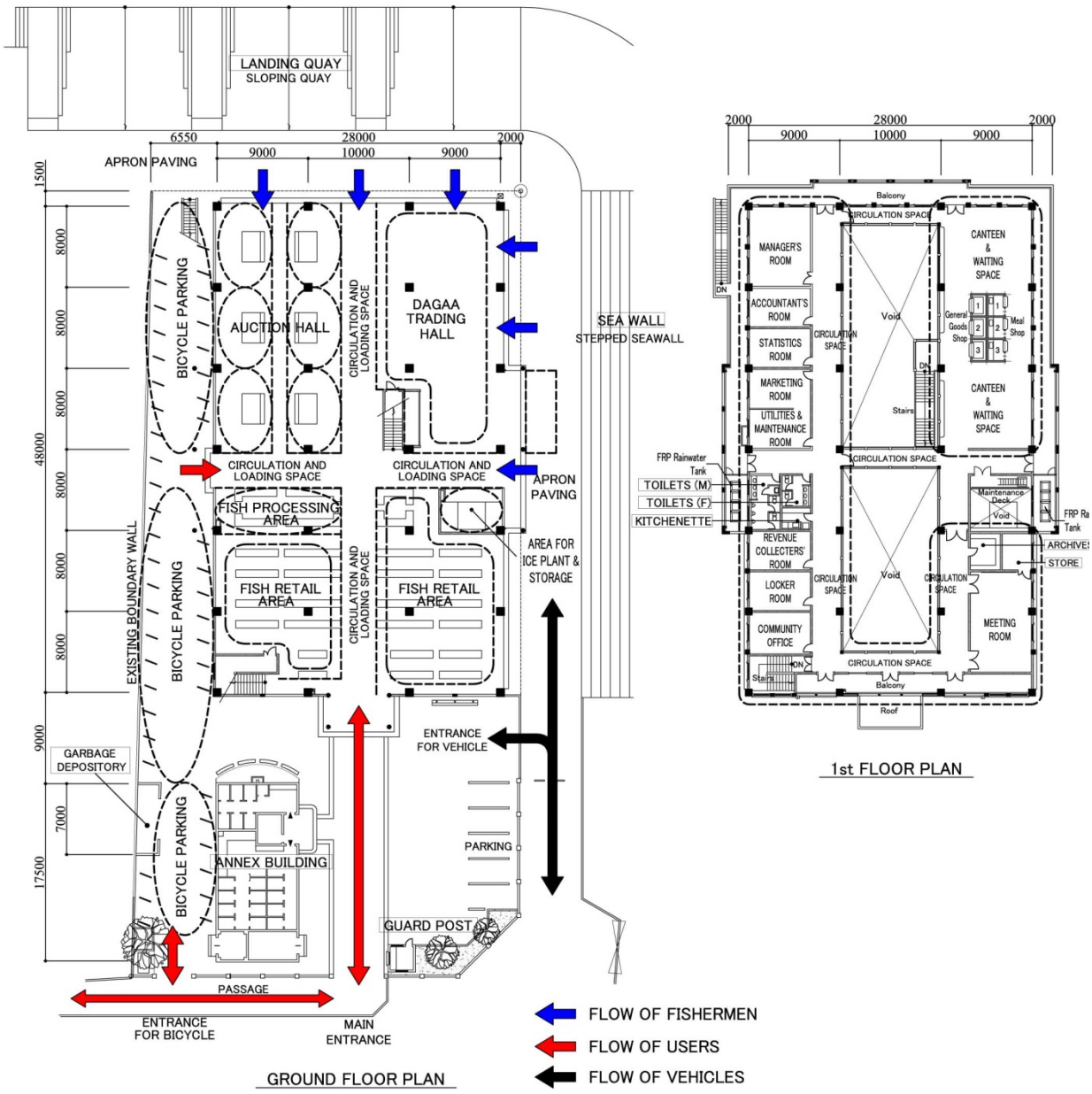


Figure 2-8： Layout plan of the market building

In line with the layout and floor plans above, surface areas for the facilities are planned as shown in the following table.

Table 2-5 : Surface areas of buildings and facilities

	Facility/room etc.	Total area
	1) Fish Market Building	**2,402.5m^2**
	Ground floor	**1,435.6m^2**
	Auction hall (6 auction tables)	298.9m^2
	Dagaa trading hall (65 units)	269.4m^2
	Fish Processing area (13 units)	50.2m^2
	Fish retail area (76vending tables)	375.9m^2
	Electricity room	14.1m^2
	Area for ice plant & storage	26.3m^2
	Equipment Storage	14.6m^2
	Circulation and loading space	386.2m^2
	First floor	**966.9m^2**
	Manager' room	49.6m^2
	Accountant's Room	24.8m^2
	Statistics Room	24.8m^2
	Management Room	24.8m^2
	Maintenance Room	24.8m^2
	Toilets	27.2m^2
	Revenue collectors' room	24.8m^2
	Locker room	24.8m^2
	Community office	26.7m^2
	Meeting room	62.1m^2
	Store	11.4m^2
	Archives	11.7m^2
	Canteens (3)	11.9m^2
	General goods shops (3)	9.9m^2
	Utility room	6.9m^2
	Waiting Space	194.2m^2
	Circulation space	406.5m^2
	2)Annex building	167.0m^2
	Public toilettes	108.0m^2
	Management room	8.0m^2
	Pump room (underground: water receiving tank)	36.0m^2
	Generator room	15.0m^2
	3)Guard Post	**6.2m^2**
	4)Garbage Depository	**15.4m^2**

(2) **Improvement of the Existing Fish Market**

1) Alteration of the function

The existing facility was constructed in 2002 by a local NGO, the Zanzibar Youth, Education, Environment and Development Support Association: ZAYEDESA with the support from Japanese Grassroots Fund.

The existing facility is a one-story building of 250 m^2 furnished with 43 vending tables for processing and retailing fresh fish, made of mortar and concrete blocks. As the facility is, however, somewhat remote and isolated from the landing site where many buyers crowd around, the usage ratio of vending tables remains approximately 30 %. The refrigeration service of fresh fish is currently provided outside at the back of the existing market. In

addition, there is not an adequate water supply and sewage for proper handling of fresh fish.

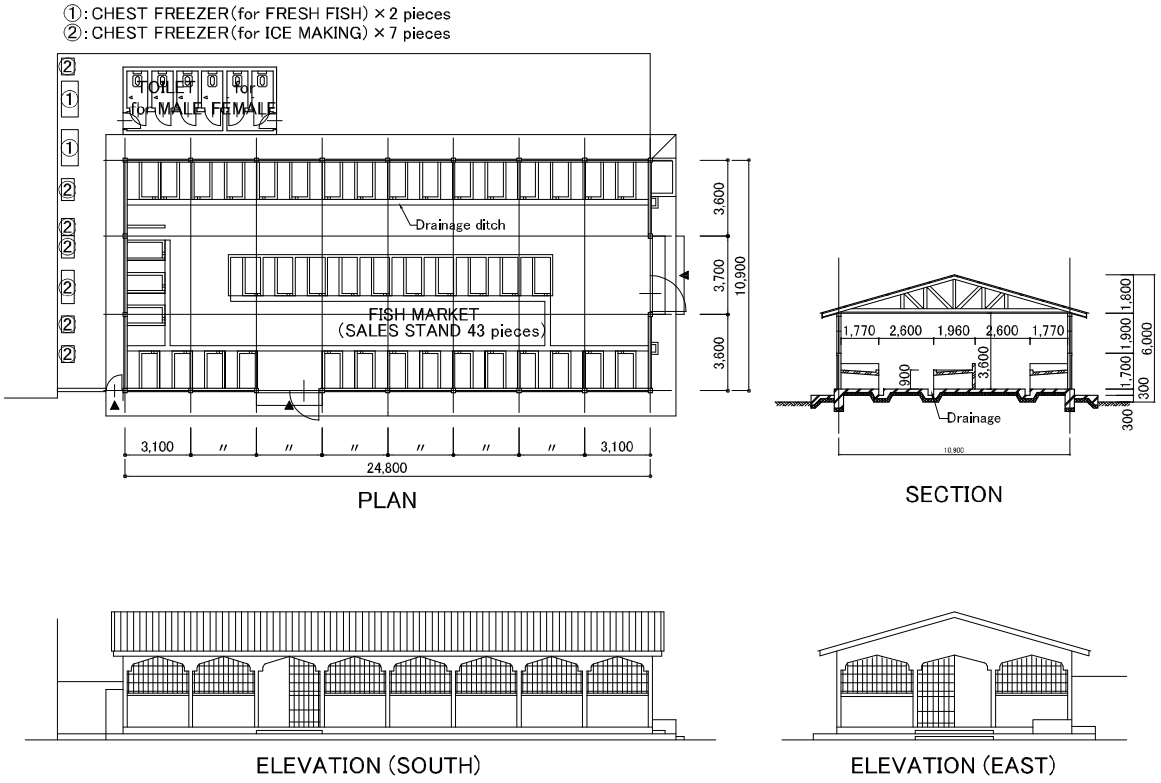


Figure 2-9 : Existing Malindi Fish Market

It is desirable to design the new facility to have fish retail functions and to plan it in a continuous access line from the landing place. Therefore, the existing fish market shall be improved in such a way as to enhance the synergy effect between the new and existing markets while raising the operation ratio but not deviating from the initial objectives of Japanese Government's assistance so that there are no redundant fish selling functions. It is sufficient to improve the existing retail market, which has defective drainage (unprocessed), to turn it into a dry facility that does not need drainage. The current handling of fish shall be transferred to the new facility which can provide a more appropriate handling environment. The existing facility shall have auxiliary functions such as cold storage of fresh fish and selling of sundry goods to users of the new facility.

Note that it was confirmed in the draft phase that this plan for division of functions is compliant with the intentions of ZMC, to which the operation is currently commissioned by the government, the Japanese Embassy in Tanzania which is in charge of grant assistance for grass-roots projects, and ZAYEDESA, the NGO that received the grant assistance.

2) Contents of the renovation works

The existing Malindi Fish Market shall be renovated in accordance with the principles above. The existing refrigeration service shall be accommodated. Since there is additional demand for refrigeration service, a new refrigeration room similar to the existing one shall be constructed and a chest freezer shall be procured for lease out. In addition, shops for lease shall be

constructed in the renovation for the small-scale dealers of household goods, who are conducting their transactions on beaches and roads. The plan of renovation is shown in the figure below.

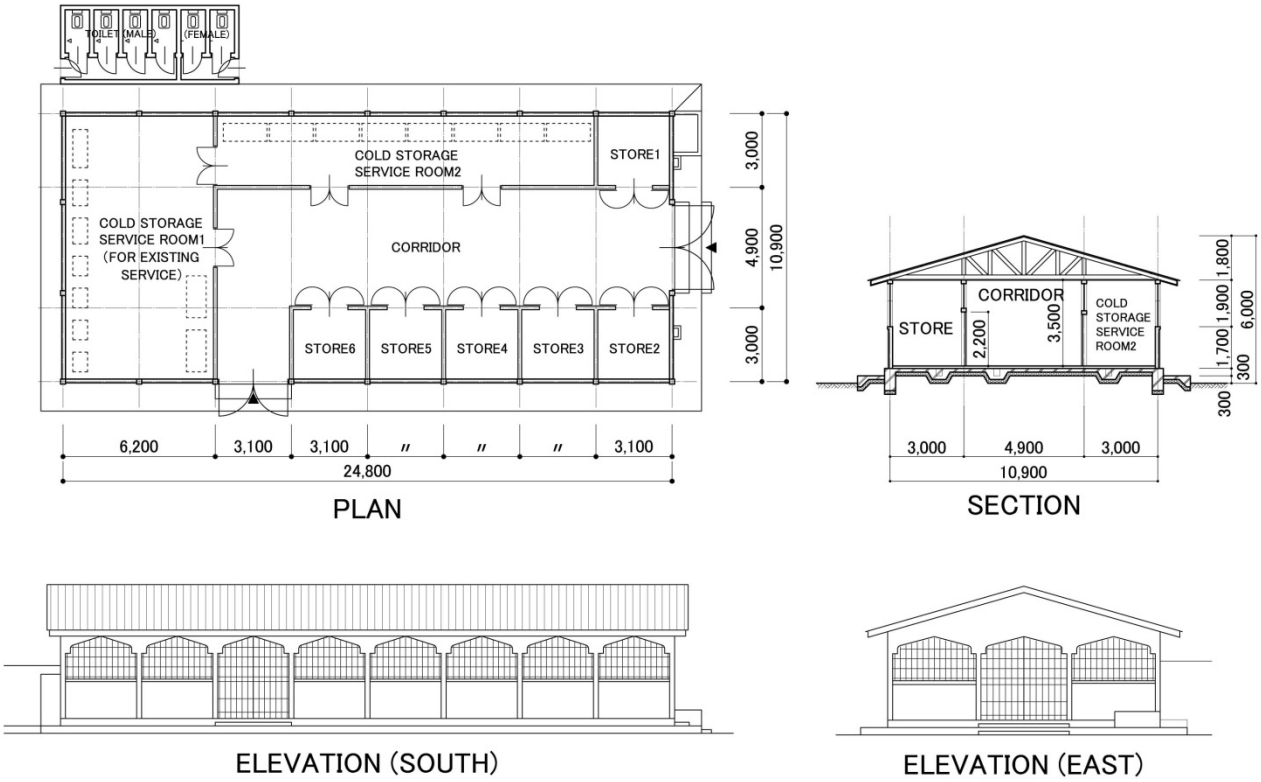


Figure 2-10 : Plan of renovation of the existing market facility

The quality of works shall be same as the existing one. The contents of the works are as follows.

- Demolition of retailing stalls, repair of floor slab,
- Installation of partition walls,
- Re-painting of interior and exterior,
- Patch work for leakage of roof.

(3) **Section plan**

1) Floor levels

Since the height of the landing quay was set at E.L. + 3.1m at the apron edge, the reference height of the ground shall be E.L. + 3.3m to ensure drainage slope for rainwater. This is roughly equivalent to the current ground height (E.L. + 3.2 to 3.7) and causes no problem regarding connection with the ground height of the front road (E.L. + 2.8 to 3.3). After consideration is given also to the drainage plan of the building part, the floor levels shall be set as shown in the table below.

Table 2-6： Floor levels of each facility

Location	Floor level
Ground floor of Market Building / Annex Building	E.L.+3.7 m
Guard Post / Garbage Depository	E.L.+3.5 m
Ground level of the site (Design G.L.)	E.L.+3.3m
Existing Market	E.L. +4.0m
After renovation (Floor rehabilitation)	E.L.+4.1m
Access road (existing level)	E.L.+2.78～3.3m
Passage	+ 15cm from access road
Landing Quay and Apron	E.L.+3.3m

(E.L.±0= Medium sea level (M.S.L.) ±0, High water level (H.W.L.) =E.L. +1.52 m, Low water level (L.W.L.) =E.L.-1.68m)

The floor of each building shall have an adequate drainage slope toward a drainage ditch or catch basin.

The space under the eaves or outdoor facilities shall have a drainage slope toward the periphery.

2) Overall Height and Roof Form

According to the directions from STCDA, the facility must have a maximum height roughly equal to the height of the eaves of the existing warehouses around the facility (about 10m) and a design that harmonizes with the appearance of the existing buildings in Stone Town. Regarding the external form and height, a draft proposal was submitted to and consultation was held with STCDA in the second survey in September 2013 and pre-authorization was obtained.

The fish market building, based on the layout plan, shall have the functions of sale and distribution of fresh fish on the first floor and the administration department and waiting room on the second floor, thus having different functions on and movement paths between different floors. The ceiling height of the first-floor market area shall be enough to ensure sufficient natural light and ventilation by providing open ceiling space in the center and high windows because the fish market facility has a large depth and many users occupy this area. In the open ceiling space, a slanted hip roof shall be installed on the monitor top to provide high windows while giving consideration to the distant view from the port, and the second-floor part shall be formed by surrounding the open ceiling space with a slightly lower monitor top to reduce the view angle from the road. The parapet will provide a comb-shaped silhouette as seen in the old city area to prevent a monotonous skyline. Furthermore, the monitor top also serves as a water catchment path, with the function of guiding rainwater from the entire roof to the rain catchment tanks installed on the second-floor balcony.

The elevated water tank tower shall be installed at G.L. + 8.4m, making the total height 11.6m, to ensure sufficient water pressure to the retail area and other areas. The overall profile

seen from the front road has roughly the same view angle as the existing trees on the site, not conspicuous in terms of the landscape.

Figure 2-11 : Landscape around Site (Front Road and Sea)

Table 2-7 : Height of the facilities

Facility	Height
Market Building (Ground floor)	G.F.L.+4.5m
Market Building (First floor)	1F.L.+3.8m
Annex (Public toilets, Generator space, Pump room, Elevated water tanks, Water receiving tank)	Flat roof:F.L.+3.1m、 Water tower:G.L.+11.2m
Guard Post	F.L.+3.0m
Garbage Depository	Top of slanted roof: F.L.+3.05m
Existing Market (not changed)	Eaves height: F.L.+3.6m

(4) **Structure Plan**

1) Design Conditions

The structure design norm of Japan shall be applied. The external force is as follows: The seismic force (standard shearing force coefficient) shall be 0.05. The wind pressure is as follows: The maximum wind velocity in Zanzibar is about 10m/s on average and about 16m/s at the maximum. The design ground proof strength shall be set to 10kN/m^2 based on the results of the geotechnical survey.

2) Types of structure

The foundation structure shall be a spread foundation in view of the scope of the planned facility and the geotechnical conditions of the site. Depending on the building form and load

conditions, the fish market building shall have independent footing and the others continuous footing. The section with the water receiving tank in the annex building shall have a mat foundation and footing foundation.

The alternatives to the superstructure are a steel frame structure, reinforced concrete block structure, and reinforced concrete structure. A wooden structure is excluded from the examination because it is inferior in maintenance and management and fire resistance. Since the market area of the fish market building shall have a structure consisting mainly of pillars with relatively large spans and few walls, it shall be a steel frame structure or a reinforced concrete structure. The lower part of the building, to which salt adheres due to salt breezes, shall be a reinforced structure in consideration of rust prevention. Concrete has high design flexibility to easily create an appearance that harmonizes with the landscape of masonry structures in Stone Town. However, the hip roof on the top, to which salt is less likely to adhere, shall be a steel frame structure because it is lighter and more advantageous in terms of construction time and cost.

Other facilities, which have a small-scale common form with walls, shall be a reinforced concrete block wall structure which is more economical.

Table 2-8 : Examination of Structure Types

Structure type	Durability and maintainability	Rust prevention	Support of large span	Cost	Construction period	Harmony with landscape area design	Examination result
Steel frame structure	△	△	◎	△	○	△	Applied to roofs where salt damage is less likely
Reinforced concrete block wall structure	○	◎	×	○	△	◎	Applied to small buildings
Reinforced concrete structure	○	◎	○	△	△	◎	Applied to the fish market building and the elevated water tank tower

(5) **Mechanical and Electric Plans**

1) Wastewater treatment facilities

Gray water from the washing of the floors of the auction hall, Dagaa trading hall (cum mobile fish retail area) shall be treated in a general septic tank (for anaerobic treatment) after debris and scales have been removed in the pits equipped with scale net and the supernatant in the tank shall be discharged into the public sewage system near the boundary of the project site.

The wastewater from the fish processing area and the fish retail area with fixed stalls shall be treated in a septic tank (equipped with aeration facilities) and the supernatant in the tank shall be discharged into the public sewage system as mentioned above. The BOD figure of 50mg/L is set for the quality of discharged water in accordance with the instruction by ZMC.

Rainwater on the roof and within the premises shall be discharged appropriately in the water area in front of the site via storm water inlets equipped with sand pits.

2) Water Supply System

The pressure of tap water supplied by the Zanzibar Water Authority (ZAWA) was found to be 4kgf/c^{m2} as a result of a water pressure test at the site, which is insufficient for a direct water supply system. Therefore, a water receiving tank and an elevated water tank shall be installed. The water receiving tank shall be installed underground in the annex building and store the amount of water used in one day. As described earlier, the elevated water tank shall be a 3m^2 FRP tank installed at a height of about 8.4m from the design ground surface. In consideration of salt damage, no pipes made of brass or other susceptible materials shall be used.

3) Rainwater Catchment Tank

A constant amount of rainwater is expected in the rainy season in Zanzibar. Therefore, it is planned to collect rainwater from the roof surface into the storage tanks installed on the second-floor balcony and then transfer it without power (by a gravity-based system) to the first floor for use as part of the floor washing water. Since the catchment area is equal to the 1,344m^2 roof area (hip roof + monitor top), the amount of water available each month was calculated based on the average monthly rainfall. Since the amount of floor washing water to be used is estimated at 7.5m^3/day, the use of rainwater will save about 886m^3 per year. One 4m^3 storage tank shall be installed on each side of the building.

Table 2-9 : Amount of Rainwater Available for Floor Washing

	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	/ Year
Average monthly rainfall (mm)	49	41	47	90	207	156	75	74	136	388	241	60	1,564
Captured rain water (m^3)	65.9	55.1	63.2	121.0	278.2	209.7	100.8	99.5	182.8	521.5	323.9	80.6	2,102.0
Water usage for floor washing (m^3)	232.5	210.0	232.5	225.0	232.5	225.0	232.5	232.5	225.0	232.5	225.0	232.5	1,955.4
Required Tap Water(m^3)	166.6	154.9	169.3	104.0	fully covered	15.3	131.7	133.0	42.2	fully covered	fully covered	151.9	1,069.1

* Any rainwater that exceeds the storage tank capacity will overflow and drain away.

Since the water in the front sea area is contaminated, seawater shall not be used as a policy.

4) Electrical Equipment

Electrical power to the project site shall be supplied from the public power grid system. The local power distribution system is a three-phase four-wire 400V/50Hz system. The power shall come from a power transformer substation located on the port side about 350m away along the road in front of the site, through cables to be installed underground by Zanzibar Electricity Corporation (ZECO) along the road to the site and via an outdoor-type transformer to be installed in the southeastern corner of the site. The construction up to the installed transformer shall be covered by the Zanzibar side and the laying of the lead-in wires from the transformer

by the Japanese side. Lead-in wires from the said transformer are also planned for improvement of the existing fish market facilities.

The tenant stores on the first floor, fee collector's office, subcontractor's office, and existing fish market (sundry stores and cold storage) shall adopt individual payment using prepaid meter system.

The electrical equipment currently planned includes lights, wall outlets, and a public address system. Assuming that lighting is basically provided by natural light, the minimum required amount of electrical lights shall be installed. The light fixtures and pipe materials shall be selected in consideration of salt damage to facilitate maintenance.

The main light fixtures shall be LED type to reduce maintenance tasks and costs. Street lamps outdoors shall be installed at nine places along the landing quay and the site circumference for the sake of early morning and after-dark operations and for crime prevention. The light fixtures indoors shall have the illuminance shown in the table below in line with the current conditions. In the fish market building where operations start from before dawn, lights shall be installed but only the minimum required illuminance shall be provided in line with the current conditions.

Table 2-10： Designed Indoor Illuminance

Offices & general areas	Approx. 300Lux
Toilets, storages	Approx. 150Lux
Market area	Approx. 50Lux

Table 2-11：Planned power consumption of various installations/equipment

Type of installation/equipment	Power consumption (kW)
Lighting	10.31
Power outlets	36.20
Water supply and drainage	4.43
Ventilation	1.40
Air conditioning	28.60
Ice making machine	15.00
Others	0.50
Total	96.44

The adoption of LED lights is expected to reduce power consumption as shown in the table below. Although no big difference is made in consideration of the costs for replacing the lighting fixtures, it is expected to contribute to the reduction of maintenance in total because the replacement of electrical bulbs will no longer be necessary and LED lights have a high resistance against fluctuations in voltage.

Table 2-12 : Comparison of Power Consumption of LED Lights and Ordinary* Lights

	Capacity (kW)	Annual power consumption(kWh)	Annual power charge	Bulb life (hours)	Bulb & fitting replacement cost (annual amount)
LED lighting	7.9KWh	19,559KWh/year	Tsh 4,166,000 ($2,600)	32,000h	$6,400/year
Ordinary lighting*	36.7KWh	95,893KWh/year	Tsh 20,425,000 ($12,800)	4,200h	$5,200/year

*Fluorescent lamps for offices, mercury lamps for exterior

The public address system shall consist of four loudspeakers installed on the ground floor and an amplifier installed in the maintenance office on the first floor to control them.

The telephone and LAN plan shall cover only the wiring conduits and the lead-in work shall be done at the expense of the Zanzibar side. The annex building shall have a switchboard for connection to an emergency generator.

5) Air-conditioning and Ventilation Equipment

The market area open to the outside air shall use natural ventilation. Having a hot and humid climate in Zanzibar, public and private offices are generally air-conditioned. Therefore, air-conditioning equipment shall be provided in the offices. The air-conditioners shall be of separate type with automatic voltage switcher (AVS) following a common local practice against voltage fluctuations. The first-floor waiting room, which is a space open to the outside air, shall have ceiling fans. Apart from them, the toilets, generator room, and maintenance deck above the ice making space shall have exhaust fans.

6) Disaster Prevention Equipment

The lightning protection equipment shall be the protruding needle type, which is more cost-efficient than the raised conductor type. The lightning rod shall be installed on the elevated water tank tower to protect the fish market building and the annex building.

As for the fire-extinguishing equipment, powder-type fire extinguishers shall be arranged on the ground and first floors of the fish market building and in the annex building.

(6) **Construction Material Planning**

The internal and external finish shall be planned suitable for the natural conditions on the site according to the following policies:

- The internal and external finish can be made and repaired by the local work force.
- The finish can be easily cleaned and washed to keep it in a good sanitary state and will require as little maintenance as possible.
- The finish shall have a high durability that suits the natural conditions of the local site such as a hot and humid climate, a lot of precipitation, and salt damage.

· Materials compatible with the land conservation and maintenance policies of STCDA shall be selected.
· The color plan shall provide an appearance compatible with the perspective renderings.

1) External Finish Schedule

External finish planning of each facility is shown in the table below.

Table 2-13 : External Finish Schedule of Each Facility

A. Market Building		
1. Roof	Sloped Roof	:Profiled colored alu-zinc alloy steel sheet
	Flat slab	:Asphalt membrane waterproofing + concrete cover
	Lean-to Roof	:Cray tile roofing
2. Ceiling, Eaves	E.P. on Cement mortar steel trowel finish(S.T.)	
3. Wall, Column, Girder	Multi layered mastic coating	
4. Skirting	Cement mortar with steel trowel finish(S.T.)	
5. Floor	Cement mortar S.T. on slab	
B. Annex Building		
1. Roof	Flat slab	:Asphalt membrane waterproofing + concrete cover
	Lean-to Roof	:Cray tile roofing
	Roof of tower	:Waterproof cement mortar S.T. on slab
2. Ceiling, Eaves	E.P. on Cement mortar S.T.	
3. Wall, Column, Girder	Multi layered mastic coating	
4. Skirting	Cement mortar S.T.	
C. Guard Post, Garbage Depository		
1. Roof	Waterproof cement mortar S.T. on slab	
2. Ceiling, Eaves	E.P. on Cement mortar S.T.	
3. Wall, Column, Girder	Multi layered mastic coating	
4. Skirting	Cement mortar S.T.	

*EP: Synthetic resin emulsion paint

2) Openings and Ventilation Screens

In the buildings in the old city area of Stone Town, hinged windows and doors with wooden frames are common. This project shall adopt aluminum sashes and wooden doors in principle because the openings of this site, being a seaside facility, are susceptible to salt damage and airtightness is required for air-conditioning. The sashes shall have the appearance of wooden frames according to the directions from STCDA, so wooden frames shall be installed around the sashes in consideration of the landscape. Furthermore, the ventilation screens to be provided in areas open to the outside air and the initial rise part of the balcony handrails shall be precast concrete screen blocks with traditional Islamic patterns, which are commonly used in the old city area.

3) Internal Finish Schedule

Internal finish planning of each facility is shown in the table below.

Table 2-14 : internal Finish Schedule of Each Facility

Building	Room	Floor	Skirting	Wall	Ceiling
Market Building	Auction hall, Dagaa trading hall Fish Processing area, Fish retail area, Circulation and loading space	A-3	B-1	B-2	C-3 (partially C-2)
	Area for ice plant & storage	A-3	B-1	B-2	C-3
	Electricity room	A-2	B-1	B-2	C-3
	Equipment Storage	A-3	B-1	B-2	C-3
	Offices & Meeting room	A-1	B-3	B-2	C-1
	Store & Archives	A-1	B-3	B-2	
	Canteen & Waiting Space	A-1	B-3	B-2	C-1
	Shops	A-1	B-3	B-2	―
	Toilets for staff	A-1	―	top:B-3 bottom:B-2	C-2
	Circulation space	A-2	B-3	B-2	C-3
Annex Building	Public toilettes	A-1	―	top:B-3 bottom:B-2	C-3
	Management room	A-1	B-3	B-2	C-3
	Generator room	A-2	B-1	B-2	C-3
	Pump room	A-2	B-1	B-2	C-3
Guard Post		A-1	B-3	B-2	C-3
Garbage Depository		A-2	B-1	B-2	C-3

Symbol		
	Floor	A-1 : Vitreous Tile
		A-2 : Cement mortar with steel trowel finish
		A-3 : Nonskid floor coating
	Wall, Skirting	B-1 : Cement mortar with steel trowel finish
		B-2 : Synthetic resin emulsion paint
		B-3 : Vitreous Tile
		B-4 : Multi layered mastic coating
	Ceiling	C-1 : Acoustic absorption panel
		C-2 : E.P. on cement board
		C-3 : E.P. on Cement mortar S.T.

2-2-2-4 Civil Engineering Facilities

(1) **Overall Plan**

1) Shape, size and length of the landing quay

As the users appreciated that the quay before collapsed had been easy to use, the shape of the new quay should basically be the same as that of the collapsed quay, which was a slope, but the new quay should be gentle-sloping so that it will not be affected by major changes in the tide level. Also, it should be equipped with a platform with a high levee crown to make it approachable by fishing boats even at high tide.

The length of the quay should be almost the same as that of the collapsed one.

- Approximate length: 78.8m (= Straight part (about 50m)＋Arc part (28.8m))
- Target fishing boats: Large wooden purse seiners
  (average boat type: Length 14m x Width 4.5m x Draft 1.6m)

As shown in the diagram below, the number of fishing boats is ten that can simultaneously use the quay connecting the provisional dredging area for mobile platforms for the sheet piling work. This is the same number of large wooden fishing boats simultaneously using the quay confirmed in the field survey.

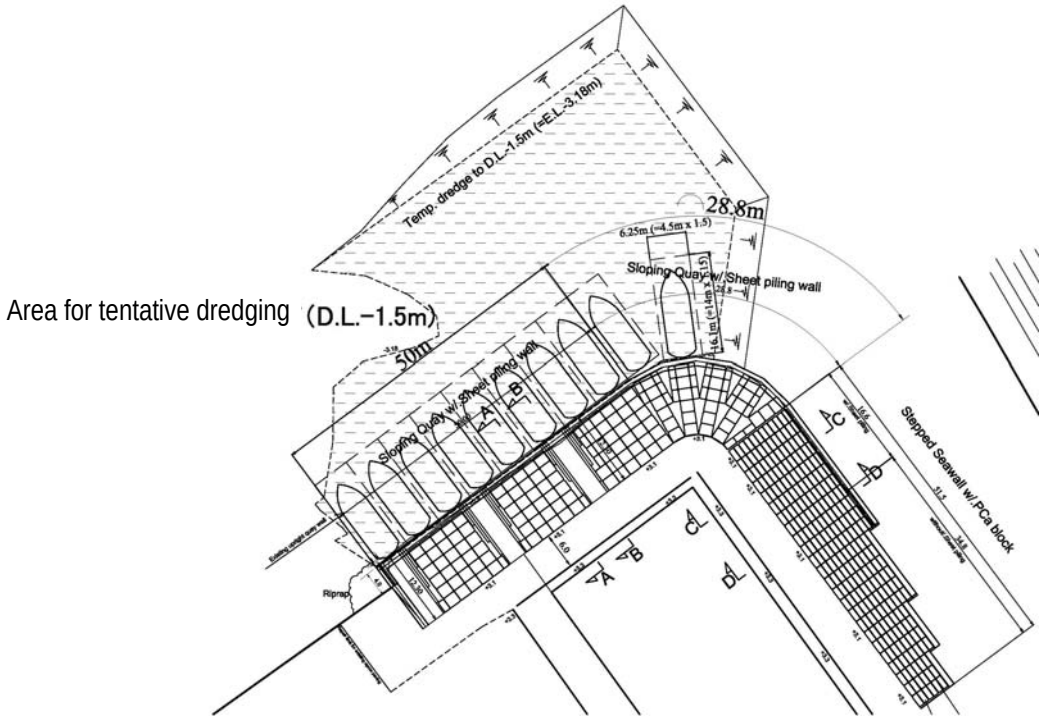


Figure 2-12：Number of Fishing Boats Simultaneously Using the Quay

① Water Depth

Based on the nautical chart, it is estimated that the water depth at the front of the port in the

1920s, when the port was built, was D. L. -3.0m at most. The current water depth has been reduced to D.L. +0.3-1.0m when the spring tide is at low tide, resulting from sand sedimentation for more than 80 years and the collapse of the quay.

On the other hand, ZPC plans to increase the water depth of the anchorage within the port to -3 to -4m in accordance with the rehabilitation of the existing quay that almost collapsed due to excessive dredging of the area in front of the quay in the Dow Harbor (reconstructed to a sheet piling wall quay by bringing the normal line forward) and the second extension plan for a slipway (plan to extend the slipway by 40m and make the tipped part deeper, allowing for the slipway of deeper draft vessels).

Considering the current conditions, there is concern that maintenance dredging may not be carried out appropriately. Therefore, dredging within the port may not be appropriate in the project. However, as it is highly likely that rehabilitation of the existing quay will be carried out in the future in accordance with the economic development of Zanzibar, it is necessary to ensure t the water depth at least -3m for the safety of the quay structure in the project so that the quay will not collapse even if dredging will be carried out or it will not hamper construction work for future port expansion and development.

Based on the considerations above, the water depth at the front should be C.D.L -1.5m as the tentative planned water depth determined in consideration of the current water depth. With respect to the structure of the quay wall, it should be designed by assuming that the planned water depth in the future will be C.D. L. -3.5m in the future dredging plan of ZPC.

② Normal lines of the landing quay

Since discussions with the Engineering Department of ZPC revealed that the normal line of the adjacent quay that is scheduled to be repaired in the future will be brought 4-5m forward from the normal line of the existing quay, it was confirmed that there is no problem in bringing the normal front line of the quay in this project 4-5m forward from the current quay.

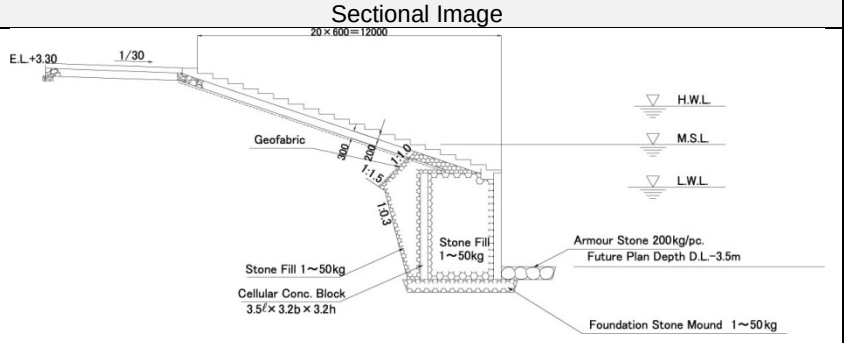
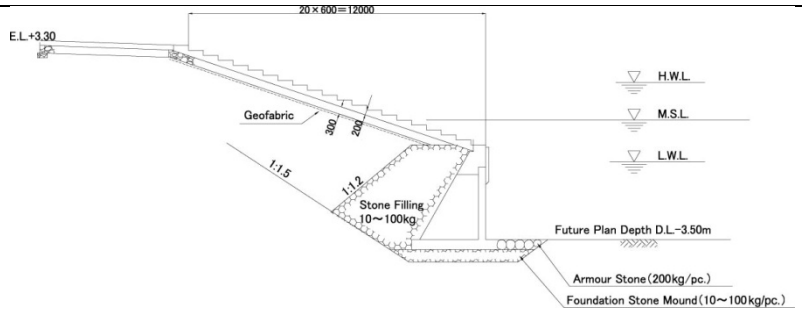
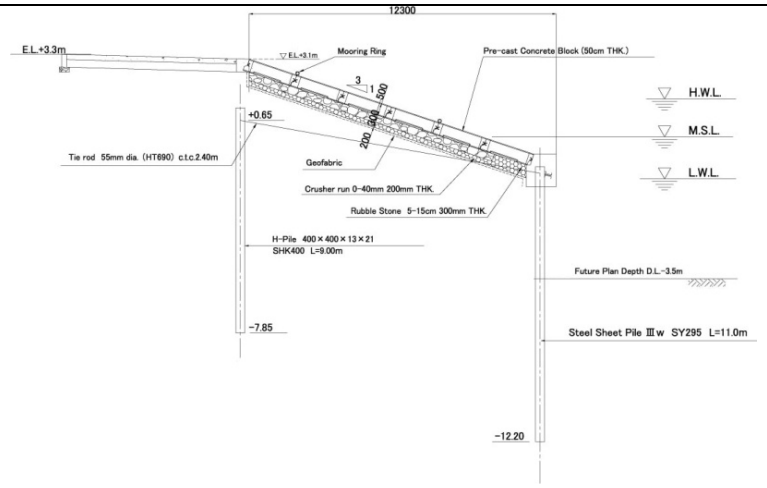
In this project, the normal front line will be set at a position 4m forward from the adjacent quay.

(2) **Section and Structure Plan**

1) Structure type of the quay wall

With respect to the structure of the quay wall, as the ground consists of compacted high quality sand, both the gravity type that uses concrete blocks, cellular blocks or L-shaped blocks and the steel sheet piling type are applicable. However, since the gravity type requires extensive excavation of the levee body to reach the planned water depth in the future in order to construct the front wall structure, it was determined that the use of sheet piling is the most economical to construct the planned quay section at the tentatively planned water depth.

Table 2-15 : Comparison of Quay Wall Structure Type

Type of Structure	Sectional Image
Gravity Type Cellular Concrete Block Concrete Volume : Mid. Gravel Volume : Large Steel Volume : Mid. Technical difficulty : Mid. Construction period : Long	
Gravity Type L-shape Concrete Block Concrete Volume : Mid. Gravel Volume : Large Steel Volume : Mid. Technical difficulty : Mid. Construction period : Long	
Counterforted Steel Sheet Piling Concrete Volume : Small Gravel Volume : Small Steel Volume : Mid. Technical difficulty : Low Construction period : Short	

2) Structure of the apron part

Because of the need to carry out civil engineering works on the adjacent site while utilizing the existing landing area, it will be necessary to complete the work at the waterfront construction position as soon as possible to avoid danger to fishing boats using the quay and users. Also, as construction work is scheduled to be carried out on the land site after the completion of the civil engineering works on the quay and the seawall, it will be necessary to shorten the period of the civil engineering works as much as possible to secure the necessary construction period for buildings.

In view of these circumstances, the gentle sloping apron part should be covered with precast concrete blocks, which require a shorter construction period.

(3) **Design Conditions**

1) Standards conformity

Design of the landing quay and seawall will be based on the following standards.

- Fish Port and Fisheries Facilities Planning Manual (2009) National Fisheries Association, Japan
- Technical Standards and Commentaries for Port and Harbour Facilities in Japan (2007), Japan Port and Harbour Association
- Technical Standards and Commentaries for Coastal Protection Facilities (2004), The Study Group of Coastal Protection Facilities

2) Planning conditions and usage conditions

① Planning conditions

Table 2-16： Planning conditions

	Landing Quay	**Seawall**
Planned water depth Tentative Future (Design water depth)	 D.L.-1.50m(=E.L.-3.58m) D.L.-3.50m(=E.L.-5.58m)	 Adjusted to the existing sea bed （L.W.L.～H.W.L.） （≒D.L.＋0.50m～＋3.50m）
Planned crown height Apron Revetment	 D.L.+5.18m(=E.L.+3.10m) D.L.+2.78m(=E.L.+0.70m)	 D.L.+5.18m(=E.L.+3.10m) D.L.+ 2.78m～3.28m (=E.L.+0.70～E.L+1.20m)
Total length	Total 78.8m Straight part (50.0m) ＋Round part (28.8m)	Total 51.5m Part with sheet piles (16.6m) ＋Part without sheet piles (34.8m)
Apron width	12.3m	12.1m, 10.2m, 8.3m, 6.4m

② Usage conditions

<Target boats using the quay>

Table 2-17：Principal Particulars of target vessels

Type of Boat	Number of boats simultaneously using the quay	Boat length (m)	Boat width (m)	Draft (m)
Large wooden purse seiner (inboard engine)	10	14.0	4.5	1.6
Small wooden fishing vessel (non-powered)	20	3.0～10.0	1.2～2.6	0.3～1.0m

③ Life of structures and corrosion measures

<Life> 50 years

< Corrosion measures> A heavy duty protective coating will be applied and steel sheet pile thickness will be increased.
Coating will be applied to the front of steel sheet piles, from 10cm above the bottom of the superstructure to 1.0m below the sea floor.
Corrosion margin is added for the back surface.

<Corrosion rate> The following general ratings given in the Fish Port and Fisheries Facilities Planning Manual of Japan are applied.

Table 2-18： Standard corrosion ratings for steel materials

Corrosive environment		Corrosion rating (mm/year)	Corrosion amount (mm)
Seaward side	Above H.W.L	0.3	15.0
	H.W.L to L.W.L.-1m	0.2	10.0
	L.W.L.-1m to water depth of 20m	0.15	7.50
	In sea floor mud	0.03	1.50
Landward side	In air	0.1	5.0
	In ground (above residual water level)	0.03	1.5
	In ground (below residual water level)	0.02	1.0

3) Planning conditions and usage conditions

① Tide level

- As shown on Table 1-3.

② Current sea bottom height

- Landing quay D.L. +0.5m～D.L.+1.00m
- Seawall D.L. +0.5m～D.L.+3.50m

③ Soil conditions

Table 2-19 shows the design soil conditions set in accordance with the survey results.

Table 2-19：Design Soil Conditions

Soil condition	Average N value	Unit weight (kN/m^3)	Internal friction angle (degree)	Adhesive force C (kN/m^2)
Sandy soil	20.5	1.8	33	($6N\ kN/m^2$)

④ Design seismic intensity

The biggest of the earthquakes that occurred within a 200km radius of Zanzibar between 1977 and 2012 is one that occurred on January 15, 2005 that measured 5.0 on the Richter scale. The hypocenter was at a depth of 10km, located 18km to the north of Stone Town. Since this earthquake can be regarded as a medium-scale earthquake with level 1 earthquake ground motion as defined by the Japan Society of Civil Engineers, based on the above-mentioned data for the earthquake, the design horizontal seismic intensity is assumed to be 0.1.

4) Main Materials Specifications

① Steel materials

Material	Allowable stress (N/mm^2)
Steel sheet pile (SY295 equivalent)	180
Tie rod (high tensile steel 690)	176 (high tensile steel 690)
Reinforcements (SD345 equivalent)	196(SD345)

② Concrete

Material	Allowable stress
Reinforced concrete σck=24	24 N/mm^2
Unreinforced concrete σck=18	18 N/mm^2

5) Design Load

① Concrete unit weight

- Plain concrete $\gamma c = 22.6 kN/m^3$
- Reinforced concrete $\gamma c = 24.0 kN/m^3$

② Superimposed load

A super-imposed load of 10 kN/m^2 is applied for the landing quay, as given in the the Fish Port and Fisheries Facilities Planning Manual.

(4) **Design Specifications**

1) Landing Quay

- Target fishing boats: Large wooden purse seiners (Average boat type: Length 14m x Width 4.5m x Draft 1.6m) 10 boats simultaneously
- Length: Total 78.8m (=Straight part (about 50m) + Arc part (28.8m))
- Water depth at the front: Tentative planned water depth = C.D.L. -1.5m (Future planned water depth = D.L.- 3.5m)

- Structure type: Tip: Counterfort sheet piling quay
  Apron: Gentle sloping precast concrete block (Gradient = 1/3)

2) Seawall

- Target boats: Small wooden non-powered boats Maximum 20 boats
  (Average boat type: Length 3-10m x Width 1.2-2.6m x Draft 0.3-1.0m)
- Length: Approximately 51.5m (about 2/3 of the total length of the old collapsed seawall)
- Water depth at the front: Same as the current ground (L.W.L.-H.W.L.) (≒D.L.＋0.5m-+3.5m)
- Structure type: Gentle sloping steplike precast concrete block (Gradient = 1/3)

3) Ancillary Facilities

The following ancillary facilities will be necessary for the quay and the seawall.

4) Curbs

To prevent vehicles from falling off the quay, curbs should be installed every 2m on the gentle sloping apron.

5) Mooring rings

Mooring rings should be installed on the gentle sloping apron for the mooring of fishing boats.

Because the tidal range is large and boats will be moored for a short period, the mooring rings should be installed in two steps, that is, for H. W. L. and L. W. L.

6) Pavement

The top of the gentle sloping quay/seawall and the area around the waterfront part of the market building should be paved with concrete blocks. The width of the pavement should be 6m to enable easy delivery of fresh fish in and out of the market by small trucks and handcarts.

2-2-2-5 Equipment Plan

As almost no ice is used for fisheries and fish distribution in Zanzibar, DFD is planning to disseminate the use of ice in fisheries by installing ice making machines at major landing bases. Accordingly, a 3-ton ice making machine will be installed in Malindi. Since it is necessary to introduce cooler boxes in order to promote the use of ice in fisheries, cooling boxes will also be introduced on a pilot scale.

As the seawater around the project site is normally polluted, to handle the catch in a sanitary

manner, it is necessary to ensure that the site is shut off from the surrounding seawater and soil. For this reason, it is essential to procure fish boxes and drain boards to place the catch on for auction. Washing equipment should also be installed to keep the floor and the fish boxes clean.

It is thought that all the retailing of fresh fish in the existing Malindi Fish Market will be transferred to the new facility after the operation of the planned facility begins. Therefore, to promote the use of Malindi Fish Market, measures such as low-temperature storage of catches and sale of frozen products will be needed. Therefore, deep freezers, which are commonly used as stockers in the locality, should be introduced.

As Malindi Landing Facility deals with the largest amount of marine produce in Zanzibar and is a significant base for collecting fishery statistics, weighing scales to measure catches should also be procured.

Such equipment that is locally available and complies with the specifications for durability and other conditions should be procured locally in principle.

(1) **Insulated fish boxes**

In order to promote the use of ice in fisheries, DFD is planning to select five fishing vessels for small pelagic fish and five vessels for demersal fish as model fishing vessels and rent to each of them two insulated fish boxes to encourage the use of ice. The insulated fish boxes should be large enough to store kingfish (*Scomberomorus spp.*) about 100 cm long.

(2) **Fish boxes**

In order to auction the catches in a sanitary manner, plastic fish boxes should be procured. It is assumed that auctions will be carried out simultaneously at six locations and about five batches of sorted marine products will wait to be auctioned at each location. Considering that the fish boxes will be collected after the auction, washed and stored for the next auction, to facilitate the smooth circulation of the boxes, 30 boxes x 3 circulations = 90 boxes plus spare boxes will be needed. Therefore, 100 boxes should be procured in this project.

(3) **Handcarts**

Ten handcarts for transportation of the insulated fish boxes, fish boxes for auctions and other heavy things should be procured. The handcarts should be made of stainless steel as they need to be hygienic and durable enough to handle marine products.

(4) **Deep freezers**

To revitalize the existing Malindi Fish Market, deep freezers should be installed for the purpose of expanding the functions of low-temperature storage of marine products and sale of frozen fish. Judging from the layout plan based on the development plan, eight chest freezers with a capacity of 500-600 liters, which are commonly used in the locality, can be accommodated. As each freezer can store about 300kg, this will enable low temperature storage of about 2.4 tons in total, which accounts for 22% of the expected quantity of marine

products to be handled by the market (11t/day), excluding small pelagic fish.

A 21-day survey of leftovers held by the retailers at Malindi Fish Market revealed that the average quantity of leftovers accounts for 8.0% (63.2% at most) of the quantity handled per day. In terms of the incidence of leftovers, the percentage of leftovers was 24% or less on 87.3% of the surveyed days. Considering that the quantity of catch varies greatly from one day to another, it is deemed appropriate for the market to have a temporary storage capacity of about 2.4t for surplus catch.

(5) **Other equipment necessary for the use and management of the facility**

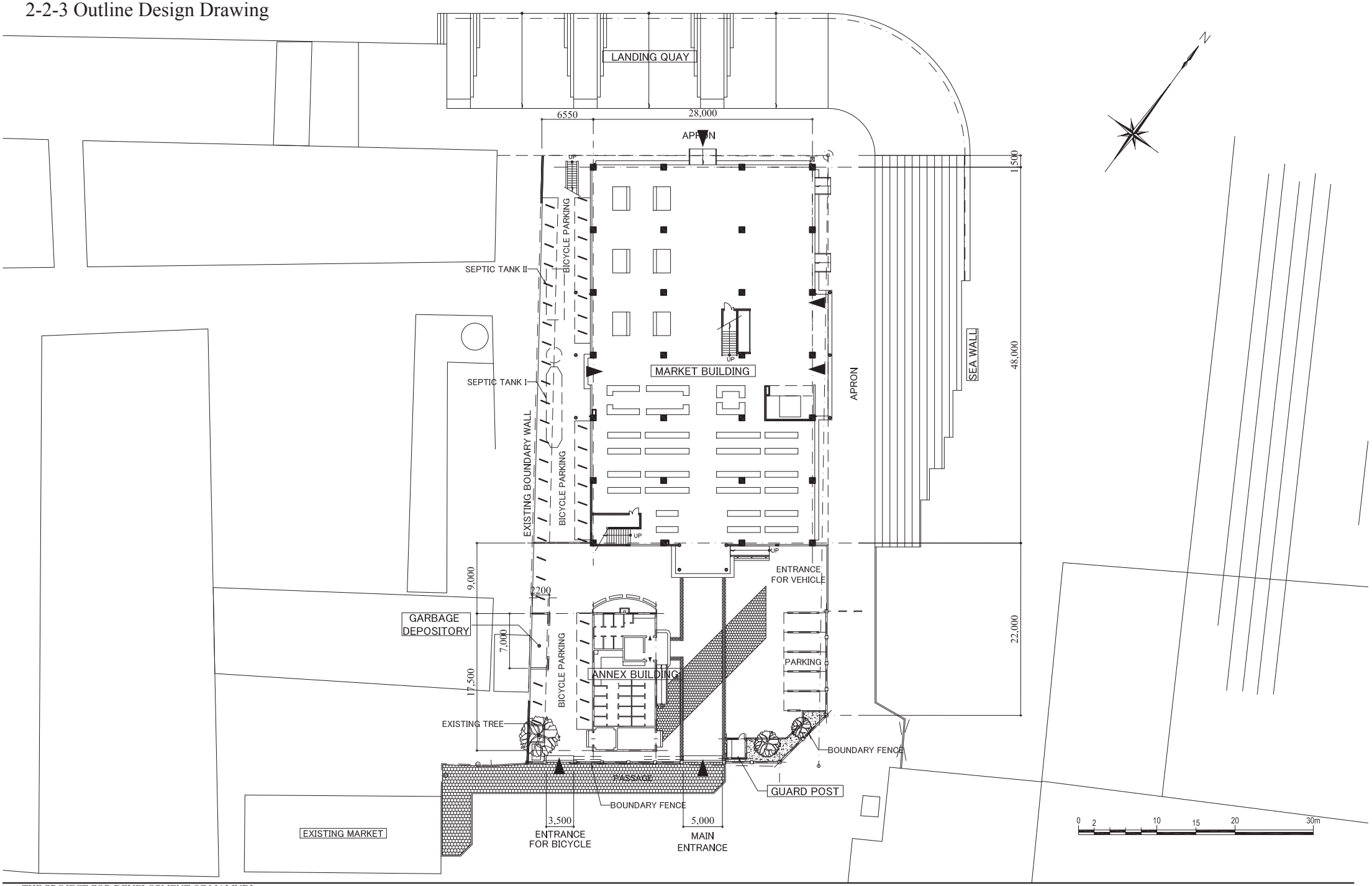
In order to ensure fair auctions and for the necessity of developing statistics, a pair of suspension scales (10kg and 30kg) should be procured for each auction site. In addition, platform scales (250kg) capable of weighing fish with the fish box should also be procured in this project.

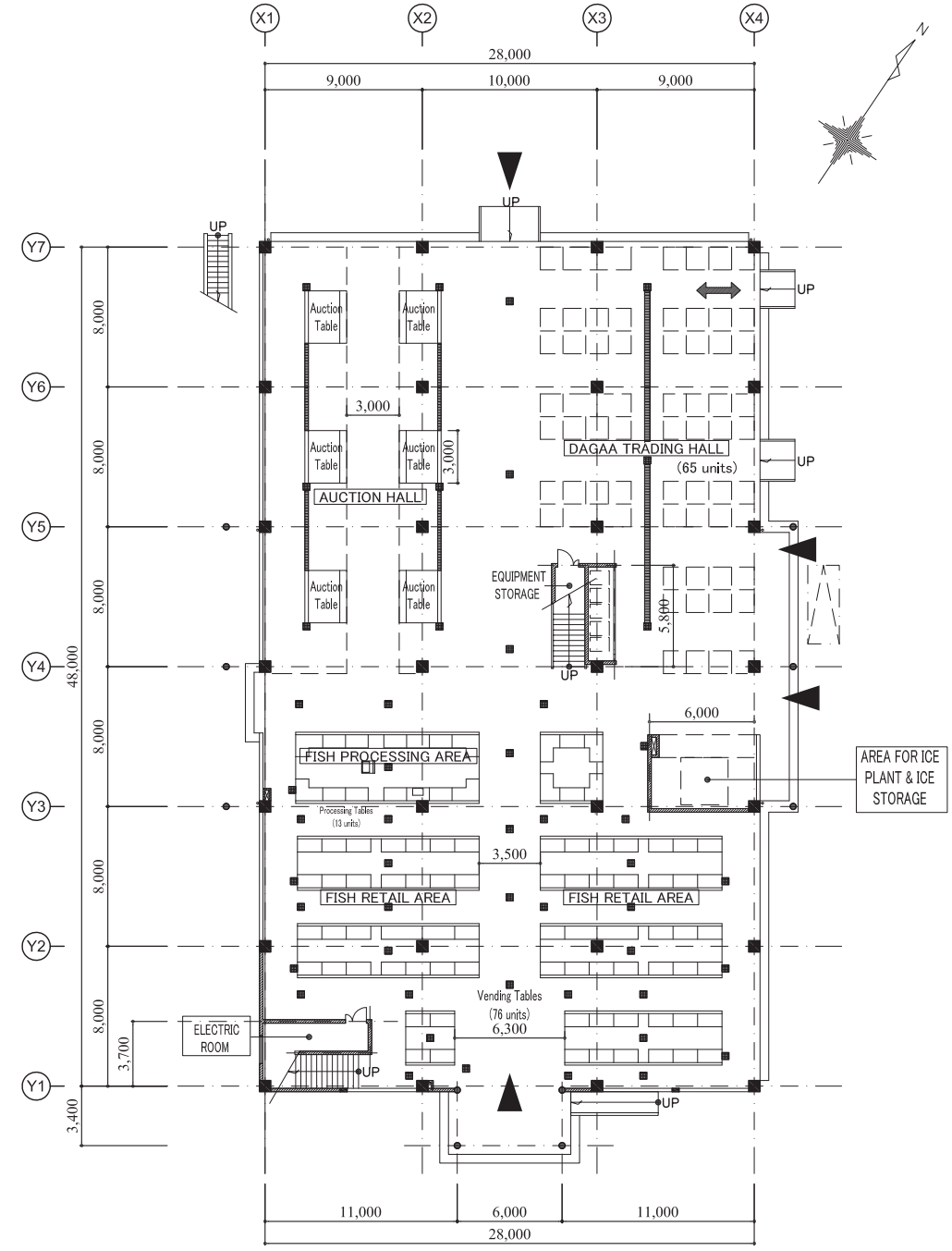
To ensure that the market is in a hygienic condition, it is necessary to procure a high-pressure washer for washing the floor and fish boxes with water and spraying disinfectant solution. It is also necessary to procure wheeled water tanks to prepare and keep chlorine solution and other disinfectant solutions. As large fish such as yellow fin tuna and ray cannot be kept in a fish box, two drain boards should be prepared at each auction site to prevent such fish from directly contacting the floor during auctioning.

Also, in accordance with the policies of the facility construction plan, portable tables, trash boxes and chopping boards should be procured.

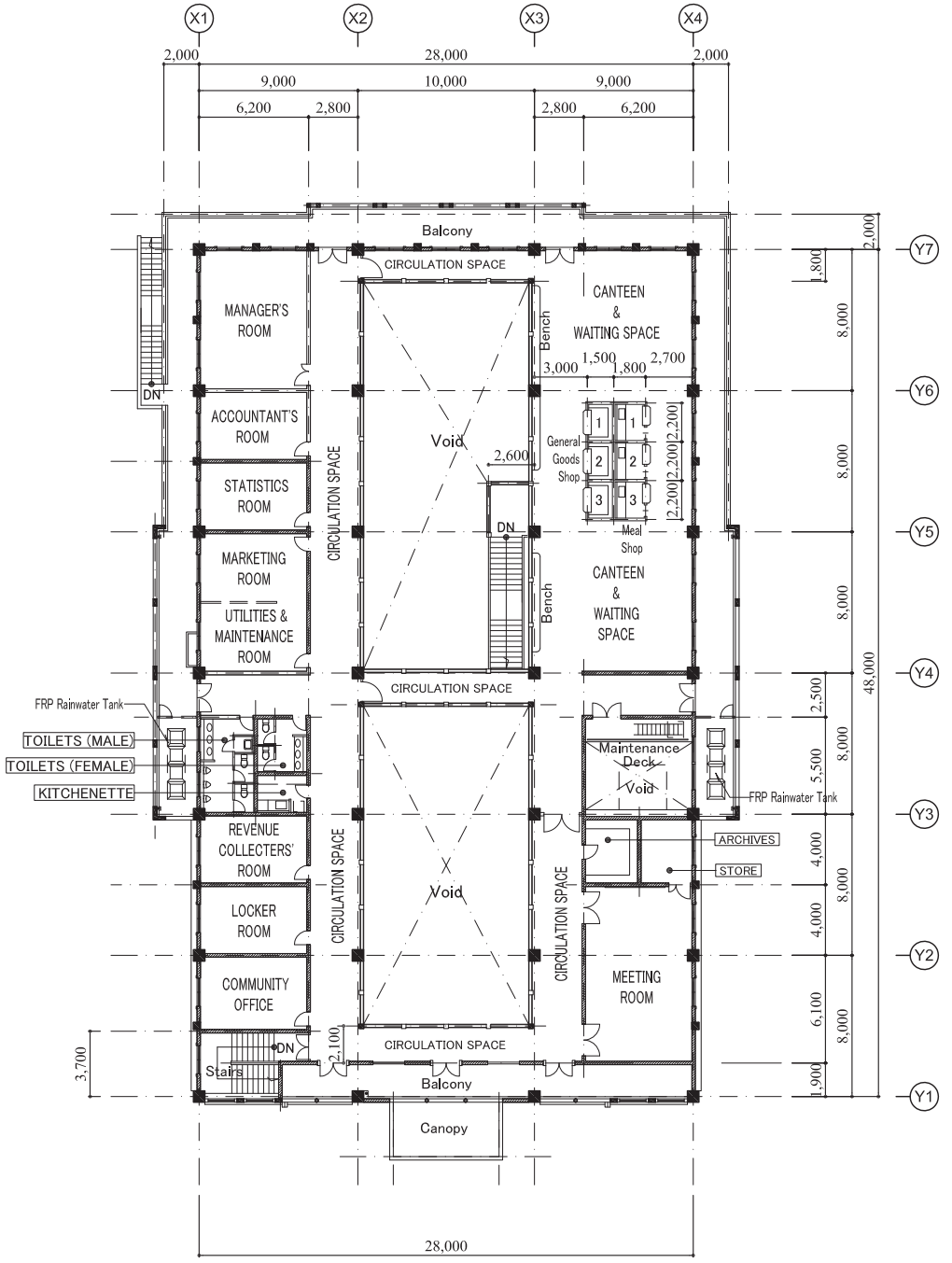
Table 2-20： List of Equipment

Equipment	**Specifications**	**Quantity**
Fish box	PE, 630mmL×400mmW×150mmH, approx. 25littres	100
Insulated fish box	PE, 1,040mmL×510mmW×530mmH, approx. 160 litters	20
Handcart	Stainless steel, 900mmL×600mmW, capacity:500kg	10
Deep freezer	-15^{o}C, approx. 550 litters 230V single phase	8
Suspension dial scales	10kg × 50g, 30kg × 100g	6 each
Platform dial scale	250kg×500g	1
High-pressure washer	Pressure: approx. 19MPa, 230V 50Hz, with hose & nozzle	1
Water tank	PP, 1,340mmL×860mmW×680mmH, approx. 500 litters	2
Drain board	PE, 1,800mmL×600mmW×50mmH	12
Portable table	1,110mmL×810mmW×180mm H	65
Trash box	PE, approx. 120 litters, with casters	15
Chopping board	PE, approx. 900L × 450W × 30mm H	13

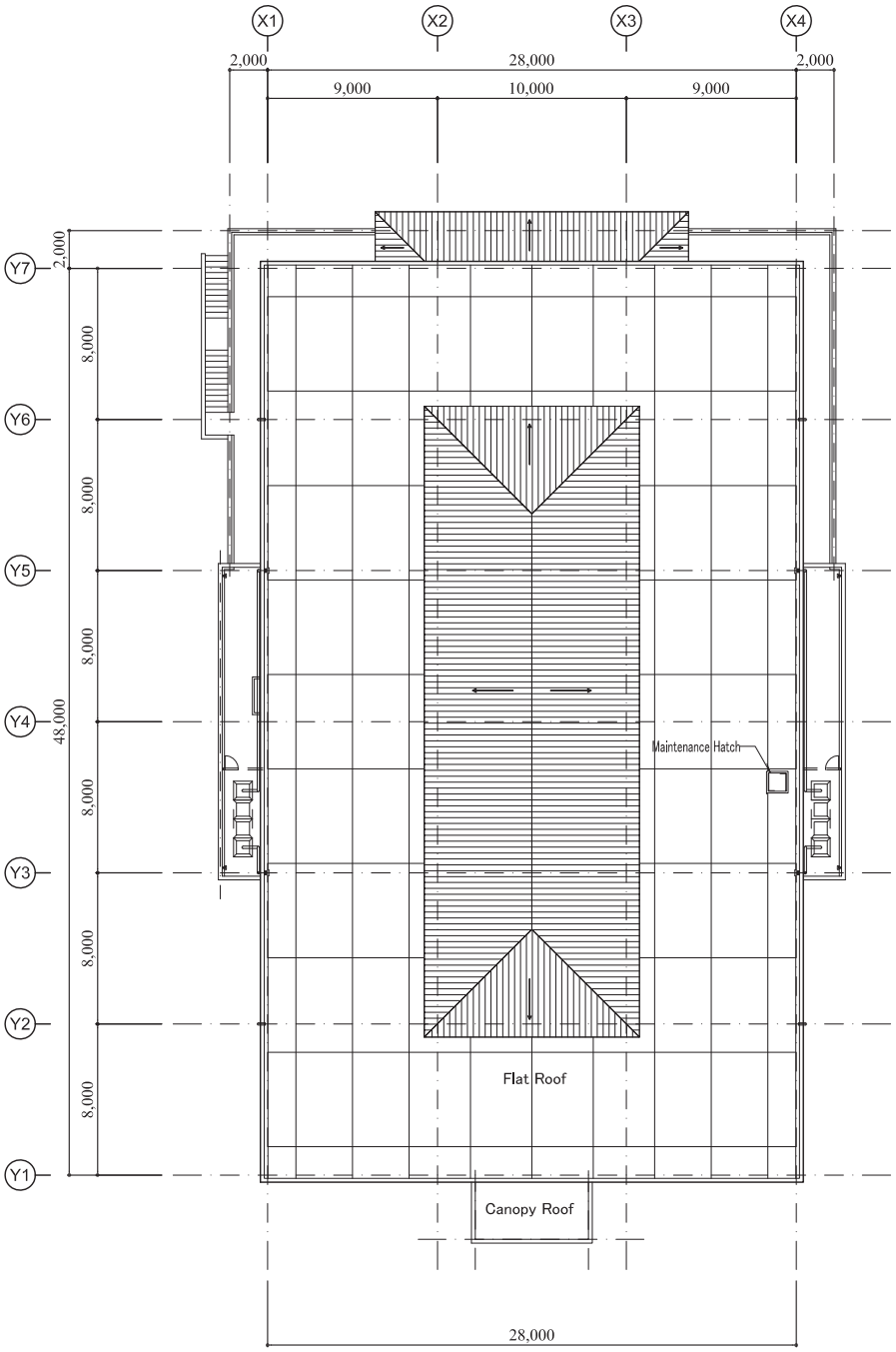

LANDING QUAY
6550
28,000
APRON
11,500
SEPTIC TANK II
BICYCLE PARKING
SEPTIC TANK I
MARKET BUILDING
SEA WALL
48,000
APRON
EXISTING BOUNDARY WALL
BICYCLE PARKING
UP
ENTRANCE FOR VEHICLE
9,000
2200
GARBAGE DEPOSITORY
7,000
17,500
BICYCLE PARKING
ANNEX BUILDING
PARKING
22,000
EXISTING TREE
BOUNDARY FENCE
PASSAGE
GUARD POST
BOUNDARY FENCE
3,500
ENTRANCE FOR BICYCLE
5,000
MAIN ENTRANCE
EXISTING MARKET
0 2 10 15 20 30m



GROUND FLOOR PLAN

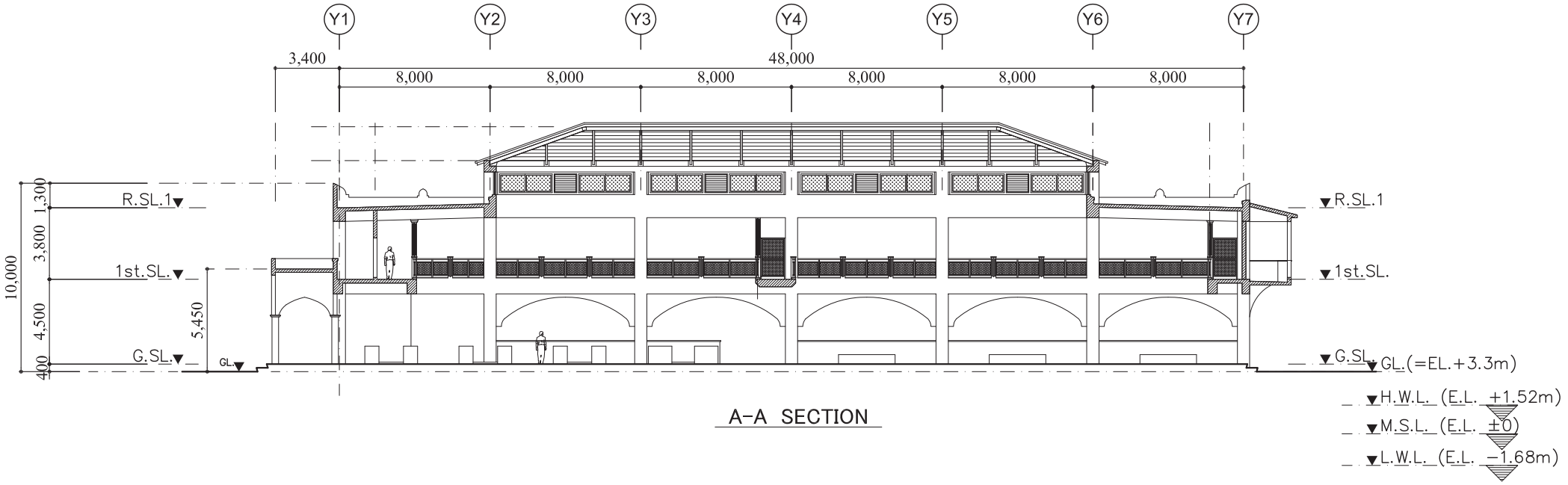


1st FLOOR PLAN



0 2 4 6 8 10 15 20m

ROOF PLAN



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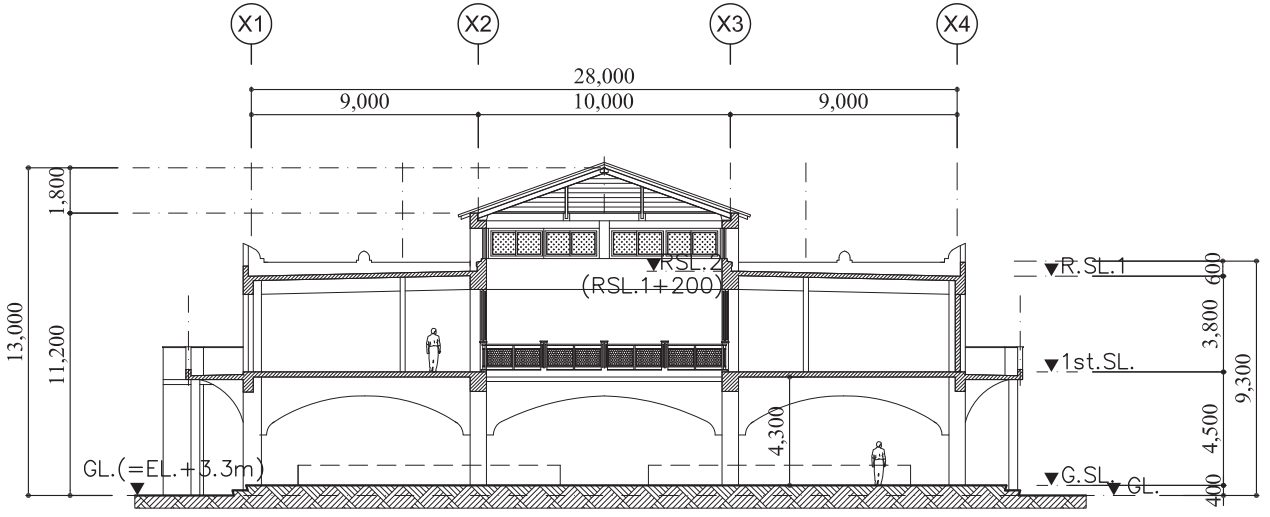
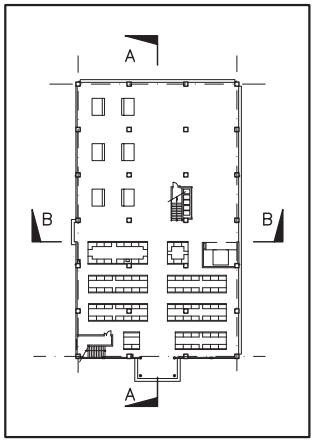
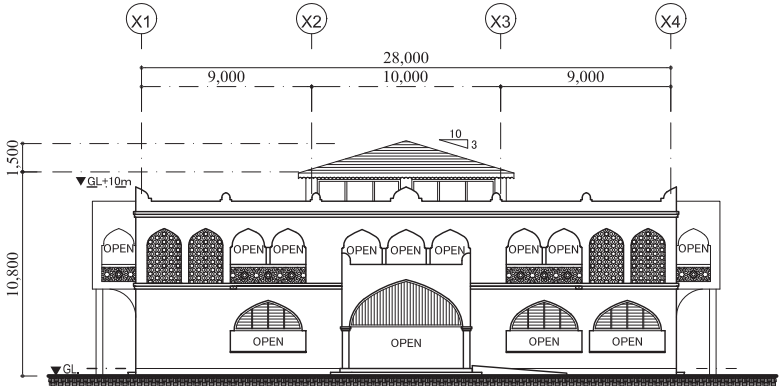


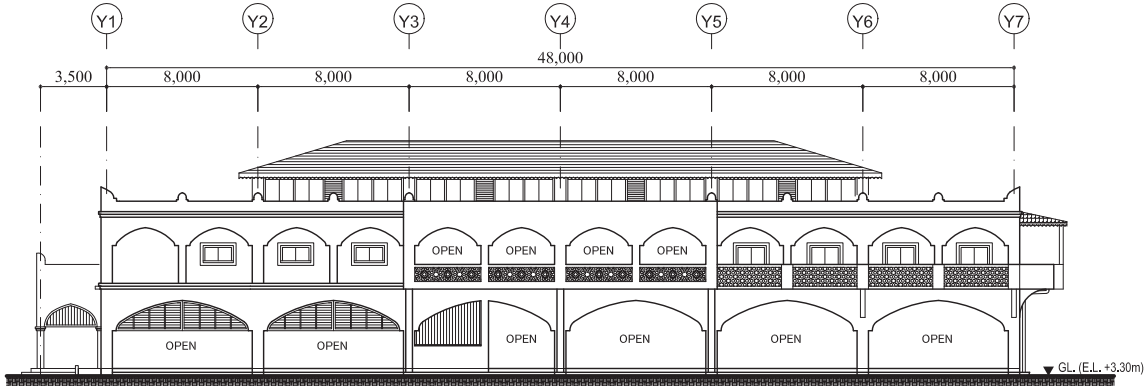
B-B SECTION



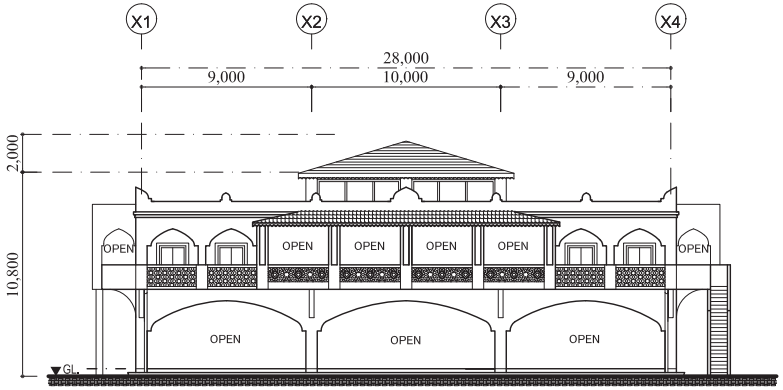
0 2 4 6 8 10 15 20m



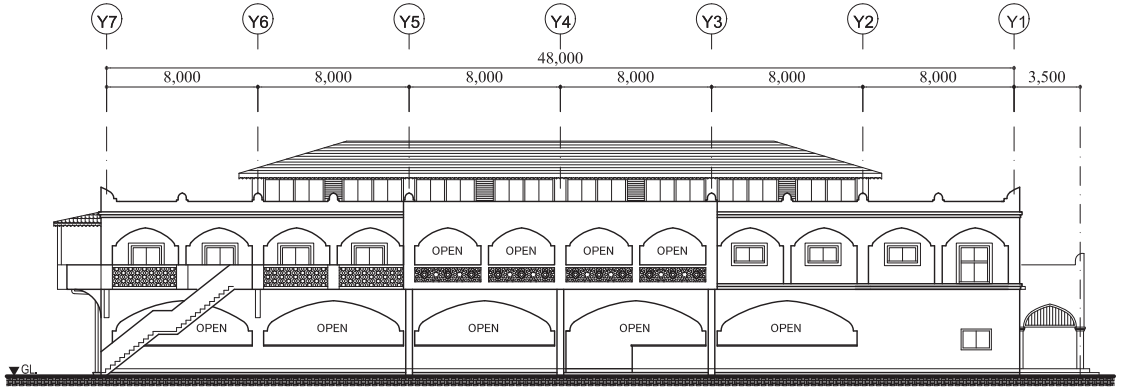
SOUTH ELEVATION



EAST ELEVATION



NORTH ELEVATION



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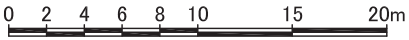
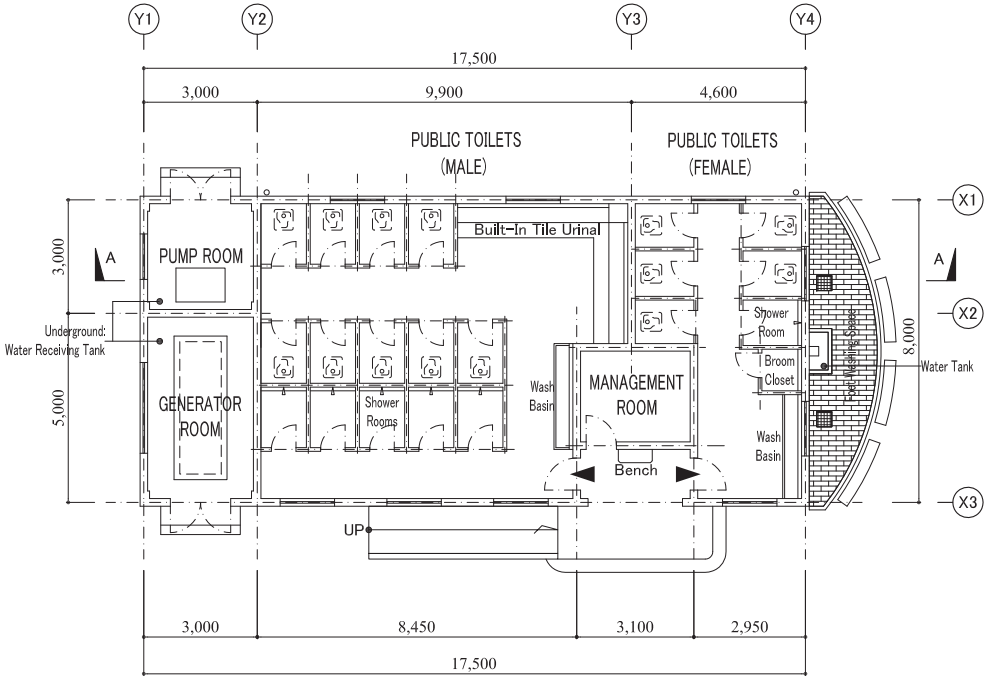
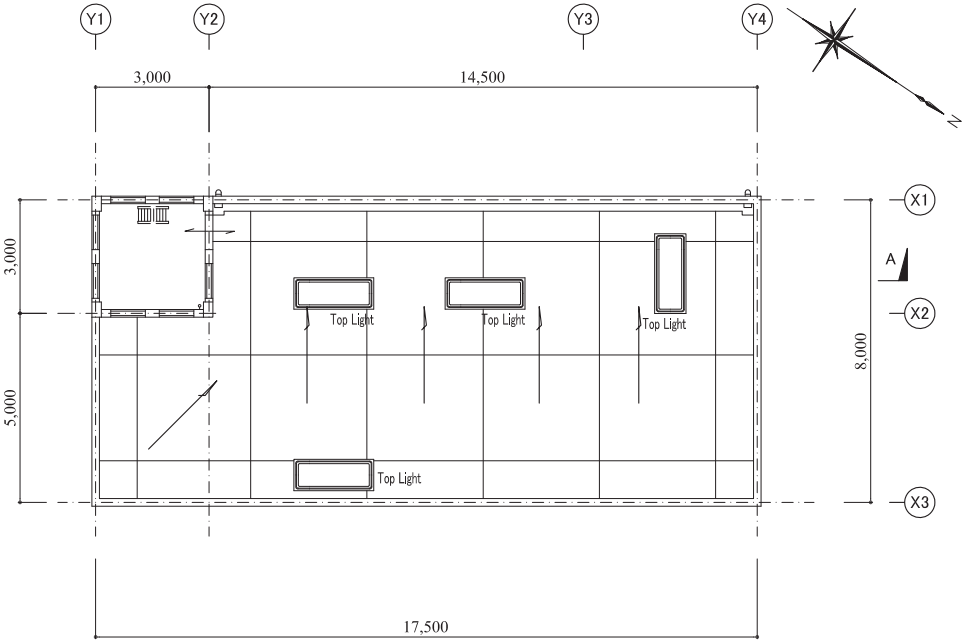
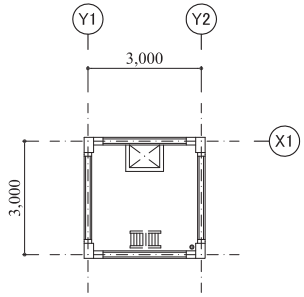




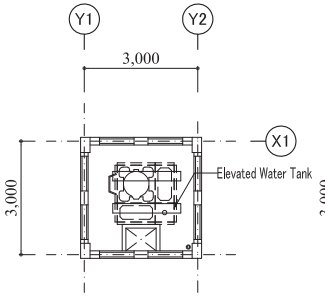
GROUND FLOOR PLAN



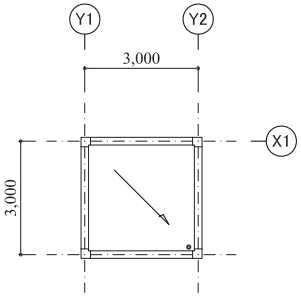
1st. SL. FLOOR & ROOF PLAN



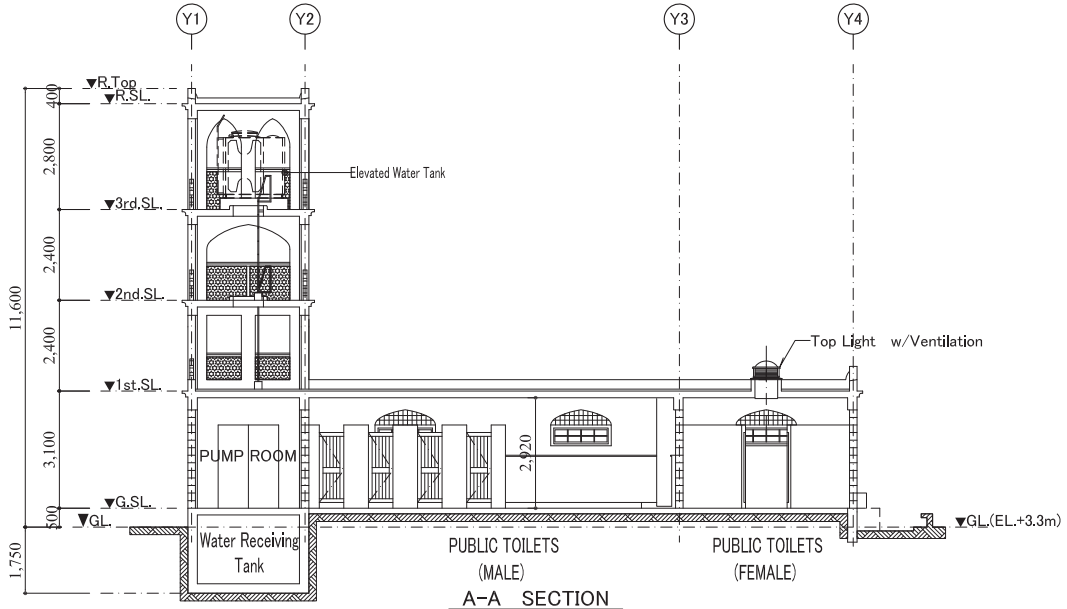
2nd. SL. FLOOR PLAN



3rd. SL. FLOOR PLAN



RSL. FLOOR PLAN



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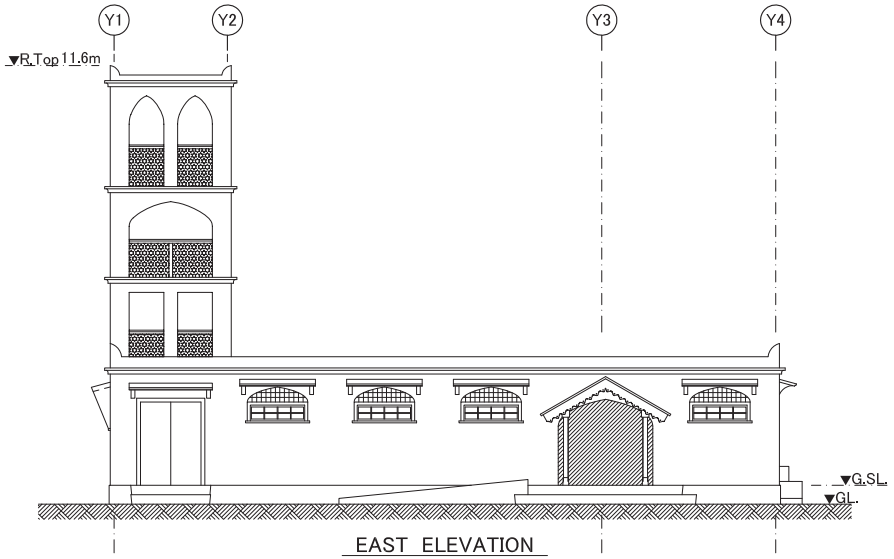

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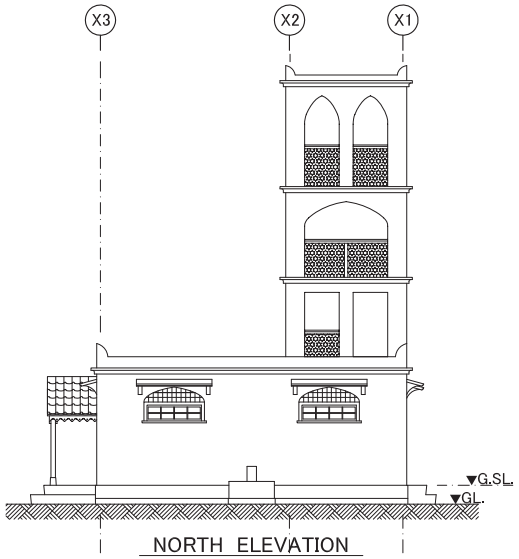
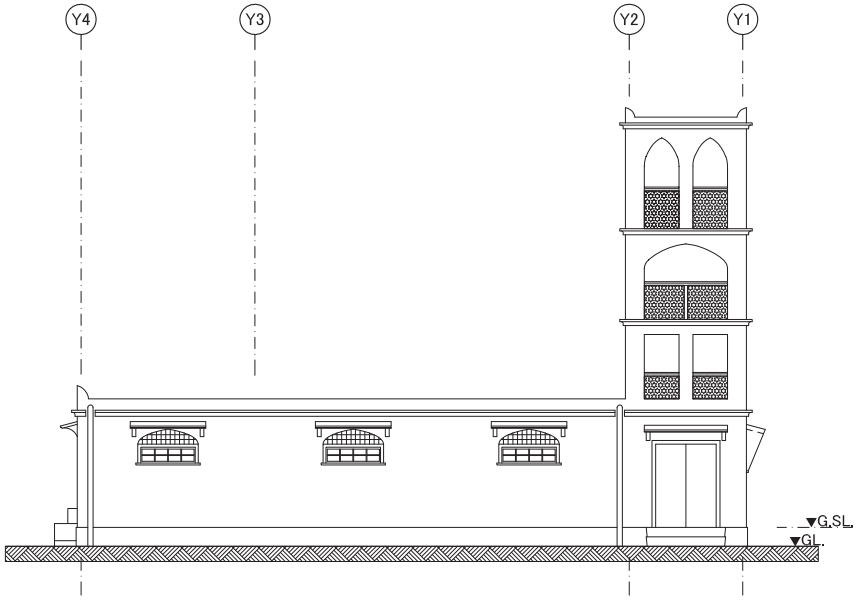


NORTH ELEVATION



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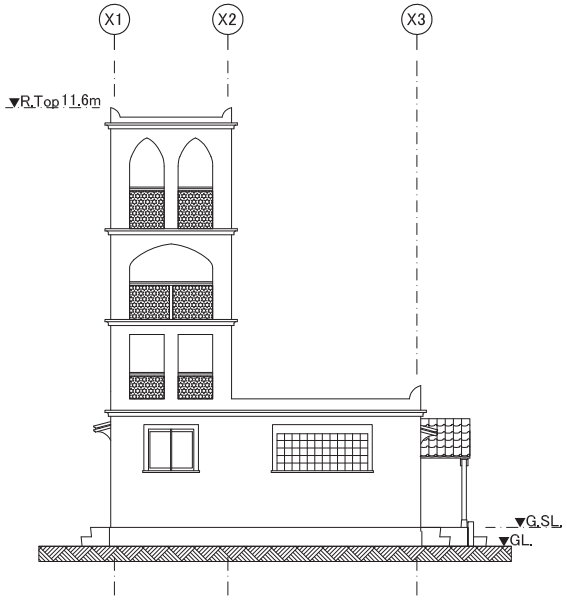
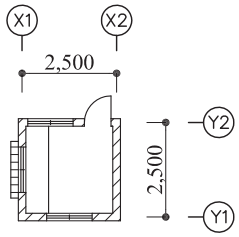
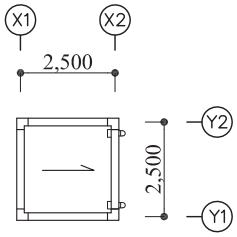


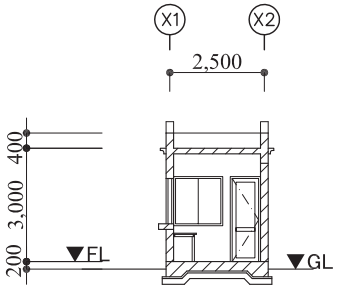
SOUTH ELEVATION



PLAN



ROOF PLAN



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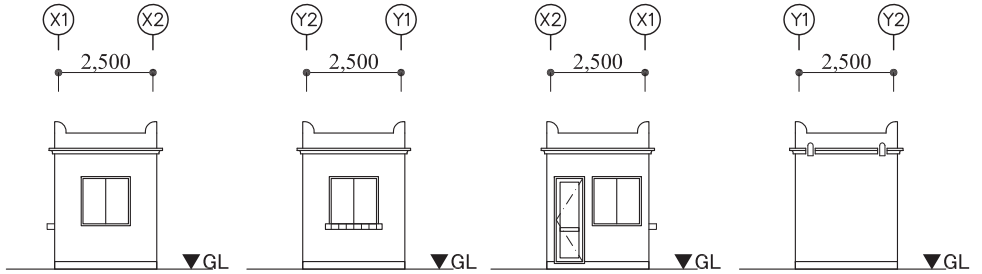
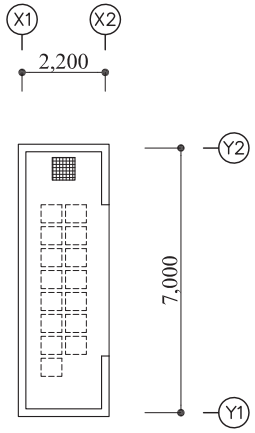


ELEVATIONS

GUARD POST



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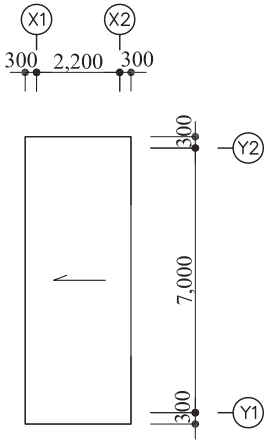

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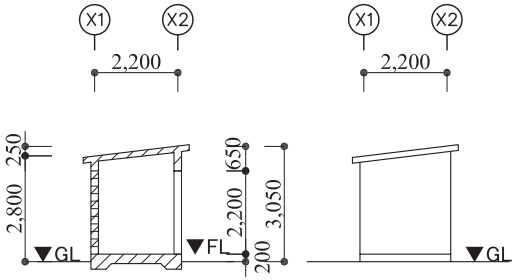

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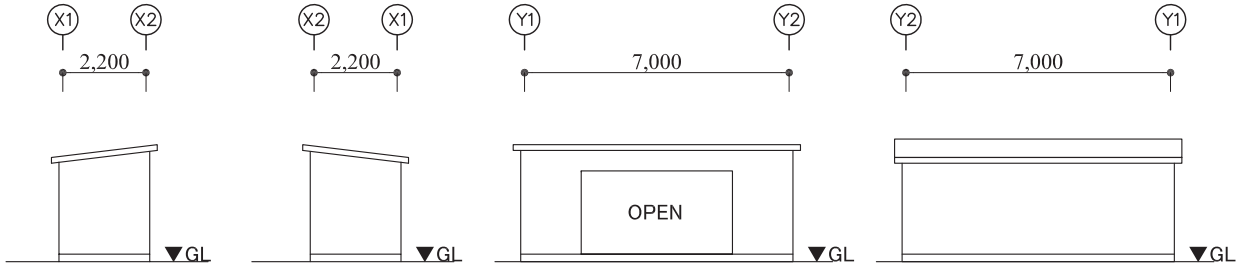


ELEVATIONS

GARBAGE DEPOSITORY

521400m

521500m

Metres 0 5 10 20 30 40 50

9320000m

N

Sloped Landing Quay
(Counterforted Steel Sheet Piling Part)

28.8

Temporary Dredging Area (D.L.-1.5m)

-3.18

Pre-cast Concrete Block

Pre-cast Concrete Block

Mooring Ring

Sloped Landing Quay
(Counterforted Steel Sheet Piling Part)

50.0

A B C D

Platform

Mooring Ring

Existing Upright Quay Wall

Riprap

12.30

Conc. Block Paving
(Civil Eng. Work)

Pre-cast Concrete Block
(Stepped Type)

Existing Paving Repair Limit

Self-supporting SSP part 16.6

Stepped Seawall 51.5

w/o. SSP part 34.8

Mooring Ring

Stone Bitt

Lighting Pole
(Arch. Work)

9319000m

THE PROJECT FOR DEVELOPMENT OF MALINDI FISH LANDING AND MARKETING FACILITIES IN ZANZIBAR

LANDING QUAY / SEA WALL

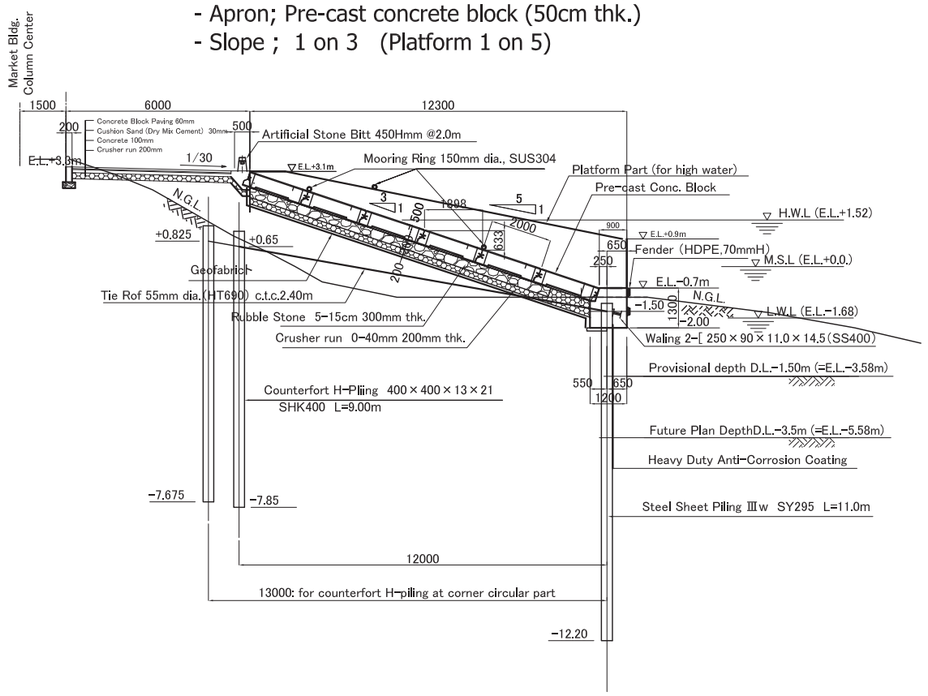
SITE PLAN

C-01

A

Sloped Landing Quay (Counterforted Steel Sheet Piling Part)

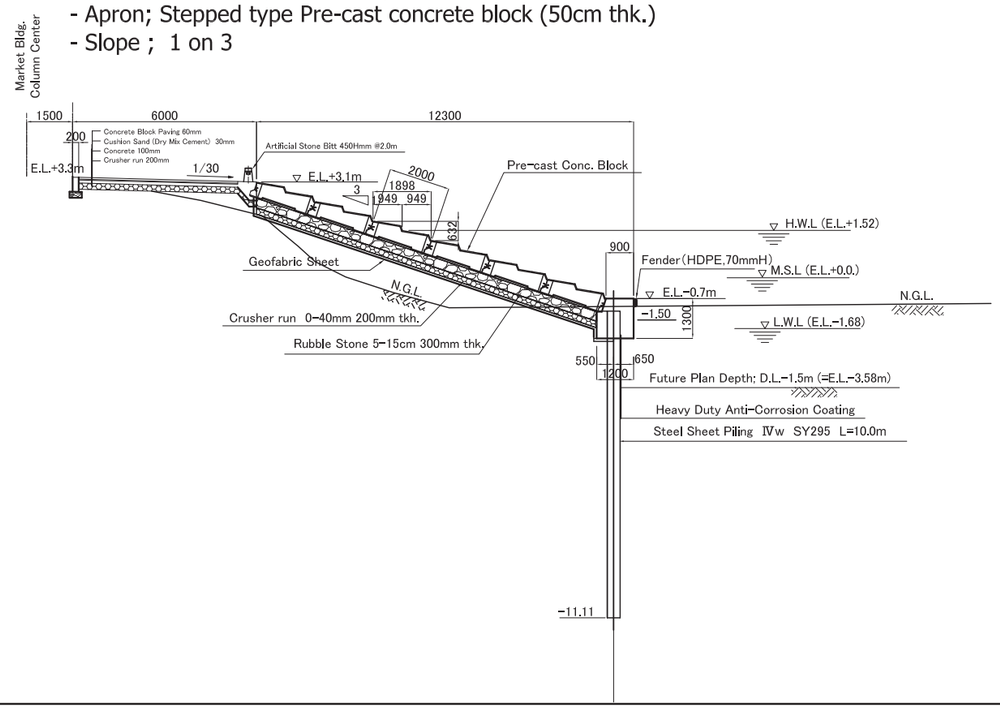
- Conterforted steel sheet piling front quay wall
- Future Plan depth; D.L.-3.5m(E.L.-5.68m)
- Apron; Pre-cast concrete block (50cm thk.)
- Slope ; 1 on 3 (Platform 1 on 5)



C

Stepped Seawall (Self-supporting Steel Sheet Piling Part)

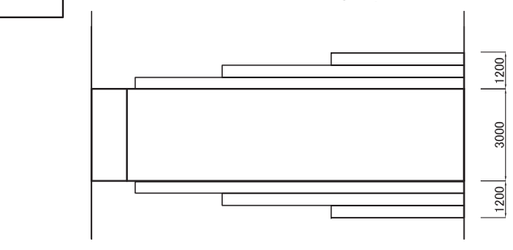
- Selt-supporting steel sheet piling front quay wall
- Future Plan depth; D.L.-1.5m(E.L.-3.18m)
- Apron; Stepped type Pre-cast concrete block (50cm thk.)
- Slope ; 1 on 3



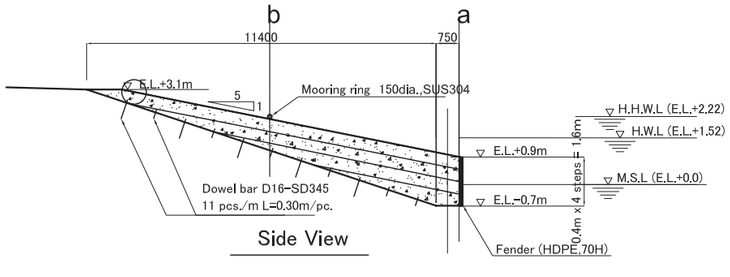
B

Platform Details

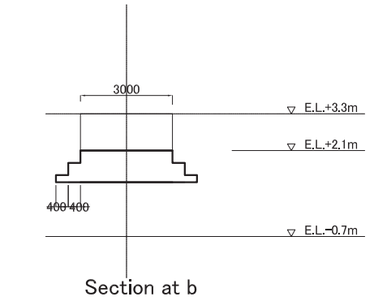
- Slope ; 1 on 5



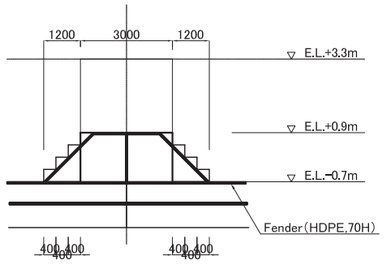
PLAN



Side View



Section at b

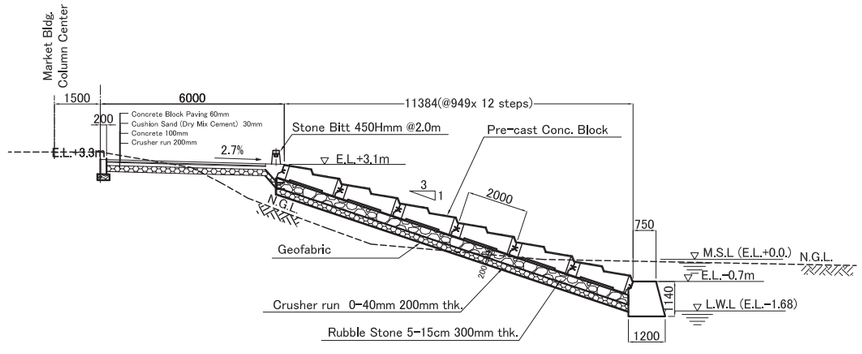


Section at a

D

Stepped Seawall

- Apron; Stepped type Pre-cast concrete block (50cm thk.)
- Slope ; 1 on 3



2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

① When this plan is to be implemented under the grant aid program of Japan, strict control of a construction period shall be a precondition. Therefore, an appropriate construction period plan shall be prepared so that contractual conditions shall be met within the term of the Exchange of Notes.

② The implementation plan shall take into consideration the climate of Zanzibar and the environmental conditions in the area.

③ The implementation plan shall take into consideration the codes and regulations regarding the historic area of the world heritage and the discussions with STCDA.

④ Economically appropriate structure and construction methods shall be taken to this plan, as the site is in an island nation, to adopt shortening the construction period and limiting expenses for materials, equipment and personnel which will constitute a major part of the construction cost.

⑤ This plan is to be implemented while maintaining activities at the existing fish landing area adjacent to the site. In order not to disrupt these activities and to give maximum consideration to the safety of vessels and users during implementation of the work, the implementation plan shall attach particular importance to a short construction period and safety.

⑥ As the facilities in the plan are complex facilities requiring building work (Site A), civil engineering work (Site B) and renovation of the existing market, construction methods which enable sharing of equipment, materials and personnel between these works and minimizing construction period shall be selected.

⑦ Adequate exchange of opinions shall be maintained among the implementing agency, DFD and ZMC in charge of operation of the existing market, the consultant and contractors, as a means of facilitating understanding among the parties concerned and to realize trouble-free work implementation.

⑧ With respect to the demolition and removal of the existing seawall at the quay site and underground structures at the construction site, the debris should be recycled for land reclamation to reduce the environmental impact and an appropriate time period should be allocated for this work

2-2-4-2 Implementation Conditions

- Major construction materials and equipment are procured and imported from the mainland of Tanzania or from Japan, therefore, due attention shall be paid to domestic stocks and the period required for procurement of individual materials in the implementation system.
- As landings, transactions and operations at the existing adjacent quay cannot be suspended during the construction period, a construction material yard and delivery routes should be planned so as not to affect the accessibility of the adjacent quay.

- Temporary works should be planned with due consideration for the high-temperature, high-precipitation climate and safety measures should be taken. Also, adequate care should be taken in the curing of concrete and plaster to avoid cracks and exfoliation.
- The construction work should be carried out while maintaining close contact with the local agencies to prepare for the intermediate inspection by STCDA, etc.
- The construction plan should incorporate environmental and social considerations.
- Although the sea in front of the project site is relatively calm, it has a large tidal range, which will affect the civil engineering work schedule. Therefore, the construction plan should be developed in consideration of the tide levels.

2-2-4-3 Scope of Works

The table below shows the scopes of work in the project by Japanese side and by Zanzibar side.

Table 2-21 : Scopes of work of Japanese side and Zanzibar side

	Undertakings in construction, procedures and expenses	Japan	Zanzibar
1.	Securing of construction sites (including securing of site for a construction materials depot and an on-site office and matters related to temporary fish landing sites)		○
2.	Landscaping, planting and provision of furniture and general goods in the facilities after completion of the work.		○
3.	Introduction of electricity and water supplies to the project site.		○
4.	Application for and acquisition of all the approvals and permits in Zanzibar related to the Project (including building permit, use of power and water supply infrastructure, construction permit, etc.)		○
5.	Communication and coordination with users of the landing site and the port and users and customers of the market during the implementation of the Project		○
6.	Consulting services including detailed design, assistance in the tender process, work supervision, and soft component	○	
7.	Construction of the landing quay and seawall	○	
8.	Construction of the fish market facilities	○	
9.	Import and customs-clearance for the materials, machinery and equipment required for implementation of the Project		○
10.	Banking Arrangement (B/A) and bank commissions for the Japanese bank		○
11.	Provision of convenience for the Japanese personnel to enter and stay in Zanzibar in conjunction with the implementation of the project.		○
12.	Proper and efficient operation of the facilities and equipment to be provided under the project.		○
13.	Payment or exemption of any kind of taxes, customs duties or domestic levies imposed upon the equipment and materials and also the services to be procured by the contractor(s) of the project in Zanzibar		○

2-2-4-4 Consultant Supervision

1) Policy on consultant supervision

① In order to conduct the construction without hitch, the consultant shall maintain close communication and sufficient discussion with the counterparts on the Zanzibar side, throughout the detailed design and procurement/construction phases to achieve completion of construction of the facilities without delay in line with the implementation schedule.

② In order to carry out smooth construction, the consultant shall maintain close communication and sufficient discussion with the contractor(s), and provide adequate advice and instructions as necessary.

③ In the consultant supervision, a supervisor specializing in civil engineering and in building work will be resident locally at the site and Japanese engineers specializing in various works will be dispatched in a timely fashion.

2) Detailed design/Selection of contractors

In implementing the project, following the Exchange of Notes between the Governments of Japan and the Evolutional Government of Zanzibar, a Consultant Contract will be concluded between DFD and a consultant of Japanese nationals with regard to detailed design and construction supervision.

① Detailed design

On the basis of the results of the outline design survey, the consultant will conduct a detailed survey and detailed design of civil engineering and building facilities to be constructed. The detailed design work shall cover the following items.

- Design conditions and standards
- Design report
- Drawings
- Bill of quantities and estimation
- Implementation Plan
- Tender documents

② Selection of contractors

After completion of the detailed design for the construction work, DFD will select a Japanese contractor who will undertake the works through tender with the assistance of the Consultant. The consultant shall assist DFD in the following procedures.

- Pre-Qualification notice
- Pre-qualification
- Explanation of tender documents
- Opening of bids
- Tender evaluation

- Contract negotiations

3) Consultant Supervision

The consultant's responsibilities in implementation supervision are as follows.

① Assistance in concluding construction contract

The consultant will prepare a draft of the evaluation method of pre-qualification, a draft of tender documents consists of a construction contract, technical specifications and drawings and a bill of quantities for the project costs. The consultant will assist tendering and contract procedures and provide an evaluation of and advice on selection of the contractor and contract conditions.

② Instructions to contractor

The consultant will examine the implementation plan of the contractor and provide the necessary instructions on the construction methods and work schedule in a timely fashion.
The consultant will examine and approve working drawings, shop drawings of the contractor, samples of materials and finishing.

③ Construction Supervision work

The consultant will verify the construction methods and control quality of the work through supervision by a resident engineer and short-term engineers in specific fields.

④ Witness to inspections

The consultant shall perform on-site inspections at interim stage of the construction as necessary, and a final inspection upon completion of the construction.

⑤ Report on the progress of the work

The consultant will prepare reports on the progress of construction of the facilities, problems encountered, measures taken against the problems and the outcome of the measures taken, and submit the reports to DFD and the relevant government organizations of Zanzibar, the Embassy of Japan in Tanzania and JICA.

⑥ Witness of handover

The consultant shall verify the handover documents at the time of handing over the constructed facilities upon completion of the construction.

⑦ Confirmation for payment approval

The consultant will assist in confirmation and approval of the amount of work done corresponding to the construction costs payable to the contractor in accordance with the contract, or completion of the work, and examination of the payment documents.

2-2-4-5 Quality Control Plan

The consultant's construction supervisor should verify whether or not the quality of the equipment and materials to be procured in this project and the completed work comply with the specifications in the contract literature and the quality and accuracy requirements shown in the design drawings, etc.

1) Main points in quality control relating to natural conditions

Sufficient attention will be paid to salt damage prevention and anti-corrosive measures for facilities which are near the sea and susceptible to briny wind and seawater spray.

There will be a particular need to establish a system which enables on-site inspection of the salt concentration in the aggregate and mixing water, types of cement, concrete mix and quality and thickness of the concrete cover of the concrete for the structural skeleton.

Heavy duty coating will be applied to the part of the steel sheet pile exposed to seawater. As for the coping concrete on the sheet piles, since removal of the salt concentration in the aggregate and mixing water will be difficult, the epoxy-coated steel bars will be used.

2) Concrete work

The quality of the concrete will be maintained and controlled by conducting the following verification and tests and by preparing concrete strength control tables (including X-R control charts) for the respective mix proportions.

Table 2-22 : List of concrete quality controls

Cement	Verification of type, standard and performance
Admixture	Verification of test results
Mixing water	Content of detrimental materials
Aggregate	Verification of grading, specific gravity and water absorption
Trial mixing	Verification of slump, strength, mix proportion and quality

2-2-4-6 Procurement Plan

1) Policy on procurement

When procuring materials and equipment, their costs and quality will be thoroughly investigated and the costs of local procurement, procurement from Japan and procurement from third countries of materials and equipment of equivalent quality and availability will be compared. Those with the lowest costs will then be procured. Particularly for the materials and equipment locally available, their quality and availability will be thoroughly investigated.

2) Procurement of major construction materials and equipment

Domestically produced and imported construction materials available in Tanzania or

Zanzibar will be procured locally for this plan so long as they satisfy the qualitative and quantitative requirements and are inexpensive. Although domestic products in Zanzibar are limited to sand, concrete blocks and wood, their quality and availability will meet the demands of this plan. As for the steel sheet pile, the quality control system of it is important in manufacturing, in particular, inspections of actual size, welding, tack-welding and paint during manufacturing, will be closely connected to the quality guarantee, and the period required after ordering the piles will be a critical factor for the construction schedule, it is considered appropriate to procure the pile materials from Japan.

Some of materials for mechanical and electrical work are available in local stocks of imported goods. However, in order to construct a reliable system, some of the materials and equipment such as switchboards, distribution boards and pumps, will be procured from Japan, in consideration of both quality and costs.

3) Procurement of major construction machinery

The construction machinery required for the work includes machinery for the construction of the quay, seawall, and for the fish market facilities.

The construction machinery required for the planned work includes excavators for the foundation work, cranes for the reinforced concrete work and dump trucks for the transport of materials. As major construction companies located in Dar es Salaam own and maintain such kinds of machinery, they will be able to be used in the plan. On the other hand, vibration hammers which cannot be procured locally, will have to be procured from Japan.

The table below shows the procurement sources of major construction materials and machinery to be used in this plan.

Table 2-23 : Procurement sources of major construction equipment and materials

		Japan	Zanzibar*1)	Remarks
	CONSTRUCTION MATERIALS			
1	Cement		○	Locally available.
2	Aggregates for concrete (gravel, sand)		○	ditto
3	Concrete blocks		○	ditto
4	Forms		○	ditto
5	Steel bars (including epoxy-coated)	○		These shall be procured from Japan considering cost, quality and stable supply
6	Steel sheet pile	○		Locally unavailable. To be procured from Japan in consideration of quality guarantee and period required for procurement.
7	Steel frames /steel plates	○		
8	Tie rods	○		
9	Accessories (Bollards/fenders)	○		
10	profiled steel sheet for roofing	○		These shall be procured from Japan considering cost, quality and stable supply

11	Timber, plywood		○	Locally available.
12	doors and windows		○	ditto
13	Sanitary ware		○	ditto
14	cables, lighting fixture	○		These shall be procured from Japan considering cost, quality and stable supply
15	Plumbing materials	○		
16	Pumps, valves	○		
17	Distribution boards, switching boards	○		
	CONSTRUCTION MACHINARY			
1	Vibro-pile driver	○		These shall be procured from Japan considering cost, quality and stable supply
2	Crawler crane		○	Locally available.
3	Barge, tag boat		○	ditto
4	Welding machine		○	ditto
5	Concrete batcher plant		○	ditto
6	Bulldozer		○	ditto
7	Back hoe		○	ditto
8	Dump truck		○	ditto
9	Tamping machine		○	ditto

*1) Items produced locally or imported goods readily available for local procurement in Zanzibar or in mainland Tanzania

4) Transportation plan

The route of regular transportation services from Japan to the project site usually goes to Zanzibar Port by way of Southeast Asia. Transportation from Japan to Zanzibar Port requires about 1.5 months. Equipment and materials procured in mainland Tanzania will require domestic marine transport of about 120km from Dar es Salaam Port to Zanzibar Port. Since large cargos, machines and bulky equipment cannot be transported by cargo liner, they will be transported by chartered landing craft. Also, as cargos cannot be directly unloaded at the construction site where the water is shallow, land transportation from a commercial port will be needed, but the distance will be short.

2-2-4-7 Soft Component (Technical Assistance) Plan

The purpose of the soft component is to set up the operation and maintenance framework on time for the Malindi Fish Landing and Marketing Facilities to be constructed under the Project.

In this regard, the soft component will support the Zanzibar government to elucidate the roles and duties of the members and staff of the new framework, the rules and regulations of operation and accounting, the revenue collection system, the regulations for users, and the terms of references of out-sourced services. The stakeholders such as fishermen, whole sellers, retailers shall be involved in the process, especially of determining the fees and rules

of usage of facilities so as to formulate their consent.

The following expected outcomes are planned to achieve the purpose above, and the necessary activities are planned in respect of each targeted outcome. These activities are implemented in collaboration with (a) local consultant firm(s), the Japanese consultant and the counterparts of Zanzibar Government.

① An operation framework, organization and the duty of each staff are clarified

- To draft the statutes of the management organization, and to elaborate the terms of references of the advisory committee and the board of directors.
- After drafting, to hold workshops in order to discuss with the relevant organizations such as DFD, MLF, POFEDP, ZMC and ZPC for refining a management and operation system.
- To support finalization of the statutes of the management organization, and the terms of references of the advisory committee and the board of directors
- To support the government to prepare documentation to register the management organization.
- To develop a draft of contracts for outsourcing services in consultation with MLF, POFEDP etc.

② Regulations and rules of management and accounting are formed and refined

- To draft Regulations of operation and accounting, with respect to collection and recording of tariffs, accounting books and internal auditing.
- After drafting, to hold workshops with staffs, contractors and stakeholders
- To refine and finalize the Regulations of operation and accounting
- To train staff and contractors.

③ A revenue collection system and rules for users are clarified

- To organize a group visit to Dar es Salaam Ferry Market for observation, discussions, exchange of views with staff and the management of the Dar es Salaam Ferry Market
- To draft the rules for users of the facilities pertaining to tariffs, and control of the market, hygiene, and street vending, together with the manual of garbage collection and disposal, and selection of persons in charge of them
- To hold workshops with relevant officials, staffs, and contractors based on the above drafts
- After revising the draft, to hold a meeting with stakeholders such as users, fishermen, fishmongers, auctioneers, transporters, processers, consumers in order to diffuse the rules
- To finalize the rules for users
- To elaborate a program of regular briefings with facility users for instructing practices of hygiene and observing rules and regulations

・To introduce registration of users. To hold a training course to registered users for proper utilization of facilities and equipment and provide posters/signboards for diffusion of the rules.

④ A concrete measure of out-sourcing of services such as security guard, cleaning, revenue colletion, etc. is developed

・To discuss with DFD and MLF the contents of outsourcing services and to develop draft Terms of References for contractors.
・To hold workshops for relevant officials and applicants for contractors based on the draft TOR
・To finalize the TOR and the contract document for out-sourcing services

⑤ A maintenance plan and persons in charge are defined

・To draft a Maintenance Plan including timing of regular checks, maintenance methods, check lists of equipment and inventory, records, work schedule, persons in charge
・To finalize the Maintenance Plan
・To hold a training course to relevant staff and contractors.

⑥ Staff in charge becomes trained in their duties of operation and management

・To train the members of the committee and the management staff on accounting and cashier work, facility management and maintenance.
・To hold a workshop to users for understanding of the statutes of the management organization.
・To instruct and supervise the outsourced service providers to hold workshops and trainings to their staff and workers.

A Japanese specialist will be engaged in with a local consultant firm. The Japanese specialist will oversee the technical assistance and lead and supervise the activities of the local consultants both from Japan and in Zanzibar on periodical basis. Local resources are personnel who specialize in management, accounting and maintenance of facilities.

The obligation of the Zanzibar Government is summarized as below.

・Implementation of Agreement of entrusting operation, employment, contract of outsourced services shall be done on time
・Appointment of the relevant officials in charge and to make them engaged in the planning process
・Continuous pursuit of improvement

The details are presented in Annex-5.

2-2-4-8 Implementation Schedule

When the project is implemented under the grant aid scheme of Japan, an Exchange of Notes (E/N) between the two countries and a Grant Agreement (G/A) between JICA and the MLF will be concluded, followed by a design and supervision contract to be signed between the authority of the MLF and the Japanese consulting firm. Detailed design, preparation of tender documents, tendering, conclusion of the contract(s) with the awarded contractor(s), and construction, procurement and the soft component by the Consultant shall subsequently be carried out.

The project under the grant-aid program in Japan shall be strictly adhered to the construction period in compliance with the system of national budget in Japan, and the implementation schedules as well as a detailed progress plan shall be conceived based on the requirements of natural conditions, procurement conditions for materials, equipment and manpower.

1) Detailed design

In the detailed design phase, the consultant shall draw up the detailed design of each facility and equipment based on the preparatory survey report and shall prepare a set of tender documents including detailed design drawings, specifications, and tender requirements. The total period of time required is expected as 3.5 months.

2) Tendering phase

The contractor(s) (Japanese company) of the project shall be selected by the means of competitive tender. The tendering procedure shall be carried out in the order of notice for prequalification of the tender, reception of expression of interests, pre-qualifications, distribution of tender documents, tender opening, tender evaluation and contracting with the successful tenderer(s)., It will require approximately 3 months.

3) Construction

The contractor shall commence the works immediately after signing of the construction contract. In the meantime, procurement of built-to-order steel sheet pile will require 3 months for fabrication and 1.7 months for ocean shipping and customs clearance.

The building work shall start later than the civil work for sharing a work space and a yard, in order not to disturb activities such as fish landing and fish trading.

A total construction period of 19 months will be required.

4) Equipment Procurement

Equipment procurement will require a total of 2.7 months between the order to the arrival in Zanzibar, including 1 month for purchasing and 1.7 months for ocean shipping and customs clearance. The timing of shipping shall be adjusted with the progress of the

construction work.

The figure below shows the implementation schedule.

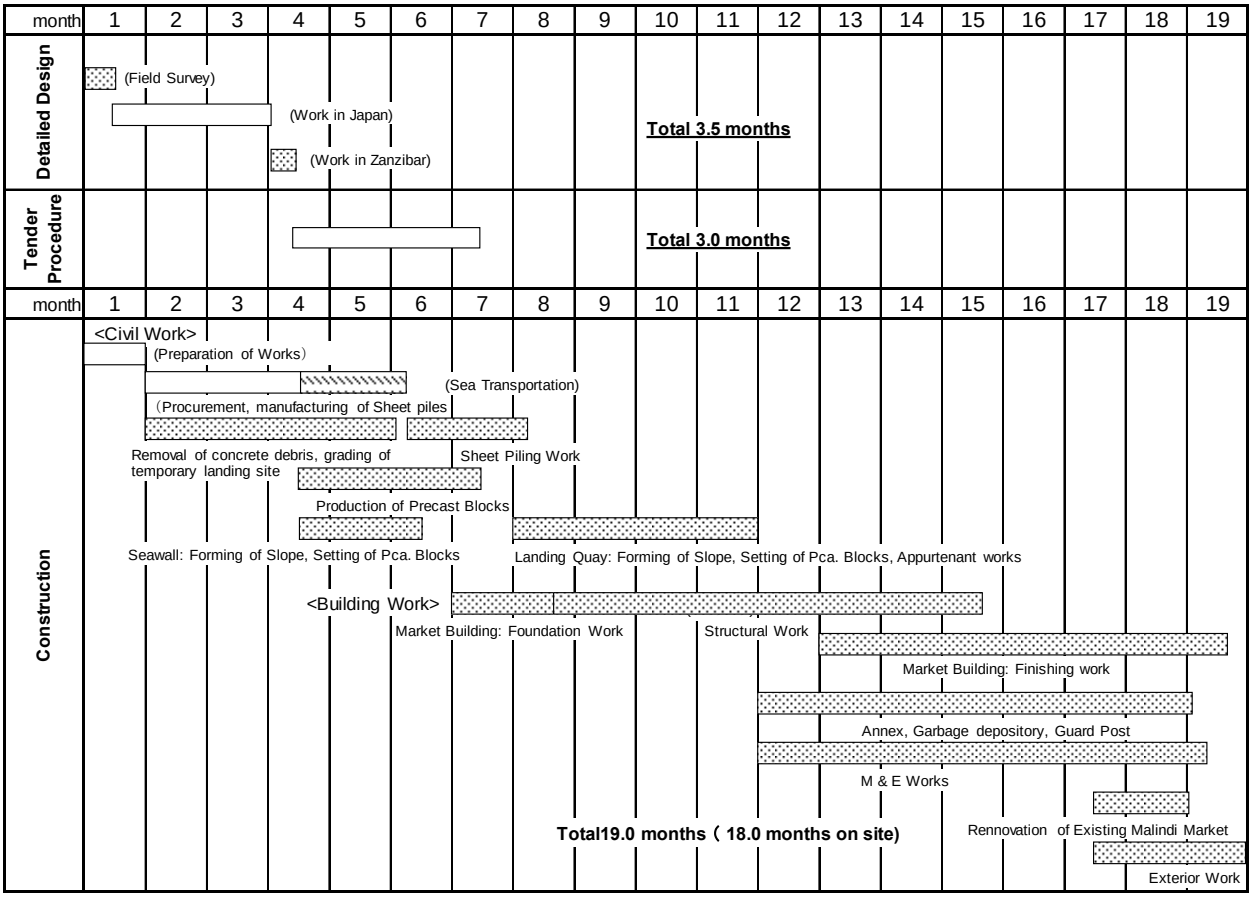


Figure 2-13：Implementation schedule

2-3 Obligations of recipient country

(1) Securing the planned construction site

Although the planned facility construction site is secured by the government, it is necessary for the Zanzibar side to continue to assume responsibility for dealing with the land issues. The charcoal transporters etc. that are tentatively using the planned site need to be moved to the previous work site designating by the government.

(2) Securing the temporary work site

The Zanzibar side must secure a temporary work site for the construction work and the site for landing operations during the construction work as necessary.

(3) Providing power cables, telephone lines and water service pipes to the site

The Zanzibar side must provide power cables, telephone lines and water service pipes to the planned market site at their own cost. The work to lay power cables and water service pipes must be completed by the start of the construction work in this project at the latest.

(4) Applications for all permits and licenses for the construction work (building certifications, use of electricity and water, work permits, etc.)

It is necessary to obtain a building permit and architectural permit from STCDA which centrally controls the building permits in Stone Town where the site is located. Applications for approvals pertaining to the construction work, including the work permit from Zanzibar Port Corporation (ZPC) and the permit for renovation of the existing market from Zanzibar Municipal Council (ZMC), as well as permits for use of electricity and water and work permits, need to be processed by the Zanzibar side in order to obtain the necessary permits before the start of the construction work.

(5) Environmental check lists/ monitoring sheets should be prepared and implemented in accordance with the environmental impact assessment report by the Department of Environment and JICA Environmental Guidelines.

(6) Safety precautions and information for users of the existing landing site during the construction work

The existing landing site will be used continuously during the construction of the planned facility. To ensure the safety of users and boats, the Zanzibar side needs to make sure that the users and boats are fully informed of the safety precautions and information such as prohibitions on entry to the restricted construction area and traffic restrictions during the entry and exiting of construction vehicles.

(7) The ice making machines, ice storage bins and emergency generators that will be

installed at the expense of the Zanzibar side must be installed immediately after the completion of the facility and operated appropriately. In addition, it is necessary to appropriate the budget at an appropriate timing to enable this.

(8) Exemption from customs duties, internal taxes and other fiscal levies and prompt customs clearance for all the equipment and materials to be imported to Zanzibar in relation to this project

(9) Exemption from value added tax and other taxes

The Zanzibar side should bear or exempt from value added tax and other domestic taxes with respect to payments for the equipment and services to be procured by the construction contractor(s) for the project in Zanzibar.

(10) Banking Arrangement with a Japanese bank and issuance of Authorization to Pay for the Consultant and the Contractor(s) to the Bank for the Project.

(11) Exemption from taxes and surcharges imposed in Zanzibar on Japanese people who provide services in relation to this project

(12) Establishment of the management framework and the organization on time, and completion of the procedure for starting adequate operation and management of the facilities.

(13) Appointment of the relevant officials in charge under the program of Soft component and to make them engaged in the planning process of operation and maintenance

(14) Other matters that are necessary for the implementation of this project and not included in the matters under the responsibility of the Japanese government

(15) Leveling of the land for the project site (as for removal of existing structures and revetment(quay) as well as the foundations thereof)

With respect to the disposal and reuse of concrete debris from the collapsed revetment, if it were removed without synchronizing with the schedule of the construction work, backfill of the revetment (fine sand) might flow out to sea, resulting in deterioration of the collapse of the revetment. Also, with respect to the site for the market, removal of the remaining foundations under the ground by the Zanzibar side may not provide appropriate timing for the foundation work schedule and the subgrade of the new facility might not be confirmed. Consequently, the debris shall be removed under the management of the Japanese side.

2-4 Project Operation Plan

2-4-1 Organization Responsible for Maintenance and Operation

The organization responsible in Zanzibar for the Project is Ministry of Livestock and Fisheries (MLF). Figure 2-14 shows the organization chart of MLF.

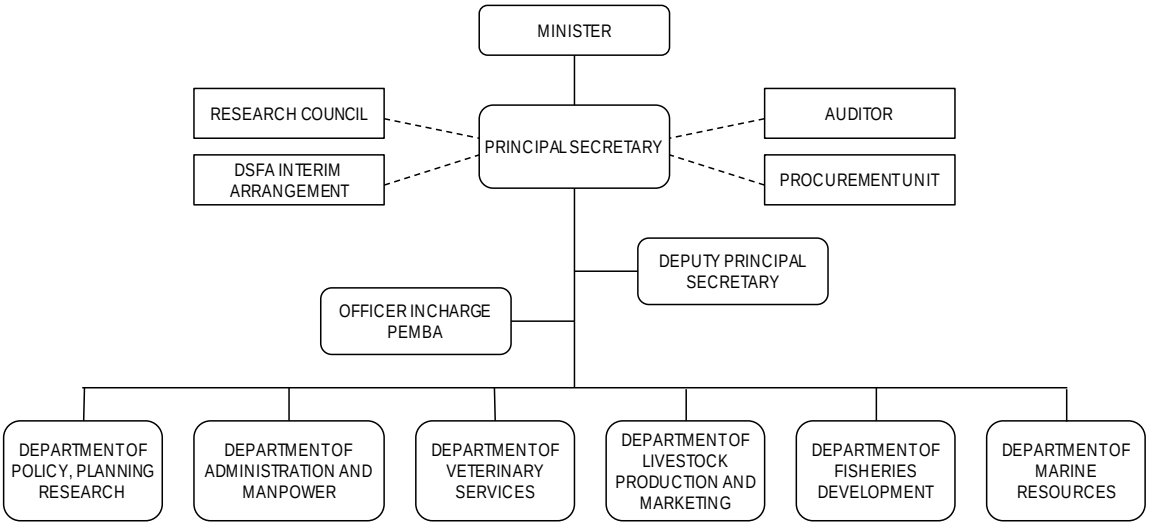


Figure 2-14 : Organization chart of MLF

The Department of Fisheries Development (DFD) under MLF takes charge of the implementation of the Project. Figure 2-15 shows the organization chart of DFD.

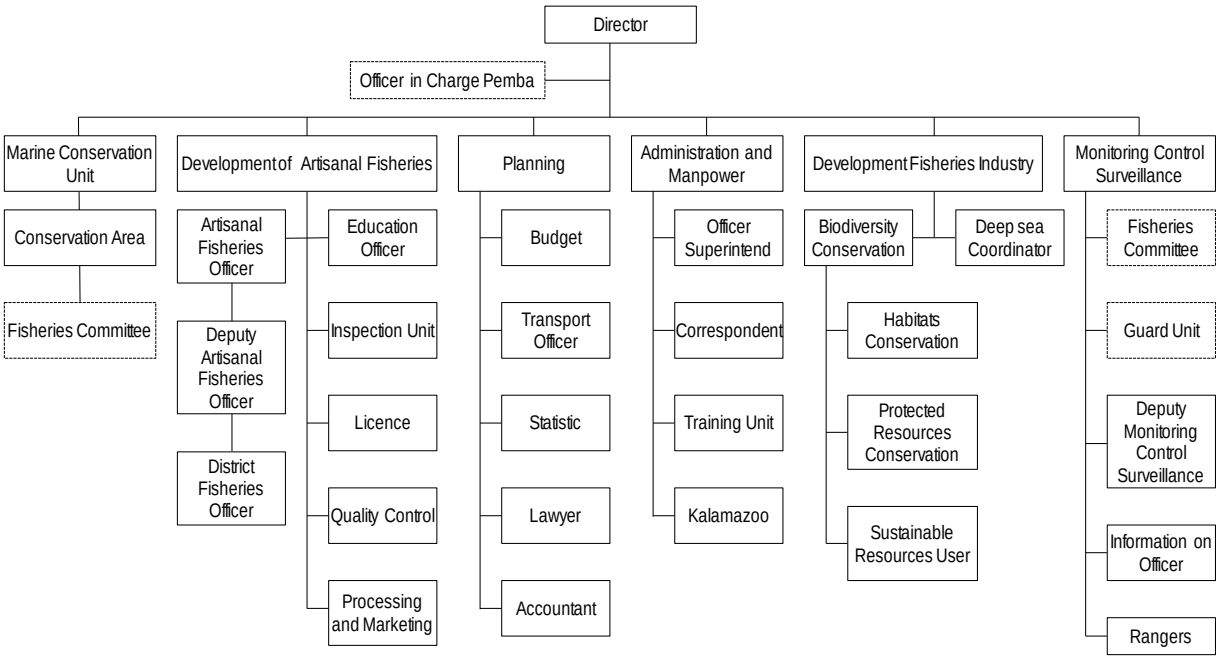


Figure 2-15 : Organization chart of DFD

2-4-2 Other Agencies Concerned

With respect to the Zanzibar Port Area in which the project site is located, all activities in this area, such as construction of facilities, installation of structures, operation, anchorage and mooring of vessels, are under the jurisdiction of the port and harbor management body. Zanzibar Port is managed and operated by the Zanzibar Port Corporation (ZPC), which is the management body of national autonomous ports. ZPC comes under the supervision of the Ministry of Communications and Transport.

The markets in Zanzibar City, including the Central Market (Darajani Market) and existing Malindi Fish Market, come under the jurisdiction of Zanzibar Municipal Council (ZMC), which also manages and operates them. ZMC consists of five departments, namely, the Town Planning Department, the Social Service Affairs Department, the Administration, Law and Order Department, the Labour Construction and Environment Department and the Finance and Economic Affairs Department. Construction and waste disposal are the responsibility of the Social Service Affairs Department, drainage is the responsibility of the Labour Construction and Environment Department, management of the incomes and expenditures of the markets are the responsibility of the Finance and Economic Affairs Department and maintenance of the facilities is the responsibility of the Town Planning Department. Operation and management of the existing fish market after renovation will be entrusted to and integrated with a new management organization, which is described in the next section.

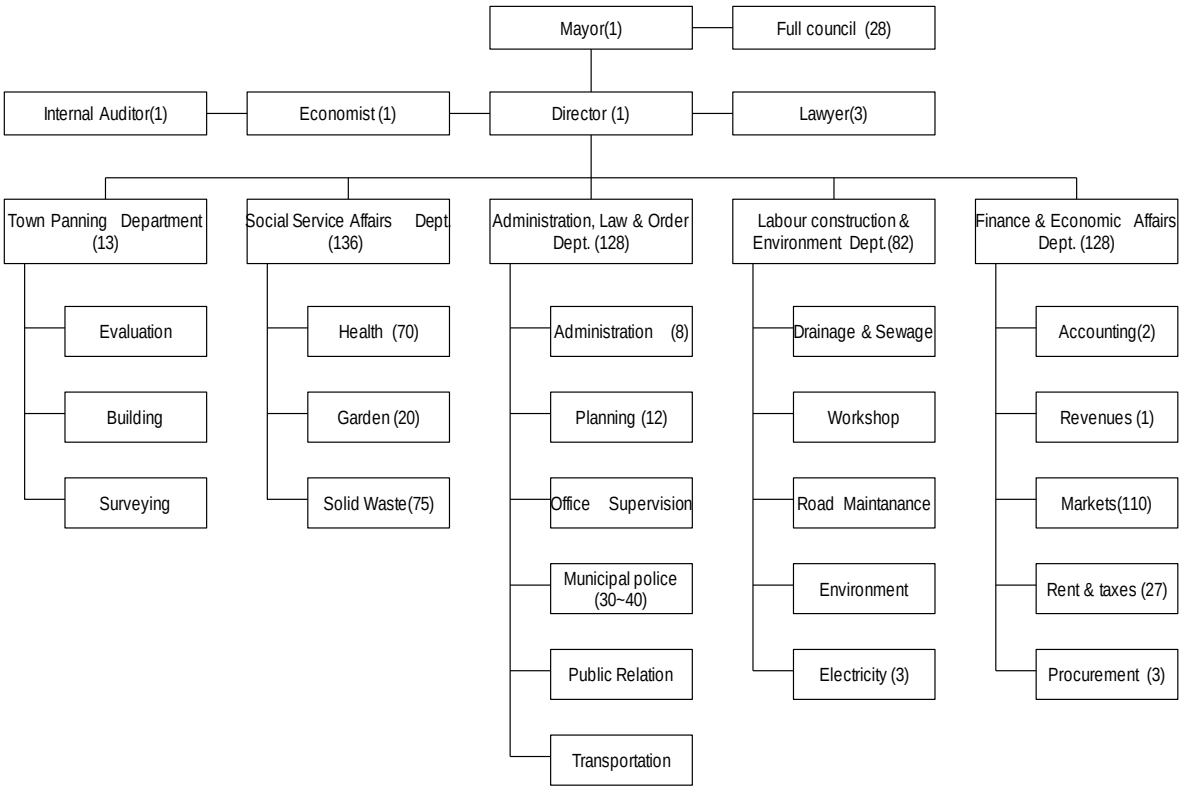


Figure 2-16 : Organization chart of ZMC

2-4-3 Plan of Operation

1) Organization of the operation of the planned facilities

MLF plans to manage the existing fish market, the new fish market and the landing quay in an integrated manner with a self-supporting management organization with independent accounting.

In Zanzibar, it is specified by law that the markets in the city should be operated by ZMC and the landing site and relevant distribution facilities should be operated by MLF. However, as it is considered that this project aims to develop the existing Malindi Landing Site under the management of MLF, the MLF will be responsible for operation of the facilities to be built in this project.

According to the draft operation plan, a management board chaired by the principal secretary (P.S.) of MLF, which consists of - P.S. of Ministry of Finance, - P.S. of Ministry for Infrastructure & Communication, - P.S. of First President's Office, - P.S. of Second President's Office and - P.S. of Local Government, will undertake the supervision, personnel management and coordination of operations.

An advisory committee, chaired by the director of DFD, will be established in order to reflect the opinions from the users and parties concerned to the plan of operation. The advisory committee will hold regular meetings, and special meetings when the Management Board convenes.

The structure of the management organization will be as described in the chart below. The landing site manager and section heads will be seconded or employed by the government and the head of Finance Section will be seconded from Ministry of Finance.

ZPC will not be involved in the daily maintenance and management of the landing quay or collection of fees. It will carry out navigation control and extend support with respect to technical issues concerning the landing facilities, e. g. regular reporting and maintenance dredging and repairs as necessary.

The finance will be audited by an internal auditor from MLF and by an external auditor from independent organization and/or Office of the Controller and Auditor General.

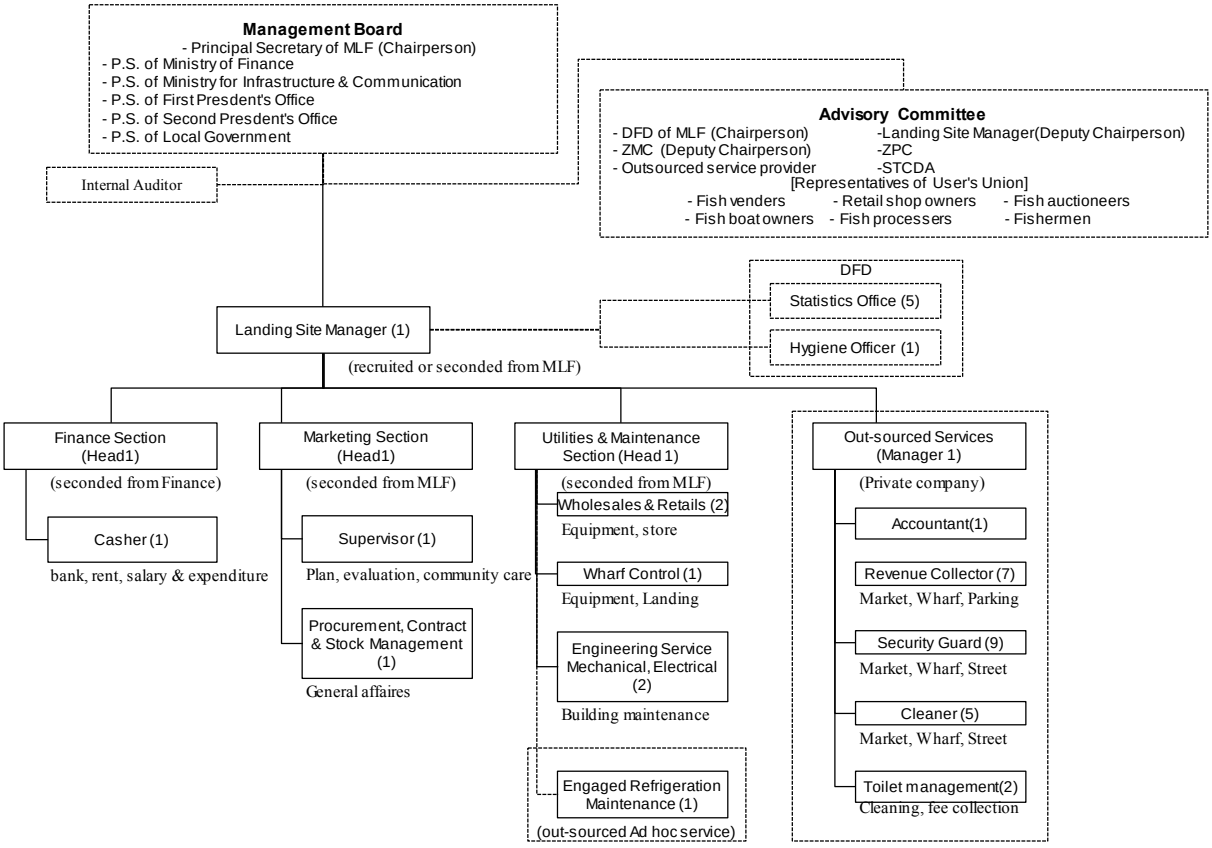


Figure 2-17 : Organization of the operation of Malindi Fish Landing and Marketing Facilities

2) Duties and responsibilities of the staff and the management bodies

The duties and responsibilities of each staff and organization are planned as shown below.

Table 2-24 : Duties and responsibilities of the staff & the management bodies

Staff / Bodies in charge	Duty, responsibility, Terms of reference
Management Board	Appointment of Market Manager and the section heads Wages of the above Approval of annual budget plans and special budget Planning of the long-term operation plan (3-5 years plan) Environmental monitoring Convening of special meetings of Advisory committee
Advisory Committee	Advice to Management Board / Market Manager Discussion on revision of the regulations, charges & rents Discussion on the problems within users, neighbors, boats, etc. Discussion on improvement of operation & management
Landing Site Manager	Management of fish landing & marketing activities Implementation of budget Appointment & employment of personnel under sub-section Contract & agreement with external bodies Reporting to Management Board
Head of Finance Section	Budget planning Evaluation & analysis of income/expenditure Regular reporting of accounting to Manager, Management board and the auditor Negotiation with PEFEDP for budget on special expenditure and wages of section heads To secure transparency & accountability

Head of Marketing Section	Marketing & management planning Control of regulations, rules and charges/rents Control of procurement and contracting Control of purchase and stock Harmonization & negotiation with MLF
Head of Utilities & Maintenance Section	Maintenance of Fish market, Landing quay & other facilities, Operation of ice machine, Supervision of outsourced service providers Maintaining of hygiene, security and fair trading
Casher	Accounting affairs (payment of salaries, goods & services, collection of room rents,) Keeping account books and account reports Control of bank account, revenue and expenditure Issue of fee receipt, invoice, ticket Recording and reporting to Market Manager
Supervisor	drafting of business plans (regulations, rules, charges/rents), evaluation, , coordination between stakeholders, community care, Arrangement of meetings (Management boards, committees, etc.), Instructions to users
Procurement, Contract & Stock Management	Order, Purchase of goods, Out-sourcing affaires, management of goods/equipment/spare parts stock Keeping of inventory
Wholesale & Retail Manager	Assistance to Market Manager Service, control & instruction to venders, Check of Market & Exterior facilities, Supervision of Revenue collectors
Quay Controller	Assistance to Market Manager Vessel navigation, control & instruction, Check of quay & seawall facilities, Supervision of Revenue collectors
Chief Technician	Check & Maintenance of Overall Facilities & Equipment, Environmental Monitoring, Maintenance planning & implementation Record & report Supervision of external services
Mechanical & Electric Technician	Assistance to Chief technician, M & E works, Overhaul, Check & Order of Spare parts, Ice plant, Generator, pumps, lumps, etc.
Engaged Refrigeration Maintenance Technician	check, overhaul & replacement of spare parts/ refrigerant of refrigeration facilities (ice plant, AC, etc.) based on the maintenance contract
Out-sourced Service Providers	Revenue collection (sales tables, ice, parking, landing, equipment) Cleaning Security guard (night & day) Toilet management (fee collection, cleaning etc.) Record of trading volume Control of street venders
Internal Auditor	Auditing of financial status of the operation (once a year from MLF)

3) Management of revenue and expenditure, Depreciation reserve to the special account

In order to secure transparency and accountability, thus realize sustainable healthy management, the revenue and the expenditure shall be managed within an autonomous account controlled by the Market Manager, except wages to section heads and the manager.

A certain amount of the revenue shall be reserved for maintaining proper hygiene and quality service. As the other existing market facilities do not have such mechanism, venders and users, who pay fees, complain that the facilities and equipment have not been renewed properly and the water supply and sewage systems have not been repaired promptly.

The depreciation reserve for renewal of equipment and machines and for maintenance of facilitates shall be kept separately to another special reserve account.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

1) Costs to be borne by Zanzibar

The cost to be borne by Zanzibar in case the plan is implemented under the grant aid is estimated to be about 244,500 US dollars (about 24,300,000 yen), broken down as follows.

①	City water supply	US$49,100	(Tsh. 78,560,000)
②	Electrical power supply	US$100,500	(Tsh. 160,800,000)
③	Installation of an ice machine	US$50,000	(Tsh. 80,000,000)
④	Installation of a generator (excluding equipment cost)	US$5,000	(Tsh. 8,000,000)
⑤	Procurement of office supplies and furniture	US$26,000	(Tsh. 41,600,000)
⑥	Bank transfer and handling fees	US$9,500	(Tsh. 15,200,000)
⑦	Environmental Monitoring (Pre-construction stage & Construction stage)	US$4,400	(Tsh. 15,200,000)
	Total	US$244,500	(Tsh. 391,200,000)

2) Conditions of Estimation

①	Time of estimate	September 2013
②	Exchange rate	US$1.00 = ¥99.38, Tsh.1=¥0.0621 (US$1=Tsh.1600)
③	Construction period	The time schedule for carrying out the detailed design, construction, procurement of equipment, and soft components is as shown on the Project Implementation Schedule.
④	Others	The plan will be implemented in accordance with the grant aid scheme of the Japanese Government.

2-5-2 Operation and Maintenance Cost

Malindi Fishing Port and Market will be operated on a self-supporting accounting system, excluding the personnel costs for the market manager and section managers. The operational and maintenance costs of the facilities, machines and equipment should be paid for from the operational income, such as the quay usage fees, car/bicycle parking charges, usage fees for the wholesale and retail sections, shop rents, usage fees for the toilets, and proceeds from the sale of ice. The income and expenditure plan based on the operational plan is as follows:

1) Income

The income comes from the usage fees for each facility. The usage fees for the quay should be in accordance with the size of the fishing vessel. The usage fees for the wholesale and retail sections and toilets and the car/bicycle parking charges should be equivalent to the current fees for the existing market to make them affordable to users.

Table 2-25 : Annual income

	INCOME						
	Item	Breakdown	Fee/day (Tsh)	Capacity/ Unit	Days of Operation/Year	Occupancy/Usage Ratio(%)	*Income / Year*
1 Revenue Collection by Contractor	Entrance Permit Fee	Large Boats	4,000	20 boat	350	100%	***28,000,000***
		Small boats	2,000	50 boat	350	100%	***35,000,000***
	Wholesale section	Registration of Auctioneer	1,000	16 user	350	100%	***5,600,000***
		Rent of Dagaa Trade Space	500	65 space	350	90%	***10,237,500***
		Sales of ice per kg	100	5000 kg	350	50%	***87,500,000***
	Retail section	Rent of Fish Retail Table	500	76 table	350	90%	***11,970,000***
		Fish Gutting & Heading Table	500	13 table	350	90%	***2,047,500***
		Movable Retail Table (rental)	300	65 table	350	90%	***6,142,500***
	Toilet	Toilet Charge	200	550 user	350	90%	***34,650,000***
		Shower Charge	500	55 user	350	90%	***8,662,500***
		Foot wash Charge	100	300 user	350	90%	***9,450,000***
	Parking Charge	Cars	500	20 lot	350	100%	***3,500,000***
		Bicycle	200	300 lot	350	100%	***21,000,000***
		Motorcycle	250	30 lot	350	100%	***2,625,000***
	Total collected by Contractor						***266,385,000***
2 by Accountant	Room Rent (upstairs)	Canteen	1,000	3 room	360	100%	***1,080,000***
		Kiosk	1,000	3 room	360	100%	***1,080,000***
		Contractor's Office	3,000	1 room	360	100%	***1,080,000***
		Meeting Room	3,000	1 room	24	80%	***57,600***
	Existing Market Facility (Renovated)	Cold storage & Ice vending services	2,000	2 room	360	100%	***1,440,000***
		Chest Freezer	200	8 unit	360	100%	***576,000***
		Retail shops for general goods	1,000	6 room	360	100%	***2,160,000***
	Total collected by Accountant						***7,473,600***
	Total Income / Year					**($171,162)**	***273,858,600***

2) Expenditure

The landing site manager and section heads should be seconded or recruited from the government and the personnel costs should be borne by the government. For the replacement of machines (ice making machines, generators, lighting fittings and pumps) and the repair of the overall facilities (quay, buildings), 5% of the income should be reserved and managed in an independent account.

Table 2-26 : Annual expenditure

	Item	Breakdown		nos. / quantity	Cost(Tsh.)	unit	Cost/Year
1	Personnel Expenses	Landing Site Manager	borne by Government	1	0	/month	***0***
		Head of Accounting section	borne by Government	1	0	/month	***0***
		Head of Planning & Administration section	borne by Government	1	0	/month	***0***
		Head of Market Management section	borne by Government	1	0	/month	***0***
		Casher	Recruited	1	250,000	/month	***3,000,000***
		Supervisor	Recruited	1	250,000	/month	***3,000,000***
		Procurement, Contract & Stock Management	Recruited	1	250,000	/month	***3,000,000***
		Wholesale & Retail Management	Recruited	2	250,000	/month	***6,000,000***
		Wharf Control	Recruited	1	250,000	/month	***3,000,000***
		Chief Technician	Recruited	1	250,000	/month	***3,000,000***
		Mechanical & Electric Technician	Recruited	1	250,000	/month	***3,000,000***
2	Electricity, Water and Maintenance services	Electricity (kWH)		24,749kWH	213	/month	***63,257,422***
		Water (cu.m.)	exclu. rainwater capture	754cu.m.	1,020	/month	***9,228,960***
		Telephone services		1	300,000	/month	***3,600,000***
		Internet services		1	400,000	/month	***4,800,000***
3	Other running cost and services	Stationeries, print & copy		1	300,000	/month	***3,600,000***
		Fuel for generator		510L	2,120	/month	***12,974,400***
		Fuel and lubricants for vehicle		100L	2,170	/month	***2,604,000***
		Garbage disposal	every day	1	200,000	/month	***2,400,000***
		Vacuum car (night soil collection)	maintenance/year	2	50,000	/year	***100,000***
	Payment to Contractor (Cleaning, Revenue collection)	Refrigeration Technician	contracted out (average)	1	300,000	/month	***3,600,000***
		25% of Revenue Collection		25%	266,385,000	/year	***66,596,250***
4	Regular & Incidental Expenses			1	350,000	/month	***4,200,000***
5	Depreciation Reserve (to Account of "Special fund")	Reserve fund for Machine renewal	Ice machine, generator	1	49,280,000	/year	***49,280,000***
		Reserve fund for Facility Repair	(5% of revenue)	5%	273,858,600	/year	***13,692,930***
Total Expenditure / Year						**($164,959)**	***263,933,962***

① Electricity rate

Considering the operating rates during and outside the operating hours of the market, monthly power consumption is estimated as follows:

Average 853.4kWh/day × 29 days = 24,749kWh/month

Table 2-27 : Planned daily power consumption

Maximum Capacity	kW	*KVA*
Lighting	10.3	*6.4*
Plug outlet	36.7	*18.3*
Air conditioning, ventilator	30.0	*18.8*
Ice plant, Ice storage	25.0	*9.4*
Pump etc.	4.4	*2.8*
Total	106.4	*55.7*

★A. Opening time(6:00am～4:00pm/10 hours)	kW	*usage ratio*
Lighting	4.1	*0.4*
Plug outlet	22.0	*0.6*
Air conditioning, ventilator	18.0	*0.6*
Ice plant, Ice storage	15.0	*0.6*
Pump etc.	0.9	*0.2*
(6:00am～4:00pm)	60.0	
(10 hours 6:00am～4:00pm)	600.0kWH	

★B. Closing time(4:00pm～6:00am/14 hours)	kW	*usage ratio*
Lighting	1.0	*0.10*
Plug outlet	3.7	*0.10*
Air conditioning, ventilator	3.0	*0.10*
Ice plant, Ice storage	10.0	*0.40*
Pump etc.	0.4	*0.10*
(4:00pm～6:00am)	18.1	
(14 hours, 4:00pm～6:00am)	253.4kWH	
Total Consumption per Day	**853.4kWH**	

② Water rate

Daily water consumption is estimated as follows:

Average 26m^3/day×29 days/month =754m^3/month

1) Auction area	(floor washing)	5.6 Lit./ m2 x	336 m2	=	1,881.6	Lit.
2) Dagaa Trade area	(floor washing)	5.6 Lit./ m2 x	336 m2	=	1,881.6	Lit.
3) Gutting & Retail area	(floor washing)	5.6 Lit./ m2 x	672 m2	=	3,763.2	Lit.
			Cleaning use/day Total		7,526.4	
		Rainwater capture by 80% in rainy season; 3 months, 10% in 9 months				
			(350 days/year=29 days/month)			
			Annual consumption of cleaning water		**1,898,910.7**	A
4) Offices		80 Lit./user x	17 user	=	1,360.0	Lit.
5) Fish Processing	(for washing fish)	1040 kg x	0.75 Lit./kg	=	780.0	Lit.
6) Public toilets	(for shower)	34.5 Lit./user x	55 user	=	1,897.5	Lit.
7) Public toilets	(for cleaning)	20 Lit./user x	550 user	=	11,000.0	Lit.
8) Public toilets	(for foot washing)	10 Lit./user x	300 user	=	3,000.0	Lit.
			General use/day Total		18,037.5	
			(350 days/year=29 days/month)			
			Annual consumption of general use		**6,277,050.0**	B
9) Ice production	inc. Evaporation	5000 Lit.	1.15 times	=	5,750.0	Lit.
				usage ratio	0.5	
				Water for Ice /day Total	2,875.0	
			(350 days/year=29days/month)			
			Annual consumption of Ice use		**1,000,500.0**	C
			Total consumption/ Year （A+B+C）		**9,176,460.7**	
			Average daily consumption =		**26 m3**	

③ Maintenance and repair costs

In order to cover the repair costs of the pavement, paint and furniture as well as the replacement costs of the pumps and LED lighting equipment, which are particularly important, 5% of the income should be appropriated for maintenance and repair costs.

④ Depreciation costs

The annual depreciation costs of the ice making and storage equipment, emergency

generators, light fittings, machinery and equipment to be procured (freezers, equipment for distribution and cleaning) that will be operated in the planned facilities should be appropriated. The annual rate of depreciation was determined based on the fixed installment method.

Table 2-28：Depreciation Rate of Machines and Equipment

Machines and equipment	**Service life**	**Annual depreciation rate (fixed installment method)**
Ice making and storage equipment	**10 years**	**0.1**
Freezer (refrigerator)	**10 years**	**0.1**
Emergency generator	**10 years**	**0.1**
Light fittings, pumps	**13 years**	**0.08**
Equipment for distribution & cleaning	**5 years**	**0.2**

Based on the annual depreciation rates above, the annual depreciation costs are calculated as **US$30,800 (Tsh.49,280,000)**

⑤ Outsourcing of maintenance and collection of fees to subcontractor

Cleaning, security and collection of fees should be outsourced to a subcontractor. As an incentive to the subcontractor, a system to determine the remuneration in accordance with the collected fees should be adopted. This system was recently introduced at the existing Malindi Fish Market and Dar es Salaam Fish Market in Tanzania and proved effective since it significantly improved the collection rate as compared to the collection rate by directly employed staff. As it is assumed that the personnel engaged in the operation by the subcontractor will be less than the minimum, 25% of the estimated income should be allocated as remuneration. It should be noted that the percentage of remuneration needs to be included in the proposal for the recruitment and selection of the subcontractor to ensure that the remuneration will be competitive and reasonable.

Table 2-29：Composition of Subcontractor's Staff

Staff	Number
Manager	1
Accountant	1
Revenue Collector	7
Cleaner & Toilet management	7
Security Guard	6
Security Guard (night shift)	3

3) Balance on Income

Based on the estimations above, the overall balance will be an annual surplus of + **US$ 6,203 (Tsh. 9,924,638)**. As the directors' salaries will be borne by the government, it is considered that there will be no problem with profitability.

CHAPTER3. PROJECT EVALUATION

CHAPTER 3. PROJECT EVALUATION

3-1 Preconditions

The preconditions for implementation of this grant aid cooperation project are as shown below.

- The Zanzibar government fulfills the obligations described in "2-3 Overview of Obligations of Recipient Country" and the minutes of discussions, such as land acquisition, construction permission, customs clearance, and tax exemption.
- The security and safety on the project site are ensured.
- The stakeholders such as existing users and neighboring residents do not object to the project in future either.

3-2 Necessary Inputs by Recipient Country

To produce and maintain the effects of this project, the Zanzibar government must:

- Take necessary budgetary measures and thus provide budgetary assistance to ensure adequate operation of the facilities if it is unlikely that sufficient income for covering the necessary expense is gained, especially just after the start of operation
- Save funds and take budgetary measures as appropriate to meet the expenses for maintaining and upgrading the facilities and equipment and manage the funds in an separate, independent account
- Keep good sanitary conditions of the facilities, ban selling fish outside the facilities through legal regulations by the government, restrict unloading of other cargo than marine products and use by general freighters (lumber, charcoal, etc.) in pursuit of safety of users, quality maintenance for marine products, and improvement of sanitary environment
- Strive to ensure the continuity of the project effects by keeping track of the implementation effects periodically and continuously using appropriate operating indexes
- Continuously conduct environmental monitoring
- Have the Zanzibar Ports Corporation conduct maintenance dredging when required in the future or repair related port facilities as appropriate
- Conduct operation, maintenance, and management through the Management Board under the responsibility of the government and strive to reflect the opinions of stakeholders such as users on the administration through the Advisory Committee

3-3 Important Assumptions

The external conditions for producing and maintaining the effects of this project are shown below.

- There is no significant decrease of fishery resources due to major climate change.
- There is no significant increase or decrease of fishing boats that use the Malindi fishing port.
- The country and region are politically and economically stable, and there is no excessive inflow or outflow of fishers.

3-4 Project Evaluation

3-4-1 Relevance

The implementation of this project will restore the functionality of the landing quay that has collapsed at Malindi and provide a safe, sanitary, and efficient work environment to fishery-related workers such as fishers, fish porters, brokers, auctioneers, and retailers who work on the open-air beach with inferior sanitary conditions and also maintain the quality of fish. Consequently, it is expected to contribute to the fishery-sector upper development plan of the Zanzibar government that aims at improving the domestic distribution from production to consumption by improving fishing ports and local markets. Therefore, it is concluded that the implementation of this project by Japan's grant aid cooperation has a high validity.

Since the Malindi landing site is used in some way by fishermen in the Urban District and related service providers (such as brokers, auctioneers, retailers, and fish porters), the direct beneficiary population of this project will be approximately 43,000 persons[14] including these people. Furthermore, about 900 thousand consumers[15] on the island of Unguja, the main area in which fish landed at Malindi are distributed, will indirectly receive benefit from this project.

3-4-2 Effectiveness

This project is considered to have a sufficiently high effectiveness in view of the following expected effects.

■ Quantitative effects

[Hygiene]

(1) Approximately 120 stands[16] that carry out unhygienic fish retailing and gutting/cleaning on the open-air beach and street will decrease to 12 (10%) or less because fish will be handled inside a hygienic permanent building.

(2) Fish remains such as guts and gills produced in gutting/cleaning of landed fish, about 600

[1]The value estimated by multiplying the labor population accounting for 76.8% (Integrated Labor force survey 2006) of the population in the Urban District, 223,000 (2012 Census) by the ratio of fishers and related workers, 25% (The Status of Zanzibar Coastal Resources 2009)

[15] 2012 Census

[16] In a counting survey for 20 days, including 10 days each in the fishing off-season in June and the busy fishing season in September, the 20-day average number of places in the peak time each day was 120 in total, including 59 fish retail stands, 48 sheets placed directly on the ground, and 12 fish gutting stands.

kg per day[17], which are dumped on the beach or in the bay, will decrease to 60 kg (10%) or less because they will be accumulated in the garbage depository and properly collected and disposed of.

[Efficiency]

(1) The 120-meter path for carrying fish from the landing site, crowded with fish retailers, etc., to the permanent retail area (existing fish market) is shortened, after project implementation, to a path about 50 meters long specialized for fish distribution[18].

(2) All of the 390 fishing boats that use the port, which cannot come alongside the quay for fish landing due to the collapsed concrete debris and shallows, can do so except during low tide.

[Safety]

(1) The fish landing and carrying by about 1400 workers per day at a dangerous collapsed quay will be changed, after project implementation, to safe work at an improved and paved quay.

(2) The dangerous fish landing at a collapsed quay done by about 392 artisanal fishing boats (about 70 per day) will be changed, after project implementation, to safe landing at an improved and paved quay.

■ Qualitative effects

(1) The management facilities for fish landing and distribution will be improved to enhance the public management system such as statistical data management and hygiene control.

(2) The meeting and administrative spaces for fishers and users will be improved to invigorate organizing of users of the Malindi landing site and activities by fisheries cooperatives.

(3) The unified management of the landing quay by MLF will clarify the division of use between the carrying vessels of charcoal and lumber and the fishing boats that unload fish, ensuring safety of moving vessels and hygiene control for landing facilities.

(4) The soft components for improvement of the operation system will enhance the capacity of MLF for operation, maintenance, and management of its fisheries facilities.

[17] In a survey for nine days in May/June and September, the catch other than small pelagic fish was about 6.5 tons on the average and the inflow from other landing sites in the six-day survey was about 0.9 tons on the average, attaining about 7.4 tons per day in total. The sample counting survey on three persons for three days in June found that the average fish residue ratio was 8.4%. The former was multiplied by the latter to obtain an estimated amount of about 600 kg per day.

[18] The distance from the tip of the collapsed quay or approximate center of the beach to the existing fish market is about 120 m. The distance from the planned landing quay to the retail area is about 50 m. The existing retail area will be used for the refrigeration and goods sale services instead of fish trading.