

2-2-2 Basic Plan

2-2-2-1 Site and facilities layout plan

(1) Location of Project site

The site of this Project comprises two parts: Market Site and Jetty Site. The site on the Market side sits at the center of the east coast of the Wewak Peninsula and the site on the Jetty side on the west coast. The two sites are about 500 meters apart, and downtown Wewak is between the two. Figure 2-2-1 shows the geography of the Project site.

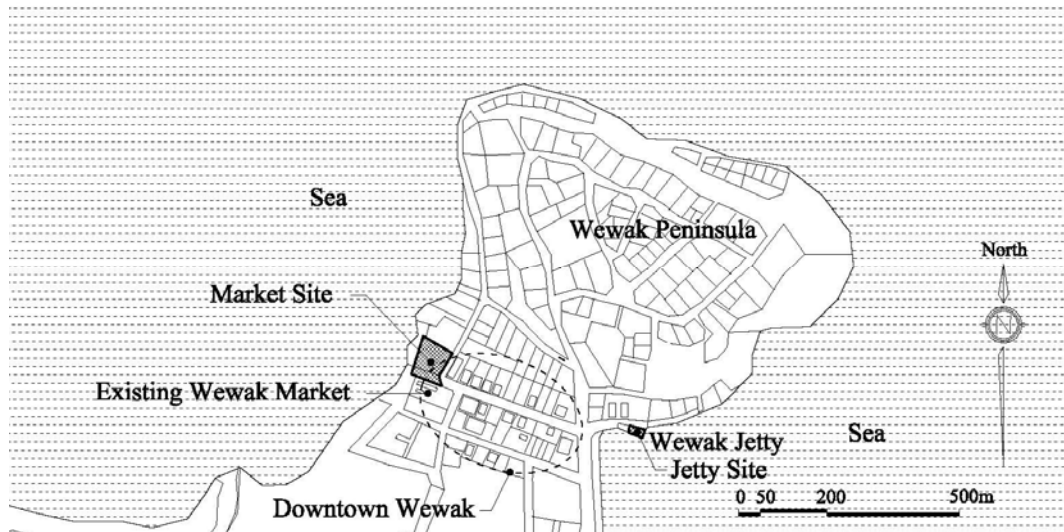


Figure 2-2-1 Geography of Project Site

(2) Market Site

1) Current status of the site

Figure 2-2-2 shows the current status of the Market Site and the surrounding area, which is outlined below:

- ① The Market Site is a lot between the present Wewak Market and Radio Wewak (NBC). At present, it is used as a bus terminal.
- ② The ground of the site slopes from the side facing the road toward the sea coast with an elevation of one meter. There is also a ground level gap of about one meter along the boundary with the Wewak Market.
- ③ Shoppers come from Downtown Wewak, which is to the southeast of the site.
- ④ There is a storm drain on the north side of the site. It runs across the site and merges with another drainage from the Radio Wewak side, flowing into the sea.
- ⑤ The existing Wewak Market will be used until the Wewak Market is completed under this Project. After that, the Wewak Market will be demolished, the ground level will be raised, and a bus terminal and a parking lot will be constructed.

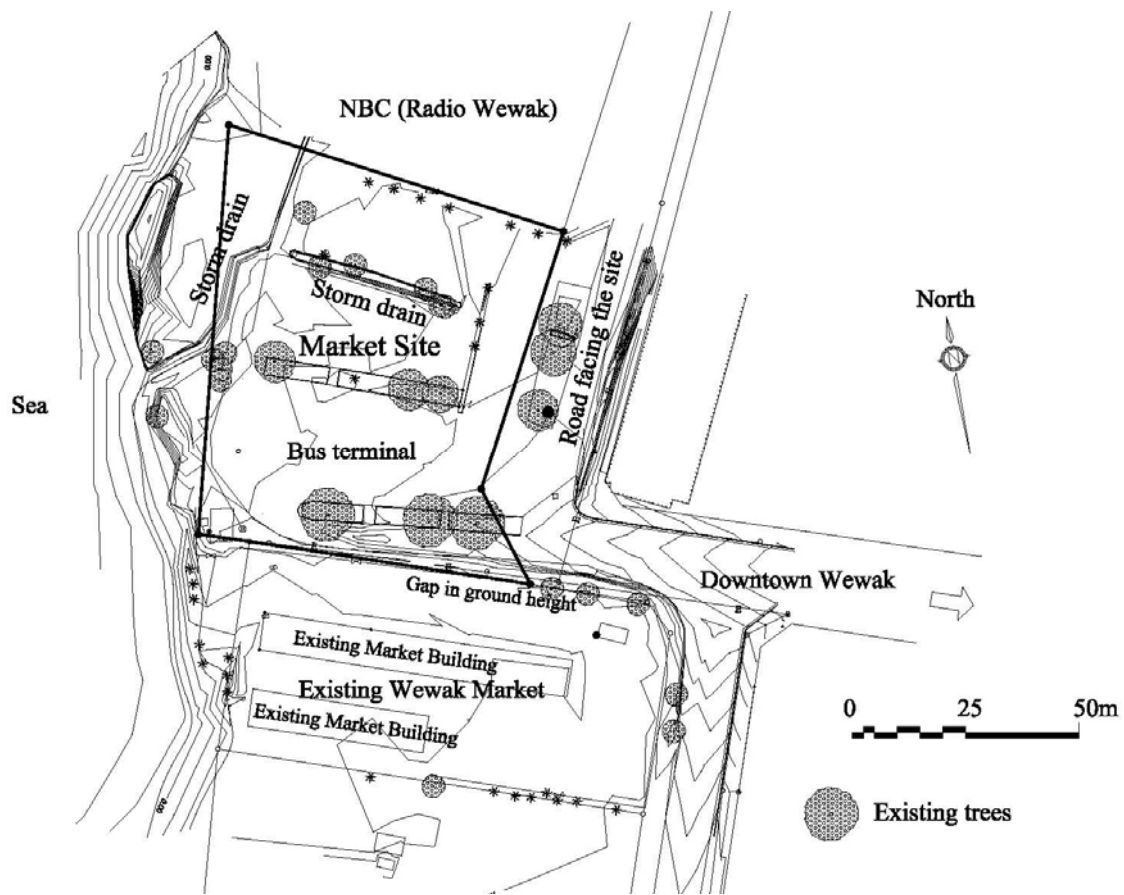


Figure 2-2-2 Current status of Market Site

2) Site and facilities layout plan

With the current status of the site in mind, the following site and facilities layout plan will be carried out:

- ① The storm drain will be moved to the end on the Radio Wewak side.
- ② A main gate will be built at the southeast corner. Two other gates will be built to avoid concentration of comings and goings.
- ③ The Administration Office Building and Public Toilet will be constructed on the south side of the site and Market Building on the north.
- ④ A shopping flow line will be established circulating in each Market Building with the axis of flow lines connecting them vertically. The Corridor and Kiosk will be built on the axis.
- ⑤ The Public Toilet will be built on a relatively elevated part of the site by taking the inclination of the drainage.
- ⑥ The Administration Office Building will be placed in parallel with the Public Toilet and a Porch will be built to connect them.
- ⑦ The Standby Rubbish Bays will be placed close to the road facing the premises for ease of carrying-out work.
- ⑧ A water point will be erected outside the Administration Office Building as Refreshment

Space and benches will be placed under the existing trees near the Kiosk. Figure 2-2-3 shows the layout plan of the Wewak Market.

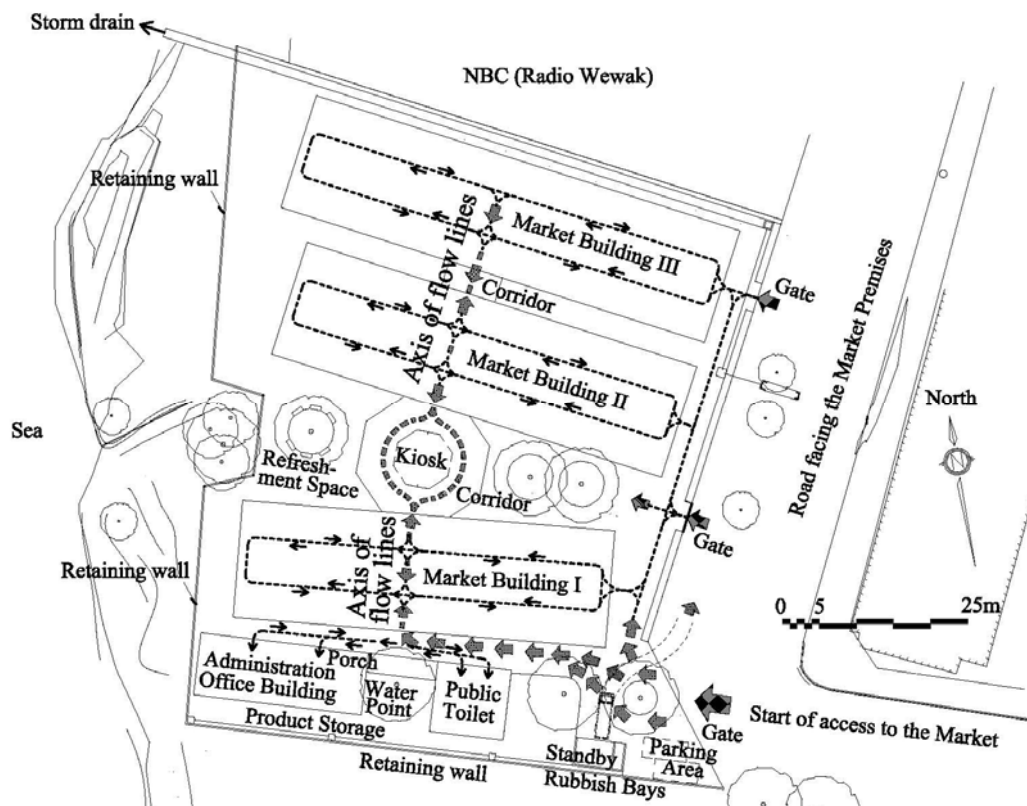


Figure 2-2-3 Layout plan of the Wewak Market

3) Exterior plan

① Pavement on the Premises

The common walkways on the premises will be paved. Table 2-2-1 is a comparison of pavement specifications. It is an overall judgment that interlocking is the most suitable type of pavement for the Project. Figure 2-2-4 shows the scope of Pavement on the Premises.

Table 2-2-1 Comparison of pavement specifications for the Market

Specifications	Ease of walk	Ease of cleaning	Radiation heat	Maintenance	Durability	Cost	Overall assessment
Interlocking	○	○	○	○	○	○	○
Concrete	○	○	△	△	○	△	△
Asphalt	○	○	△	△	○	△	△
Gravel	△	△	○	○	△	○	△
Wood deck	○	○	○	△	△	○	△

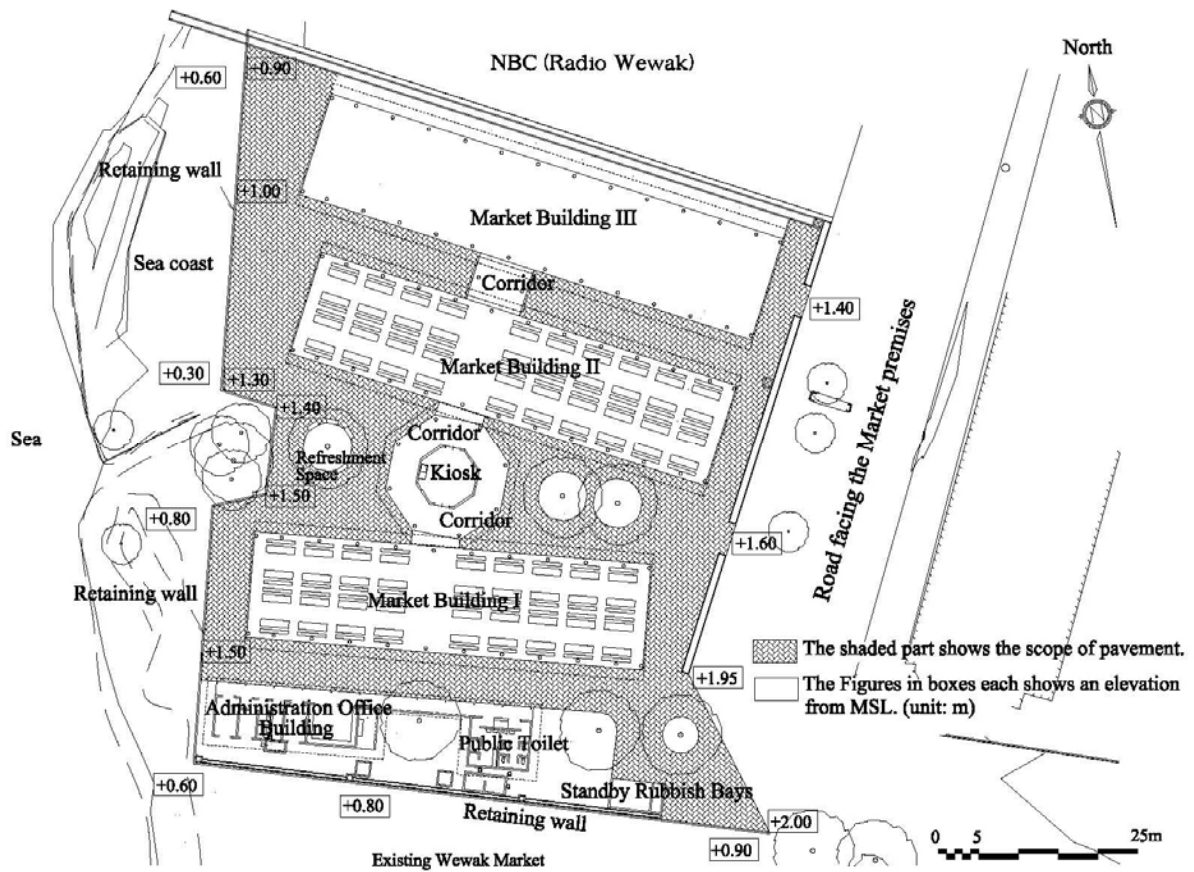


Figure 2-2-4 Scope of the Pavement on the Premises

② In-premises drainage inclination

The ground in the premises will be provided with a drainage slope from the road side toward the sea coast for yard drain.

③ Retaining wall

Retaining walls will be made at the borders with the present Market and the coastline where there is a ground level gap of 0.3 to 1.1 meter.

Figure 2-2-5 shows layout plan for Retaining wall.

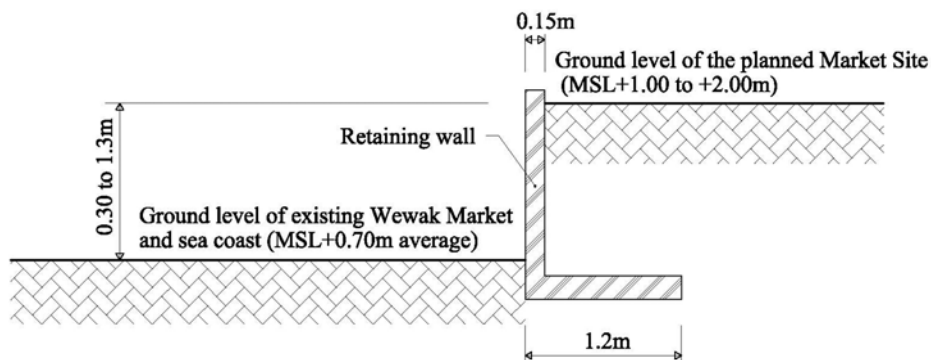


Figure 2-2-5 Plan for Retaining wall

④ Standby Rubbish Bays

The Standby Rubbish Bays will be enclosed by the retaining wall. Figure 2-2-6 shows both plain and sectional views of the Standby Rubbish Bays.

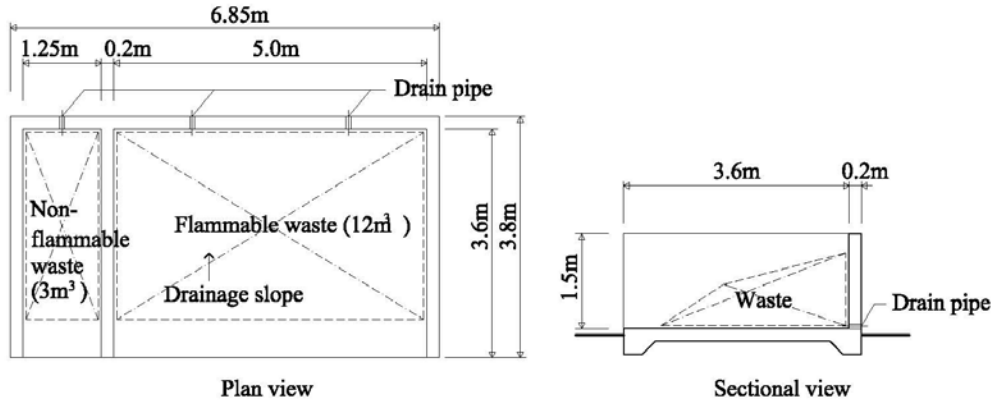


Figure 2-2-6 Standby Rubbish Bays

⑤ Refreshment Space

Figure 2-2-7 shows both plane and elevated views of the Refreshment Space.

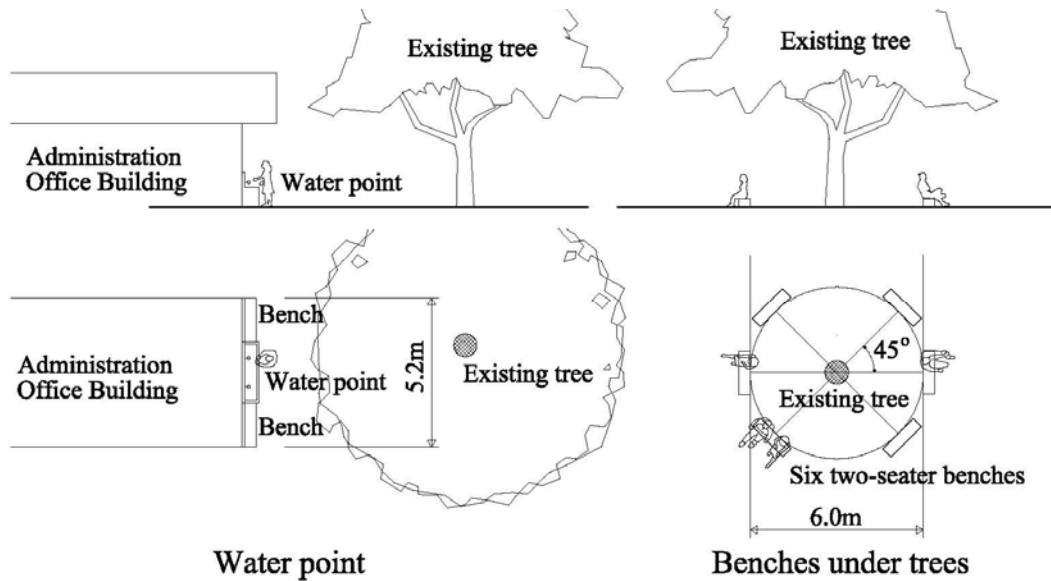


Figure 2-2-7 Refreshment Space

⑥ Fences and gates

The outer circumference of the site will be fenced and provided with gates. For this purpose, galvanized steel-net fences widely used in PNG are suitable. This work will be borne by PNG.

(3) Jetty Site

The present status of the Jetty Site is summarized below:

- ① The site comprises the lot of the Wewak Jetty and the adjoining ground facing the sea coast.
- ② The ground is even and its elevation is DL+2.1 to 2.3m.
- ③ The Wewak Jetty will be demolished at the expense of PNG.
- ④ The coastline along the site will be provided with revetment using stone baskets. The construction will be done at the expense of PNG.
- ⑤ The tidal and seasonal currents and winds are in parallel with the part of the Wewak Jetty where boats dock.

The following layout plans for the lot and facilities will be carried out on the basis of these conditions. Figure 2-2-8 is the layout plan of the Jetty Site.

- ① The berth part of the New Wewak Jetty will be relocated to the place where the depth of the water is DL-0.5. It will be made in parallel with the Wewak Jetty.
- ② The berth part of the Jetty will be connected with the revetment by means of a jetty access.
- ③ The berth part of the Jetty will be constructed in such a way that boats can come down on both sides of it.
- ④ The Ice Making Building will be separated from the coastline by 3.0m.
- ⑤ The in-premises ground between the Ice Making Building and the revetment will be paved. Vehicles coming to the jetty must park on the concrete pavement. In principle, no vehicle may enter the jetty.

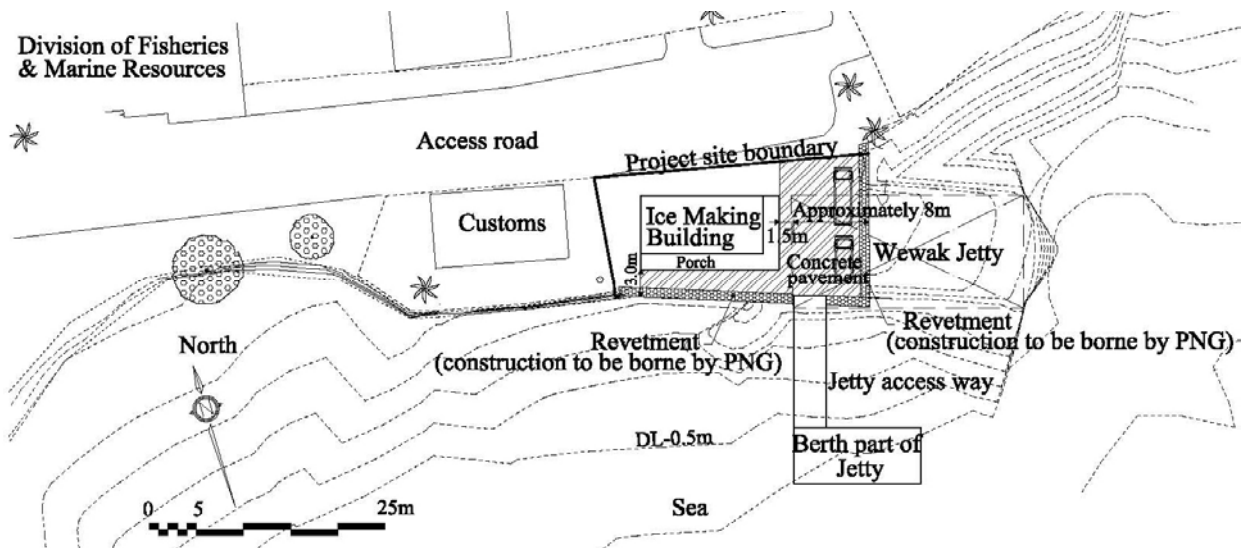


Figure 2-2-8 Planned layout of Jetty Site

2-2-2-2 Architectural Plan

(1) Floor Plan

1) Market Building

① Three market buildings will be built according to the merchandise item zoning plan shown in Table 2-2-7.

Market Building I : Place for table selling (Zone A)

Market Building II : Place for table selling and floor selling under the eaves (Zones B and C)

Market Building III : Place for floor selling and selling under the eaves (Zones B and C)

Figure 2-2-9 shows the floor plan of the Market Building. Table 2-2-2 is the breakdown of the selling places based on the floor plan. Table 2-2-3 is the breakdown of the floor area.

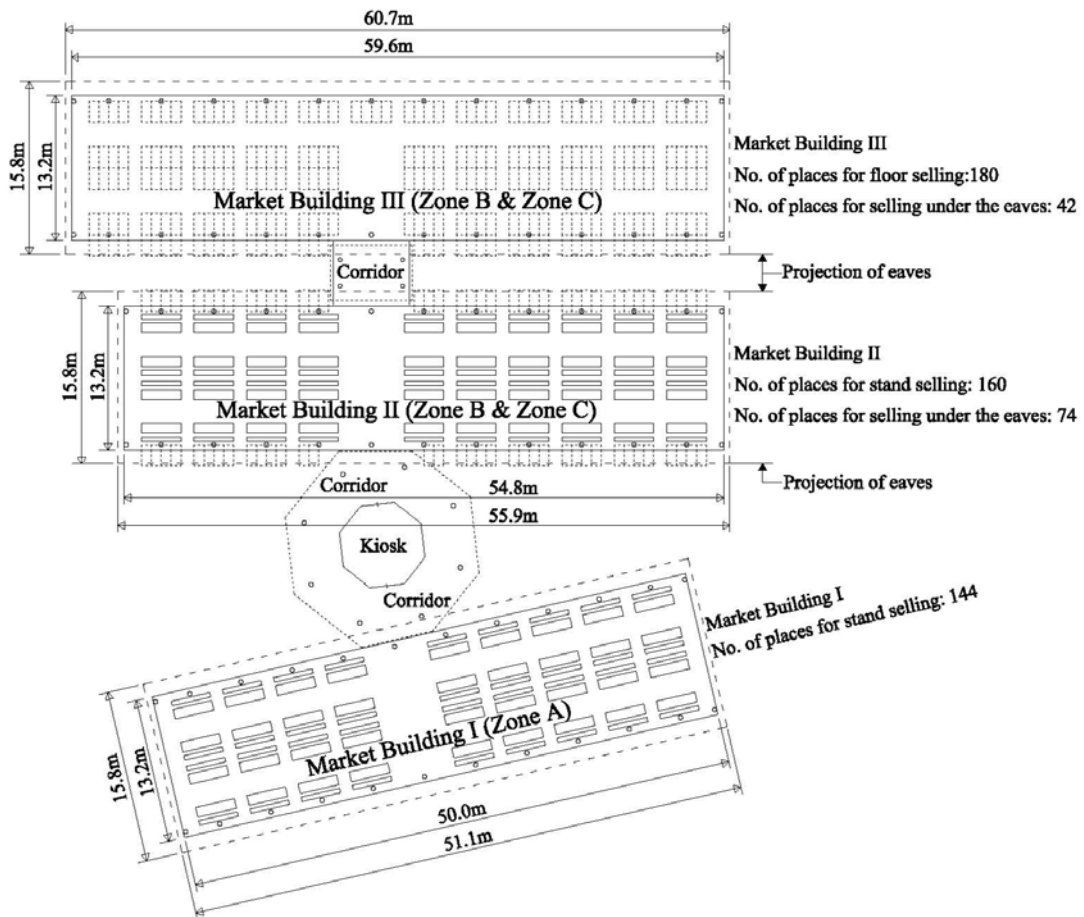


Figure 2-2-9 Floor plan of the Market Building

Table 2-2-2 Breakdown of the number of Market Building selling places

Market Building	Zone	No. of table selling places	No. of floor selling places	No. of selling places under the eaves	Total
I	Zone A	144	0	0	144
II	Zone B	160	0	74	234
III	Zone C	0	180	42	222
Total		304	180	116	600

Table 2-2-3 Breakdown of the Market Building Floor Area

Market Building	Breakdown	Floor area (m ²)
I	Selling place 144×3.66 m ² + Walkway, etc. 132.96 m ² =	660.00
II	Selling place 160×3.66 m ² + Walkway, etc. 137.76 m ² =	723.36
III	Selling place 180×3.66 m ² + Walkway, etc. 127.92 m ² =	786.72
Total		2,170.08

② Spaces around the Market Building and on the common walkways in the premises will be allocated to 250 vendors who cannot be contained in the Market Building as shown in Figure 2-2-10.

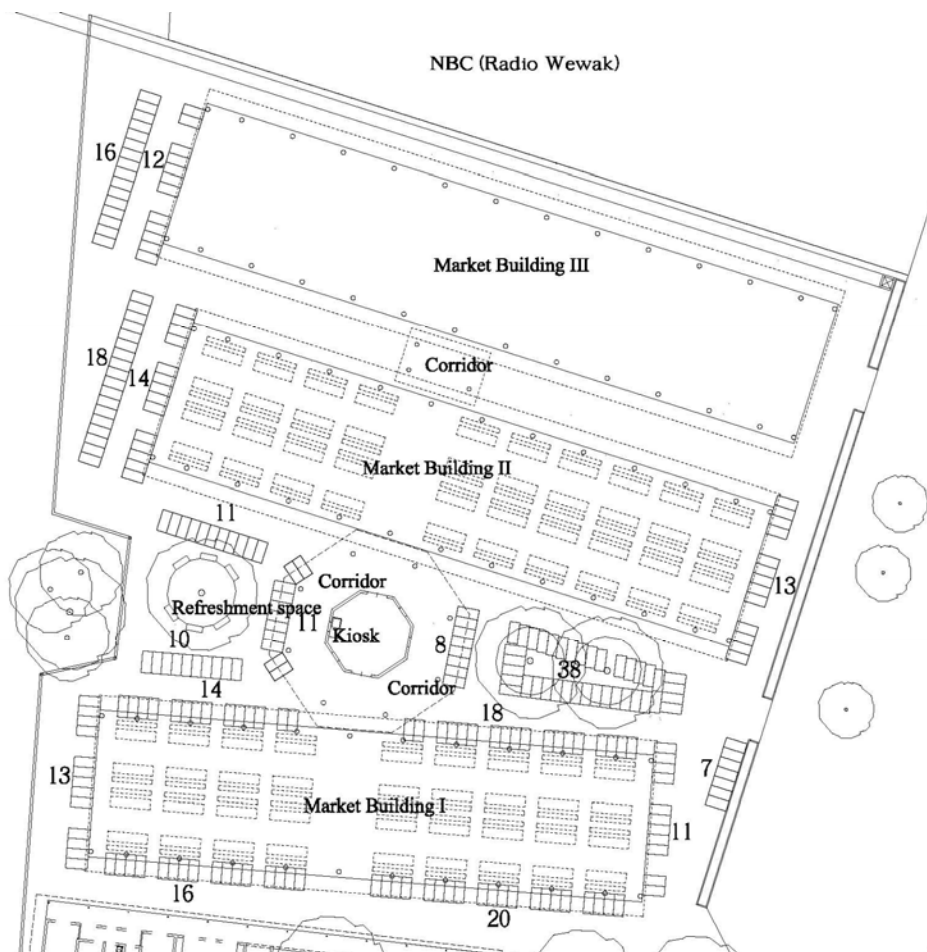


Figure 2-2-10 Utilization spaces allocated to 250 vendors

2) Administration Office Building and Products Storage

- ① To considerate the ease of the administrative management, the Products Storage will be included in the Administration Office Building.
- ② The Staff's Room will be designed to be shared by 13 personnel; three people for Ticket Sales, three people for Maintenance & Rubbish, three Public Toilet Keepers and four Security people. Figure 2-2-11 shows the floor plan of the Staff's Room, layout design was adjusted from the view of its purpose and usage of the room.

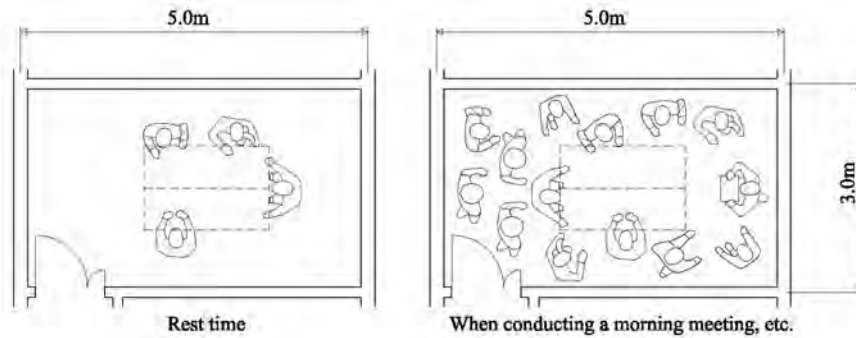


Figure 2-2-11 Floor plan of Staff's Room

- ③ The Products Storage will be provided with a shelf for luggage keeping.

Table 2-2-4 shows the functions and area of each room of the Administration Office Building.

Table 2-2-4 Breakdown of area of Administration Office Building

Room	Functions	Floor area (m ²)
Market Manager's Room	Market Manager's Office	15.00
Market Clerk's Room	Market Clerk's Office	8.64
Staff's Room	Staff's morning meeting. business meeting, rest, etc.	15.00
Kitchenette	Staff tea service	4.32
Office Toilet×2 (Male & female)	Toilets for staff members (one water-closet and one hand basin each)	4.32
Tools Storage	Storage for cleaning tools for the Market and furniture and fixtures for Administration Office	3.24
Entrance	Entrance and corridor	7.98
Products Storage	Storage for vendors' luggage in custody	31.50
Total		90.00

3) Public Toilet

The doorway of the Public Toilet will be placed on the Market Building side, together with a Pay Counter. The walls and door of the doorway will be arranged in such a way that the inside of the toilet cannot be seen from the outside. Table 2-2-5 shows the floor area of each booth of the Public Toilet.

Table 2-2-5 Breakdown of the area of Public Toilet

Room	Functions	Floor area (m ²)
Men's Toilet	For male vendors (two water-closets, two urinals, two hand basins)	22.10
Women's Toilet	For female vendors (four water-closets, two hand basins)	22.10
Pay Counter	Collecting toilet use fees	2.16
Total		46.36

4) Kiosk and Corridor

The Kiosk is a small store selling drinks and snacks to Market users. It will be provided with one counter and two doorways each in the direction of the axis of the flow line. Figure 2-2-12 shows the floor plan, and Figure 2-2-6 a description of the floor area of the Kiosk and Corridor.

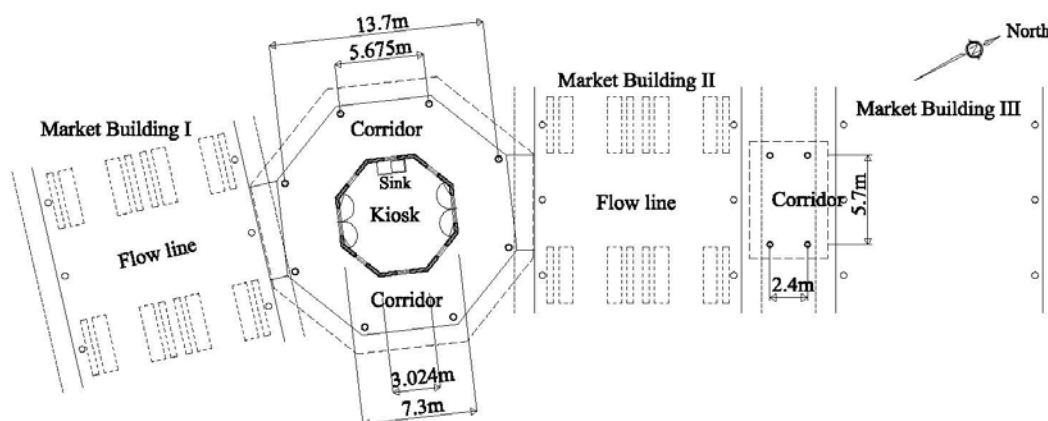


Figure 2-2-12 Kiosk and Corridor

Table 2-2-6 Description of the Kiosk and Corridor Area

Name	Calculation	Floor area (m ²)
Kiosk	$7.30\text{m} \times 3.024\text{m} \times 2 =$	44.15
Corridor	$13.70\text{m} \times 5.675\text{m} \times 2 - 44.15 \text{ m}^2 =$	111.35
Corridor	$5.70\text{m} \times 2.40\text{m} =$	13.68
Total		169.18

5) Ice Making Building

The Ice Handling Area, Operation Office, and Office Toilet will be placed in parallel on the Jetty side. Porches will be provided under the eaves. The window of the Operation Office will be provided with an ice selling counter. Table 2-2-7 shows the functions and floor area of each room of the Ice Making Building.

Table 2-2-7 Breakdown of the Ice Making Building Floor Area

Room	Functions	Floor area (m ²)
Machine Room	Installation of the Ice Making Plant related machines	43.59
Ice Storage	Storage of ice blocks	7.29
Ice Handling Area	Handling of block ice, and use of ice crusher and scale	12.69
Operation Office	Office for Administration Officer and Data Officer (Data collection, Ice Making Plant management, Jetty management)	9.72
Office Toilet	Toilet for staff members (one water-closet, one hand basin)	3.51
	Total	76.80

(2) Section plan

1) Market Building

- ① The floor height of the Market Building will be made higher than the ground level at the boundary with the front road. Table 2-2-8 shows the floor height of each Market Building.

Table 2-2-8 Floor heights of the Market Building

Market Building	Height at the boundary with the front road	Floor height
I	+ 1.95m	+ 2.00m
II	+ 1.60m	+ 1.70m
III	+ 1.40m	+ 1.55m

Note: The figures in the table show heights from MSL.

- ② The floor of each Market Building will be provided with a drainage slope from the center to the eaves side.
- ③ Daylight and winds will be utilized for the lighting and ventilation of the inside of the Market Building.
- ④ The height under the eaves will be set at about 2.5m. Air ventilation will be provided by means of a monitor roof made by lifting the center part of the roof to let the air warmed by radiation heat escape so that radiation heat from the roof will not be conducted downward. Also, a part of the monitor roof is made with a top light so that the inside of the Market Building without electric illumination is well-lighted. Figure 2-2-13 shows a sectional plan of the Market Building.

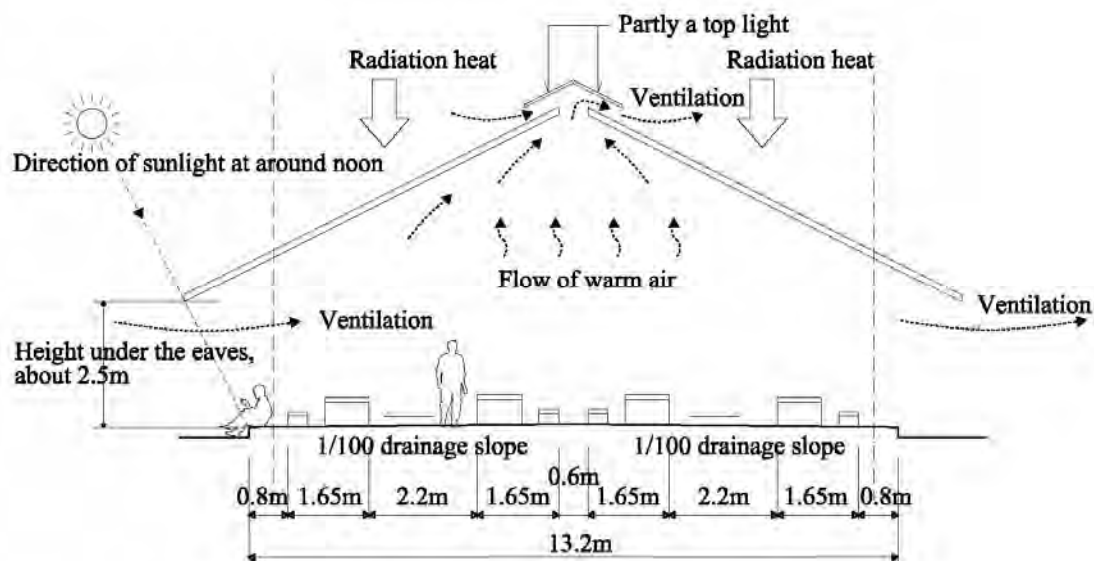


Figure 2-2-13 Sectional Plan of the Market Building

2) Administration Office Building and Products Storage

- ① The floor height will be made 150mm higher than the surrounding ground level.
- ② The ceiling height of each office room will be set at 2,700mm in accordance with PNG's Building Act and Regulations.
- ③ The ceiling height of the Tools Storage and Entrance will be set at 2,700mm as with the Office Rooms.
- ④ The ceiling height of the Kitchenette and Office Toilet will be set at 2,400mm, and a ventilation duct will be provided under the roof.

3) Public Toilet

- ① The floor height will be made 150mm higher than the surrounding ground level.
- ② The ceiling height of the Public Toilet will be set at 2,700mm. The partitioning of the toilet booths will be set at 2,100mm from the floor, leaving the upper part of the walls open for ventilation purposes.
- ③ The upper part of the exterior concrete block walls will partially be made of ventilating blocks.

4) Kiosk and Corridor

- ① The floor height of the Corridor will be adjusted with the floor height of each Market Building (shown in Table 2-2-8) by providing the Corridor floor with a slope.
- ② The roofs of the Corridor will be made above the roofs of the Market Building.

Figure 2-2-14 shows an elevated view of the Corridor and Kiosk.



Figure 2-2-14 Elevation view of the Corridor and Kiosk

5) Ice Making Building

- ① The floor height of each room of the Ice Making Building (except the Machine Room) will be made 150mm higher than the surrounding ground level. The floor of the Machine Room will be made 100mm lower than the other rooms.
- ② The ice selling counter will be fixed at a height of 900mm from the floor.
- ③ The ceiling of the Machine Room will be provided with an electric hoist to handle block ice. The height at the bottom of the hoist rail will be set at 3,500mm from the floor of the Machine Room.

(3) Structure plan

1) Soil bearing capacity for designing

Table 2-2-9 shows the Project Site's soil bearing capacity for designing.

Table 2-2-9 Soil bearing capacity for designing

Site	Soil bearing capacity for designing	Reason
Market Site	0.05Mpa	Based on the findings of geological survey
Jetty Site	0.05Mpa	Based on the findings of geological survey

2) Types of structure

Table 2-2-10 shows general strengths and weaknesses of different types of structure.

Table 2-2-10 General strengths and weaknesses of different types of structure

Type of structure	Durability	Earthquake resistance	Column interval	Cost	Remarks
Timber	△	△	○	◎	Anti-termite measures required
Steel	○	◎	◎	△	Anti-corrosion measures required
Reinforced masonry	○	○	△	○	
Reinforced concrete	◎	○	△	△	Heavy

- ① The Market Building consists of only roof and column, and it's structure needing large intercolumniation. For such structures, the steel structure is greatly advantageous in comparison with other structures. In case of the reinforced concrete structure, lateral forces

increase at the time of earthquake due to heavy self-weight thus requiring heavy foundation which is not economical. The timber structure is inferior with earthquake if only built with columns. Therefore, the Market Building will be steel structure and the lower part of columns covered with the reinforced concrete (RC) because these part will be affected by rain water and easy to rust. The structure of Corridor should be the same as the Market Building since the corridors is connected to the Market Building.

- ② The other buildings do not need large column intervals. Their structure will, therefore, be the reinforced masonry wall structure which is conventional construction method in PNG.

Table 2-2-11 summarizes the type of structure for each building.

Table 2-2-11 Type of structure of each building

Building	Foundation	Footing beam	Column or Wall	Beam	Roof
Market Building Corridor	RC independent	RC	S: Column Lower part: RC covered	S	S: Purlin
Kiosk	RC continuous		RM wall+ RC lintel		S: Rafter S: Purlin
Administration Office Building Public Toilet	RC continuous		RM wall+ RC lintel		S: Rafter S: Purlin
Ice Making Building	RC continuous		RM wall+ RC lintel		S: Rafter S: Purlin
Abbreviations in the table			RC: Reinforced concrete S:Steel RM: Reinforced masonry		

(4) Machines & equipment plan

1) Ice Making Machine

① Types of ice

Table 2-2-12 is a comparison of characteristics of different types of ice. It seems that block ice is suitable for use with fisheries under this Project, that is, keeping ice itself before catching fish as well as keeping catches cool. Since the ice making capacity is as small as 500 kg a day, ice will be made in blocks of 22kg each.

Table 2-2-12 Comparison of characteristics of different types of ice

Type of ice	Block ice	Crushed ice
Characteristics of ice	Can be kept for a long time. Can be used as crushed ice by crushing when it is used.	Can be used directly for cooling. Cannot be kept for a long time.
Structure of ice making machine	Relatively complex and big.	Compact but complex.
Water requirements	Needs ice making water, plus ice melting water.	Needs only ice making water.
Price of ice making machine	Installation work required. Relatively high cost of work.	Available in the market. Cheaper than the block ice making machine.

② Refrigerant

Table 2-2-13 is a comparison of characteristics of different types of refrigerant. Considering possible environmental issues, R-22 should not be used. If two environmentally favorable refrigerants, R-404A and ammonia, are compared, the latter is advantageous in terms of operating expense (price), but the former is advantageous in many other aspects, e.g. the wide

use in PNG, ease of maintenance, and flame resistance. For these reasons, R-404A will be used for this Project.

Table 2-2-13 Comparison of refrigerants

	Freon		Ammonia
	R-22	R-404A	
Impact on ozone layer	Yes	No	No
Use of air-cooled compressor	No problem	No problem	Cannot be used because of high discharge temperature
Maintenance	Easy	Water control necessary	Nasty smell, oil removing and other complicated problems
Inflammability	No	No	No
Use of compact compressor	Available	Available	Unavailable
Use in Wewak	Yes	Yes	No
Price	Low	High	Middle

③ Types of compressors

Table 2-2-14 is a comparison of characteristics of different types of compressors. An open-type compressor will be used because it is capable of making 500kg of ice a day and is easy to maintain.

Table 2-2-14 Comparison of characteristics of different types of compressors

	Open type	Half-closed type	Closed type
Flexibility with respect to ice making capacity	Not available for very small capacity	Widely flexible	Suitable for small capacity, not for large capacity
Ease of repair	Easy	Slightly difficult	Replacement necessary
Maintenance cost	Low	Middle	High

④ Methods of condensation

Table 2-2-15 is a comparison of different methods of condensation. By refrigerant R-404A, the discharge temperature is relatively low and, therefore, use of an air-cooled condenser. The air-cooled method is advantageous in terms of maintenance, as well. So this method of condensation will be employed. To protect the condenser against brine damage, its radiation fins will be made thick and epoxy coated.

Table 2-2-15 Comparison of condensation methods

	Air cooled	Liquid-cooled	
		Evaporation	Cooling tower
Maintenance	Easy	Relatively difficult	Relatively difficult
Discharge temperature	Relatively high	Low	Low

2) Ice Storage

A prefabrication type of structure will be employed for the Ice Storage for ease of construction. Since the cooling capacity is very low, a built-in-type cooling unit will be used. Table 2-2-16 gives the specifications of the Ice Storage.

Table 2-2-16 Ice Storage specifications

Dimensions	2,700mm in width×2,700mm in depth×2,564mm in height
Materials and thickness	Heat insulation panel: Rigid urethane form, 100mm in thickness Outer skin material: Color Stainless steel sheet
Inner volume and ice storage capacity	About 14.3m ³ , 22kg of block ice×80 blocks
Carrying-in and carrying-out doors	One for each, with a single swing door
Cooling equipment	Built-in type unit fixed to the ceiling

3) Emergency Generator

The Machine Room will be equipped with a 10KVA diesel-driven Emergency Generator. It will be able to deliver power to operate the Ice Storage cooling unit and illuminate the Machine Room in the event of power outage. Switch panel will be installed in the Machine Room for connection between public power supply and generator. The generator will be turned on/off manually.

4) Furniture and fixtures

The furniture and fixtures listed in Table 2-2-17 will be provided.

Table 2-2-17 List of furniture and fixtures

Item	Description	Quantity	Use
Ice Crusher	Electric, with a stand	One unit	To crush block ice
Ice Box	Plastic, 150ℓ-type	Two boxes	One for ice delivery and one for ice storage
Platform Scale	100kg-Stand type balance weight	One unit	To weigh ice
Tool Box	Ice catch, ice saw, hand hook	One set	To handle ice
Maintenance Tools	Freon retrieval unit, vacuum pump, torque wrench, tool set, etc.	One set	To maintain the Ice Making Plant

(5) Building Equipment Plan

1) Electrical installations

① Installations for power receiving and transformation and for trunk lines

- The electric power will be received from the aerial electrical supplies installed along the road facing the Market Site. The power receiving panel and distribution boards will be installed in the Administration Office Building.
- In the case of the Jetty Site, as well, the power will be received from the aerial electrical supplies installed along the access road. The power receiving panel and distribution boards will be installed in the Machine Room.
- The Mains-supply to the power receiving panel and the meter will be installed at the expense of PNG.

② Light fittings

- The base illumination intensity of each room of the premises is set as follows:

Market Manager's Room and other office rooms	300 lux
Kitchenette, Office Toilet, Public Toilet	100 lux

Entrance, Ice Handling Area	70 lux
Products Storage, Tools Storage, Ice Storage	70 lux
Machine Room	150 lux

- Fluorescence lighting will be used to illuminate the inside of the facilities.
- No outdoor light will be installed in the Market Site. For outside security lighting, one 20W fluorescence lamp will be installed under the eaves of the Administration Office Building Porch.
- One 20W fluorescence lamp will be installed under the eaves of the Ice Making Building Porch. Another 400W spot light will be fixed on the external wall to provide illumination in the jetty direction.
- The present two street lights in the Market Site will be moved to the front road side at the expense of PNG.

③ Power outlets

- One to two power outlets will be installed in each room of each facility.
- Power outlets of waterproof type will be used in each Toilet booth and the Kitchenette.

④ Others

- Conduit pipe for telephone wiring will be provided in the Market Manager's Room of the Market Site Administration Office Building and the Operation Office in the Jetty Site Ice Making Building.
- The necessary telephone wiring and communications equipment will be installed at the expense of PNG.
- No lightning protection system will be installed.

Table 2-2-18 shows the capacity breakdown of the electric equipment.

Table 2-2-18 Capacity breakdown of electric equipment (kW)

Facilities	Power	Light fittings	Power outlet	Air conditioning	Ventilation	Others	Total
Market Site							
Administration Office Building	-	0.94	1.5	4.0	1.0	-	7.44
Public Toilet	-	0.16	-	-	0.5	-	0.66
Kiosk	-	0.32	2.5	-	1.0	-	3.82
Total	-	1.42	4.0	4.0	2.5	-	11.92
Jetty Site							
Ice Making Building	9.95	0.94	0.1	1.0	0.6		12.59
Total	9.95	0.94	0.1	1.0	0.6	-	12.59

2) Water supply, drainage and sanitary equipment

① Water supply system

- Piping from the main to the water meter in the site will be provided at the expense of PNG. The water supply system connecting the meter in the site will be provided at the expense of Japan.

- Water will be supplied through direct coupling. Piping will be provided underground to the designated water points.

Table 2-2-19 shows the estimated daily water consumption in each site.

Table 2-2-19 Estimated daily water consumption

Site	Estimated water consumption	
Market Site	• Administration Office Building, Public Toilet, Water Point	
	Office Toilet: Water-closets 20 times×18ℓ =	0.36 m ³
	Public Toilet: Water-closets 200 times×18ℓ =	3.60 m ³
	Water point: 600 people×1/10×1×2ℓ =	0.12 m ³
	Water supply for staff members: 15 people×20ℓ =	0.30 m ³
	• Kiosk: 300 meals×9ℓ =	2.70 m ³
	Total	7.08 m ³
Jetty Site	• Water for ice making	
		9.30 m ³
	• Office Toilet: Stool 20 times×18ℓ =	0.36 m ³
	• Water supply for staff members: 3 people×20ℓ =	0.06 m ³
	Total	9.72 m ³

② Sanitary equipment

- Number of items

Building	Room	Items
Administration Office Building	Office Toilet	Two water-closet, two hand basin
	Kitchenette	One sink
Refreshment Space	Water point	One sink (to be made on site)
Public Toilet	Men's Toilet	Two urinals, two water-closets, two hand basins (The urinals will be made on site.)
	Women's Toilet	Four water-closets, two hand basins
Kiosk		One sink
Ice Making Building	Office Toilet	One water-closet, one hand basin

③ Water drainage

- Sewage from the toilets will be drained to the Septic Tank, which will be built on site. Discharge from the Septic Tank will be allowed to elute into the ground through the Effluent Tank.
- Rain water from the roof will be drained from the gutters to the Catch Basin and then to the sea through the underground drain pipes.

3) Air-conditioning and ventilation

- A separate-type room air-conditioner will be installed in each of the following rooms:
Market Manager's Room, Market Clerk's Room, Staff's Room of the Administration Office Building
Operation Office of the Ice Making Building
- A mechanical wall-type ventilator will be installed in each of the following rooms:
Kitchenette and two Office Toilets (shared) of the Administration Office Building
Men's and women's Toilet of the Public Toilet
Kiosk
Office Toilet and Machine Room of the Ice Making Building

(6) Construction materials plan

Each part will be finished with specifications which are generally accepted in PNG, as shown in Table 2-2-20 and Table 2-2-21.

Table 2-2-20 Exterior finish

Facility	Finish
Market Building Corridor	Roof : Metal roofing sheet with steel purlin Bottom of column : Concrete with water repellent coating Column, beam : Steel frame, hot dip galvanizing
Administration Office Building Public Toilet Kiosk Ice Making Building	Roof : Metal roofing sheet with steel purlin Soffit of eaves : Non-asbestos cement board, acrylic resin enamel paint External wall : Mortar rendering finish, acrylic resin enamel paint Door : Aluminum door Window : Aluminum frame, glass louvered window External floor : Concrete with steel trowel finish
Standby Rubbish Bays	Wall : Cement mortar plastering Floor : Concrete with steel trowel finish

Table 2-2-21 Interior finish

Facility/room		Finish		
		Floor	Wall	Ceiling
Administration Office Building	Market Manager's Room	Floor: Ceramic tiling Base board: Cement mortar plastering, acrylic resin enamel paint	Cement mortar plastering, Acrylic resin enamel paint	Non-asbestos cement board, Acrylic resin enamel paint
	Market Clerk's Room Staff's Room Entrance Kitchenette			
Ice Making Building	Operation Office	Floor: Ceramic tiling	Ceramic tiling	Non-asbestos cement board, acrylic resin enamel paint
Administration Office Building	Office Toilet			
Public Toilet	Men's and Women's Toilet			
Ice Making Building	Office Toilet	Floor: Concrete with steel trowel finish Base board: Cement mortar plastering, acrylic resin enamel paint	Cement mortar plastering, Acrylic resin enamel paint	Non-asbestos cement board, acrylic resin enamel paint
Administration Office Building	Products Storage, Tools Storage			
Ice Making Building	Machine Room/Ice Handling Area			
Kiosk				

2-2-2-3 New Wewak Jetty

(1) Overall plan

Under this Project, the New Wewak Jetty will be constructed in the lot of the present Wewak Jetty. Figure 2-2-15 shows an overall view of the New Wewak Jetty.

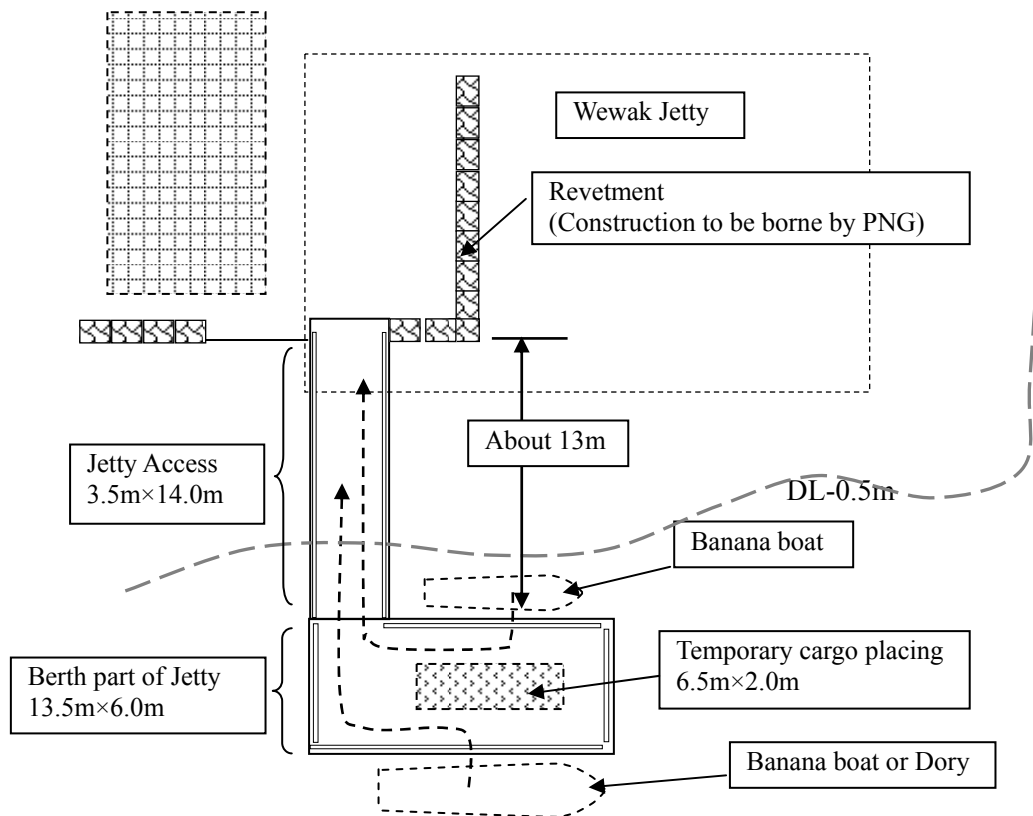


Figure 2-2-15 Overall view of the New Wewak Jetty

(2) Facilities plan

The following are the basic conditions for facilities planning:

① Sea level (calculated from the 2007 SL forecast)

HWL (Average high-water-level) = $\text{DL} + 1.4\text{m}$

LWL (Average low-water-level) = $\text{DL} + 0.2\text{m}$

MSL (Mean sea level) = $\text{DL} + 1.00\text{m}$

LLWL (Lowest low water level) = $\text{DL} \pm 0.0\text{m}$ (calculated value + 0.1m)

② Usage vessels

Banana boat : 7.0m in length \times 1.4m in width \times 0.5m in draft

Dory : 10.0m in length \times 2.0m in width \times 1.0 (small) \sim 1.5m (medium) in draft

③ Berth part of Jetty water depth : $\text{DL} - 0.5\text{m}$

④ Jetty bearing load: 5 kN/m^2 (at any time)

1) Floor plan

① Necessary length of berth part of Jetty

Generally, the length of the berth part of the Jetty for parallel docking is calculated by the following expression:

Allowance length (0.15L) + Vessel length (L) + Allowance length (0.15L)

Banana boat : $0.15 \times 7.0\text{m} + 7.0\text{m} + 0.15 \times 7.0\text{m} = 9.10\text{m}$

Dory : $0.15 \times 10.0\text{m} + 10.0\text{m} + 0.15 \times 10.0\text{m} = 13.0\text{m}$

For the New Wewak Jetty, the allowance length of one side will be set double the calculated value to ensure that a banana boat will not crash against the berth part of the Jetty on the shore side:

$$\text{Banana boat} : 0.15 \times 7.0\text{m} \times 2 + 7.0\text{m} + 0.15 \times 7.0\text{m} = 10.15\text{m}$$

With this, the shore-side berth part of the Jetty length will be set at 10.0m.

② Necessary width of berth part of Jetty

- The berth part of the Jetty needs to provide space adequate for handling (unloading and loading) and temporarily placing cargo.
- The necessary width of cargo handling space will be set at 2.0m.
- The temporary cargo placing space is set at 6.5m×1m, assuming that it will be used alongside the full length of a banana boat.

It is assumed that one piece of cargo occupies an area of 0.7m×0.9m on average.

Suppose the crew of a banana boat comprises ten people and they each carry one piece of cargo, the required space of temporary cargo placing will be:

$$\text{Temporary cargo space} = 10 \text{ pieces} \times 0.7\text{m} \times 0.9\text{m} = 6.3\text{m}^2$$

Figure 2-2-16 shows the shape of the berth part of the Jetty.

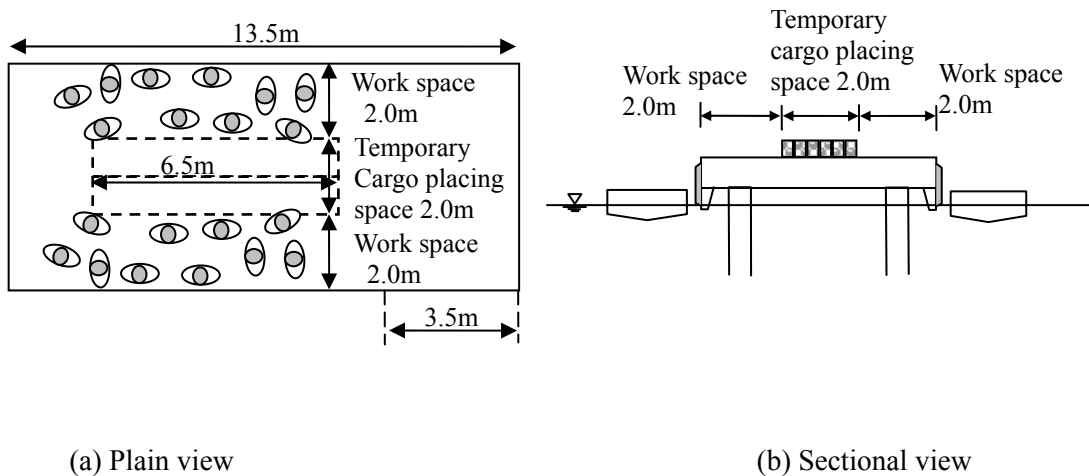


Figure 2-2-16 Shape of berth part of Jetty

③ Periphery of berth part of Jetty

Of the work space width of 2.0m on both sides of the berth part of the Jetty, a separate space will be secured to place cargo which is unloaded from, or loaded onto, the boat on the periphery and also a curb will be built for security. Sectional drawing of Periphery of berth is shown in Figure 2-2-17.

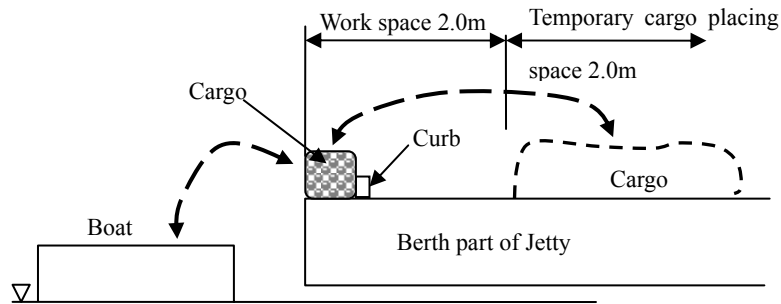


Figure 2-2-17 Sectional view of peripheral part

④ Necessary length of access part

To make the berth part of the Jetty at a place where a water depth is $DL - 0.5m$, it is necessary to provide the access part with a length of 14.0m.

⑤ Necessary width of access part

- To determine the width of the access part, it is necessary to give consideration to how the jetty is used while securing the normal width of the walkway.
- As shown in Figure 2-2-18, the walkway needs a width of about 1.5m to ensure that individual users walk through safely when carrying their luggage. In view of this, the width of the access part will be double the walkway width for single users ($1.5m \times 2$ lanes) plus a safety allowance of 0.25m on both sides ($1.5m \times 2$):

$$\text{Width of access part} = 0.25m + 1.5m \times 2 \text{ lanes} + 0.25m = 3.5m$$

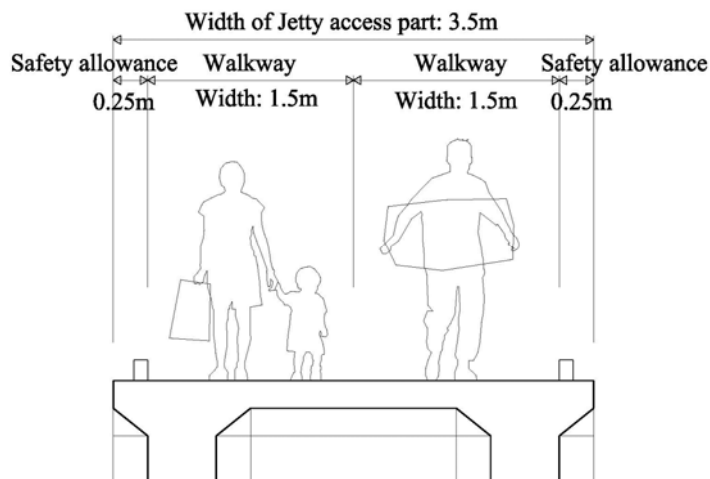


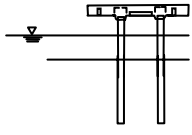
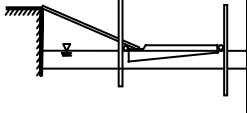
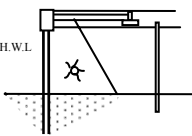

Figure 2-2-18 Width of Access Part

2) Section/structure plan

① Basic structure

Table 2-2-22 is a comparison of basic jetty structures. As shown in the table, it can be determined that a pile jetty structure is most suitable for the New Wewak Jetty.

Table 2-2-22 Comparison of jetty structures (1)

	Pile jetty structure	Floating structure	Sheet pile quay wall	Gravity retaining wall
Structural drawing				
Structural characteristics	Pile-supported upper structure. Many cases in PNG.	Floating structure anchored to piles. Constant top-end surface irrespective of sea level.	Enclosed steel sheet piles. Inside landfill.	Enclosed by gravity retaining wall. Inside landfill.
Constructional characteristics	Heavy construction machines for piling and temporal scaffolding required	Difficult to construct floating structure in PNG	The low water depth allows a small-scale structure. Ease of construction	The seabed floor needs to be dredged to make the base mound.
Environmental impact	Small impact on tidal currents and drift sand	Impact on tidal currents and drift sand is small next to the pile jetty structure	The structure with landfill can prevent tidal currents and drift sand.	The structure with landfill can prevent tidal currents and drift sand.
Cost	Middle	High	Low	Middle
Problems	Cost varies with how scaffolding for heavy construction machines is built.	The floating structure will be stranded when the sea level is low.	Can be buried by drift sand	Can be buried by drift sand
Overall judgment	◎	×	△	△

② Pile jetty structure

Table 2-2-23 gives a comparison of different methods to pile jetty structure. The steel pipe direct piling method is considered the most suitable for the New Wewak Jetty.

Table 2-2-23 Comparison of jetty structures (2)

	Vertical piling		Diagonal piling (Steel pipe piling)
	Steel pipe piling	Concrete piling	
Structural characteristics	Upper structure supported by vertical steel pipe piles	Upper structure supported by vertical concrete piles	Upper structure supported by vertical and diagonal piles. High strength against horizontal force.
Earthquake protection	High strength against horizontal force in the event of an earthquake. Many cases in PNG where earthquake protection is required.	Low strength compared with steel pipe piling.	Better than steel pipe piling in terms of earthquake protection
Pile material	To be imported. Anticorrosion measures required.	To be imported.	Same as steel pipe piling
Ease of construction	Heavy construction machines for piling and temporal scaffolding required	Heavy construction machines for piling and temporal scaffolding required. Heavy concrete piles require large construction machines compared with steel pipe piling.	Special machines required for diagonal piling in addition to machines for steel pipe piling
Cost	Middle	Middle	Relatively high
Overall judgment	◎	△	△

③ Pile supporting layer

Figure 2-2-19 shows the result of the geological survey.

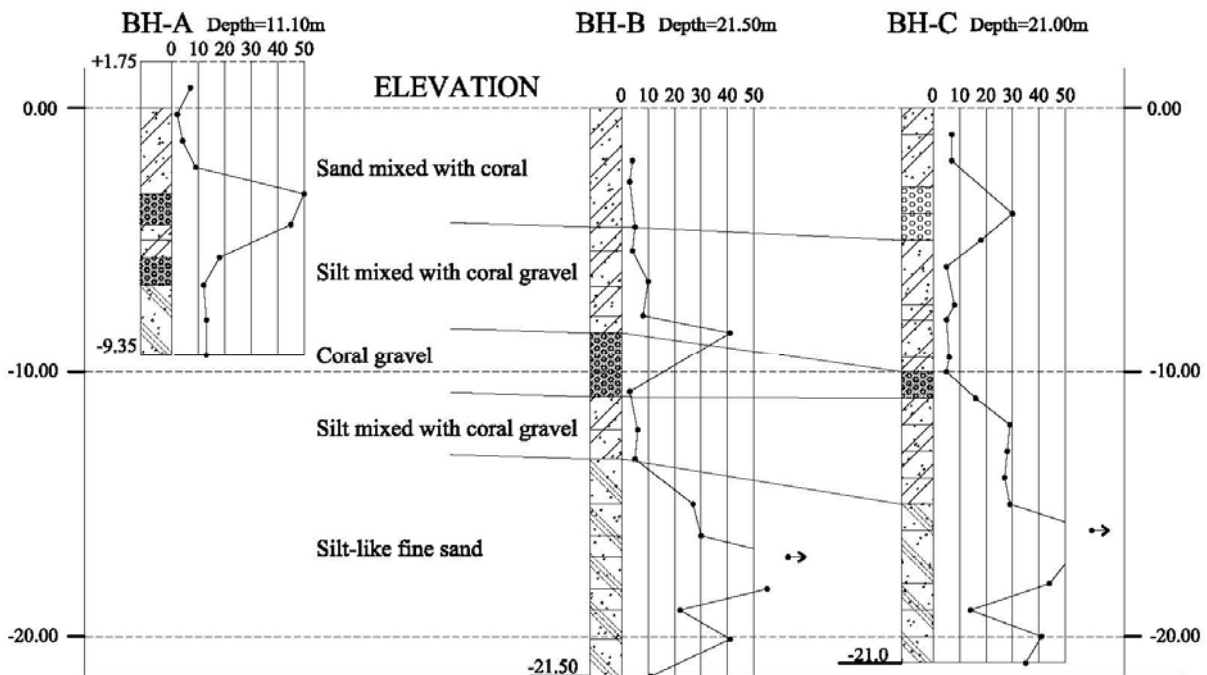


Figure 2-2-19 Result of geological survey

The lower end of piling will be positioned at DL – 15.5m based on the result of the geological survey.

④ Selection of steel pipe piles

- The geological survey shows that in the Project site there is an underground coral gravel layer at a depth of about 10m. Also coral gravel is contained locally in other intermediate layers. Judging from the survey result, it is highly possible that resistance against piling would get larger in intermediate layers. In view of this, steel pipe piles with 9mm in thickness will be used to secure an adequate strength at the time of piling and prevent local buckling due to the influence of coral gravel.
- Structural calculations show that if steel pipe piles with 450mm in diameter are used, stress at the time of an earthquake would exceed the stress tolerance by 15% and the ultimate pile-head strength would be inadequate. If steel pipe piles with 500mm in diameter are used instead, stress at the time of an earthquake would be within the tolerance and the required ultimate pile-head strength and the required horizontal bearing force would be secured.

Therefore, steel pipe piles with 500mm in diameter and with 9mm in thickness will be used.

⑤ Corrosion prevention of steel pipe piles

- Steel pipe piles require corrosion prevention. Generally, corrosion prevention is done by covering the portion of piles exposed to airborne droplets with a heavy-duty coating and providing the portions in the water and under the seabed with electrolytic protection.
- The site of the New Wewak Jetty has a shallow seabed. The piles of the New Wewak Jetty will, therefore, be provided with a heavy duty coating down to 0.5m under the seabed and a corrosion margin for the part in the ground.
- There are a number of methods to provide a heavy-duty coating, including painting, organic/inorganic lining, and petrolatum lining. Of these, painting is unsuitable for durability reasons. Table 2-2-24 shows a comparison between an organic/inorganic lining and a petrolatum lining.
- As a result of this comparison, petrolatum lining is preferable compared to organic/inorganic lining. Thus petrolatum lining will be utilized in the project.

Table 2-2-24 Characteristics of different types of corrosion protection for steel pipe piles

	Organic/inorganic lining	Petrolatum lining
Coating method	Attach coating material during production of steel pipe piles in the factory	Provide coating process on-site
Disadvantages during constructing process	High probability of coating damage during transportation (△)	Time consuming for the coating process caused from additional on-site work (△)
Other disadvantage	Difficulty in coping with piles remaining at a higher-than-designed level (△).	Tends to become costly because of on-site work (△).
Reliability	Liable to be damaged by a mechanical shock (△).	No liability problem should occur, because of covering by FRP structure (○).
Maintenance	A heat source is required for repairing. Therefore it is difficult to repair on the site (△).	Repair process is relatively simple (○).
Assessment	△	○

⑥ Upper structure

The upper structure will be made of reinforced concrete. The upper-end height of this structure is set at HWL plus 0.7m for vessels the size of banana boats and dories (gross tonnage of 20 tons or less) in this project: From this reason, upper-end height of upper structure is set to DL+2.10m (=DL+1.4m+0.7m). This height, DL+2.1m is almost equal to the Wewak Jetty. Figure 2-2-20 is an outline section view of the berth part of the New Wewak Jetty.

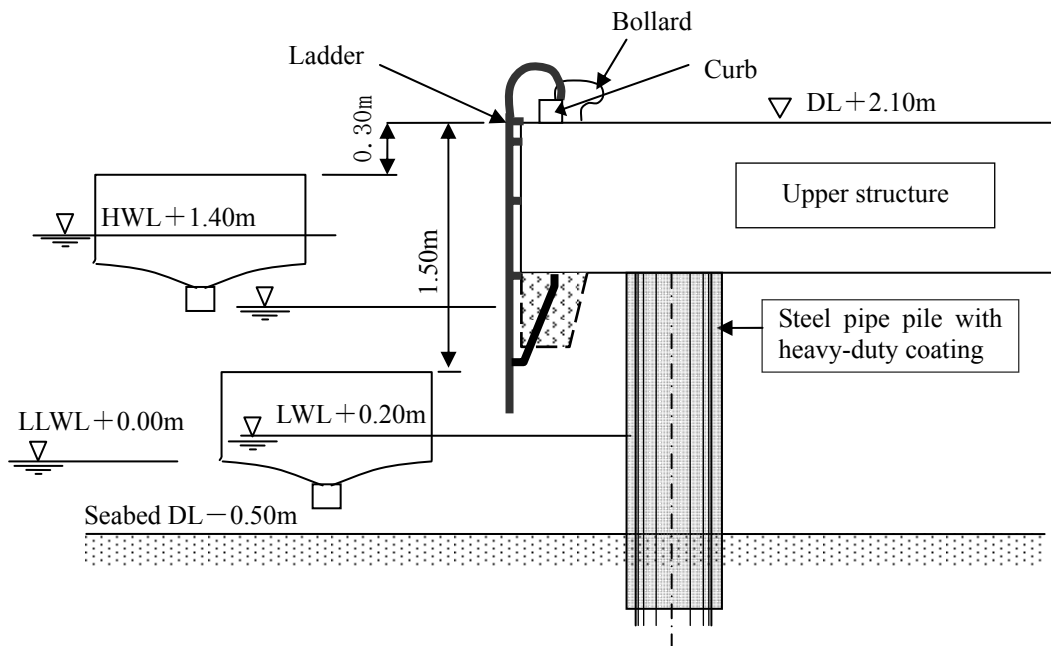


Figure 2-2-20 Outline sectional view of the berth part of the New Wewak Jetty

⑦ Ancillary equipment

The following ancillary equipment are required for the New Wewak Jetty:

a) Ladder

- There will be a gap of about 1.5m between the upper part of the Jetty and the banana boat when the tide level is low. It will, therefore, be necessary to provide a ladder at the berth part of the Jetty.
- Some ladders are a steel structure with rubber coating and others are a stainless steel structure. In the case of the former, if the rubber coating is damaged, it is possible that the structural steel would become rusted and eventually corroded. A stainless steel ladder is itself corrosion resistant and is advantageous with respect to maintenance. Therefore, a stainless steel ladder will be employed.

b) Protection work

- Figure 2-2-21 is an outline of protection work for the Jetty.

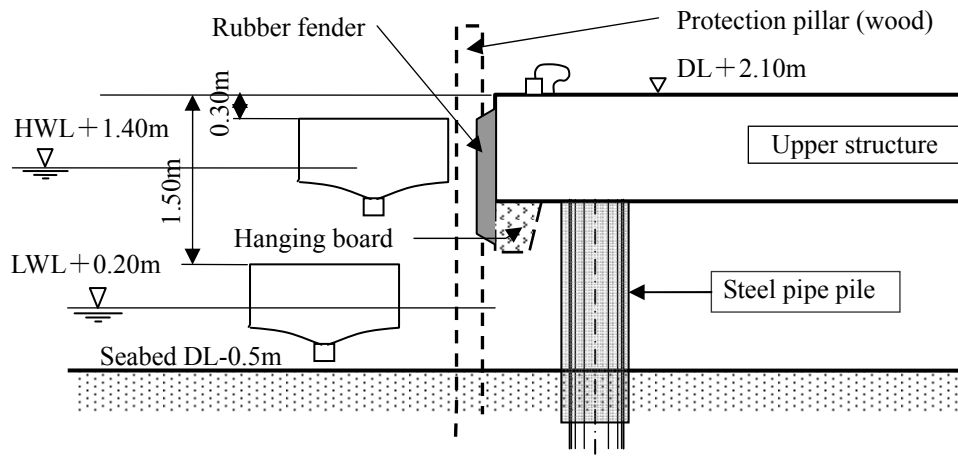


Figure 2-2-21 Outline of protection work

- Table 2-2-25 is a comparison of different types of protection work for banana boats. Rubber fenders will provide suitable protection.

Table 2-2-25 Comparison of protection work

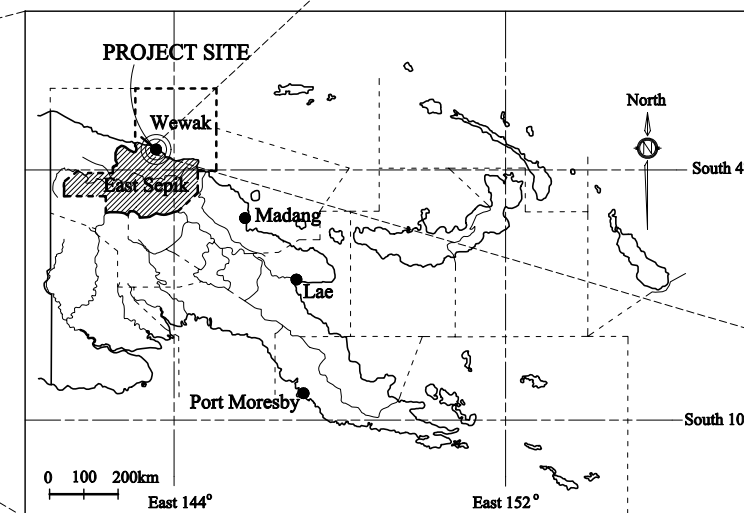
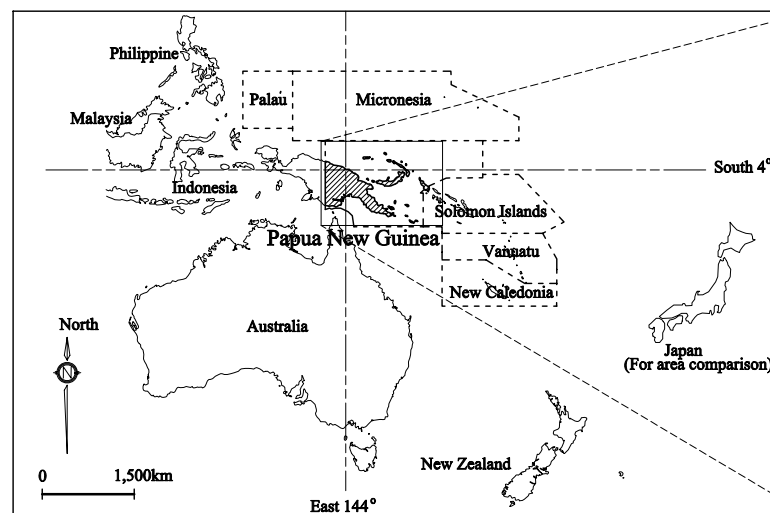
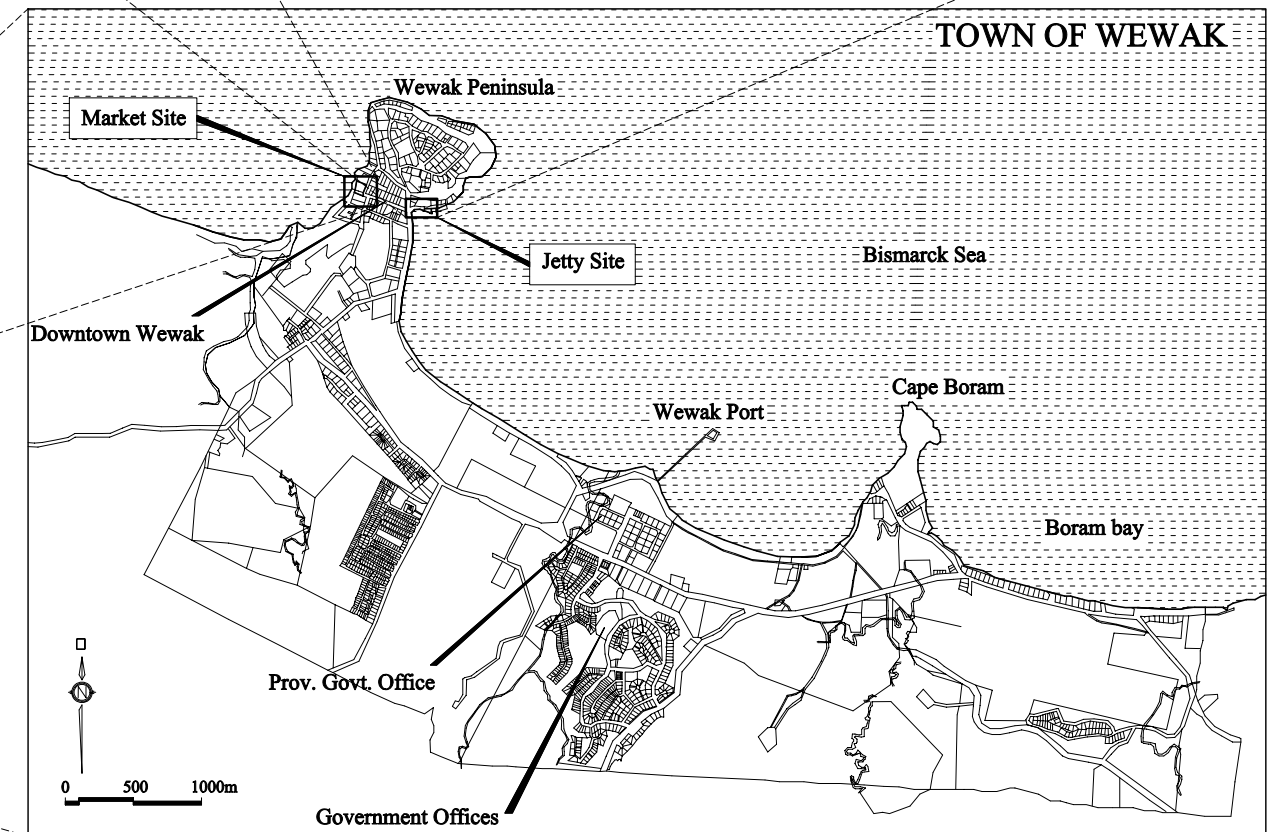
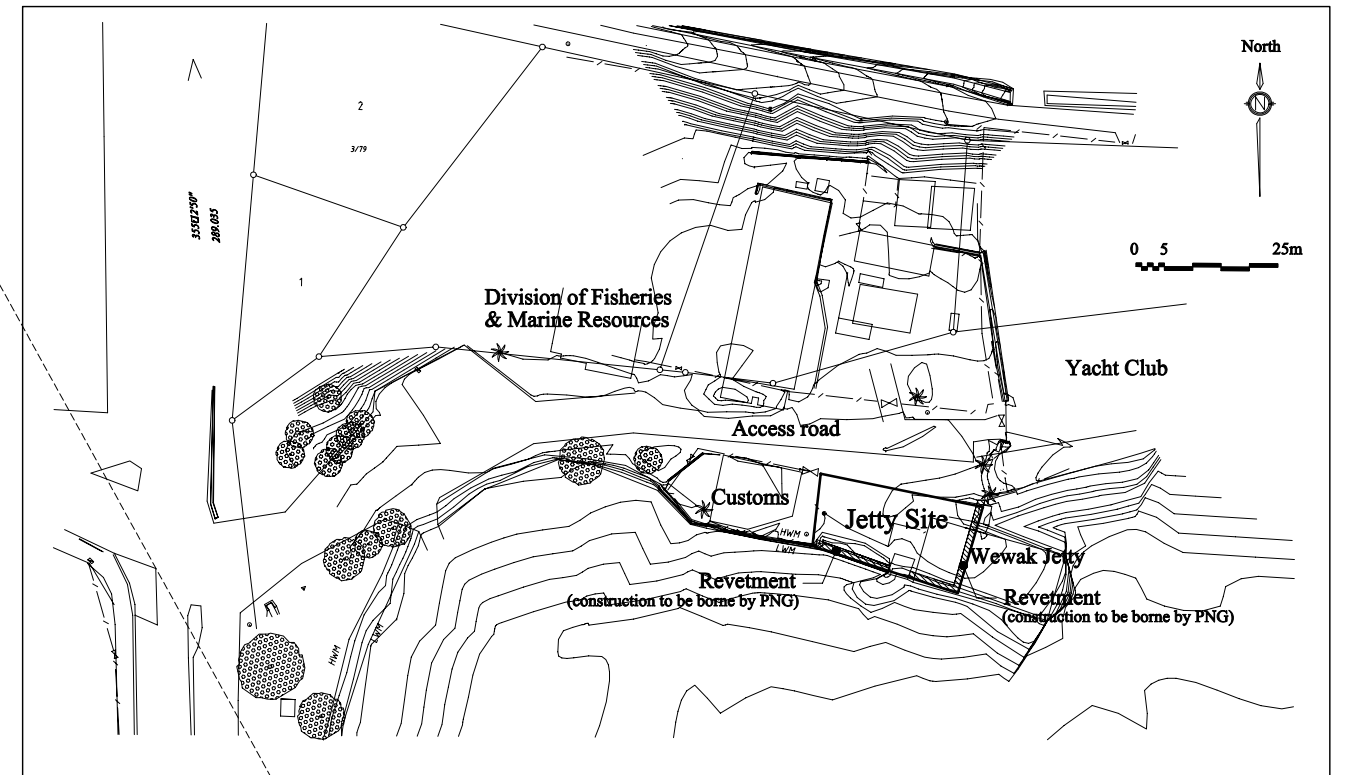
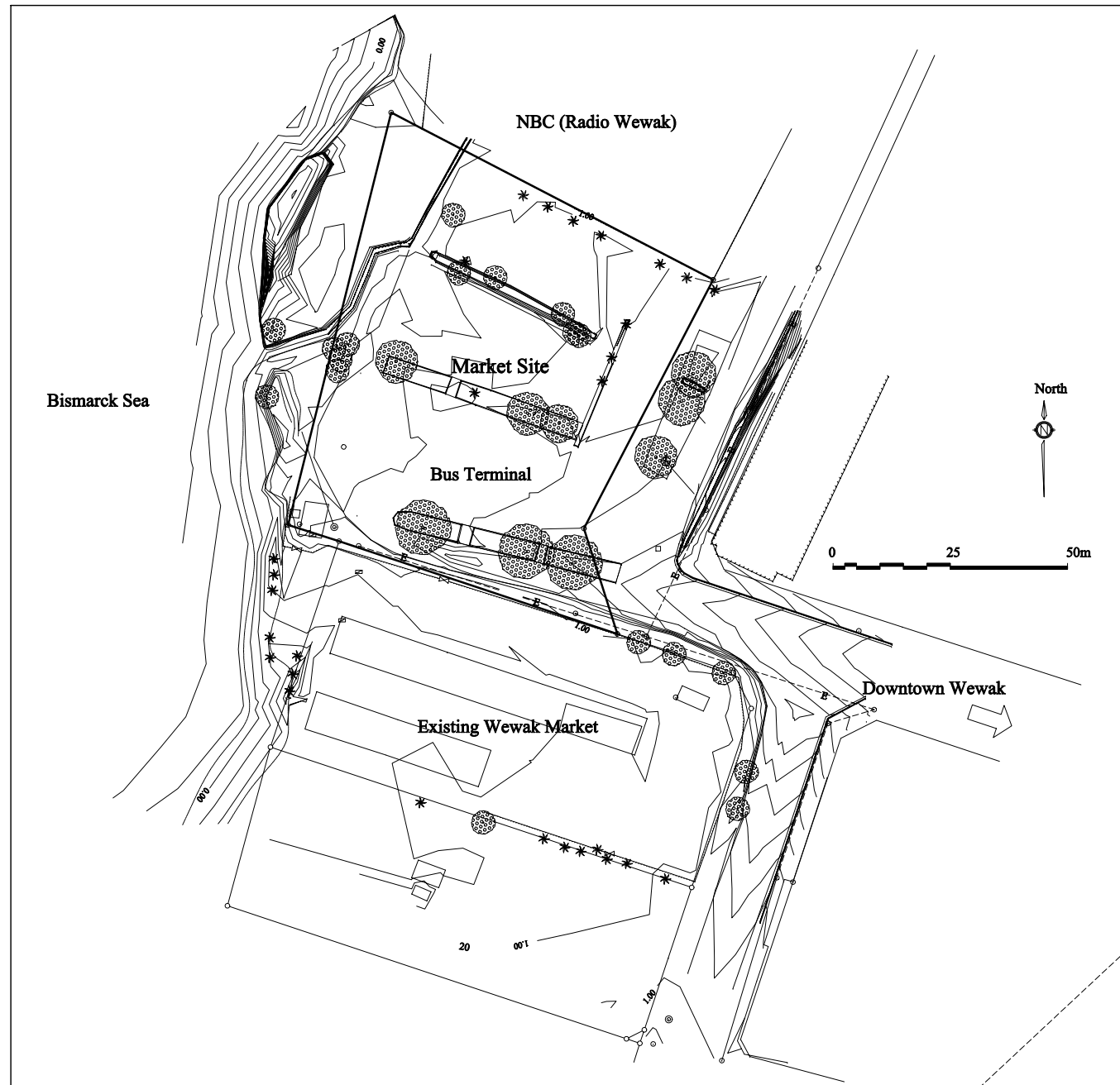
	Rubber fenders	Protection pillars
Installation interval	The size of a banana boat requires installing protection work at an interval of 4.0m or less.	
Method of installation of Protection work	Providing the upper structure with a hanging wall to attach rubber fenders	Casting protection piles outside the Jetty. This involves a wide gap between the boat and the Jetty, making it difficult to on/off board.
Performance	Effective level of performance can be achieved for banana boats.	Installation of Pillars alone cannot achieve adequate performance for banana boats. It is necessary to provide the pillars with rubber fenders or used tires.
Overall assessment	◎	△

c) Mooring piles

Mooring piles will be installed to moor a visiting boat at both ends and the amidship position.

d) Curb

Curb will be installed along the outer periphery of the Jetty to prevent Jetty users from falling into the water.



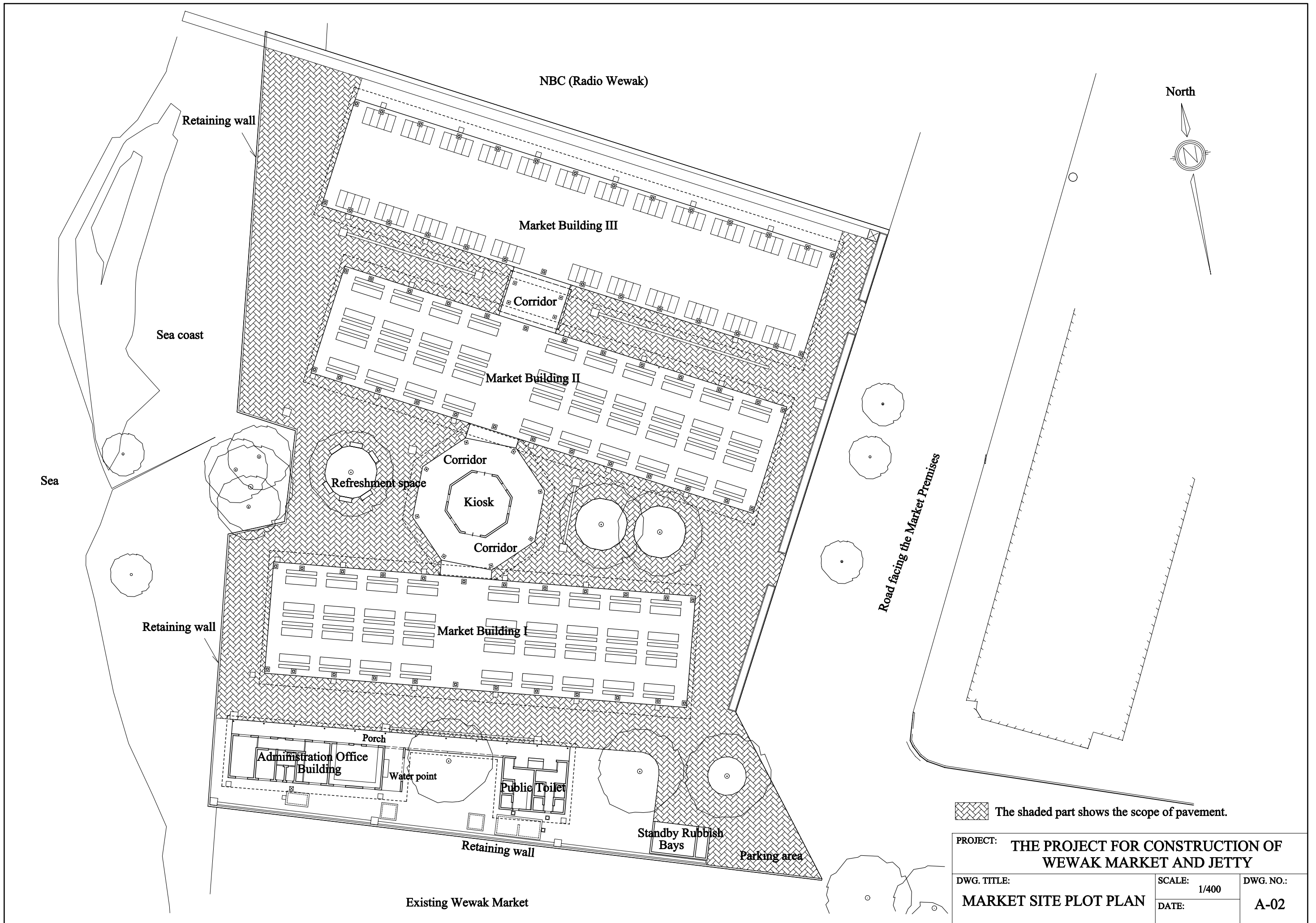
LOCATION OF PAPUA NEW GUINEA

PAPUA NEW GUINEA

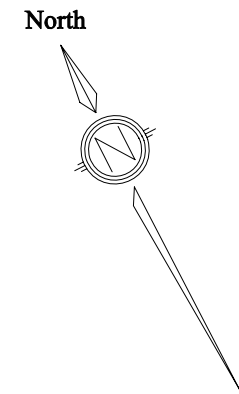
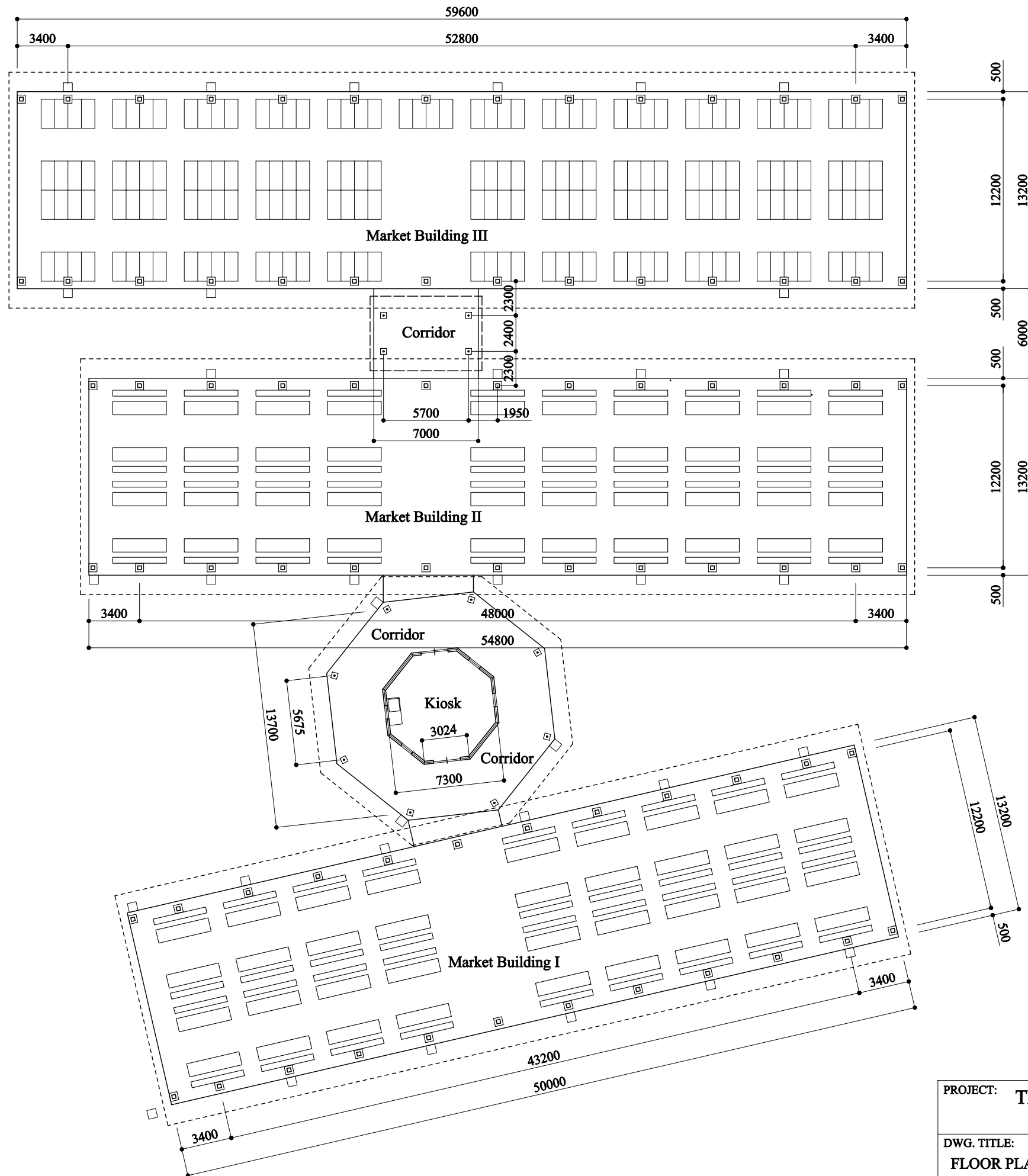
PROJECT: THE PROJECT FOR CONSTRUCTION OF WEWAK MARKET AND JETTY

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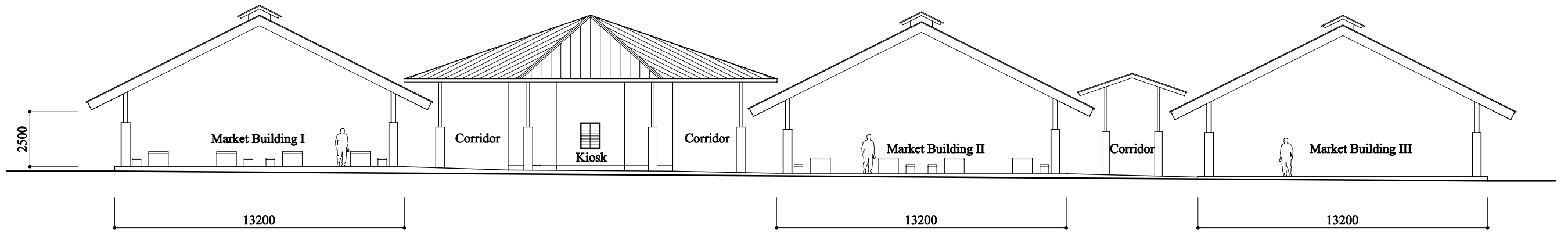
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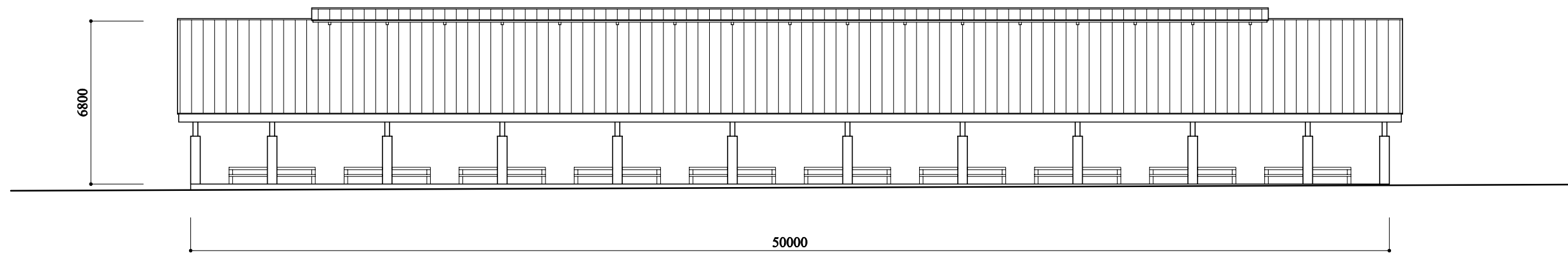
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	DATE:	



PROJECT: THE PROJECT FOR CONSTRUCTION OF WEWAK MARKET AND JETTY		
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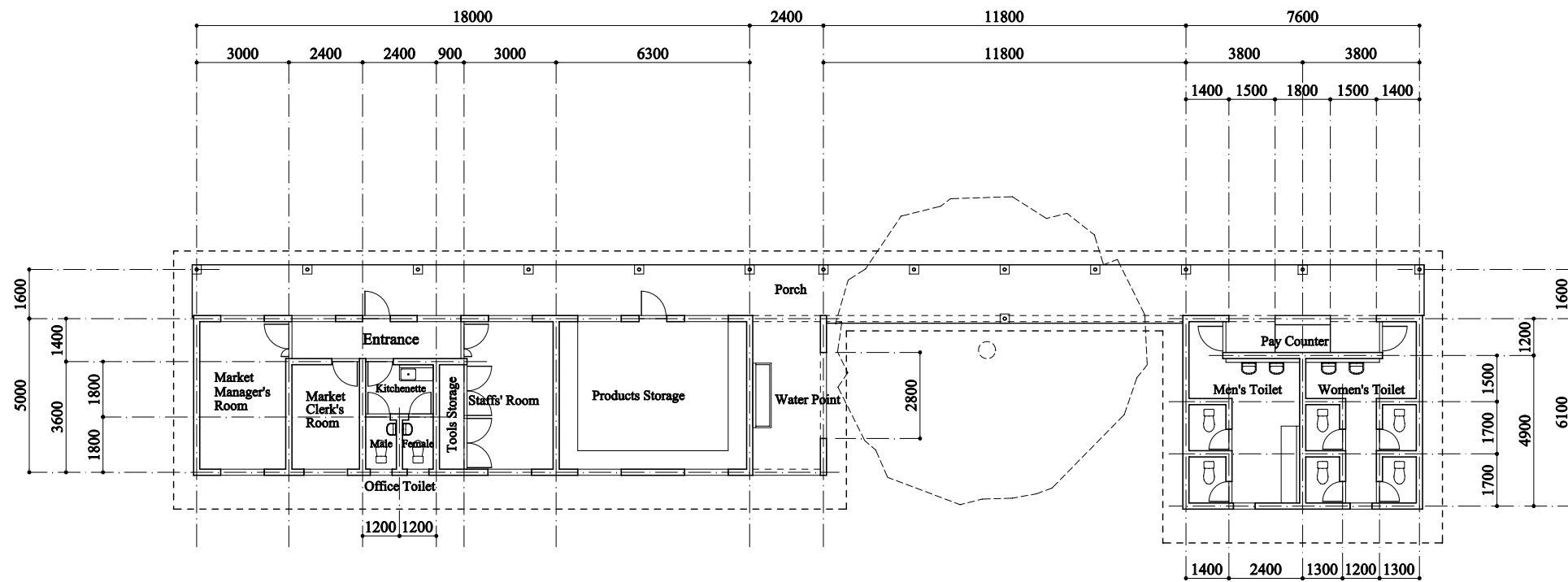
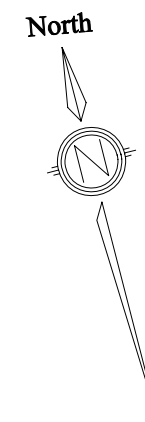


EAST ELEVATION



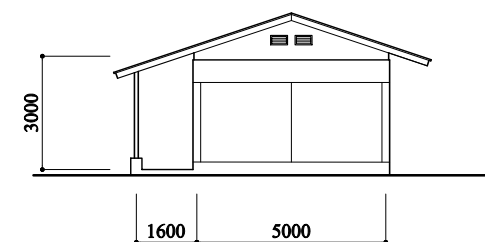
SOUTH ELEVATION (MARKET BUILDING I)

PROJECT: THE PROJECT FOR CONSTRUCTION OF WEWAK MARKET AND JETTY		
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	DATE:	

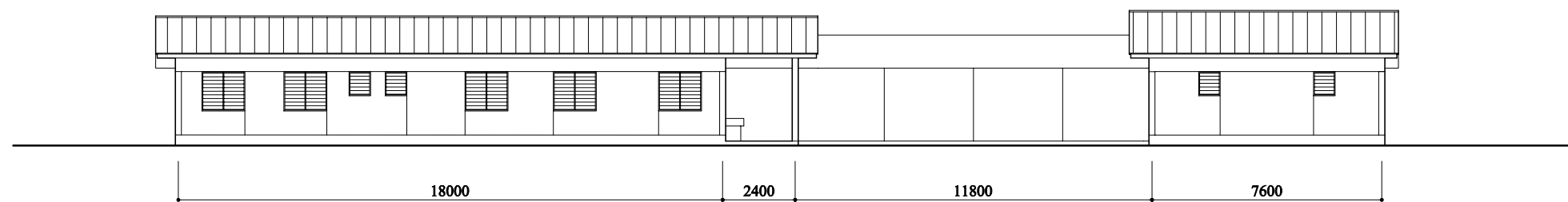


ADMINISTRATION OFFICE BUILDING PLAN

PUBLIC TOILET PLAN

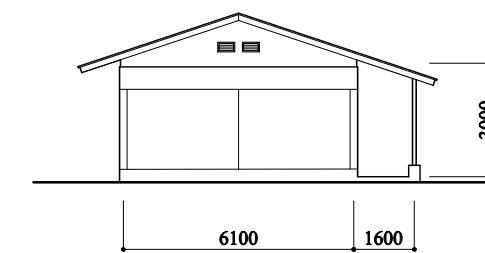


WEST SIDE ELEVATION
(ADMINISTRATION OFFICE BUILDING)



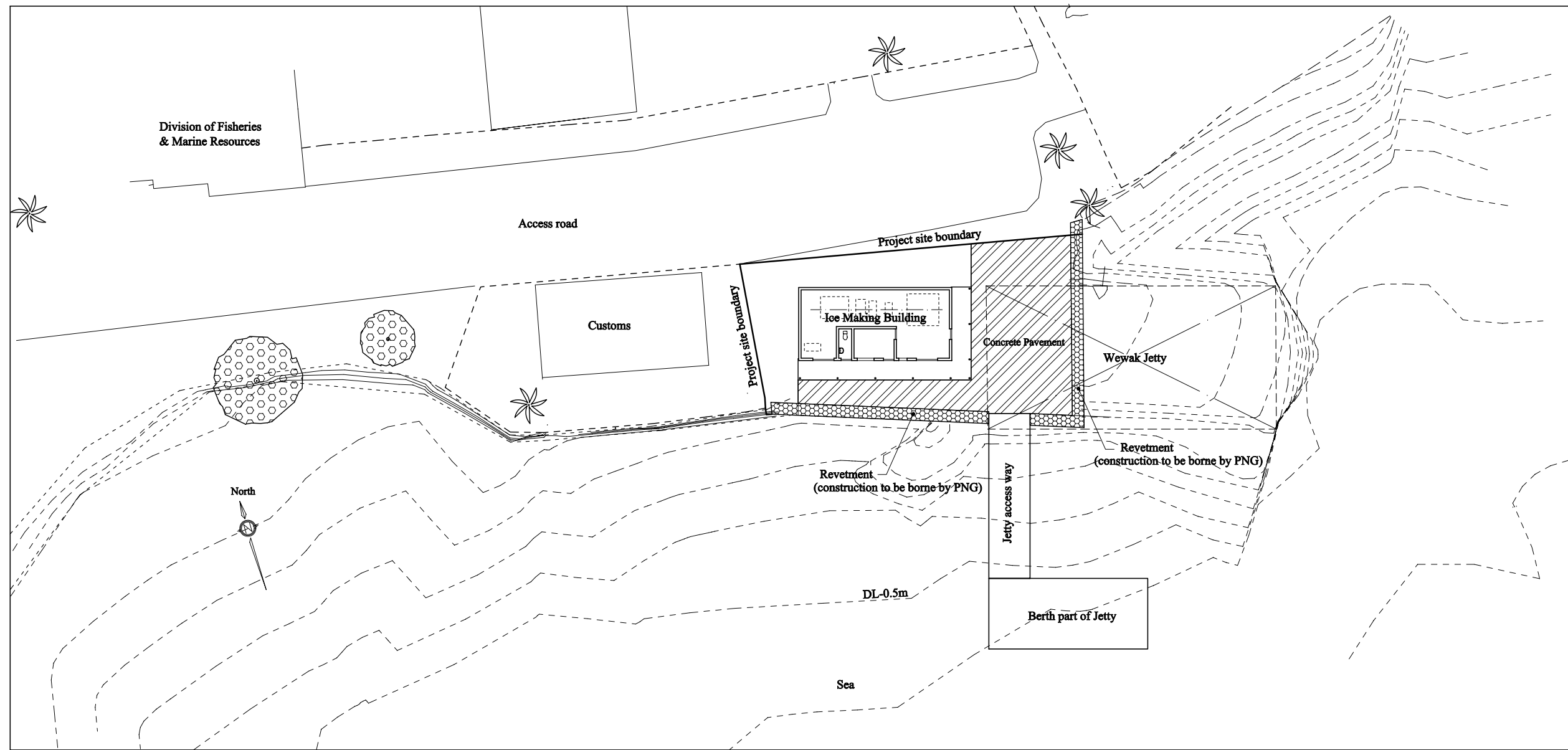
SOUTH SIDE ELEVATION
(ADMINISTRATION OFFICE BUILDING)

SOUTH SIDE ELEVATION
(PUBLIC TOILET)

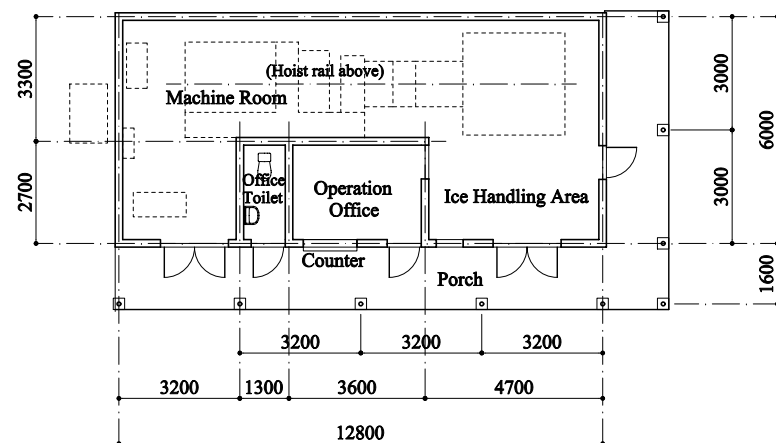


EAST ELEVATION (PUBLIC TOILET)

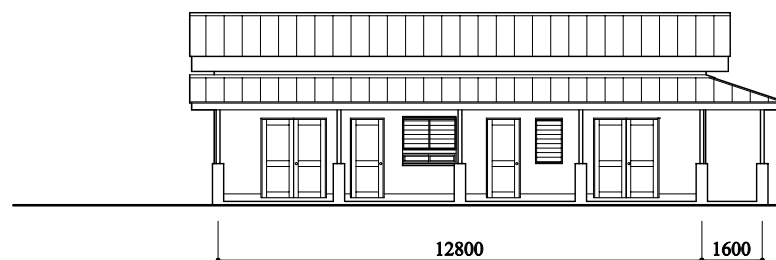
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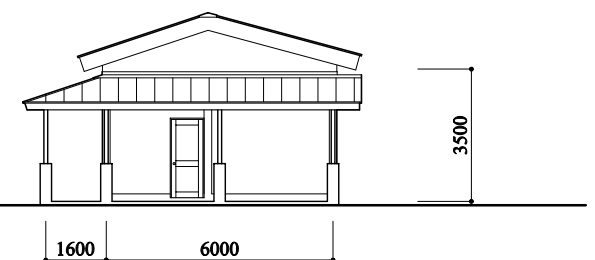
JETTY SITE PLOT PLAN SCALE: 1/400



ICE MAKING BUILDING PLAN SCALE: 1/200

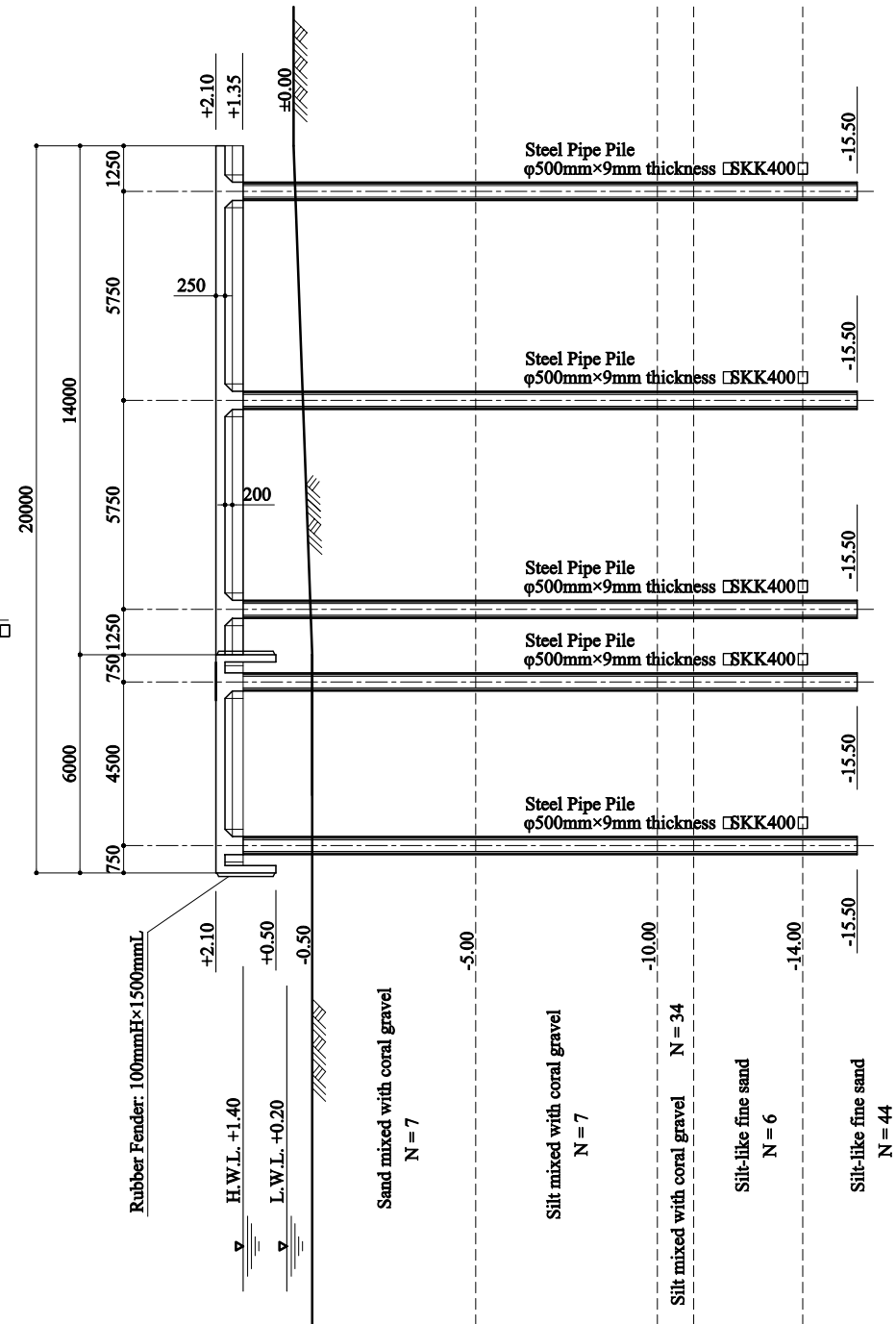
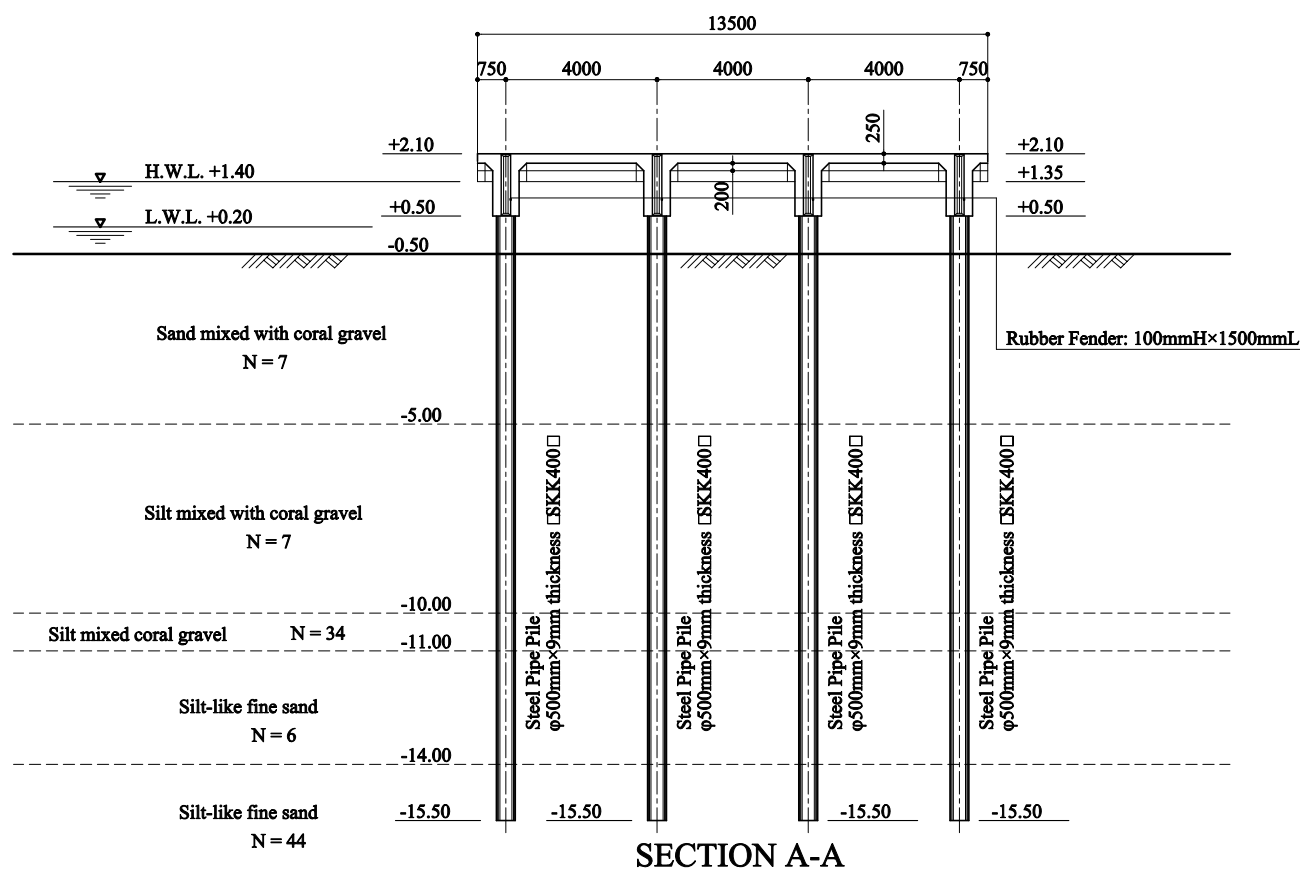
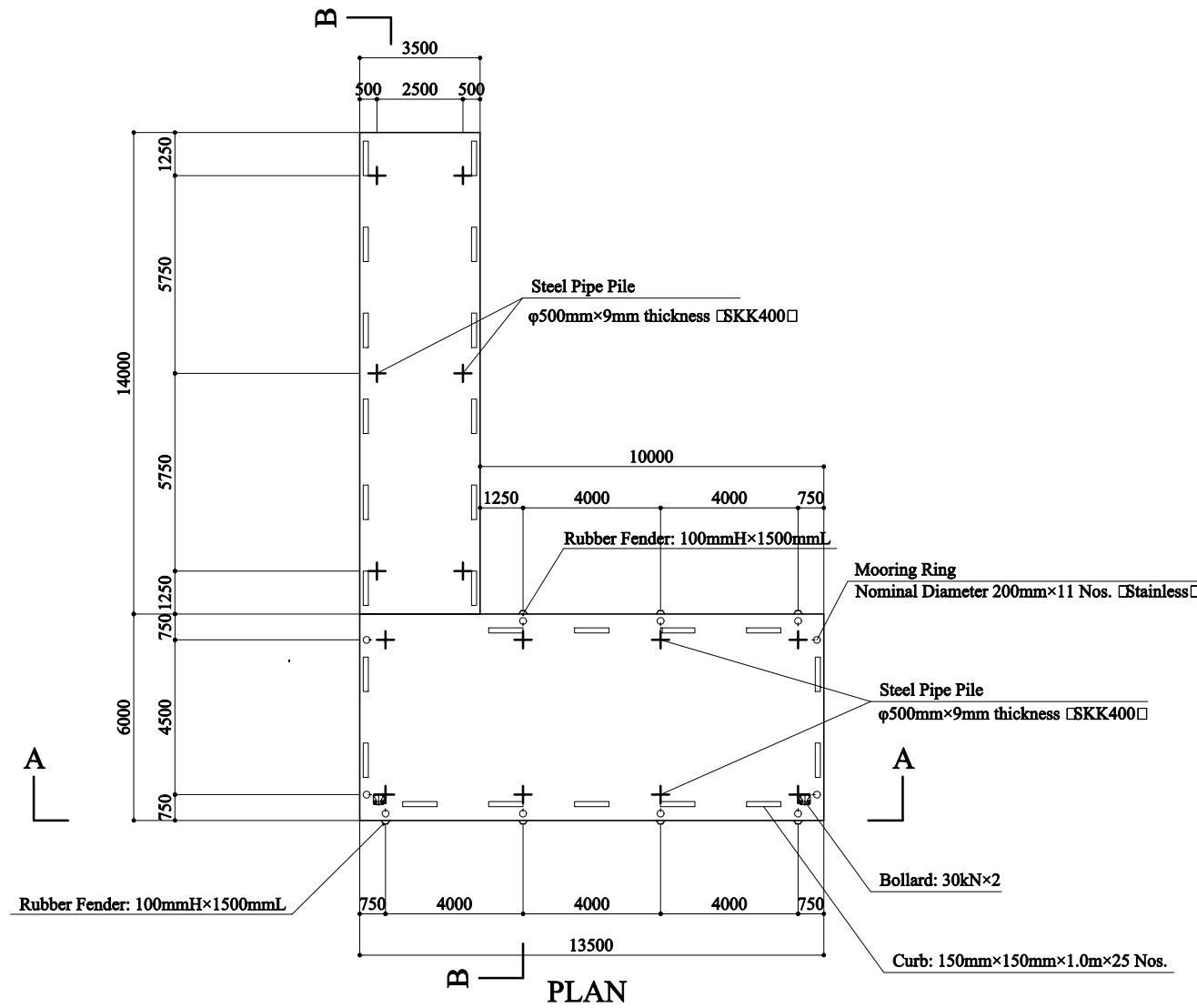


SOUTH SIDE ELEVATION (ICE MAKING BUILDING) SCALE: 1/200



EAST SIDE ELEVATION (ICE MAKING BUILDING) SCALE: 1/200

PROJECT: THE PROJECT FOR CONSTRUCTION OF WEWAK MARKET AND JETTY		
DWG. TITLE: MARKET SITE PLOT PLAN	SCALE: 1/400, 1/200	DWG. NO.: A-06
	DATE:	



SECTION B-B

PROJECT: THE PROJECT FOR CONSTRUCTION OF WEWAK MARKET AND JETTY

DWG. TITLE: PLAN AND SECTION WEWAK NEW JETTY

SCALE: 1/200
DATE:

DWG. NO.: A-07

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

This Project will be carried out in compliance with the Japanese Grant Aid. PNG's authority in charge is the National Fisheries Authority, which is responsible for providing overall management of the Project, obtaining the required permits and licenses, and coordinating with the other organizations concerned.

After completion, the premises will be operated and maintained by the Office of East Sepik Provincial Administration and the Wewak Town Commission. The National Fisheries Authority will provide support for the promotion of the business through audit of the operating organizations, etc. Construction work of this project will be implemented accordance with following basic policy:

- ① Since any Japanese Grant Aid project requires completing work within a specified period, it is necessary to develop appropriate plans for construction methods, material and equipment procurement, processes, and quality control and thereby carry out work under appropriate execution management.
- ② The existing Wewak Market abutting on the site of this Project will remain in service during the construction period. As much as is possible, consideration should, therefore, be given not to hinder its activity.
- ③ Consideration should be given to preserving the nearby facilities and natural environment.
- ④ Close contact should be kept with the partner country's people concerned to ensure close communication at each stage of construction in order to avoid mistakes in procedure.
- ⑤ When it comes to selecting materials and equipment, due consideration should be given to ease of operation and maintenance, as well as to the availability of spare parts.
- ⑥ In executing construction work and providing labor management, it is necessary to respect the partner country's customs, traditions and culture.
- ⑦ Local construction companies have a certain level of construction work and labor skills. In executing construction, therefore, local construction companies should be used as far as possible.
- ⑧ Adequate security measures should be taken to protect the people associated with this Project.

2-2-4-2 Implementation Conditions

- ① The Project site is in an urban area, and car and human traffic is relatively heavy around the Project site. During the period of construction work, therefore, it is essential to take appropriate measures to restrict access to the construction works only to authorized people.
- ② During construction work, it is necessary to take measures to prevent soil and dust from spreading to the abutting Wewak Market.
- ③ In marine construction, it is necessary to take measures to avoid polluting the surrounding ocean areas for the conservation of the environment.
- ④ Since construction work will take place in a tropical environment, it is essential to develop work plans with due consideration to the hygiene and health of the workers involved.

- ⑤ Construction materials and equipment will come mostly as freight by sea. Procedural misarrangement would seriously affect the process of construction work. In view of this, it is essential to procure materials and equipment with careful planning.

2-2-4-3 Scope of Works

Supposing that this Project will be carried out by Japanese Grant Aid, the work responsibilities of the project assigned to Japan and PNG are as specified below. Each country performs its assigned work at its expense.

1) PNG's obligations to the project

- ① Secure the planned construction site for this Project and remove the existing facilities and obstacles in the site.
- ② Provide revetment following the removal of the Wewak Jetty.
- ③ Supply water and electricity to the designated points in the Project site.
- ④ Install telephone lines required for the offices and other facilities.
- ⑤ Install the necessary fences and gates and provide planting.
- ⑥ Move the existing street lights in the Project site.
- ⑦ Secure ground for a temporary construction yard and a field office.
- ⑧ Procure furniture and fixtures required for use in the office of this Project.

2) Japan's obligations to the project

- ① Construct the Wewak Market facilities, the New Wewak Jetty, Ice Making Building, and Ice Making Plant.
- ② Make a detail design, provide support for construction work bidding, and deliver consulting services including execution management.
- ③ Provide all the construction materials and labor required to fulfill the construction work of this Project assigned to Japan.
- ④ Transport by sea and land all the import materials and equipment required for this Project assigned to Japan, and pay the necessary transportation insurance premium.

2-2-4-4 Consultant Supervision

- ① For the Consultant Supervision of this Project, efforts should be made to ensure that construction work is done in a consistent manner, keeping a designated level of quality for satisfactory delivery.
- ② The consultant is responsible for examining carefully the details of the planned construction work, process planning, quality control planning and others based on the contents of this Project's design and thereby taking appropriate measures for execution management.
- ③ In executing construction work, it is necessary to secure an appropriate setup to ensure satisfactory communication with the PNG authorities concerned, the Japanese Embassy in

PNG, the Office of JICA, the consultant, and the contractors.

- ④ Appropriate plans will be developed with respect to the procurement of materials and equipment, vehicles and office which are required for execution management, as well as various procedures, timeframes and methods associated with quality control.
- ⑤ In connection with personnel planning, the skill level, labor allocations, head counts and organization required will be examined carefully to ensure proper execution management.

2-2-4-5 Quality Control Plan

For quality control plan for this Project, emphasis will be placed on the building structure because it bears heavily on the basic performance, including durability and safety, of the facilities with focus on these items:

- ① In carrying out each major stage of construction work, the contractors are required to draw up plans describing the details of work including the method of construction employed, execution scheme and quality control planning and obtain the consultant's approval in advance.
- ② Basically, steel beams, reinforcing bars and steel pipe piles will be checked for quality by means of mill sheets.
- ③ Basically, cement will be checked for quality by means of the manufacturer's certificate of inspection.
- ④ Concrete will be checked for quality by inspecting data about manufacturing quality each day concrete is cast.
- ⑤ Concrete blocks will be checked for compression strength each time they are brought to the site.

2-2-4-6 Procurement Plan

1) Construction materials

General construction materials other than special ones are available relatively abundantly in PNG. Special construction materials are items which are difficult to obtain in PNG, or items which, even if available, need to be imported and, therefore, there is uncertainty with respect to delivery time. Also, some materials with the sufficient quality are difficult to obtain. Such materials will be imported from Japan or neighboring countries. Table 2-4-1 shows the classification and procurement sources of construction materials.

Table 2-4-1 Classification and procurement sources of construction materials

Construction materials and equipment	Source of procurement		Reason
	PNG	Japan or nearby countries	
Crushed stone, sand, cement	○		It is possible to meet the specifications for this Project locally.
Concrete blocks	○		It is possible to meet the specifications for this Project locally
Mold form materials	○		It is possible to meet the specifications for this Project locally
Reinforcing bars	○		It is possible to meet the specifications for this Project locally
Steel pipe piles		○	It is difficult to meet the specifications for this Project locally.
Structural steel		○	It is difficult to meet the specifications for this Project locally.
Timber	○		It is possible to meet the specifications for this Project locally.
Roof materials	○		It is possible to meet the specifications for this Project locally
Tile	○		It is possible to meet the specifications for this Project locally
Paint	○		It is possible to meet the specifications for this Project locally
Aluminum windows	○		It is possible to meet the specifications for this Project locally.
Light fittings	○		It is possible to meet the specifications for this Project locally
Water supply and drainage and sanitary equipment	○		It is possible to meet the specifications for this Project locally
Air-conditioning and ventilation equipment	○		It is possible to meet the specifications for this Project locally
Ice Making Machine		○	It is difficult to meet the specifications for this Project locally.

2) Equipment

Every piece of equipment procured under the Requested Japanese Assistance is related to the Ice Making Plant. They will, therefore, be procured as furniture and fixtures of the Ice Making Plant.

2-2-4-7 Operation Guidance Plan

For the purpose of this Project, no initial operation training will be provided.

2-2-4-8 Soft Component (Technical Assistance) Plan

(1) Need for Soft Components

The Wewak Town Commission has the following problems in connection with the operation management of the Wewak Market:

- ① There is no responsible accounting person who is in charge of collecting space utilization fees, and the adequate collection method of utilization. Thus, uncollected ratios for the market utilization fee is estimated to more than 50% of its value.
- ② Garbage collection is sometime suspended, resulting uncollected garbage left in the Market premises or being littered to the abutting vacant lots.

To address this situation by establishing a proper operation, installation and implementation of market management by Soft Component to the Wewak Market are essential. Activities of Soft Component include, establishment of market operation, maintenance, and preparation of management plan.

(2) Activities of Soft Component

The Soft Component will be provided in the following framework:

Objective: Establish an appropriate management and maintenance activities of for the initial Wewak Market operation.

Outcome: 1. Proper collecting system for space utilization fee is established.
2. Routine methods for garbage disposal and garbage collection are established.
3. Establishment of Market operation and management rules

Activities: 1-1. Conduct surveys on current fee collecting systems and financial condition of the Market.

1-2. Determine proper system for collecting fees from user.

1-3. Modify accounting books for tracking market utilization fee.

1-4. Conduct trial operation for a fee collection and accounting operation.

2-1. Survey the current status of Market fee collection and accounting.

2-2. Define the procedure for garbage collection and disposal.

2-3. Encourage the practice of periodical garbage collection and disposal.

3-1. Prepare a draft rule book for market operation and management.

3-2. Analyze the problems of the Market operation

3-3. Discuss about proper way of operation system for the Market with vendors.

3-4. Prepare draft manual of the Market operation and management rules.

A consultant capable of giving total advice on the operation of the Market cannot be found locally. In addition, the operation of the Market is closely related to the facilities design. From those reasons, it is desirable to assign a Japanese consultant who was involved in the Project's basic design study is to participate and assign as Soft Component personnel, and on the other hand, members from the Wewak Town Commission will be assign to cooperate with the Japanese staff as a counterpart.

2-2-4-9 Implementation Schedule

It is estimated that implementation of this Project will take three months for execution design down to detail facilities designing, and the acquisition of approval on tender documents, two and a half months for the subsequent bid tendering and construction work contract signing, and ten and a half months for the acquisition of approval of the drawings, construction work and inspection after the contract with contractors. Table 2-4-2 shows the implementation schedule of this Project.

Table 2-4-2 Implementation Schedule

	1	2	3	4	5	6	7	8	9	10	11	12	
Details Design	■ (Field survey)												
	□ (Work in Japan)												
			■ (Field survey)										
						□							
								(Total: 3.0 months)					
								(Total: 2.5 months)					
								(Bid tendering and construction work contract signing)					

	1	2	3	4	5	6	7	8	9	10	11	12
Construction	■ (Preparations for work)											
		□ (Foundation work)										
				■ (Building construction)								
						■ (Jetty construction)						
								■ (Finishing work)				
										□ (Exterior work)		
		(Total: 10.5 months)										

2-3 Obligations of Recipient Country

- ① Securing a site for this Project; demolishing and removing the existing jetty, buildings, sunken ships and any obstacles in the Project site; and providing revetment work.
- ② Going through PNG's legal procedures with respect to the possible environmental and social impact of this Project; and letting the parties concerned know the possible impact through bulletins and preliminary explanatory meetings.
- ③ Providing a parking lot and an alternative bus terminal for users of the Wewak Market during the construction work of this Project; as well as an alternative market for vendors doing business outside the market premises.
- ④ Relocating the people illegally living in the Project site and their house.
- ⑤ Acquiring all the permits required in PNG with respect to the execution, construction and material procurement for this Project.
- ⑥ Handling and removing the unexploded bombs in the Project site.
- ⑦ Making the Banking Arrangement required for this Project; and issuing the necessary Authorization to pay without delay.
- ⑧ Ensuring prompt duty-free customs clearance on the PNG side as required for the execution, construction and material procurement for this Project.
- ⑨ Allowing exemption of tax and other public duties for the Japanese individuals and organizations engaging in construction work, material procurement and services for this Project.
- ⑩ Giving the Japanese individuals who engage in the execution of this Project entry to and residence in PNG, and ensuring security during their stay in PNG.
- ⑪ Securing lots for a makeshift yard, a construction office and other facilities required for the execution of construction work for this Project.
- ⑫ Prohibiting outside persons from entering the Project site during the construction work of this Project.
- ⑬ Making the fences and gates and providing water-supply piping, electric supply, and telephone wiring required for this Project.
- ⑭ Procuring the office equipment, telephones, furniture and fixtures required for the execution of this Project.
- ⑮ Paying other expenses required for the execution of this Project but are not borne by the Japanese Government for the Requested Japanese Assistance.

2-4 Project Operation Plan

2-4-1 Wewak Market

(1) Operation organization

Figure 2-4-1 shows the planned operation organization of the Wewak Market, which incorporates the following modifications into the existing Market operation organization (one Market Manager plus five people responsible for Ticket Sales and Maintenance & Rubbish):

- ① Assigning a Market Clerk to ensure improved independency of accounting.
- ② Separating the function of Ticket Sales and the function of Maintenance and Rubbish.
- ③ Maintaining the planned new Public Toilet properly.
- ④ Maintaining security of the market properly.

This results in the addition of one Market Clerk and eight people for sundry services. The Market Clerk will be selected from among the administrative staff members of the Wewak Town Commission and the eight people for sundry services will be recruited separately.

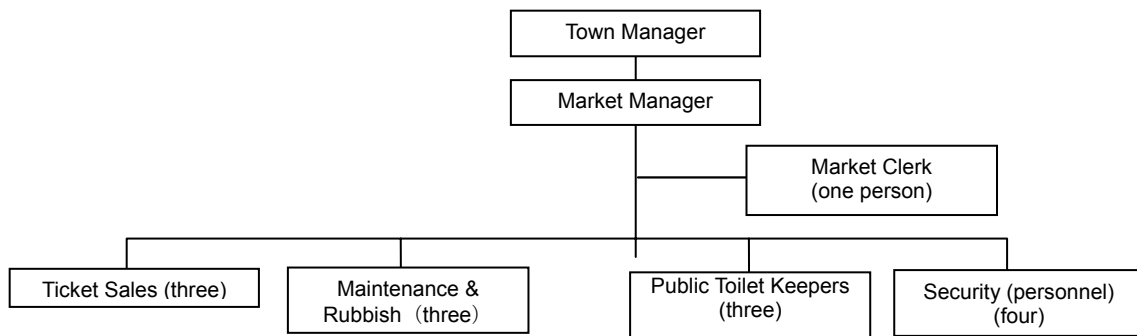


Figure 2-4-1 Wewak Market Management Organization

(Source: Wewak Town Commission)

(2) Operation method

The following is the way the Wewak Market is run:

Business days: From Tuesday to Saturday

Business hours: From 6:00am to 6:00pm. On Saturdays, close the selling places getting quiet one by one from around 3:00pm and perform week-end cleaning.

Fees: Use of a selling place, 1.5K/person/day (table selling) and 1K/person/day (floor selling); Use of a Kiosk, 250K/week; Use of Products Storage, 1K/person/night; Use of Public Toilet, 1K/one use

No. of vendors using the market: 600 vendors/day on average; No. of vendors being housed in the market premises, 850/day

No. of indoor selling places: 300 for table selling and 300 for floor selling

Job descriptions:

Market Manager:	General management of market operations
Market Clerk:	Accounting and budget control
Ticket Sales:	Collecting fees
Maintenance & Rubbish:	Premises cleaning, daily maintenance, simple repairs
Public Toilet Keeper:	Collecting toilet use fees and toilet cleaning
Security:	Managing vendors in use of the market, and providing security control in coordination with the police (e.g., settling disputes)

2-4-2 New Wewak Jetty and Ice Making Plant

(1) Operation organization

The New Wewak Jetty and the Ice Making Plant will be operated by the operation organization, which will be operated by the Jetty & Ice Making Facility Management Committee, whose organization is shown in Figure 2-4-2. The Management Committee consists of the PNG National Fisheries Authority, the ESP Division of Policy and Planning, the ESP Division of Fisheries & Marine Resources, the Wewak Town Commission and the Customs and Excise Operation, Internal Revenue Commission. The Committee is responsible for stipulating market operation policies, performing business operations audits, and providing overall control of market operations. The actual work of running the related facilities will be done by personnel from the Division of Fisheries & Marine Resources. The Advisor, ESP Division of the Fisheries & Marine Resources will assume overall responsibility for running and maintaining the facilities. The Engineer/Project Manager, Ice Making Facility & Jetty, will be assigned to manage the daily operations of the facilities.

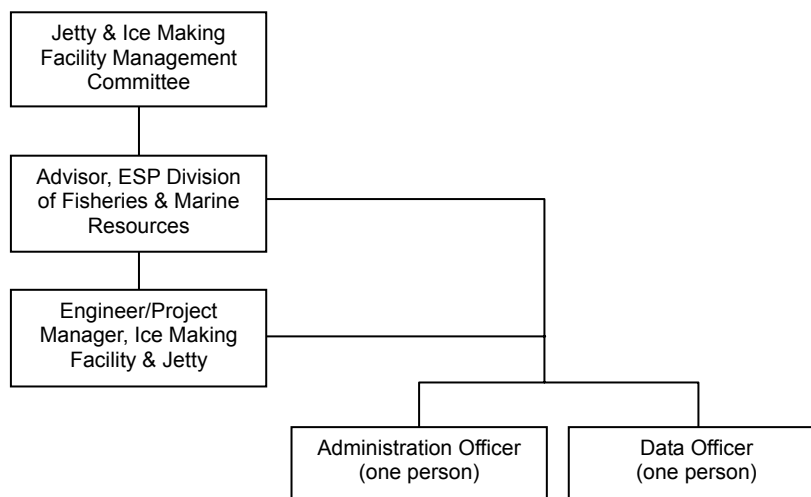


Figure 2-4-2 New Wewak Jetty and Ice Making Plant Management Organization

(Source: Division of Fisheries & Marine Resources)

(2) Operation method

The following is the way the New Wewak Jetty and the Ice Making Plant are run:

Business days and hours: Ice making, from Monday to Friday, at 6:00am and 6:00pm;
Ice selling, from Monday to Friday, from 8:30 to 15:45 (12:00 on Saturdays);
Jetty, available throughout the year

Operations: Monthly volume of ice making and selling, 22kg of block ice x 480 blocks (24 blocks/day x 20 days/month)

No. of boats using the jittery, 50 banana boats and 3 dories

Fees: Ice price: 10K per 22kg ice block (for fishery purposes) or 12K (for general purposes)

Use of the Jetty (annual fee): 60K/vessel/year for banana boats, 180K/vessel/year for dories

Job descriptions:

The Engineer/Project Manager, Administration Officer and Data Officer will not work for the facilities on a full-time basis. Instead, they will work while serving as staff members of the Division of Fisheries & Marine Resources:

- ① The Engineer/Project Manager, will be responsible for overall management of ice making plant operations and facility management and work to perform the assigned duties for two hours a day on average. Their primary work place is the Office of the Division of Fisheries & Marine Resources. A staff member of the division will be assigned to this position. He will receive a six-month Refrigeration Engineering Course at the Kabin Fisheries College of the National Fisheries Authority.
- ② The Administration Officer will be assigned to make ice (for a total of two hours to take out and store ice in the morning and evening), sell ice (for an average of 1.5 hours a day during the peak period during which banana boats leave jetty in the afternoon), and clean the facilities (for 30 minutes). He will work at the Office of the Division of Fisheries & Marine Resources in the morning and at the Operation Office in the afternoon. A division staff member in charge of repairs and utilities will be assigned to this position.
- ③ The Data Officer will be responsible for weighing the landed catches (for about 1.5 hours a day on average for the peak period in the morning when banana boats call in), and providing support for ice selling (for 30 minutes). He will work at the Operation Office in the morning and at the Office of the Division of Fisheries & Marine Resources in the afternoon. A division staff member in charge of the local fishery will be assigned to this position.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

(1) Project Cost borne by the PNG Side

Project cost borne by the PNG side is estimated to be 1,985,400 PNG Kina. Table 2-5-1 shows the contents of the project cost. This cost estimate is provisional and would be further examined by the Government of Japan for the approval of the Grant.

Table 2-5-1 Project Cost Borne by the PNG Side

Category	Amount
	(Kina)
Environment and Social Consideration fee	20,000
The removal of the existing jetty, building, submerged vessel and any obstacle in the project site. Land preparation for temporary yard	380,000
Revetment maintenance expense after the demolishment of current jetty	100,000
Connecting cost for an electricity, water service and telephone line to the project site	57,000
Construction of the fence together with gates for outer circumference of the project site.	67,000
Procurement of office supplies and furniture	116,000
Preparation of new parking lot	12,400
Bank transfer and handling fees	1,985,400

(2) Condition of Estimation

- ① Date of estimation base : November 2007
- ② Exchange rate : 1USD119.84 Yen (Average of the past 6 months)
: 1Kina43.176 Yen (Average of the past 6 months)
- ③ Construction periods : As shown in the table 2-4-2
- ④ Others : Cost estimation is in accordance with the framework of Japanese grant aid scheme.

2-5-2 Operation and Maintenance Cost

2-5-2-1 Wewak Market

(1) Operating revenue and expenditure forecast

It is estimated that the Wewak Market will generate about 4,792 Kina a month in operating revenue as shown in Table 2-5-2.

Table 2-5-2 Operating revenue and expenditure forecast for the Wewak Market

(Kina/month)

Item	Amount	Calculation
Operating revenue		
Vender fee	15,000	$(1.5K/\text{person}/\text{day} \times 300 \text{ vendors} + 1k/[\text{person}/\text{day} \times 300 \text{ vendors}] \times 20 \text{ days}/\text{month}$
Kiosk use fee	1,000	$250K/\text{week} \times 4 \text{ weeks}/\text{month}$
Storage use fee	2,000	$1K/\text{person}/\text{night} \times 100 \text{ people}/\text{day} \times 20 \text{ days}/\text{month}$
Public Toilet use fee	4,000	$1K/\text{use} \times 200 \text{ times}/\text{day} \times 20 \text{ days}/\text{month}$
Subtotal	22,000	
Operating expenditure		
Miscellaneous	5,100	$500K/\text{person}/\text{month} \times 6 \text{ people}$ (Ticket Sales, Maintenance & Rubbish) + $300K/\text{person}/\text{month} \times 7 \text{ people}$ (Public Toilet Keeper, Security) The Market Manager/Market Clerk is an employee of the Wewak Town Commission and his pay will be recognized by the Town Hall.
Overtime allowance	4,000	Working after 4:00pm qualifies for an overtime allowance.
Garbage truck fee	5,600	$140K/\text{truck}/\text{day} \times 2 \text{ trucks}/\text{day} \times 20 \text{ days}/\text{month}$
Purchase of cleaning tools, etc.	400	Purchase of cleaning tools, etc. (Estimated by Wewak Town Commission)
Water bill	707	Table 5-2-2
Electric bill	1,026	Table 5-2-2
Tenancy rate	75	$900K/\text{year} \div 12 \text{ months}$
Maintenance fee	200	Estimated by Wewak Town Commission
Consumables for clerical work	100	Estimated by Wewak Town Commission
Total expenditure	17,208	

Remarks: Through the public hearing to user, above-mentioned fees were determined to establish.

(Source: Wewak Town Commission)

Table 2-5-3 Water and electric bill calculation related to operation of the Wewak Market (Kina/month)

Item	Monthly amount	Usage	Calculation
Water bill	707	300m ³	79.2K (basic fee for up to 12m ³) + 1.875K/m ³ × (30m ³ -12m ³) + 2.2K/m ³ × (300m ³ -30m ³) = 706.95Kika
Electric bill	1,026	Capacity 12KVA Use 700Kwh	200K (basic rate) + 46.64K/KVA × 12KVA (electric capacity-based rate) + 0.3813K/ Kwh × 700Kwh = 1,026.11Kina

(2) Recommendation related to operating revenue and expenditure

- ① Remuneration of the Market Manager and Market Clerk payable to Wewak Town Commission is estimated at about 1,333K/month (16,000K/year) and about 1,000K/ month (12,000K/year), respectively. The total monthly payment is, therefore, estimated at 2,333K. Considering that this amount can be covered by the above-mentioned monthly income of 4,792K, it is desirable that their payroll be made independent of the Wewak Town Commission in order to enhance the independency of the Wewak Market.
- ② For sustainable long-term Market operation, it is necessary to set aside a part of the income to build funds for equipment replacement shown in Table 2-5-4.

Table 2-5-4 Funds for equipment replacement for the Wewak Market

Years of service	Fund requirement	Description
5 years	17,600 Kina	Paint repair of the Administration Office Building, Premises pavement repair,
10 years	13,300 Kina	Replacement of air conditioner
15 years	84,000 Kina	Rust prevention paint Repair of Market building

2-5-2-2 New Wewak Jetty and Ice Making Plant

(1) Operating revenue and expenditure forecast

It is estimated that the planned New Wewak Jetty and Ice Making Plant will generate about 933 Kina a month in operating revenue as shown in Table 2-5-5.

Table 2-5-5 Operating revenue and expenditure forecast for the New Wewak Jetty and the Ice Making Plant

(Kina/month)

Item	Amount	Calculation
Operating revenue		
Ice sales	4,992	10K/block × 384 blocks/month (for fishers) + 12K/block×96 blocks/ month (for general users)
Use of jetty	295	60K/year × 50 boats ÷ 12 months + 180K/year × 3 dories ÷ 12 months
Subtotal	5,287	
Operating expenses		
Overtime allowance	800	Overtime allowance for working on Saturdays, Sundays, or after 4:00pm. Estimated by Division of Fisheries & Marine Resources
Water bills	456	Table 5-2-5
Electric bills	2,298	Table 5-2-5
Maintenance	600	Estimated by Division of Fisheries & Marine Resources
Consumables for clerical work	200	Estimated by Division of Fisheries & Marine Resources
Total expenditure	4,354	

Remarks: Through the public hearing to the user, above-mentioned fees were established.

(Source: Division of Fisheries & Marine Resources)

Table 2-5-6 Water and electric bills calculation related to operation of the New Wewak Jetty and the Ice Making Plant (Kina/month)

Item	Monthly amount	Usage	Calculation
Water bill	456	186 m ³	79.2K(basic rate up to 12m ³) + 1.875K/m ³ × (30m ³ -12m ³) + 2.2K/m ³ × (186m ³ -30m ³) = 456.15K
Electric bill	2,298	Capacity 15KVA Use 3,667Kwh	200K (basic rate) + 46.64K/KVA × 15KVA (capacity-based rate) + 0.3813K/Kwh × 3,667Kwh = 2,297.9K

(2) Recommendation related to operating revenue and expenses

- ① The total remuneration of the Engineer/Project Manager, Administration Officer and Data Officer is estimated at 3,333K a month (40,000K a month =16,000K + 12,000K × 2). The Administration Officer's work in the morning and evening will be covered by overtime allowance. Therefore, their work will account for about 25% of the above-mentioned remuneration (two hours out of their regular hours of work), or about 833 Kina (3,333 × 0.25). Their monthly pay is about 933 Kina, a less-than-satisfactory level to ensure business accountability with respect to their work.
- ② Since this Project emphasizes invigorating the economy of the fishing area, PNG plans to cover the major personnel expenses by its administration budget. For this reason, the price of block ice is set as low as half the price of broken ice. The jetty use fee chargeable to banana boats is set at a substantially discounted rate of 60 Kina a year. Our marine transport and physical distribution survey shows that the jetty users' payable price is about 3 Kina a day. If a user uses the jetty once a week, the annual fee becomes 156 Kina.

- ③ To ensure sustained long-term healthy operation of these facilities, however, it is important to make their operation an independent business. The established use fee gives full consideration to user benefits. If the electric and water rates are increased in the future, it would be necessary to raise the income by adjusting prices appropriately to maintain the business accountability.
- ④ Furthermore, it is necessary to provide funds for equipment replacement as shown in Table 2-5-7 in order to ensure sustained long-term operation of the facilities. The Division of Fisheries & Marine Resources plans to obtain from the National Fisheries Authority an annual subsidy of 40,000 Kina for maintenance and management of the facilities. The subsidy will be used to fill up a deficiency in daily maintenance and management expenses and also supplement equipment replacement funds. To ensure that the subsidy is appropriated properly, it is necessary to manage it in a properly separated account.

Table 2-5-7 Funds for equipment replacement for the New Wewak Jetty and the Ice Making Plant

Years of service	Fund requirement	Description
Every 2.5 years	250 Kina	Compressor lubricant
Every 5 years	3,380 Kina	Compressor lubricant, Replacement of sliding parts, Replacement of generator battery, Mortar repair paint of the Ice Making Building.
Every 10 years	75,350 Kina	Compressor major units, ice making cans, Ice Storage air cooling unit, sliding parts
Every 15 years	18,000 Kina	Exchange of Fender beam for Jetty

2-6 Other Relevant Issues

- 1) The system of possessing the land in PNG is very complicated; it is necessary to pay close attention to secure a land for the project site by pledge of PNG.
- 2) The utilization of the current Wewak Market will continued to operate during the construction of new facilities. Because of a construction site is within a parking lot of the existing market, it is crucial to pay close attention for the security for the substitution of parking lot.
- 3) PNG contains serious security issues; it is require to pay close attention to the safety and security of the Japanese staff workers.

Chapter 3 Project Evaluation and Recommendations

Chapter 3 Project Evaluation and Recommendations

3-1 Project Effect

Table 3-1 Effect of the Project

Current Status and Problems	Action by Requested Japanese Assistance	Direct Effect and Expected Level of Improvement	Indirect Effect and Expected Level of Improvement
The Wewak Market becomes out of operation and unhygienic when it becomes waterlogged with mud by high tides and heavy rain.	• Paving of the market premises	• The Market can remain in operation without being affected by high tides and heavy rain. • The market premises will be well drained, thus improving the hygiene standard.	Vendors (gardening & fishing villagers) will be able to operate their sales and income earning opportunities will be increased.
The Wewak Market can currently accommodate only a small number of vendors (150) indoors and many are forced to operate their businesses outdoors.	• Construction of the Market Building and Corridor	The number of vendors the Market can accommodate indoors will increase from 150 to 600 (approx.).	
There are no public toilets at the Wewak Market.	• Construction of the Public Toilet	There will be toilets available to vendors.	
The operation and management of facility fee collection and refuse collection is inadequate.	• Construction of the Administration Office Building • Implementation of Soft Component	The Market will be operated and managed appropriately.	The stable operation of the Market will be ensured and income earning opportunities for vendors will be increased.
The Wewak Jetty is not accessible for banana boats that are used for transporting products from fishing areas.	• Construction of the New Wewak Jetty	The daily number of banana boats accessing the Jetty will increase from 0 to 10 (on average).	The distribution of agricultural and fishery products will become more active thus contributing to the regeneration of fishing villages.
The supply of ice blocks needed for preserving the freshness of fish while transporting them from fishing areas is not available.	• Construction of the Ice Making Plant	The weekly supply of ice blocks will increase from 0t to 2.5t (approx.).	

Those who will benefit from the Project are as follows:

- ① Vendors (gardening & fishing villagers) who use the Wewak Market: approx. 850
- ② Consumers (residents of Wewak Town) who use the Wewak Market: approx. 3,700
- ③ Gardening & fishing villagers in fishing areas around Wewak: approx. 9,300

Table 3-2 lists the targets and indicators of success to be achieved by the implementation of the Project and Table 3-3 shows how to predict the level of each achievement after improvements have been made.

Table 3-2 Indicators of Effect

Indicator of Effect	Present (2007)	Post Project Phase (2011)
No. of vendors which the Wewak Market is able to accommodate indoors	Approx. 150	Approx. 600
No. of banana boats able to access the New Wewak Jetty	0/day	Approx. 10/day
Supply of ice blocks	0t/week	Approx. 2.5/week

Table 3-3 How to Predict the Level of Each Achievement After Improvements

Indicator	Details of Baseline Study	Ground for Calculating Achievement Level	How to Predict the Level of Achievement After Improvements
No. of vendors to be accommodated indoors	Questionnaire survey about the usage of the Market	No. of questionnaire responses	Record the income earned from market usage fees
No. of banana boats accessing the Jetty	Questionnaire survey about the usage of the Jetty	No. of questionnaire responses	Record the no. of boats accessing the Jetty
Supply of ice blocks	Examination of the condition of the existing ice making plant	Result of the examination of the volume of ice produced	Record the amount of ice blocks sold

3-2 Recommendations

3-2-1 Obligations of Recipient Country – Initiatives

- ① To provide in advance, explanation and public information for the market users who are likely to be affected by the construction work which will be carried out as part of the implementation of the Project for a certain period of time.
- ② To establish a system and implement budget measures appropriate for sustainable refuse collection at the Wewak Market.
- ③ To ensure savings and budget measures appropriate for maintaining and updating equipment, such as ice making machines, and manage finance properly by creating a separate account.
- ④ It is essential to accurately identify the effectiveness of the Project so as to ensure its steady progress. Hence, the concerned parties in the PNG side should preferably measure the effectiveness of the Project regularly and continuously.

3-2-2 Technical Cooperation and Collaboration with Donors

- ① In PNG, improvements have been made to market facilities through donors' cooperation in areas other than the target area of the Project. The Wewak Market should be operated more efficiently by taking advantage of learning other markets' examples.
- ② A large variety of people, including vendors and customers, gather at the Wewak Market for different interests. This often creates managerial issues concerning site arrangement, refuse collection and hygiene management. Through the implementation of the Soft Component, the acquisition of knowledge about how to operate markets and the learning of their examples should contribute the more effective and efficient operation of the Wewak Market.