Port Authority (APORTIL)
The Democratic Republic of Timor-Leste

PREPARATORY SURVEY REPORT ON OECUSSE PORT URGENT REHABILITATION PROJECT(PHASE 2) IN THE DEMOCRATIC REPUBLIC OF TIMOR-LESTE

September 2010

JAPAN INTERNATIONAL COOPERATION AGENCY

JAPAN PORT CONSULTANTS, LTD.

Preface

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey on Oecusse Port Urgent Rehabilitation Project (Phase2) in the Democratic Republic of Timor-Leste, and organized a survey team headed by Mr. Yuzo Suzuki of Japan Port Consultants, Ltd. between October, 2010 to September, 2011.

The survey team held a series of discussions with the officials concerned of the Government of Timor-Leste, 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 Timor-Leste for their close cooperation extended to the survey team.

September, 2010

Director General,
Economic Infrastructure Department
Japan International Cooperation Agency

Summary

(1) Outline of the Country

The Democratic Republic of Timor-Leste (hereinafter referred to as "East Timor") consists of the eastern half of Timor Island and "Oecusse" which is an enclave surrounded by the Western Timor of Indonesia. The national land area is about 14,000 ㎢ and the total population is 1,065 thousand people (estimated by IMF as of 2008). The GDP per capita is US$368.5 (estimated by IMF as of 2008). It is said to be one of the poorest countries in Asia. Oecusse, the project area, has a population of about 68,000 (as of 2008), 6.3% of the country's total population.
Since 2004 key socioeconomic indicators have been as follows: population has increased at annual average growth rate of 3.2%, that of GDP has been 5.5% while GDP per capita has increased 2.6%. Industrial breakdown of GDP in 2008 is 27.3% for agriculture, forest and fisheries sector, 29.0% for mining and manufacturing sector and service sector, and 43.7% for public sector (including 12.0% for United Nation activity). The economy depends on agricultural production; especially coffee which is the only export product. For most agricultural products such as rice, flour, sugar and corn, the country relies on imports. Therefore, petroleum production which was started at Timor Sea in 2004 in cooperation with the Australian Government is the largest source of income of the national budget. More than three quarters of national revenues were derived from gas and oil production in 2007.

In the National Development Plan which was settled upon as the first five-year plan (2003~2007), poverty reduction and sustainable economic development were the main targets. To achieve the targets, support for private sector in the field of transportation and the development of relevant transport infrastructure such as roads, bridges, ports, airports and communication systems were addressed as priority development areas.
In the development program which is planned every year, investment areas are selected and given high priority. Infrastructure development was one of ten priority investment fields in the development program in 2009. The rehabilitation of Oecusse Jetty was adopted as urgent project from the following points of view.

/The project will contribute to achieving safe and stable maritime transportation and enhance the welfare of the inhabitants in Oecusse.
/The project will contribute to economic growth through the improvement of maritime transportation not only in Oecusse, but also in the whole country.

(2) Project Background

Oecusse Port is located in Oecusse District which is an enclave surrounded by West Timor of Indonesia. Oecusse is connected with other areas in the country by ferry which is operated to and from Dili two times a week, and by cars through Indonesian territory. Road transportation between Dili and Oecusse is not popular because it is necessary for a driver to obtain a visa and a transit pass for the vehicle through the Indonesian Embassy at a total cost of US$60 before starting the travel. For this reason, most people choose the ferry for moving between Dili and Oecusse. At present the ferry arrives at the slipway in Oebau. There is also a T-shaped jetty for cargo vessels at Mahata which was constructed by the Indonesian Government in 1992. However, it has not been used for cargo handling or maintained at all since the withdrawal of the Indonesian military in 1999. There has been no cargo ship service at Mahata terminal since then.
It is necessary to develop maritime transport infrastructure to improve regional disparities in income and to promote the economic development of Oecusse. Against this background, the

Government of East Timor requested the Government of Japan to repair the jetty at Mahata for cargo vessels of 4,000DWT class in July 2008.

The Japanese Government dispatched a survey team in February 2009. On the basis of the survey result, the Japanese Government judged that it was much more urgent and important to repair the facility for the ferry than for cargo vessels. The ferry now uses the slipway at Oebau, but the water depth has become shallower by degrees because of littoral drift. The ferry cannot arrive at the slipway safely during low tide. And the backyard of the slipway is limited and not able to cope with future increases in ferry traffic. On the other hand, the jetty is totally damaged and dangerous for arriving ships. But the water depth in front of the jetty is sufficient for the ferry and there is enough space for the terminal yard and a future extension. And there shall be no negative influence on the current ferry service during the rehabilitation work. This is the best way to rehabilitate the jetty for being able to accommodate the ferry. Accepting those survey results, the Government of East Timor submitted a revised request letter for repairing the jetty in order to accommodate ferry and cargo vessels of 4,000DWT class at Mahata to the Government of Japan.

(3) Outline of the Project

Subsequent to the above preliminary study and considering its result, the Government of Japan decided to conduct a basic design study and an expert team was dispatched according to the following schedule.

The First Site Survey : Oct. 12th – Nov. 21st, 2009
The Second Site Survey : Jan. 18th – Feb. 6th, 2010

From the site survey and analysis, the team identified and examined the background and details of the project, natural conditions, the current conditions and problems of port facilities and the ferry transportation system, operation and management plan, the capability of local contractors and the conditions of construction materials and machines. Finally the explanation team of the Draft Basic Design was dispatched to explain the outline of the project to the Government of East Timor in June 2010.

The project is to repair the existing jetty which has been idle and to extend the jetty to be able to accommodate the ferry 'NAKROMA' and cargo vessels. Some cargo vessels may call at Oecusse Port on the way to or from Dili Port. The target cargo ships are relatively small class ocean-going ones and their sizes may be less than around 2000DWT. The land terminal will be separated into passenger, cargo and public parking areas. That will contribute to ensuring a smooth and safe traffic flow in the terminal area.

The project consists of the following components.

①Repair and Extension of the Jetty
/The repair of the existing jetty and its extension (approximately 1,890 ㎡)
/The repair (140 ㎡)and the construction (140 ㎡) of the transitional part of the trestle
/The installation of 8 sets of rubber fenders (Low-reaction type 800H)
/The installation of 9 bollards (250kN type)
/The installation of 3 sets of navigation aid facilities

②Terminal Development
/The construction of port-related buildings (an administration office of 150 ㎡, a passenger terminal of 300 ㎡, a warehouse and generator room (450 ㎡)
/The pavement of the stacking yard and roads (approximately 10,200 ㎡)
/The repair of the revetment (130m)
/The construction of 15 sets of outdoor lightings
/The provision of a generator (75kVA)

(4) Schedule and Budget of the Project

The entire project period is approximately 24.0 months from detail design, bidding assistance and construction work to soft component plan.

(5) Evaluation of the Project

(Suitability of the Project for Japanese Grant Aid)

Suitability of the Project in terms of qualifying for Japanese Grant Aid is evaluated from various points of views.

① Benefit group of the Project

The Project will have a direct positive effects to not only the ferry passengers (35,000 people as of 2008), but also the 68,000 people of Oecusse. The Project will contribute to secure stable seaborne cargo traffic for daily commodities and construction materials which are necessary for the Oecusse economy.

②The target and the effect of the Project

The Project aims to improve the maritime transportation infrastructure on ferry transportation between Dili and Oecusse, and to develop a seaborne gateway of cargo transportation at Oecusse. Direct calling of cargo vessels will lead to a reduction in transportation costs for commodities and materials in Oecusse.

③ Compatibility with superior national development plans

The improvement of Oecusse Port is ranked as one of the important national projects in order to improve the safety of maritime transportation and social welfare of Oecusse people. It is also recognized that the Project will have a positive impact on the national economy due to the improvement of maritime transportation network.

④ Management and maintenance system of the implementation agency

APORTIL, which manages Oecusse Port, has an engineering division. The management and maintenance works are done mostly by the division which has necessary technical staffs. Daily management and maintenance cost can be covered by the income from the port operation.

⑤ Profitability of the Project

The ferry fair is set up in consideration of the amount which ferry users are able to bear. Judging from the amount of the subsidy from the central government for the ferry operation cost, the Project will produce any profit at all, even if the number of passengers greatly increased due to the improved system.

⑥ Environmental impact

The project is to repair the old jetty which is idle now. There is nothing to cause big damages on environmental conditions. An environmental management plan (EMP) will be prepared in advance. The environmental impact can be minimized through measures based on the EMP.

⑦ Difficulty of implementing the Project

There are no major problems from the standpoints of construction technique and cost. The project is suitable for a Japanese Grant Aid scheme.

⑧Necessity of Japanese Technical Assistance

The jetty will be constructed in the open sea. It is necessary to secure the safety of construction work and to confirm the safety of utilizing. Japan has a lot of knowhow in o constructing jetties on islands which face the open sea, and management knowhow on their terminal operations. Those experiences will be utilized in the Project effectively.

(Project Effect)

The project has the following measurable and qualitative effects.

①Measurable effects

The project will have considerable ramifications on the Oecusse economy, and its measurable effects are as follows.

/The Project will allow people in Oecusse to visit Dili more easily and will f provide sound infrastructure for maritime transportation between Dili and Oecusse.

/Cargo vessels are expected to call at Oecusse Port at least once a month. The volume of handling cargo at Oecusse Port is also expected to increase year by year after opening the terminal.

Those measurable effects are shown in Table 1.

Table 1 Measurable Effects of the Project

Indicator	Base year (2008)	Target year(2015)
The number of ferry passengers (Dili → Oecusse) (persons)	20,000	36,000
Cargo handling volume at Oecusse Port (tons)	2,330	16,000
The number of calling cargo vessel at Oecusse Port (units)	0	12

②Qualitative effects

The project will enhance safety at boarding and landing time of the ferry and shorten the boarding and landing time as mentioned in Table 2. Furthermore, cargo vessels will call at Oecusse and a lot of cargoes will be imported directly. That will lead to economic development and price stability of goods and commodities in Oecusse.

Table 2 Qualitative Effect of the Project

Current Situation and Problems	Qualitative Effect
1. The ferry cannot approach the slipway at low-tide level. It sometimes takes certain time by starting the passenger landing. Passenger and vehicles are hit by waves during their landing and boarding.	It sometimes takes 30 minutes for the ferry to approach at the jetty during low-tide level. Those cases will be dissolved and there will be no time difference of the approaching work between low-tide level and others. Passengers and vehicles can land and board without being hit by waves.
2. Passengers land and board on the ferry through the ramp. It takes a lot of time for passengers and vehicles to land and board on the ferry. It is not a safe situation.	The landing and boarding places will be separated for passengers and vehicles respectively. The landing and boarding time shall be shortened considerably than at present.
3. Maritime cargo transport is carried out only by ferry at present and the capacity of the ferry is quite limited. This is said to be the reason that commodity prices in Oecusse are higher than in Dili.	Cargo vessels can call at Oecusse Port directly. That will lead to stable supply and stable price of various commodities in Oecusse.

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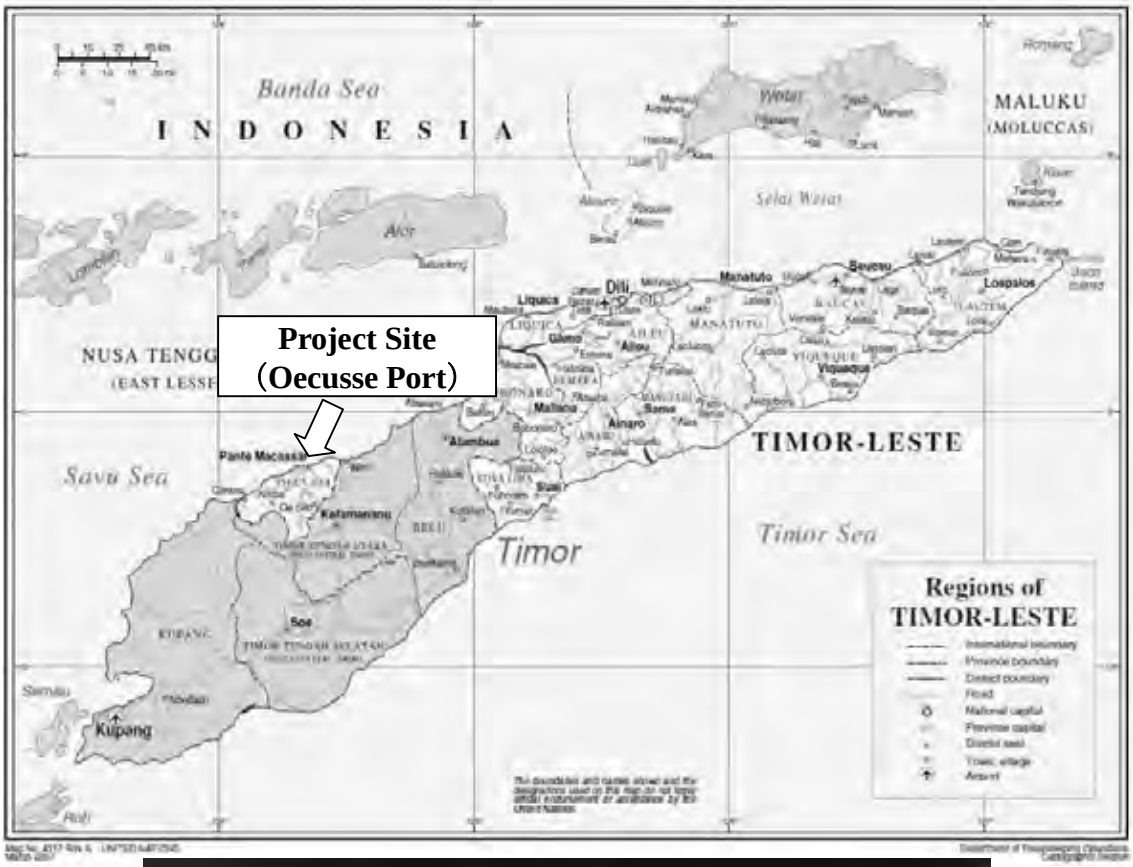

Existing Jetty at Mahata

Slipway for the Ferry at Oebau

Perspective of The New Terminal

Perspective of The Passenger Terminal

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Abbreviations

Term	Formal Name
A/P	Authorization to Pay
ADB	Asian Development Bank
APORTIL	Port Authority
Aus AID	The Australian Agency for International Development
B/A	Banking Arrangement
CBR	California Bearing Ratio
CDL or DL	Chart Datum Level
DGSC	Directorial General of Sea Communication
DWT	Dead Weight Tonnage
GDP	Gross Domestic Product
GRT or GT	Gross Tonnage
GTZ	Deutche Gesellshaft fur Technische Zusammenarbeit GmbH
H.H.W.L.	Highest High Water Level
H.W.L.	High Water Level
H.W.S.	High Water Spring
JICA	Japan International Cooperation Agency
JIS	Japanese Industrial Standards
L. L.W.L.	Lowest Low Water level
L. W.L.	Low Water Level
L. W.S.	Low Water Spring
LOA	Length Overall
M.S.L.	Mean Sea Level
MOI	Ministry of Infrastructure
NDP	National Development Plan
PKO	Peace Keeping Operation
UNDP	United Nations Development Program
WFP	World Food Program

Chapter 1 Background of the Project

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1-1 Current Conditions of Port Sector

1-1-1 Current Conditions and Issues

(1) Current Conditions and Future Plan of Ports in East Timor

East Timor has eleven (11) ports, namely, Oecusse, Tibar, Dili, Dili Pertamina, Hera, Atauro, Carabella, Com (Los Palos), Betano, Beaco and Suai as shown in Figure 1-1-1 below. Ports of Oecusse, Dili and Atauro are operated and managed by the Port Authority of East Timor (APORTIL), based on the law established in March 2003.

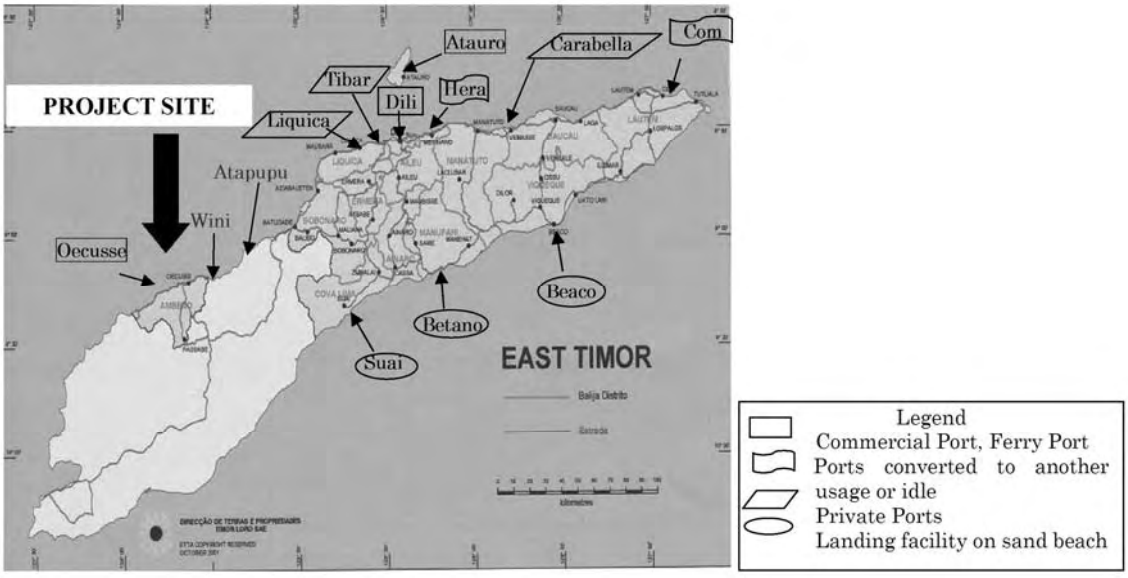


Figure 1-1-1 Location Map of Ports in East Timor

Main features of each of the eleven (11) ports in East Timor are presented below.

- Dili Port is the only one commercial port to receive general cargo ships in East Timor. Ports of Oecusse and Atauro accommodate ferryboat, but no general cargo ship calls at these ports.
- Ports of Tibar, Dili Pertamina and Carabella are exclusively used by private companies.
- Ports of Betano, Beaco and Suai having landing space on sand beach are planned to be improved as base port for oil resources development in future.
- Hera Port used as a fishing port until 2006 is currently serving as a naval port.
- Com Port used as a naval port when East Timor was a part of Indonesian territory is not in use at present.
- Liquica Port has a small-scaled oil terminal operated by East Petroleum Corporation (EPC).
- Dili Port is the only one commercial port in the country, through which active cargo movement is observed. The port, however, suffers ship congestion for its limited number of berths and shallow water depth alongside the berths. In addition, the port has no space for expansion of the existing terminal which is surrounded by the trunk road at its immediate rear and the occupied areas along the coastline at its both sides. It is expected to develop a substitute port with wider access road for reduction of cargo transportation

cost.

- Tibar Port located about 12 kilometers west of Dili has an oil tanker pier, and the port is planned to develop as container terminal which is accessible by containerships or as oil terminal by reclamation of a part of shallow Tibar Bay. The existing road between Dili and Tibar which is narrow and devious along the coastline is required to be expanded for development of the Tibar Bay.

(2) Port Cargo in East Timor

In East Timor, only Dili Port handles the export-import cargos. Cargo traffic through the port is on a constant increase, and remarkable increase is observed in containerized cargo handling volume in recent years as shown in Table 1-1-1.

A ferryboat plies between Dili Port and Oecusse Port and between Dili Port and Atauro Port, transporting passengers and freight. Record of freight transportation by the ferry in 2009 shows that 1,647.5 tons of freight are destined to Oecusse Port and 225 tons are shipped from Oecusse Port. Commodities from Dili Port to Oecusse Port are mainly rice and cement.

Table 1-1-1 Export-Import Cargo Volume in Dili Port

Year	Containerized Cargo (TEU)					Laden Container Conversion Weight (ton)	General Cargo (ton)	Total (ton)
	Import		Export		Sub-total			
	Laden	Empty	Laden	Empty				
2004	9,903	36	984	9,475	20,398	160,039	63,193	223,232
2005	7,743	11	624	6,996	15,374	122,995	104,971	227,966
2006	8,390	39	886	6,159	15,474	136,357	106,878	243,235
2007	11,085	45	764	12,654	24,548	174,180	127,786	301,966
2008	12,649	21	1,133	10,154	23,957	202,595	131,667	334,262
2009	15,300	-	-	-	29,382	224,910	179,985	404,895

Source: APORTIL

Note : Weight conversion of the containerized cargo is based on the value (1TEU=14.7tons) of the Preliminary Investigation (Part I) Report.

According to the record of export-import cargo traffic through Dili Port for the period from January to September 2009, import cargo of 302,745 tons occupies 97 % of the total export-import cargo volume, and export cargo of 8,735 tons represents the remaining 3 %. Share of import containerized cargo, rice and cement in the total import cargo volume is 52.8 %, 30.5 % and 12.3 %, respectively, as shown in Table 1-1-2 below.

Table 1-1-2 Export-Import Cargo by Item in Dili Port

Period	Import (ton)						Export (ton)			
	Vehicle (Nos.)	Containerized	Rice	Cement	Mixed	Total (excluding Vehicle)	Vehicle (Nos.)	Containerized	Mixed	Total (excluding Vehicle)
Jan. to Sep.	709	159,701	92,419	37,102	13,523	302,745	31	8,629	106	8,735
Share (%)	–	52.8	30.5	12.3	4.5	100%	–	98.8	1.2	100%

Sixty percent (60 %) of the total import cargo volume in Dili Port is from Vietnam (mainly rice and sugar), and 35 % of the total volume is from Indonesia (cement). The other import cargos come from Australia, Singapore and Thailand.

As for export cargo from Dili Port, sixty-one percent (61 %) of the total volume is shipped to Australia, 35 % to Singapore, and only 1 % to Indonesia. Commodities of the export cargo comprise mainly coffee beans.

Export cargos are transshipped at Darwin Port in Australia or at Singapore Port to large containerships serving on North American Sea Route or Europe-Mediterranean Sea Route, and then transported to the final destinations. Main export countries in 2008 include United States, Germany, Indonesia, Singapore and Japan, representing the share of 31 %, 21 %, 19 %, 12 % and 5%, respectively.

(3) Ferryboat Services

Ferry passenger traffic, both between Dili Port and Oecusse Port and between Dili Port and Atauro Port, is on an upward trend in recent years. As presented in Table 1-1-3, the number of passengers departing from Dili Port is larger than the number of passengers arriving at Dili Port by 10 to 30 %. The difference in the number of ferry passengers departing from and arriving at Dili Port will be caused by the inaccurate counting of passengers departing from Oecusse Port and / or Atauro Port where the port management system is not well established. It is considered that the number of passengers departing from Dili Port reflects the actual number. In addition, it is supposed that the actual number of ferry passengers will be 20 to 30 % larger than the published figure which does not include the passengers under 12 years old.

Table 1-1-3 Ferryboat Services from and to Dili Port

Year	Dili → Oecusse		Oecusse → Dili		Dili → Atauro		Dili→ Atauro	
	No. of Services	No. of Passengers	No. of Services	No. of Passengers	No. of Services	No. of Passengers	No. of Services	No. of Passengers
2004	92	12,252	92	11,341	46	6,091	44	4,151
2005	92	15,365	92	13,045	46	6,186	46	5,385
2006	96	14,651	97	12,577	53	5,976	49	5,269
2007	83	17,289	82	16,196	48	9,381	48	7,809
2008	87	19,859	87	14,882	44	11,420	44	8,995

Source: APORTIL

The ferryboat services between Dili Port and Oecusse Port and between Deli Port and Atauro Port are operated and managed by APORTIL with a ferryboat "NAKROMA" which was granted in 2007 by the Germany Organization for Technical Cooperation (GTZ) to the Government of East Timor.

This ferryboat is designed to transport 300 passengers, 15 crews, and 170 tons of freight including vehicles. Maximum number of standard vehicles and heavy vehicles (such as pick-up trucks) which the ferryboat can carry is 21 units and 6 units, respectively.

Number of passengers who used the ferryboat services between Dili Port and Oecusse Port in 2008 represents 76% of the total calculated complement (300 passengers / service × 87 services = 26,100 passengers). However, the above record does not include the passengers under twelve years old. Volume of freight carried shows 2,337 tons which is equivalent to 16 % of the total calculated freight capacity (170 tons / service × 87 services = 14,790 tons).

As the ferryboat is moored to the berthing structure at its bow, jib crane equipped on the deck of the ferryboat is not usable for unloading the freights. The volume of freight carried on the ferryboat is quite limited, because the freights are placed on the vacant space of the vehicle parking space.

As shown in Table 1-1-4, NAKROMA plies between Dili and Oecusse twice a week at the present. The ferryboat service between Dili and small island of Atauro is available on Saturdays on a one-day basis, and no services are available on Sundays.

Table 1-1-4 Time Table of NAKROMA

Day of Week	Dili	Oecusse		Dili
	Departure	Arrival	Departure	Arrival
Mon.	17:00			
Tue.		6:00	17:00	
Wed.				6:00
Thu.	17:00			
Fri.		6:00	17:00	
Sat.				6:00

Table 1-1-5 Current Tariff Rate of NAKROMA

Item	Fare (US$)	
Passenger	Economy Class	4
	Business Class	14
	VIP Class	20
Vehicle	Motorbike	15
	Pick-up Truck	115
	4WD Vehicle	115

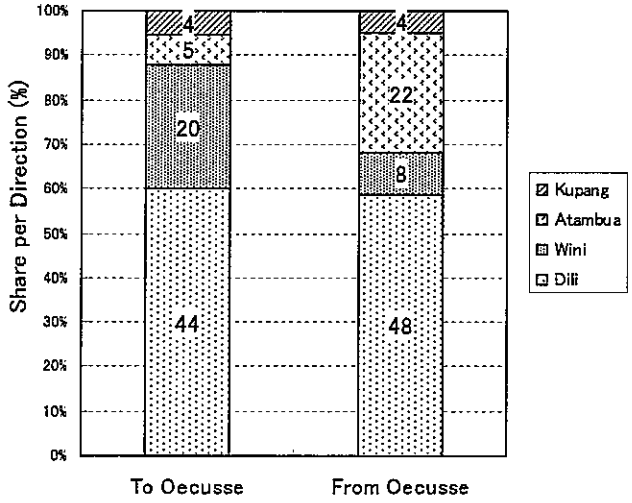
Ferryboat tariff rate is set at such price as payable by ordinary users for such public transportation means, as shown in Table 1-1-5. Fare. revenues of about US$ 400,000 per year are not sufficient for maintaining the ferryboat services, and the shortage of about US$ 1.5 million is covered by subsidy from the Government of East Timor.

APORTIL intends to manage and operate the ferryboat services without any governmental subsidy, but substantial change in the current tariff rate will be required for improvement of the present revenue and expenditure status.

Taking into consideration that the tariff rate hike will give a large influence on the daily life and economic activities of Oecusse citizens, APORTIL decides to maintain the current tariff system for the time being.

(4) Border Crossing Vehicular Traffic

Figure 1-1-2 presents the results of traffic survey conducted at Sakato, the land border between East Timor and Indonesia, for the duration from October 22 to 28, 2009.



Note: The figure indicates the number of the passing vehicles in a week.

Figure 1-1-2 Origin and Destination of Vehicles Passing the Land Border at Sakato

Daily vehicular traffic from Oecusse District to Indonesian territory and vice versa is about 20 vehicles at a maximum, and the total number of vehicles passing the land border at Sakato from the both directions amounts to about 10 to 30 units per day at most. A remarkable variation in the vehicular traffic is not seen in any day of a week.

Vehicular traffic between Oecusse District and Indonesian territory is quite few and does not constitute an important transport means to support the economy of Oecusse District. As for the types of the vehicles passing the land border, 4WD vehicles occupy more than 50 % of the total traffic in either direction, and the second largest is pickup trucks of 20 to 30 %. Sixty percent (60 %) of the vehicular traffic is from or to Dili, and the remaining 40 % from or to Wini, Atambua and Kupang, Indonesia. Vehicular traffic from Indonesian territory is mainly related to the construction works in Oecusse District.

Fuel which can not be transported by ferryboat relies on the land transportation. Six (6) units of fuel carriers were recorded during the traffic survey, and diesel oil of 32,000 kl was transported from Dili to Oecusse by these fuel carriers.

Among the vehicles bound for Oecusse, five (5) units of vehicle carrying the mixed cargo containing rice and cement were recorded in a week, and only one vehicle carrying construction equipment and materials from Dili was observed in a week.

It was also observed during the traffic survey that a majority of the vehicles from Oecusse to Indonesian territory transports various documents, and several units of vehicles carry clothes or machine and equipment in a week. It is pointed out that the land traffic between Dili and Oecusse is limited due to the following bottlenecks :

- Three (3) or four (4) days are required to obtain the entry visa to Indonesia, and payment of US$ 20 for single entry visa or US$ 40 for double entry visa is required.
- It is essential to acquire the vehicular traffic permit from the Land Traffic Bureau of East Timor and also from Indonesian Embassy, and many copies thereof are required to submit to the authorities concerned at the respective land borders of the countries.
- Registration procedure at the land border takes much time, because such procedure is done with manual work.
- Time limitation is set out by the Indonesian border checkpoint (09:00 to 16:00, Indonesian Time, 10:00 to 16:00, East Timor Time:)

1-1-2 Development Plan

The Government of East Timor has advanced various reformations targeting at "Poverty Reduction" and "Sustainable Economic Growth", based on the Five-Year National Development Plan (2003-2007) formulated in 2002.

Stressed in the transport sector are "Increase of Domestic and Foreign Investments through Promotion to Transport-Related Private Sectors" and "Development of Transport Infrastructures such as Roads, Bridges, Ports, Airports and Telecommunication Systems".

The Government of East Timor is endeavoring to work out the mid-term national development plan as well as the priority development plan for each year. For the year of 2009, the infrastructure development is one of the priority plans, and the rehabilitation of Oecusse Port, an isolated enclave of East Timor, is taken as an extremely important infrastructure development project.

The project will largely contribute to the correction of the regional gaps within East Timor, and the safe and stable transport system established and maintained in Oecusse District will be quite essential from the national security viewpoint.

Original plan for the "National Infrastructure Plan (2009-2020)" was worked out in March 2009 by the Ministry of Infrastructures with assistance of the Asian Development Bank (ADB) and the Australian Agency for International Development (AusAID), but this plan has not been published at the present moment.

The above National Infrastructure Plan covers the construction of transport infrastructures, water supply and sewerage systems, sanitary facilities, electricity supply system, and schools. As for the port sector, the necessity of formulation of development master plan for the national ports is described, the development plan of Tibar Port considering the present ship congestion and no available space for port expansion and other development plan for the ports on southern coast are proposed.

With respect to Oecusse Port, development of ferryboat terminal and general cargo terminal is proposed to improve the current situation that this area has no choice but to depend on Indonesia in terms of supply of oil and food.

1-1-3 Social and Economic Conditions of Oecusse District

(1) Population and Density

According to 2004 Census, Oecusse District has population of 57,469 which is equal to 6.2 % of the country's total population, and land area of 814.66 km2 equivalent to 5.5% of the national total area, as shown in Table1-1-6 below. Passabe Sub-District, the most upcountry area in Oecusse District as presented in Figure 1-1-3, has the highest population density of 118.7 persons / km2 which is comparable with Shimane Prefecture in Japan.

Table 1-1-6 Population Distribution in Sub-Districts of Oecusse District

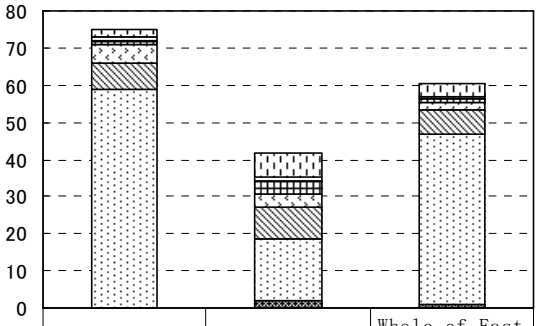
Sub-District	No. of Villages	Population	Land Area (km²)	Population Density (per km²)
Nitibe	5	11,052	311.52	35.5
Passabe	2	7,139	60.12	118.7
Oesilo	3	10,220	99.12	103.1
Pante Makassar	8	29,058	343.9	84.5
Total	18	57,469	814.66	70.5
Whole Country	442	923,198	14,919	61.9

Source: Preliminary Study Report - Oecusse Port Urgent Rehabilitation Project

Figure 1-1-3 Oecusse District and its Sub Districts

(2) Employment Structure

Employment structure for Oecusse District consists of agricultural and fishery industries of 58.9 %, self-employed individuals of 6.7 %, and employees of private company of 5.3 % as shown in Figure 1-1-4. The employment rate over 15 years old is 75.1%, which is the second highest figure next to Ailona District.



	Oecusse	Dili	Whole of East Timor
Government	2.2	6.7	3.3
UN	0.8	1	0.6
NGO	1	3.4	1.3
Private Company	5.3	3.2	1.9
Self-Employed	6.7	8.9	6.3
Agricultural and Fishery Industries	58.9	16.5	46
Job Seekers	0.2	2	1

Source：2004 Census

Figure 1-1-4 Employment Structure for Oecusse District

(3) Agricultural and Livestock Industries

Main grains among the agricultural products in Oecusse District show the higher productivity as compared in the terms of population rate by District, with the productivity in other Districts (Refer to Table 1-1-7).

At present the agricultural products are rarely transported from Oecusse District to Dili. With increase in frequency of ferryboat services between Oecusse and Dili, however, Oecusse District is expected to function as the agricultural production base for neighboring agricultural industries.

Table 1-1-7 Output of Agricultural Products and Number of Livestock in Oecusse District

Item	District	Rice	Soybean	Cassava	Vegetable	Total
Main Grain & Vegetable (ton)	Whole Country	80,236	100,170	35,541	14,247	227,356
	Oecusse	8,994	15,232	4,452	449	29,127
	Share (%)	11.2%	15.2%	12.5%	3.2%	12.8%

Item	District	Cow	Buffalo	Horse	Goat	Sheep	Pig	Chicken	Total
Livestock (No.)	Whole Country	145,407	102,216	65,541	137,444	41,298	388,270	771,014	1,651,190
	Oecusse	25,089	1,302	2,120	16,103	175	28,182	75,404	148,375
	Share (%)	17.3%	1.3%	3.2%	11.7%	0.4%	7.3%	9.8%	9.0%

Source : State of National Report (2008)

With respect to the livestock industry, cows and goats account for large share. Currently, pigs and chickens are transported by ferryboat from Oecusse Port to Dili Port, and livestock feeding which corresponds to the demand in metropolitan areas should be considered in developing the industries in Oecusse District.

(4) Water and Electricity Supply

Restrictions on the water and electricity supply are observed throughout East Timor, and such restrictions are remarkable, especially in Oecusse .District. Water supply rate in Oecusse District shows 45.2 %, while the national average is 64.7 %. Average electrification rate in Oecusse District is 13 %, while the national average is 36.1 %.

Though the electrification rate at urban areas in Oecusse District comes up to 75.5 %, planned blackout is carried out from 6:00 am until 6:00 pm. It is essential to provide the generator sets for execution of the construction works.

Table 1-1-8 Water Supply Rate and Electrification Rate in Oecusse District

Item		Oecusse District	National Average
Water Supply Rate (%)	Whole	45.2	64.7
	Urban	67.4	82.4
	Rural	41.5	58.3
Electrification Rate (%)	Whole	13.0	36.1
	Urban	75.5	82.1
	Rural	2.8	19.7

Source : State of National Report (2008)

1-2 Background and overview of the Grant Aid

The Democratic Republic of Timor-Leste (hereinafter referred to as "East Timor") consists of the eastern half of the Timor Island and "Oecusse" which is an enclave surrounded by the Western Timor of Indonesia. The national land area is about 14,000 ㎢ and the total population is 1,065 thousand people (estimated by IMF as of 2008). The GDP per capita is US$368.5 (estimated by IMF as of 2008). It is said to be one of the poorest countries in Asia.

After East Timor had been ruled over by the United Nations Transitional Administration in East Timor (UNTAET) since the civil war on Independence in 1999, and the country became formally independent from Indonesia in May 2002. Since then, East Timor has been developing and rehabilitating infrastructure with international assistance. The Japanese government has been assisting with rehabilitation projects of infrastructure related to transportation, electricity, water supply and sewage and agriculture. Regarding port rehabilitation, navigation aid facilities were equipped at Dili Port in 2001 and the improvement project in Dili Port has been conducted as a Japanese aid project since 2006.

Oecusse Port is located in Oecusse District which is an enclave. There is a slip way for a ferry at Oebau and a T-shaped jetty for cargo vessels at Mahata. The T-shaped jetty was constructed by the Indonesian Government in 1992 but has not been used for cargo handling or maintained at all since the civil war for independence. There has been no cargo ship service at Mahata terminal since then.

The slip way was constructed with the financial and technical assistance of GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit GmbH) in order to secure the maritime traffic service between Dili and Oecusse. There are two ferry services a week using the slipway. Road transportation between Dili and Oecusse is not popular because it is necessary for the driver to obtain a visa and a transit pass for the vehicle through the Indonesian Embassy before the start of travel at a total cost of US$60. It is said to be one of the main factors for higher consumer prices and lower standard of life in Oecusse compared with the national average.

It is necessary to develop maritime transport infrastructure to improve regional disparities in income and to promote the economic development in Oecusse. Based on this background, the Government of East Timor requested the Government of Japan to repair the jetty at Mahata for cargo vessels in July 2008. To respond to the request, the Japanese Government dispatched a survey team for preparatory survey (Phase1) in February 2009. On the basis of the survey result, the Japanese Government judged that it was urgent and important to repair the facility for the ferry as well as cargo vessels. The ferry now uses the slipway at Oebau, but the water depth has become shallower by degrees because of littoral drift. The ferry cannot arrive at the slipway safely during low tide. And the backyard of the slipway is limited and not able to cope with future increases in ferry traffic. On the other hand, the jetty at Mahata destroyed during the civil war at the end of 90's has not been repaired and concrete separation and exposure of reinforcement are remarkably found. However, considering the water depth in front of the Jetty and utilization of the backyard space, it was judged appropriate to rehabilitate the jetty for use by ferry and cargo vessels.

Based on the preparatory survey results, the Government of East Timor submitted the request for rehabilitation of the jetty at Mahata to the Government of Japan.

1-3 Natural Conditions

Various natural conditions data are required to implement basic design study. Since there is wind and weather data only, topographic survey, bathymetric survey, tidal level observation, tidal current observation, soil investigation, water quality and sediment survey were conducted on site. In addition, the wave conditions were estimated by using global meteorological data and the sand drift simulation was conducted by using wave estimation result and above-mentioned on-site survey results.

The natural condition for facility design was determined on the basis of those data. The outline of the survey results are as follows.

(1) Wind and Meteorological Phenomena

Temperature in Oecusse is fairly constant all year round. The maximum temperature is 33 ~ 35 ℃, and the minimum temperature is around 20 ℃. The annual rainfall is about 1,100mm. The rainy season is from December to March and 80% or more of the annual rainfall tend to fall in this season. The wind direction between March and August is E~SE and between September and April is W~N. Average wind speed is not remarkable. However, there are a few days during the rainy season when strong winds blow. In January 1993, a cyclone attacked the whole country and some areas suffered heavy damages.

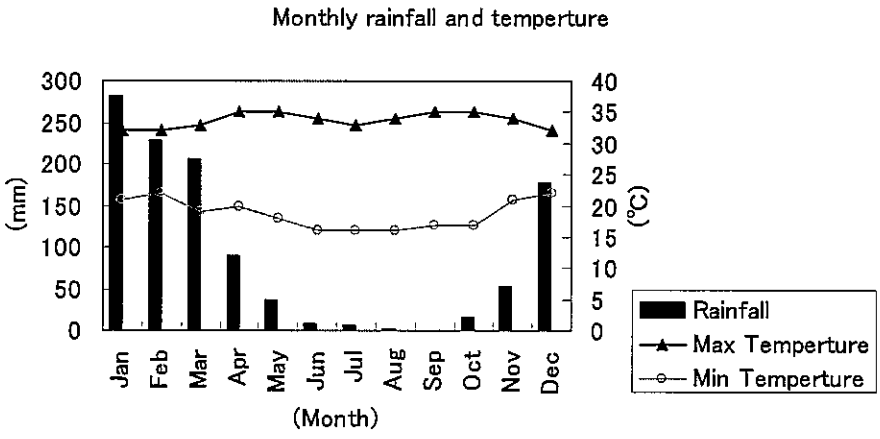


Figure 1-3-1 Temperature and Rainfall in Oecusse

(2) Topography and Bathymetry

Based on the results of the bathymetric survey, existing jetty is located at the area where the depth is about -3.0m, and the water depth of offshore side becomes deeper exponentially. Water depth around the eastern side of the jetty is deep, while the western side is shallower than that of the eastern side. Topography of the land behind the revetment is flat, and altitude is around 3.6m.

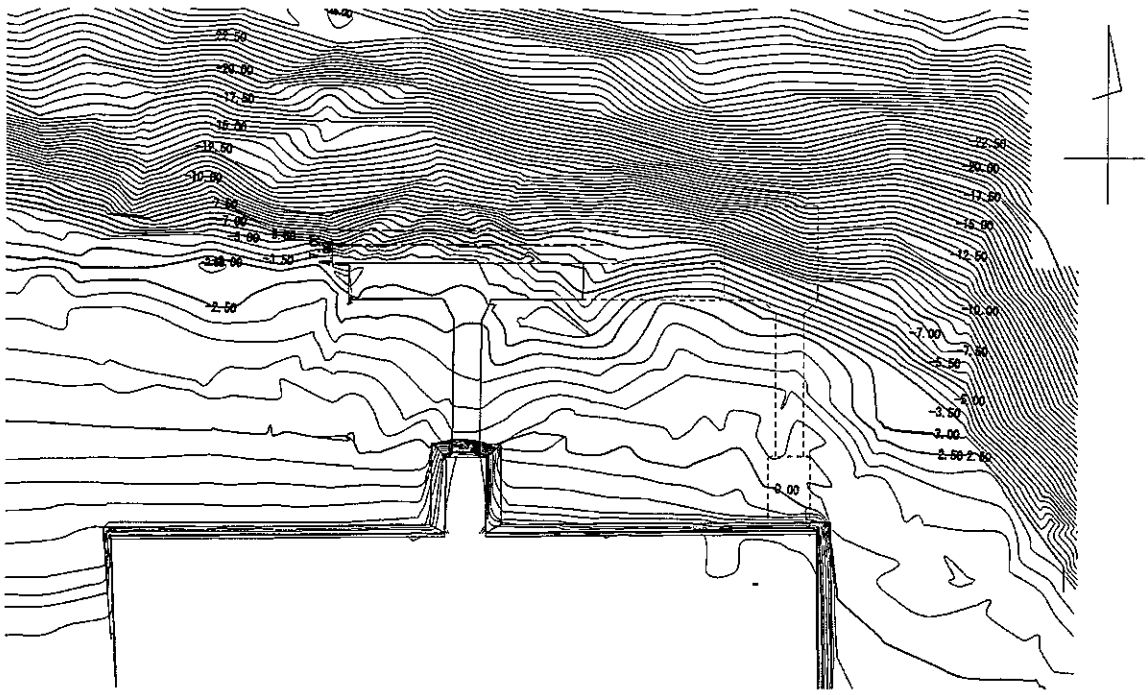


Figure 1-3-2 Bathymetry at Mahata in Oecusse

(3) Ocean Wave

Since there is no wave observation data, winds well and swell was estimated on the basis of the wind data at Oecusse and global wind estimation data. The probabilistic wave whose return period is 50 years was calculated as the design wave, and calculation results in front of each facility at H.W.L. are shown in Table 1-1.

Table 1-3-1 Design waves (Return period of 50 years, Tidal level:HWL)

Location	Deepsea Wave			Wave in front of each Facility				
	Wave Direction	Ho (m)	T' (S)	Ho' (m)	Wave Direction	$H_{1/3}$ (m)	Hmax (m)	HD (m)
Jetty (at the slipway)	NW	2.93m	6.93s	2.65m	323.4°	2.42m	4.36m	4.36m
Jetty	NW	2.93	6.93	2.58	326.6	2.38	4.28	4.28
Traditional part of trestle	W	5.10	11.33	1.34	348.8	2.14	2.81	3.68
Eastern part of Revetment	W	5.10	11.33	1.26	347.3	2.12	2.78	3.64
Western part of Revetment	W	5.10	11.32	1.59	352.2	1.40	1.99	2.56

Notation1 : Wave direction shows the angle of clockwise from N
Notation2 : HD shows Hmax at the point of 5H1/3 sea side from target point

(4) Tidal level

Tidal level observation was carried out from October 22 to November 22, 2009. Harmonic analysis was conducted by using the result of hourly tidal level observation and determined Chart Datum Level (CDL), High Water Spring(H.W.S) and Low Water Spring(L.W.S.).

The design tidal level is stipulated as average height of monthly highest water level (H.W.L)/lowest water level (L.W.L) observed within 5 days of synodic over 1 year in the Japanese Technical Standards. The design tidal level is determined by the same way as in Japan as follows.

H.W.S. = CDL+2.8m
H.W.L. =CDL+2.6m
L.W.L. =CDL+0.2m
L.W.S. = CDL+0.0

(5) Tidal Current

Based on continuous observation for 15 days and nights (October 23, 2009 to November 6, 2009), the maximum velocity of tidal currents at shallow area (depth is around 6m) is about 1.0m/sec (about 2 knots), about 0.6 ~ 0.8m/sec (1.2 ~ 1.5 knots) at deep ocean area (depth is around 16m).

The current speed at each point is almost uniform at more than 2m high area above the sea bottom. Prevailing current direction is W and NW.

(6) Littoral Drift

Average wave energy during the dry season is incident nearly perpendicular to the coastline, and average wave energy during the rainy season, when waves are higher than in the dry season, is incident in the coastline with western oblique direction.

Judging from the above-mentioned tendency, it is estimated that the predominant direction of littoral drift is from west to east. Since the grain size at sea bed is about D_{50} = 0.2mm, the threshold depth of sand drift is estimated at about DL-4.2m by using the calculation diagram for threshold depth of surface layer sediment movement at high-wave. (H=1.06m、T=5.3s、Lo=43.8m) .

Water depth in front of the planned jetty is about DL-5.0m. It is deeper than the threshold depth of littoral drift and thus a significant sediment movement is not expected to arise.

(7) Soil Condition

Soil investigations are carried out at three points at sea and five points at land. The soil under the sea bed is almost silty sand, most likely formed by sedimentation of coral. N value's is scatted widely and has the following tendencies.

/It is found that N values increase a little at more than 10m deep points from the surface of the sea bed.
/N values of boring points No.1 and 2 at offshore area are bigger than that of the land side of boring No.3.
/Hard foundation stratum to maintain steel piles safely is not found.
/As a result of boring on the land, N values have a tendency to become smaller to become deeper.
/Comparing the results of the seaside boring with those of landside boring, N values of

the seaside are better than those of the landside. Weathering of sea side's coral does not seem to have greatly progressed. That is why the strength of the ground is greater than others.

/The soils consist of a mixture of weathered coral, sand and silt. There are big N values of the surface on the land, possibly the result of hard coral.

Soil design condition of the jetty is determined considering the average of N values of three seaside borings, except for those N values which are too high to be compared to other values. They have good correlation with each other.

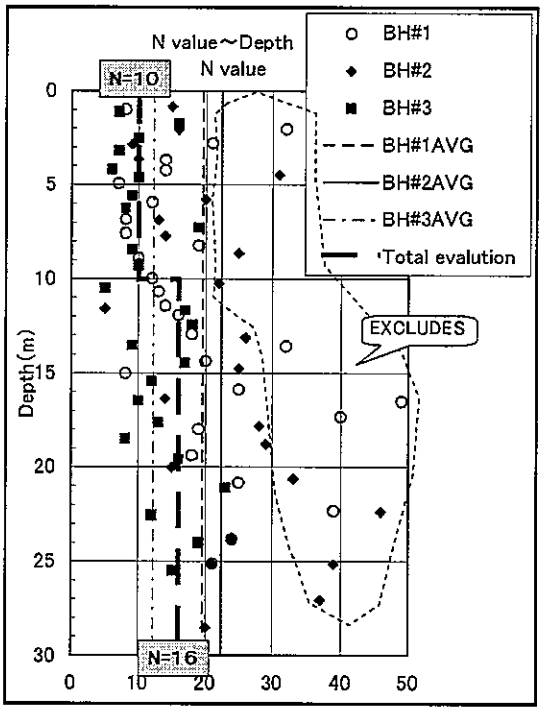


Figure1-3-3 Brief overview of Soil Boring

(8) Earthquake

Earthquakes in and around Timor-Leste have been observed from 2007. Some examples which are considered to have a big influence on Oecusse are shown in Table .The seismic coefficient was computed from location, magnitude, and depth.

Table 1-3-2 Major earthquakes occurring in recent three years in Oecusse

Date and hour	Distance from earthquake source (km)	Depth d (km)	Magnitude	Seismic coefficient
9 : 02AM, September 14th 2008	272 (272)	10	6.5	0.011
4 : 37PM, September 30th 2008	61 (61)	10	5.1	0.021
4 : 53PM, January 28th 2009	41 (40)	10	6	0.086
1 : 45AM, January 29th 2009	64 (30)	57	5.5	0.031
8 : 59PM May 20th 2009	51 (28)	42	5.2	0.029

Note: Numerical value in parentheses "( )" of 'Distance from earthquake source' represents horizontal distance.

(Design Seismic Coefficient)

The existing jetty was constructed by PT.Pelindo during Indonesian rule. It is assumed to have been constructed according to " STANDARD DESIGN CRITERIA FOR PORTS IN INDONESIA、JAN 1984 DGSC ". Design Seismic coefficient is determined as follows.

Kh (Design Seismic Coefficient)＝Kr ×Ki

Kr （Regional seismic coefficient） : 0.09、Oecusse （Zone2、Soft soil）

Ki （Coefficient of importance） : 1.5 （Special class）

Kh＝0.09×1.5＝0.135 → Kh＝0.15

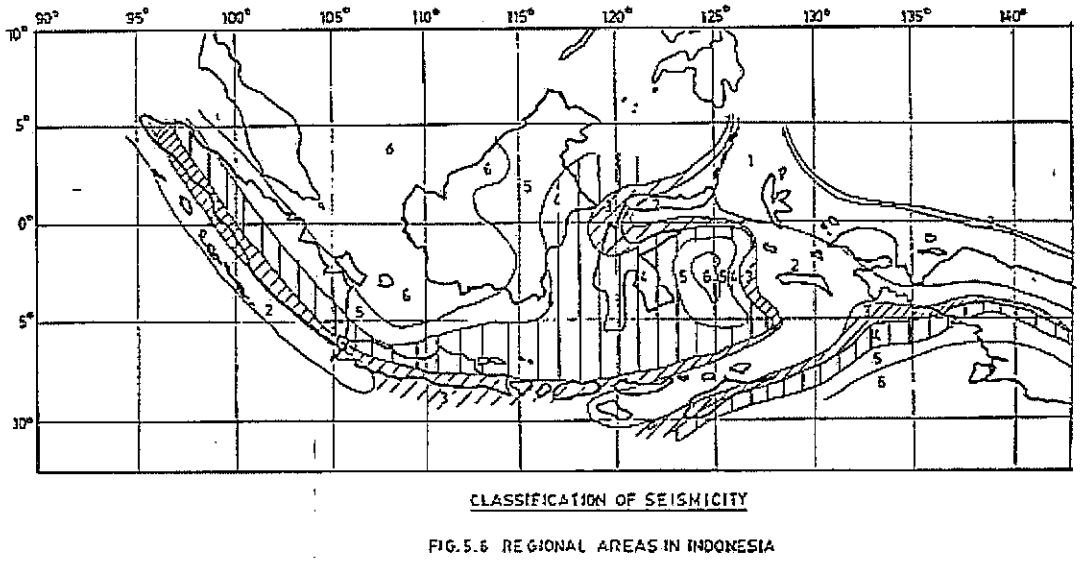


Figure 1-3-4 Regional Seismic Coefficient for Port Facility Design

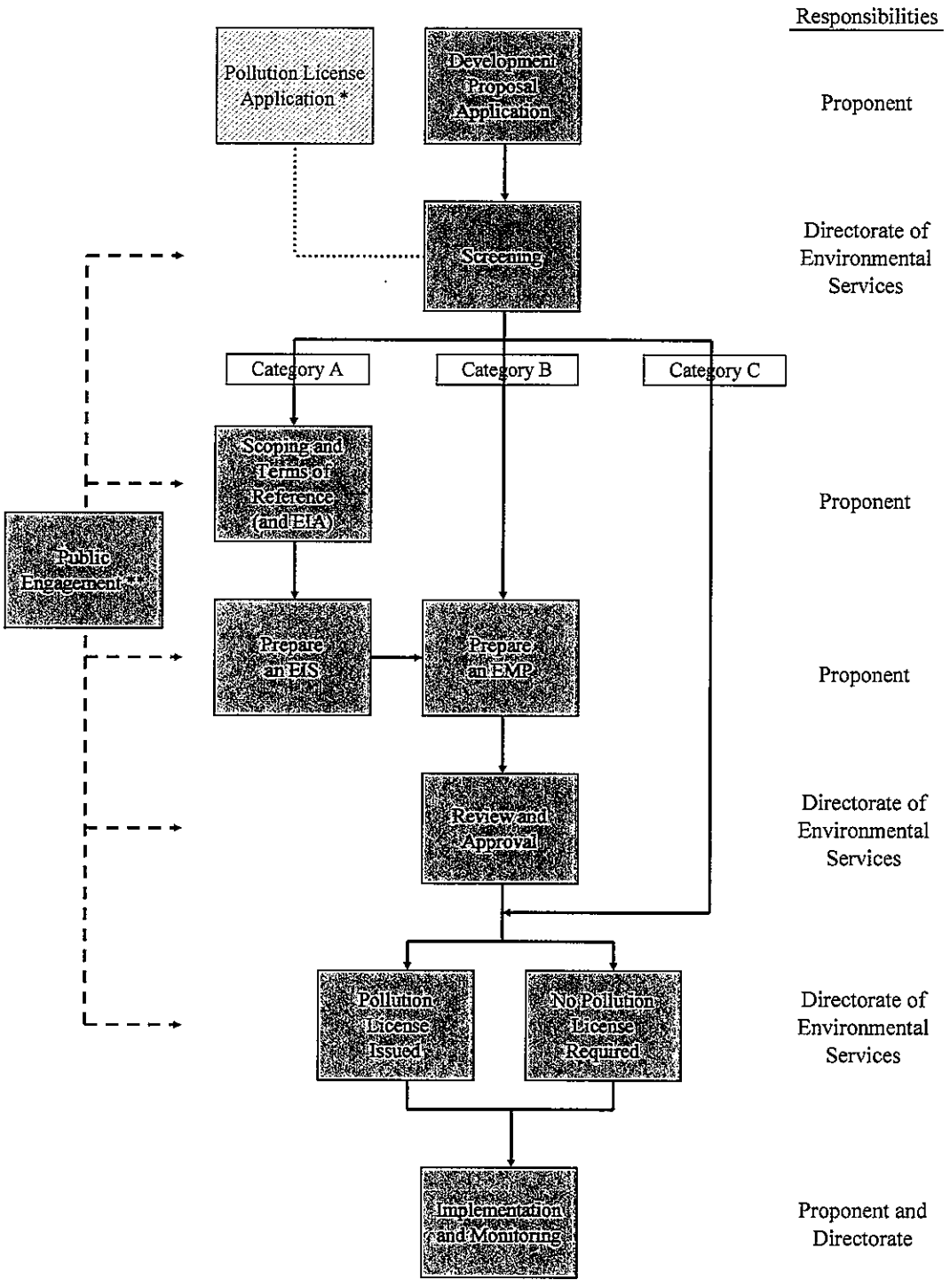
Source : 「STANDAR DDESIGN CRITERIA FOR PORTS ININDONESIA, 1984 DGSC」

1-4 Environmental and Social Matters

In this study, together with the results of previous studies, present environmental conditions in and around the project site were evaluated to support a preparation of Environmental Monitoring Plan (EMP) by APORTIL.

(1) Required Environmental Procedure in East Timor

During the years of Indonesian colonial, environmental procedure in the country was implemented in accordance with the Indonesian Environmental Low. Now, however, it is implemented referring to the Environmental Guideline, which was formulated by United Nations Transitional Administration in East Timor (UNTATE) in 2004. Although the Environmental Guideline has not been completed yet, it is only the guideline which is currently available in East Timor. On the other hand, however, the Environmental Guideline describes that the Indonesian Environmental Low still has been varied. The discrepancy in those environmental regulations regarding to classification of environmental category, requirement of public meeting, etc. makes the environmental procedure confused. At the time of this study, a draft environmental law prepared based on the both environmental regulations was under discussion in the congress. The environmental procedure described in the Environmental Guideline is shown in **Figure 1-4-1**. As described in the following section, this project has classified in to "B" category, EIA is not required but EMP is required.



* The review of scheduled premises and issuance of pollution licenses follows a similar process.

** Public engagement occurs throughout the EIA process.

(Source: Environmental Guideline)

Figure 1-4-1 Flow of Environmental Procedure in East Timor

(2) Present Environmental Conditions Survey

1) Natural Environment

In and around the project site, present environmental qualities, including water quality, sediment quality, noise, coral and mangrove conditions, were surveyed from October to November 2009. Purpose of this survey is to obtain and quantitatively evaluate present environmental conditions as background data for subsequent preparation of an EMP for the project.

The detailed results of the survey are attached to this report and summary results can be described as follows.

Water quality indicates very low turbidity (suspended solid content) and contamination level of organic substances.

Sediment quality indicates very low contamination level of nutrient salts and organic substances and because of that the seabed sediment along the shoreline consists of sand with little composition of silty soil.

The project site adjoins a residential area Present noise levels in the wharf and terminal areas tend to be rather high due to breaking waves, terminal operation and workers. Daytime background noise level in the residential area behind the terminal (40 to 50 db) is smaller than those in the terminal area because of fewer numbers of people and vehicles. However, the noise level sometimes exceeds 70 db due to trucks and mini-buses passing by.

Live coral patches are found on the seabed in 20-25m depth and approximately 50m off the existing wharf. Since coverage of seabed by the coral patches seems to be less than 5%, and those are locally common spices which are patient to increase of water turbidity, potential impact on the coral patches caused by the project will be minor.

Natural mangroves are found along the coast line on both sides of the project site. Since the distances from the project site are kept more than 2 kilometers, no negative impact on the mangroves caused by the project is anticipated.

Disposal site of the construction waste materials has been designated in Palaban area 6km away from the project site. The construction waste materials will be transported by a number of trucks. In order to prevent dust dispersion and dropping of the waste materials from the trucks, the waste materials on trucks will be watered and covered by sufficiently large sheets. In addition, to reduce volume of the disposal, removed concrete pieces will be reused as much as possible for armor material of retaining wall foundation to be constructed in front of the terminal.

2) Social Environment

Evaluation present social conditions in and around the project area, to discuss necessary social measures during the project implementation, an interview survey was conducted with local residents and government offices. Summary results are described below.

In the project site, no plot and residents exist. Therefore, no resettlement procedure is involved. 10 resident house are located surrounding the project site. Their main livelihood are small scale fishery, farming, live stock, kiosk and construction related works.

Local residents expect project-originated income (provision of construction workers and construction materials, etc.) and request impartial distribution of it to local communities.

Local fishing fleets consisting of about 5 boats equipped with 5 to 15 horsepower engine, operate during daytime. They expect increase of catchments by larger boats, thanking to the port construction in this project. On the other hand, they worry about degradation of existing corals due to the port construction. However, no serious degradation is anticipated because of no existence of the corals in the construction site and execution of proper environmental monitoring during the project implementation.

Since most of daily goods distribution and traveling between Dili seriously depend on the

current Ferry services, local residents and government offices highly expect to the project.

3) Environmental Check List

Based on the above environmental conditions, an Environmental Checklist has been prepared and attached to this report, in order to verify the items to be considered in the project implementation.

(3) Assistance for Preparation of Environmental Management Plan (EMP)

The environmental category of this project was classified into "B" category by the National Directorate for Environment (DNMA) on 21 May 2010 with the official letter attached to this report. According to the Environmental Guideline in East Timor, the project categorized into "B" is required to prepare an EMP and submit to DNMA for approval. In order to support APORTIL for preparing a proper EMP in accordance with JICA's environmental guideline, a draft EMP was prepared in this study and attached to this report. The EMP, which is finalized by APORTIL, was approved by Secretary of State for Environment on 13 August 2010 by the official letter attached to this report.

Table 1-4-1 shows potential environmental Impact and mitigation measures, which are presented in the approved EMP.

Table 1-4-1 Major Potential Environmental Impact and Mitigation Measure

Major Potential Environmental Impact	Environmental Mitigation Measure
Noise and vibration originated from large size construction equipment (Pile driver, etc.).	Noise and vibration monitoring. No operation in early morning and late night.
Water quality degradation due to demolition of existing concrete facilities.	Water quality monitoring. Minimize broken concrete peaces and dust dropping into water.
Construction waste.	Appropriate disposal at designated area. Prevention of dust emission during transportation. Reuse of waste material. Air quality monitoring.
Sewage discharge from port facilities.	Treatment by individual septic tank.
Increase of local traffic volume.	Safety control measures by port users and related local government offices.
Conflict in local community.	Impartial distribution of project profit to local communities.

Table 1-4-2 and **Figure 1-4-2** show scope and location of the environmental monitoring, which is proposed in the approved EMP.

Table 1-4 -2 Monitoring Scope

Monitoring Item	Parameter	Method	Frequency (Construction Phase)
1. Physical Environment			
Ambient Water Quality Survey	Temperature, Salinity, pH, Turbidity (equivalent SS)	Field measurement by handy equipment.	During pier demolition: Once / day Other: Once / week
Ambient Air Quality Survey	Dust (TSP)	Field measurement by handy equipment.	Once / month
Noise/Vibration Survey	Noise and Vibration levels	Field measurement by handy equipment.	First 2 weeks during pile driving: Once / day During pile driving: Once / week Other: Once / month
2. Biological Environment			
Live Coral Survey	Location, Coverage, Healthiness, etc.	Field survey by divers.	Once / 6 months
3. Social Environment			
Local Residents Survey	Positive/Negative Satisfied/Dissatisfied, etc.	Field interview by NGO	Once / 6 month

Note: Frequency in operation phase can be decided later based on the actual site conditions but Once / 6 months is recommendable.

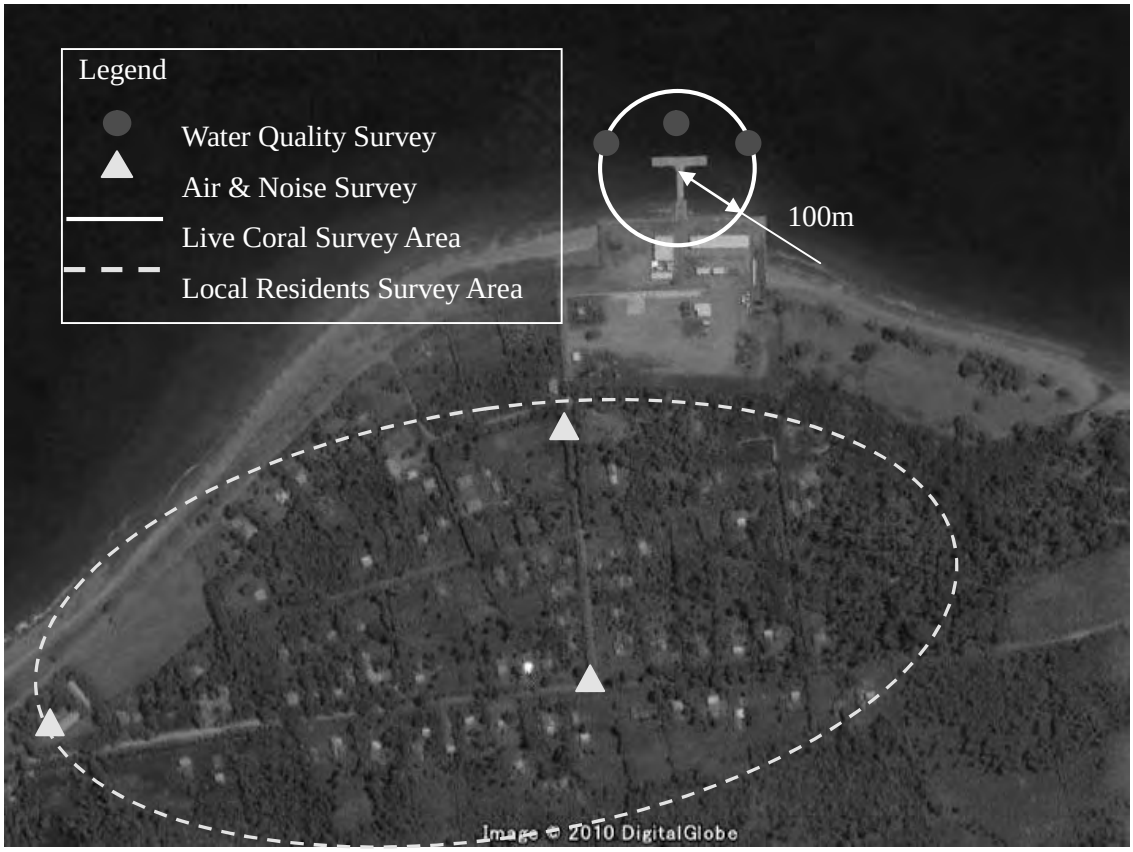


Figure 1-4-2 Monitoring Location Map

(4) Public Meeting

According to the Environmental Guideline in East Timor, a public meeting is required to obtain comments from public and reflect them in preparation of EMP. Summary of the public meeting held on 20 July 2010 in Oecusse is presented below.

Date:	20 July 2010
Venue:	Oecusse State Secretary House
Participant:	20 participants (including two DNMA staff and one APORTIL staff)

This public meeting was held in Tetun language. The summary below was prepared based on the verbal translation into English made by APORTIL staff.. This record of meeting has been attached to the approved EMP.

- State Secretary Oecusse opened this meeting with a declaration.
- APORTIL presents a project summary emphasizing increase of safety of ferry passengers due to the project.
- Major questions and answers.
  - ✓ Will Japanese contractor (s) construct the port? Will they bring construction workers from Japan?

    Answer: Japanese contractor (s) construct the port but construction workers will be

employed locally.

- ✓ Will ceremony be held before starting construction?

  Answer: In general, Japanese contractor (s) likely hold a ceremony for their safe operation.

- ✓ When construction work start and finish?

  Answer: It will be started in May next year and finish after one and half years.

- ✓ Will construction area occupy private area?

  Answer: The construction area is limited within existing port area.

- ✓ What is the scope of environmental Monitoring?

  Answer: Explained based on the draft EMP..

- ✓ How the waste and garbage will be treated?

  Answer: Construction waste will be transported to the designated disposal site in Palaban. Waste water discharge will be treated by the septic tanks placed in the terminal area. General gavages will be kept in garbage bins and periodically corrected and transported to the Palaban disposal site.

- ✓ Will toilets be placed in the port terminal?

  Answer: Toilets will be placed in port office building and passenger terminal building.

Chapter 2 Contents of the Project

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

2-1-1 Comprehensive Goal of the Project

In the National Development Plan which was settled upon as the first five-year plan (2003~2007), poverty reduction and sustainable economic development were the main targets of the plan. To achieve the targets, the support to private sector in the field of transportation and the development of relevant transport infrastructure such as roads, bridges, ports, airports and communication systems were addressed as priority development areas.

In the development program which is planned every year, investment area are selected and given high priority. Infrastructure development was one of ten priority investment fields in the development program in 2009. The rehabilitation of Oecusse Jetty was adopted as an urgent project from the following points of view.

/The project will contribute to securing safe and stable maritime transportation and enhancing the welfare of the inhabitants in Oecusse.

/The project will contribute to economic growth through the improvement of maritime transportation not only in Oecusse, but also in the whole country.

This project is expected to directly stimulate the economy in Oecusse and to improve the domestic inter-regional disparities in the country. That will lead to greater stability in East Timor.

The specific goal of the project is to establish more stable ferry transport service system connected to Dili through the rehabilitation project. And the direct arrival of cargo vessels at Oecusse Port will bolster the regional economy and stabilize prices of consumer goods.

2-1-2 Outline of the Project

The project is to repair the existing jetty which has been idle and to extend the jetty to be able to accommodate the ferry 'NAKROMA' and cargo vessels. Some cargo vessels may call at Oecusse Port on the way to or from Dili Port. The target cargo ships are relatively small class ocean-going ones and their sizes may be less than around 2,000DWT. The project consists of the following components.

①Repair and Extension of the Jetty

/The repair of the existing jetty and its extension (approximately 1,890 ㎡)

/The repair (140 ㎡)and the construction (140 ㎡) of the transitional part of the trestle

/The installation of 8 sets of rubber fenders (Low-reaction type 800H)

/The installation of 9 bollards (250kN type)

/The installation of 3 sets of navigation aid facilities

②Terminal Development

/The construction of port-related buildings (an administration office of 150 ㎡, a passenger terminal of 300 ㎡, a warehouse and generator room (450 ㎡)

/The pavement of the stacking yard and roads (approximately 10,200 ㎡)

/The repair of the revetment (130m)

/The construction of 15 sets of outdoor lightings

/The provision of a generator (75kVA)

The Government of East Timor should do the following work for the implementation of the project.

/The removal of the unwanted properties in the project site
/The repair of the part of the fences
/The change of the location of a ladder on the ferry 'NAKROMA'
/The preparation of the necessary budget for the operation and maintenance of the terminal

2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policy

(1) Basic Policy

The following is the basic policy to design the facilities as the Japanese Grant Aid Project.

① The rehabilitation of the jetty at Mahata

There are two different port facilities in Oecusse, a slipway at Oebau which is in use and a jetty at Mahata which is idle now. The slipway is located in the city center and very convenient for people to use the ferry. But the water depth in front of the slip way is rather shallow for the ferry to arrive safely by the cumulative results of the sand sedimentation. On the contrary, the jetty is located 3km from the city center. But the water depth is enough for the ferry arriving and the sand sedimentation is not considered to make the vessel anxious about arriving safely. Furthermore there is a sufficient land area for the terminal and a future extension is possible. There is no big problem to hamper the utilization as the port terminal. Accordingly, the selection of Mahata terminal as the project site of the Grant Aid Project makes good sense.

② A shared berthing facility

The request by the Government of East Timor is to rehabilitate the jetty to be able to accommodate the ferry and cargo vessels of 4,000DWT class. The number of ferry passengers has been increasing year by year and the frequency of the ferry service is expected to increase from two times a week to more in future. On the other hand, there is no cargo vessel service at Oecusse now but there is potential demand. At present there is no concrete plan to provide cargo vessel services at Oecusse. The berthing facility for a ferry should be provided exclusively because of its periodical use and passenger's use. A passenger berth should not be used by cargo vessels because expected cargo vessels are non-regular services and some of them transport dirty cargoes. But it is difficult at this time to estimate demand in order to provide a dedicated facility for cargo vessels. Therefore, the jetty should be developed as a shared facility but one which will primarily be used by the ferry. A cargo vessel can use the jetty during those times when the ferry is absent. The target size of the cargo vessel is less than the 2,000DWT class one which calls at Dili Port.

③ The future possibility of the further jetty extension for a dedicated cargo terminal

The number of ferry passengers will continue to increase due to economic growth, higher income levels and the increase in population in Oecusse and in East Timor. The ferry uses the berth from around 5 o'clock in the morning to around 6 o'clock in the evening 2 times a week now. If the frequency of the ferry service increases in future, the use of the jetty by cargo vessels will be severely restricted. Situations may arise where cargo handling works would have to be stopped before completion. A dedicated cargo berth should be constructed timely in future by watching the frequency of the ferry service and the number of cargo vessels calling at Oecusse. So it should be borne in mind during design that the jetty will be expanded in future for the construction of a dedicated cargo terminal.

④ Efficient use of the existing jetty

More than 18 years have passed since the existing jetty was constructed. Available structural components should be reused effectively to the extent possible. Necessary measures should be taken to be able to keep the same lifetime as the new facility.

⑤ Facility disposition corresponding to local natural conditions

The water depth in front of the jetty inclines severely and the eastern area adjacent to the jetty is much deeper than the western area. The target cargo vessels have shallower draft compared with the water depth around the jetty. So the jetty should be extended to the western area for ensuring the necessary depth for vessel's berthing in order to reduce the construction cost.

⑥ Effective separation of traffic flows

The ferry currently berths by touching the head ramp to the slipway and passengers and cars get on and off board through the ramp. That causes some problems regarding safety and time efficiency because passengers and vehicles use the same path. After the completion of the new jetty, passengers shall board on and off through a ladder equipped on the ferry and vehicles through the ramp. The passenger traffic can be separated from the vehicle traffic. That will dramatically improve safety and the efficiency during boarding and deboarding. To ensure that the traffic separation is effective, the ladder should be equipped on the left side of the ferry and an additional trestle should be constructed. Furthermore the yards are also separated into passenger, cargo and public parking areas. That will help to control the traffic flow of ferry passengers, guests, ferry-using vehicles and bus and trucks for pick-up respectively.

⑦ To leave the future expansion area for the terminal in the project

There is a vast available area at Mahata compared with the project scale. The project doesn't need to use the whole area. The area should be zoned into the development area and the future extension area clearly.

⑧ Application of Japanese technical standards

The following standards are applied for the facility design.

/Technical Standards and Commentaries for Port and Harbor Facilities in Japan, May 1999, Japan Port and Harbor Association

/Standard Design Criteria for Ports in Indonesia, 1984, Directorate General of Sea Communication in Indonesia Government

/Building Standards Act, the Building Codes and the Bylaws

/JIS (Japanese Industrial Standards) and other standards related

(2) Policy on Coping with Natural Conditions

The geographic feature of Oecusse port is that there is no artificial or natural breakwater such as coral reefs, and the construction work of port facilities is likely to be influenced by wave conditions. It will be important in order to secure safe construction work to foresee marine conditions sufficiently in advance.

As to weather it is clearly divided into 2 seasons: the dry season and rainy season, and more than 80% (about 900mm) of the annual rainfall occurs during the 4 months between Dec. to March.

Occurrence frequency of large wave is also high during these 4 months. Therefore it will be necessary to avoid construction work using work barges during this period taking evacuation matters into consideration.

Along the seashore of the project site littoral drift from west to east is predominant. It can be considered that the influence of littoral drift will be small since the front sea area of the planned

jetty is very deep. However as to the beach area behind the jetty there is some possibility of change in sand movement as a result of revetment construction. Therefore, during construction work it will be necessary to monitor the change of beach line so that the future impact on the usage of port and stability of port structure can be predicted.

(3) Policy on Socio-economic Conditions

Since Oecusse is isolated from the main land of Timor-Leste and surrounded by Indonesia, there are time and cost constraints for procurement of food and fuel, and water and electricity supplies are limited. Therefore due consideration should be paid so that there will be no significant impact on prices such as daily commodities and fuel and on supply of water and electricity to local inhabitants. Therefore systematic procurement of foods, commodities and fuel, saving public water by utilizing groundwater, and saving public electricity by using generators should be considered specifically during construction periods.

Since accommodations for project workers are considered limited, deliberated plan should be made in advance to secure sufficient accommodation including discussion with local relevant parties. It is anticipated that there will be some friction between local people and project workers brought from outside Oecusse. To avoid such unnecessary friction it is recommended that meetings between local parties and construction party be held periodically to exchange information and discuss preventive measures against potential problems.

Project site is located beside a quiet residential area, and noise and vibration caused by construction work may directly affect residents. It will be difficult to completely eliminate the effect of such noise and vibration. However construction methods to minimize those nuisances are to be adopted.

(4) Policy on Procurement of Materials, Machines and Equipment

Most construction materials are presently imported from foreign countries except sand and stones. At present most materials are imported from neighboring Indonesia. Therefore procurement of materials for this project will be also made from Indonesia, especially Surabaya. Construction equipment, especially floating working equipment, is basically unavailable in Timor-Leste since port and/or marine construction work have rarely been carried out here. Most of the construction equipments in Timor-Leste are brought from Indonesia and they are generally used ones made in Japan. Therefore on-land multipurpose equipment such as truck-crane and backhoe will be planned to be imported as used equipment from Japan taking import tax into account. Working vessel such as pile driving barges are planned to be mobilized from Indonesia.

(5) Policy on Utilizing Local Companies

Presently relatively large-scale civil and architectural works are being constructed by foreign-affiliated companies from Portugal, Australia and Indonesia but not by pure Timor-Leste companies. Pure Timor-Leste companies are considered not to have sufficient experience, necessary equipment, and competent human resources. Therefore it will be difficult to utilize local contractors as subcontractors for major works and their role will be limited to minor works or local manpower supply.

(6) Policy on Operation, Management and Maintenance

APORTIL, the implementing agency, is already familiar with the ferry operation and is used to managing the cargo vessel operation. It is believed that the new terminal at Oecusse can be managed and operated without any major problems. To facilitate effective management and operation of the new terminal at the initial stage, the soft component will support their activity. As to facility maintenance, APORTIL has much experience at Dili Port and the technical assistance has been conducted through the technical cooperation Project by JICA. Accordingly, the maintenance work can be done effectively.
The maintenance cost has been covered with the annual routine maintenance budget so far and this will not change after the completion of the project. But large scale repair costs should be supported financially by the central government

(7) Policy on Quality Grade of Facilities

As to the quality grade of facilities, facilities should be designed on the basis of the design lifetime which is adopted in various Japanese technical standards. The structural type and materials should be selected in consideration of not only the initial costs, but also total costs including maintenance costs.

(8) Policy on Construction Method and Schedule

Since the project site faces the open sea and is not shielded by natural or manmade breakwater, it is necessary to choose the construction method and schedule not affected by marine weather conditions. And since the site is isolated from the mainland and similar to an isolated island, it will be necessary to select construction methods which minimize kinds of equipment and materials and execute the work with minimum essentials. Upon procurement of equipment and material it will be important to select the most reasonable procurement source, loading port, customs clearance place taking transportation cost, time, and custom clearance procedure into account.
As to time for completion, taking the site's enclave and constraints of water, electricity and accommodation into consideration, it will be necessary to have extra time for material and equipment transportation and to allow a longer time for completion than in usual projects. However the project is planned to be completed within 2 years at maximum due to the great urgency of the project.

2-2-2 Basic Plan (Construction Plan)

2-2-2-1 Design of Jetty and Trestle

(1) Vessel Size for Planning

The ship for planning is basically the ferry 'NAKROMA' which is operated at present. There is no actual record on cargo vessel service at Oecusse Port. Cargo vessels shall be assumed to arrive at the new jetty temporarily when the ferry isn't using the jetty. The future traffic demand of the ferry shall be estimated and the potential cargo demand by cargo vessels shall be also predicted. Those traffic demands shall be checked for the shared use among those vessels.

(Estimation of the future ferry traffic)

The number of ferry passengers between Dili and Oecusse has been increasing year by year. The traffic demand is expected to continue increasing in future according to the increases income levels, the number of the person trips and the population in Oecusse. The population in Oecusse and the GDP per capita is estimated in 2020, 2025 by time series prediction method. And the number of person trips by the ferry is estimated in 2020, 2025 on the basis of the time series prediction and correlation with GDP. The result of the estimation of the person trips is 0.516~0.528 in 2020 and 0.611~0.637 in 2025.

The future ferry traffic is calculated by multiplying the future number of person trips by the future population in Oecusse. The estimated traffic demand is about 52,000 persons in 2020 and about 70,000 persons in 2025.

The service frequency of NAKROMA may increase from 2 times a week to 4 times a week or more. That means an additional ferry should be provided in future.

Table 2-2-1 Actual Trend and Future Estimation of Ferry Passenger (Dili→Oecusse)

Year	GDP per Capita(US$)	Population in Oecusse (A) (persons)	Number of person trip (B)	Number of Passengers (A x B) (persons)
2004	340	57,469	0.213	12,252
2005	334			15,365
2006	315			14,651
2007	357	66,569	0.260	17,289
2008	373	67,636	0.294	19,859
2020(estimation)	468.4	100,179	*0.52*	*52,000*
2025(estimation)	512.9	113,455	*0.62*	*70,000*

Note: The estimation is based on time series prediction method.

(Reference) The future prediction of the number of person trips

Year	Time series prediction	Estimation by correlation with GDP	Average
2020	0.516	0.528	0.522
2025	0.611	0.637	0.624
Correlation Coefficient	0.982	0.997	

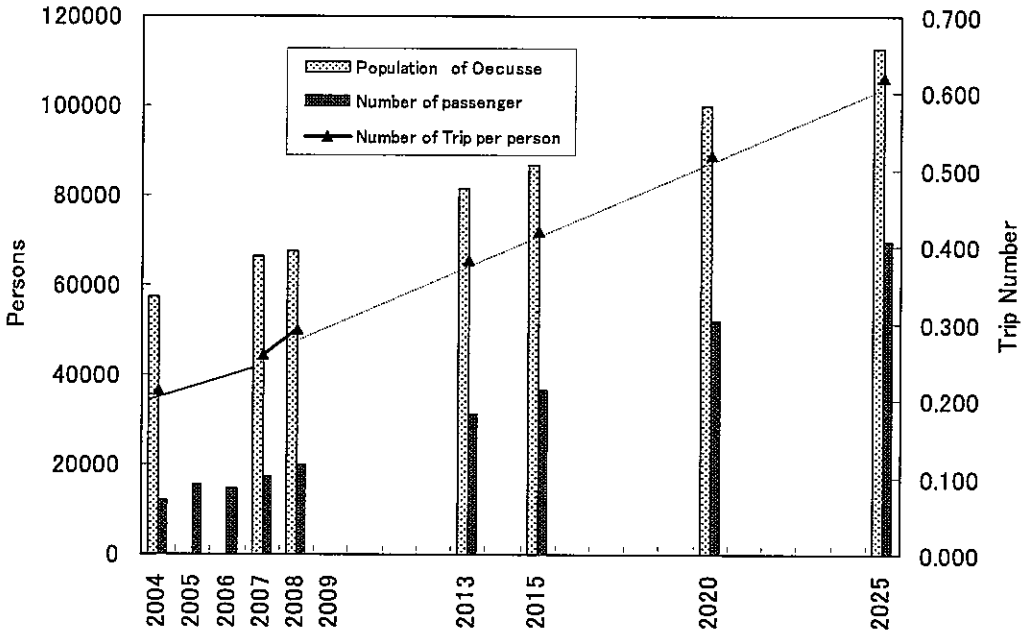


Figure 2-2-1 Actual Trend and Future Estimation of Ferry Passenger (Dili→Oecusse)

(Estimation of the potential cargo by cargo vessels at Oecusse Port)

The kinds of cargoes handled at Dili Port are container, rice, sugar, cement and other import commodities. The cargoes carried into Oecusse by the ferry are almost the same as those cargoes. The actual volume carried into and out of Oecusse in 2009 is 1,647.5 tons and 225 tons respectively. The demand for consumer goods can be estimated by multiplying the population by average personal consumption amount. Consuming habits are different by regions, but those differences are not so prominent.

The import volume from Indonesia by road is considered to be about 4% of the total import volume. Assuming that a quarter of those import volumes will be carried into Oecusse, the potential cargo handling volume in 2008 is estimated as follows.

① Potential cargo demand in Oecusse:

Handling cargo volume at Dili Port	x	Population share of Oecusse	
317,607t	x	0.0626	= 19,882t

② Cargo volume imported from Indonesia by road

Handling cargo volume at Dili Port 317,607t x 1% = 3,176t

③ Potential handling cargo volume at Oecusse Port

①19,882t−②3,176t = 16,700t

Based on the hearing to WFP (World Food Plan), rice, sugar, salt, cooking oil, flour and others are stocked in the warehouse at Oebau and their monthly turnover is said to be about 350 tons. Furthermore a hospital which is idle is used as a storage house and other government warehouses are used for the storage of those foodstuffs. All of them are stored only for Oecusse people. The annual turnover of the storage is expected to be more than 4,200ton (=350ton x 12 months). The ferry is the main transportation means from Dili while trucks are used when transporting dangerous cargoes and at times when the ferry doesn't have any remaining space to load those cargoes.

According to a Chinese manager working for an import dealer in Oecusse, there is a large demand for construction materials in Oecusse and the influx of cement is expected to be 3~400tons monthly. Considering that cement comes not only from Dili, but also Indonesia, the total influx volume of construction materials is estimated to be 5,000tons a year.

Based on the hearings from WFP and the import dealer the influx cargo volume may amount to more than 10,000 tons. If the cargoes carried by other import dealers in Oecusse are included, the annual influx cargo volume may reach around 12,000 tons. That means the potential handling cargo volume estimated here is recognized as appropriate.

As mentioned above, potential cargo demand can be estimated to some extent at Oecusse Port. There are a few ship agents who intend to have cargo ships call at Oecusse Port after the new jetty opens. Considering that there are no facilities for cargo vessels at present, the new facility should be arranged as a shared facility for the ferry and cargo vessels. A dedicated cargo berth should be planned when the ferry service frequency increases and the number of cargo ship is expected to sharply increase.

(Cargo Ship Size)

The potential cargo volume at Oecusse Port may be limited within a certain volume for the time being. It is not expected that cargo vessels will call at Oecusse Port only without a stopover at Dili Port for some time. That means Oecusse Port will be a secondary port for a certain period. Some cargo vessels may call at Oecusse to handle some cargoes on the way to and from Dili Port.

General cargo vessels capable of carrying containers, bulk carriers which carry rice, cement and others are considered as cargo vessels for the planning. The vessel size of container-carrying vessel calling at Dili Port now is 2,000~4,500GT, 81~101m long. The vessel size has been increasing year by year. As for bulk carriers, the vessel size has wider range than that of general cargo vessels. The ship size of general cargo vessels is 1,000~5,500GT and 64~106m.

If all of the ships calling at Dili Port are considered as the target vessel, the desired ship size of Oecusse Port would be 4~5,000GT and the maximum full draft would be 6.5m. But water depth of the existing jetty is limited and the berth is shared by cargo vessels and the ferry. Therefore the ship to be planned should be smaller than the maximum ship calling at Dili Port. The maximum ship size shall be planned to be a tramper ship of 1,000GT (≒2,000DWT) . They are around 70m long, 2,000DWT class and their draft are around 5.0m (See Table 2-2-2). .

Table 2-2-2 Main Vessels Calling at Dili Port

Carried Cargo	Name of Ship	GRT (t)	DWT (t)	LOA (m)	Breadth (m)	Draft (m)	Note
Container	Meratus Prgs 1	4,450	5,539	100.6	18.8	6.7	518 TEU
	Kathryn Bay	3,850	4,766	100.6	16.5	5.9	387 TEU
	Territory Trader	2,826	3,194	91.0	14.7	5.0	256 TEU
Rice	Vinashin Ruby	5,688	6,844	99.9	18.0	7.5	Tramper carriers are multi-purpose vessels, not special-purpose ones.
	Ocean Bright	4,271	7,127	106.0	16.8	6.9	
	Van Don Star	2,920	5,116	96.1	16.2	6.0	
	Lampunchai	1,381	2,099	69.4	11.4	5.2	
	Tai Chinh II	998	1,620	71.8	10.0	4.8	
Cement	VinanshinShip 04	4,039	6,286	102.8	17.0	6.9	
	Vinashinship 01	2494	4,045	89.7	14.4	6.0	
	Melina	1314	1,295	73.8	11.9	3.7	
Sugar	Quang Minh	998	2,115	67.7	11.5	5.3	

Note: Hatched ships can be accommodated safely by the new jetty. However, there are some draft restrictions.

(Dimensions of Planned Calling Vessels)

Based on the above-mentioned analysis, the dimensions of the calling vessel shall be as follows. The dimensions of cargo vessels are set in consideration of actual vessels calling at Dili Port.

Table 2-2-3 Dimensions of Planned Vessels Calling at Oecusse Port

Type of Vessel	LOA (m)	Breadth (m)	Draft (m)	DWT(ton)	GT (ton)
Ferry (NAKROMA)	47	12	2.5	260	1,134
Cargo Vessel	70	12	4.8	2,000	About 1,000

(2) Ferry Landing Method

The landing method of the ferry 'NAKROMA' is now bow landing type. The ladder which is equipped on the right side of the ferry is not used at all so far. If the landing method is changed to side landing for passengers, vehicles shall land and board the ferry through the ramp and passengers through the ladder. Passenger traffic shall be separated from vehicle traffic. That may shorten the landing and boarding time and improve traffic safety. The ferry shall berth at the jetty during its waiting time. But considering that the jetty faces the open sea without any breakwater or a natural barrier against wave, wind and wave conditions should be observed at all times when the ferry is berthing at the jetty. And if the wave conditions are severe and the hull or the fenders could be damaged, the ferry should be instructed to evacuate from the jetty for ensuring its safety.

(3) Layout Plan of the Jetty

The layout plan of the jetty is determined in consideration of the result of the bathymetric survey, the direction of its extension, the location of the slipway for the ferry, an additional space for the future extension of the terminal and the construction cost.

The Jetty is considered to accommodate the ferry 'NAKROMA' and cargo vessels of 2,000DWT class. Bow berthing which is the currently adopted berthing method and the shipside berthing method which the captain and crews of the ferry would like to see adopted were examined carefully. The berth length needs to be 50~60m for the ferry and more than 80m for cargo vessels. The berth depth needs to be about 5m for cargo vessels. Several alternative layout plans are proposed and evaluated from the above-mentioned point of view. The layout plan was determined based on those necessary conditions for the berth. The comparison of the alternatives is shown in Table 2-2-4.

Alternative 1: Eastern extension plan

/Since a new trestle shall be set on the eastern end of the terminal, trucks can pass through the jetty by using the old and the new trestles. That shall improve the safety of the traffic and the efficiency of cargo handling work.

/Since a slipway shall be constructed at -15m deep sea area, it is assumed that the length of steel piles is rather long and their diameter is rather big. That means the construction cost shall be relatively expensive.

/The jetty can be extended to the western direction in future, but the sea depth in that area is inadequate. Dredging may be necessary to accommodate large cargo vessels.

Alternative 2: Western extension plan

/Similar to alternative 1, a new trestle shall be set on the western end of the terminal and trucks can pass through the jetty by using the old and the new trestles. That shall improve the safety of the traffic and the efficiency of cargo handling work.

/Since a slipway shall be constructed at -10m deep sea area, its construction cost shall be smaller than alternative 1.

/The jetty can be extended to the eastern direction and accommodate larger cargo vessels compared to vessels planned in this project

Alternative 3: Separation plan of a ferry berth and a dedicated cargo berth

/In order to reduce the construction cost, the ferry berth shall be constructed at relatively shallow sea area. Its berth length shall be almost the same as the ferry length and a stern line shall be moored to a bollard on the cargo berth.

/In order to reduce the construction cost, the length of the berth shall not be enough for cargo vessels.

/The ferry berth can be separated from the cargo berth, but it may be difficult to use both berths simultaneously because of the short length of both berths.

/It may take a relatively longer time to construct the jetty compared to other alternatives.

Alternative 4: Bow-berthing plan

/Since a slipway for the ferry shall not be jutted out from a jetty line, ship maneuverability is considered to be good.

/Since the length of the cargo berth can be confirmed to be 100m in a straight line, large cargo vessels can be accommodated by extending the jetty to the offshore direction in future.

/The captain and crews of the ferry do not favor this plan and the mooring condition of the ferry is not stable compared to other alternatives.

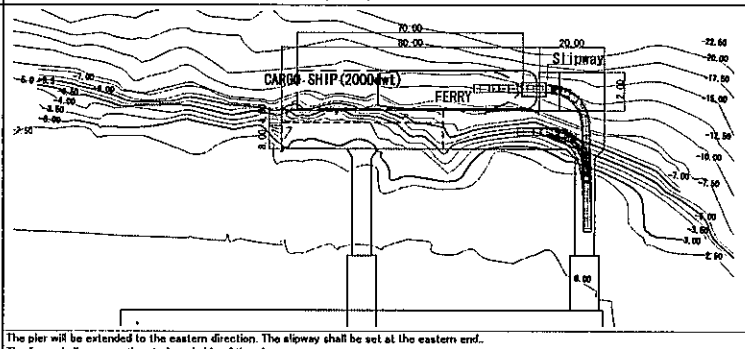
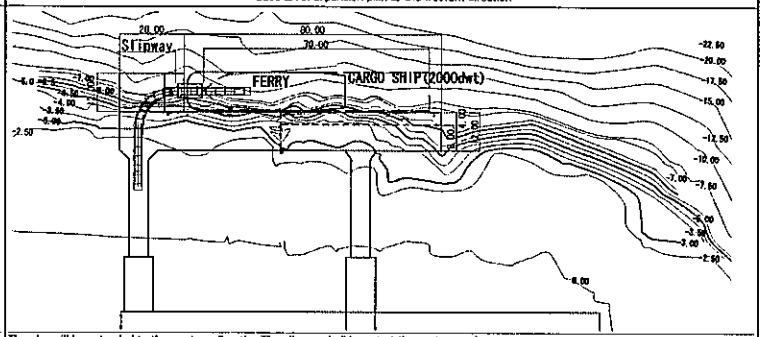
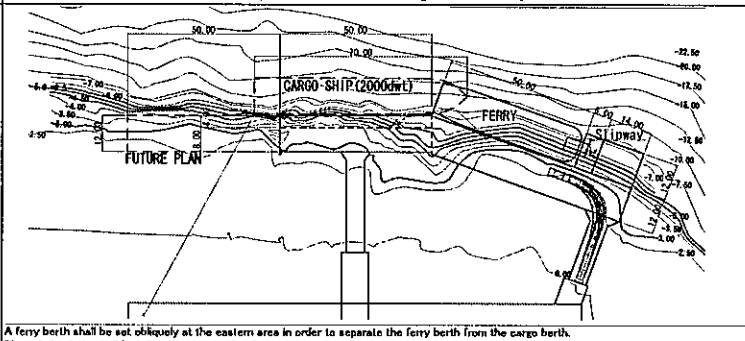
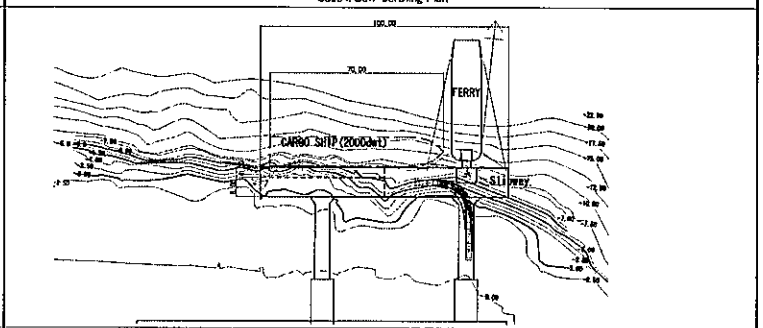
/Since passenger traffic can not be separated from vehicle traffic, additional time may be required for passengers and vehicles at landing and boarding time.

According to the result of the bathymetric survey, the existing jetty is located on a shallow sea bed shelf which is inclined gently from the shore. The inclination is rather steep and deep from the front area of the jetty. The western sea area adjacent to the jetty is shallow and the eastern sea area forms deep and steep configuration of the sea bed. To extend to the western direction is better than that to the eastern direction in order to reduce the construction cost. Since the ferry doesn't need a deep-water berth, the slipway should be constructed at the western area. Considering that larger vessels will call at the jetty in future, a plan which has room for the future development to the western direction is desirable.

Considering the use of the ferry only, 8m is sufficient for the width of the jetty. It is the same as the width of the existing jetty. If the jetty accepts cargo vessels, the jetty should be 12m wide. In all alternatives, cargo vessels of 2,000DWT class can be accepted by the jetty by means of widening the jetty by 4m to the offshore direction. But there is certain limitation of water depth during low tide. The tidal level will have to be considered when using the jetty.

Based on the above-mentioned evaluations, alternative 2, western extension plan, was selected as the project plan as it gives priority to the development of the ferry terminal, has a good layout plan in terms of cost, ensures the safety of passengers and vehicles and cargo handling efficiency etc.

Table 2-2-4 Alternatives of Jetty Layout Plan

Alternative	Case 1: An expansion plan to the eastern direction	Case 2: An expansion plan to the western direction
Image Layout		
Outline	The pier will be extended to the eastern direction. The slipway shall be set at the eastern end.. The ferry shall moor on the starboard side of the pier. The length of the pier for ferry's mooring is 80m. The berth depth is −4.5~−7.0m.	The pier will be extended to the western direction.The slipway shall be set at the eastern end. The ferry shall moor on the starboard side of the pier. The length of the pier for ferry's mooring is 80m. The berth depth is −4.5~−7.0m.
Advantage	Since vessels moor along the pier, there is less rolling and pitching during landing time compared to Case 4. The ladder on the ferry can be utilized for passengers' landing and boarding.	Since vessels moor along the pier, there are less rolling and pitching during landing time compared to Case 4. In case of the extension of the pier to the eastern direction in future, larger cargo vessels will be able to moor the pier without dredging.
Disadvantage	In case of the extension of the pier to the western direction in future, the extension area should be dredged so as to accommodate cargo vessels. Since the wave direction crosses the direction of the ferry ramp at a right angle, there is a fear that the ramp may flutter during high waves. Vessels should not moor at the pier during high waves because the fender of the ferry could damage the rubber fenders.	It is necessary to relocate the ferry ladder from the right side to the left side. The same problems as in Case 1 will happen during high waves.
Construction	The water depth of the slipway for the ferry is −15m. The construction cost is rather high.	Since there is no pile driving work at deep sea area, the construction cost is less expensive than that of Case 1.
Development Scale	Total area including a new pier and a new trestle: 1403m2	Total area including a new pier and a new trestle: 1403m2
Evaluation	△	◎
Alternative	Case3: Separation Plan of a dedicated cargo berth from a ferry berth	Case4: Bow-berthing Plan
Image Layout		
Outline	A ferry berth shall be set obliquely at the eastern area in order to separate the ferry berth from the cargo berth. The existing jetty shall be utilized as a cargo berth. The length of the ferry berth will be equal to the length of the ferry. The stern line is moored to the bollard in the cargo berth. Both the length of the ferry berth and the cargo berth are 50m. The berth depth of the cargo berth is −4.5m~−7.0m and that of the ferry berth is −5.0m.	The pier will be extended in a straight line. The slipway for the ferry will be provided in the pier. The length of the pier for cargo vessels is 100m. The berth depth is −4.5m~−7.0m.
Advantage	The berth can be operated effectively because that the ferry berth is separated from the cargo berth. Since vessels moor along the pier, there are less rolling and pitching during landing time compared to Case 4. The lader on the ferry can be utilized for passengers' landing and boarding.	The berth length is sufficient for accommodating cargo vessels. Since the wave direction is parallel to the direction of the ferry ramp, there is less fluttering than other alternatives. Since the ferry doesn't moor along the pier, the damage to the rubber fenders caused by the fender of the ferry is the least among all alternatives.
Disadvantage	The length of the cargo berth is insufficient for accommodating cargo vessels. It is necessary to extend the berth more in order that cargo vessels can moor at the berth in safety. If so, the extension area should be dredged so to secure the depth sufficient for accommodating cargo vessels. The same problems as Case 1 will happen during high waves.	Since the ferry moors at the bow of the pier, the same as the current mooring method, it takes certain time for passengers and cars to land and board on the ferry. The mooring condition is not stable compared to other alternatives. It is rather difficult for cargo vessels to handle cargo in and around the slipway.
Construction	Since there is no pile driving work at deep sea area, the construction cost is not high, but nor is it so economical because of the total development length.	Since there is no pile driving work at deep sea area, the construction cost is the most economical among all alternatives.
Development Scale	Total area including a new pier and a new trestle: 1470m2	Total area including a new pier and a new trestle: 1163m2
Evaluation	△	○

(4) Crown Height of the Jetty

The current crown height of the existing jetty is +3.50m. The crown height of the jetty is stipulated in general as H.W.L.+1.0~2.0m in case of large-scale berth in which berth depth is more than 4.5m in Japanese Technical Standards of Port Facility. H.W.L. is +2.60m in Oeccusse. The normal crown height of the berth is considered to be 2.6m+1.0~2.0m = +3.60~4.60m.

The crown height should be set as high as possible in order that waves don't overtop the jetty at H.W.L. However, the gap between the jetty and the deck of the ferry should not be so large that vehicles are unable to drive through the ramp at L.W.L. Considering the effect of wave force against the floor of the jetty (uplift), smooth connecting with the existing revetment (+3.5m) and smooth driving of vehicles at landing and boarding time, and the possibility of the deterioration of the concrete floor of the jetty by wave force, the crown height was decided as +3.8m, 30cm higher than the existing jetty.

(5) Width of the Jetty

In general, the width of a jetty is stipulated on the basis of the berth depth. The berth depth is stipulated as 15m in case of the berth depth of 4.5m~7.5m and 10m in case of the berth depth of less than 4.5m in the Japanese Technical Standards.

The jetty shall accommodate cargo vessels of 2,000DWT as maximum. The full draft of the vessel is 5.0m. And the berth depth is 5.0m. The width of the jetty should be 15m. But a width of 12m is enough for a trailer to travel and for cargoes to be handled by a ship crane at the crossing on the jetty. So the width of the jetty is decided to be 12 m from economical point of view. And curbs shall be set on both edges of the jetty.

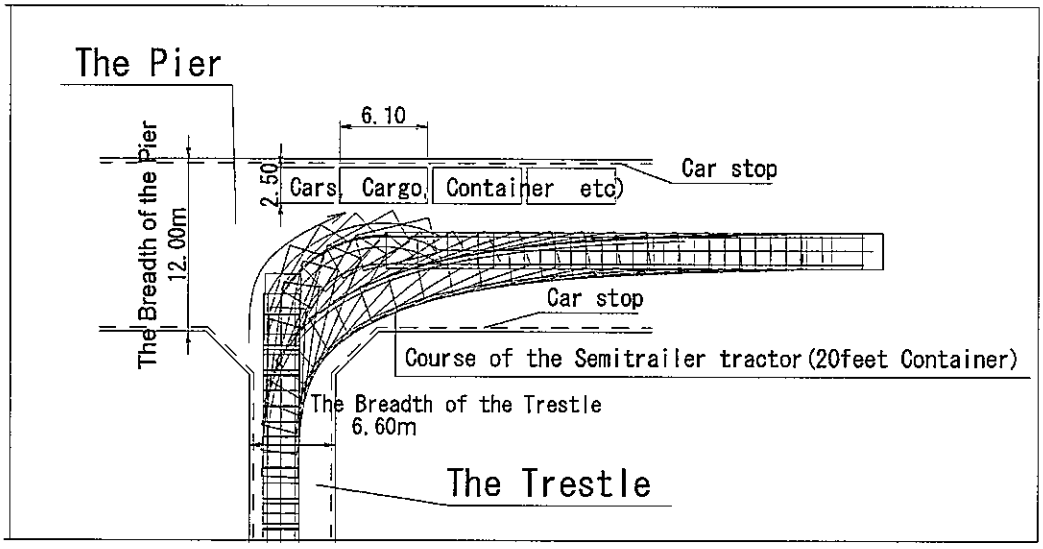


Figure 2-2-2 Track Image of Semi-trailer on the Jetty

(6) Structural Type of the Jetty

Considering the result of the site survey of the degraded existing jetty and the jetty utilization plan, the basic policy of the jetty renovation is as follows.

①The width of the jetty shall be 12m by widening the existing jetty by 4m.
②The existing steel piles shall be reutilized.
③The coping concrete of the existing jetty (concrete floor, concrete beam) shall be removed.

According to the basic policy of the jetty renovation, several structural designs were proposed and evaluated. The result of the evaluation is shown in Table 2-2-5. Jetty type structure, the same as the existing facility, is the best option from workable, structural and maintainable points of view.

(7) Slipway of the Ferry

a) Structural type

Three structural types were considered as the slipway for vehicles, a fixed type, a movable type and a gangway type. The evaluation result is shown in Table 2-2-6. A fixed type was selected because it's more economical. The maintenance cost is lower than other alternatives.

b) Incline of the slipway

The incline of the slipway will have a transitional slope to ensure smooth driving between the ferry and the jetty even if the tidal level changes. The height of the slipway should be as high as possible in order to reduce the effect by wave force at H.W.L. But if the slipway is high, it would be difficult to drive vehicles smoothly between the ferry and the slipway. Taking both factors into account, the gradient of the slipway is determined to be 1:2 at the tip and 1:6 at the transitional part.

The incline between the slipway and the ramp of the ferry may be the steepest at L.W.L. and full load of the ferry and the most severe V-type slope at H.W.L. and light load. At L.W.L. the ramp should be put down on the slope with a gradient of 1:2. The gradient of the ramp may be 1:3. It is steeper than the gradient of 1:6 which is stipulated as the maximum limitation of slope of parking area. But L.W.L. time is not so long and steep slope is 7m long only on the ramp. It is considered that the steep slope will not be difficult to negotiate. And there is 1m room below L.W.L. until the gradient of the ramp becomes the same 1:2 as the tip slope of the slipway.

At H.W.L. the ramp shall be set on the flat floor of the jetty by the ferry closing to the jetty more as shown in Figure 2-2-3. The slope forms opposite figure, but the gradient is not any more severe than that at L.W.L.

Table 2-2-5 Alternatives of Structural Design of Pier Repair

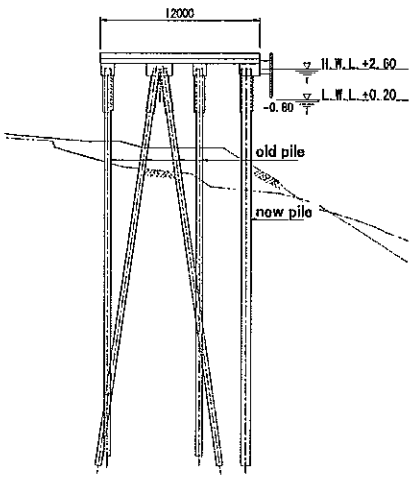
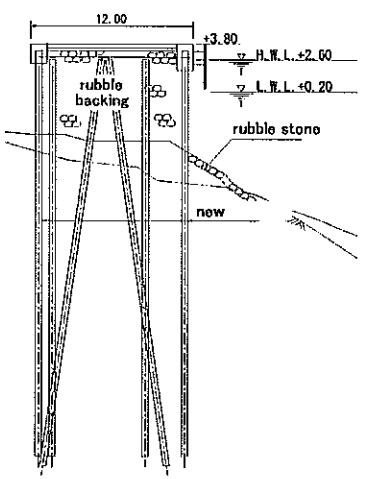
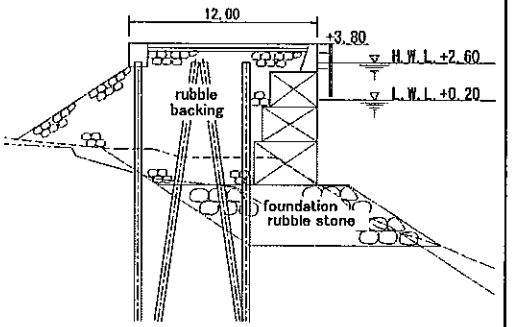
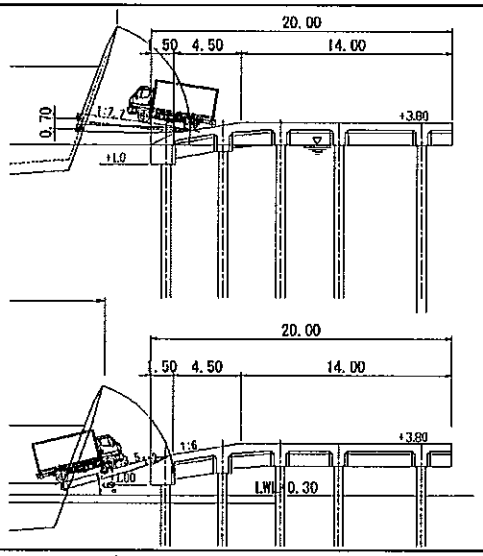
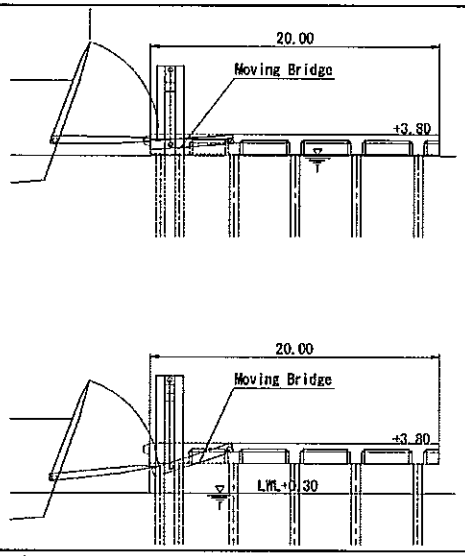
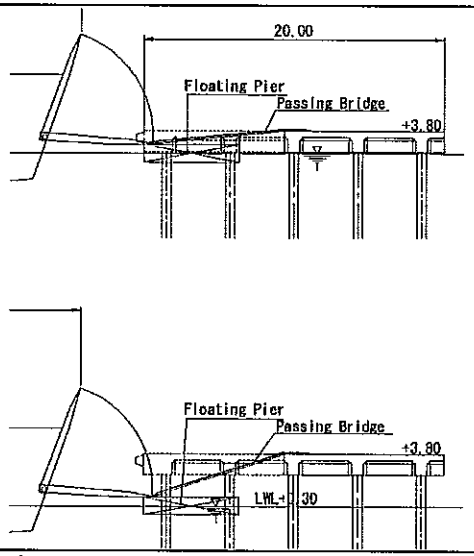
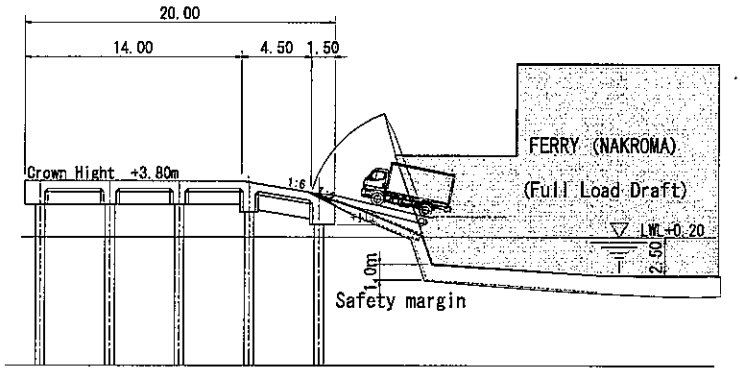
Alternative	Case1: Piled Pier Type	Case2: Double Sheet Pile Quaywalls Type	Case3: Gravity-type Quaywalls Type
Standard Cross Section			
Outline	Foundation piles are driven in the seabed in front of the existing piles and the pier is formed with the existing piles altogether.	Sheet piles are erected at the front and back sides of the existing pier and the space between the both piles are reclaimed by sands.	Gravity structure like concrete block type is put in front of the existing pier and the back side of the structure is filled with stones.
Economical Standpoint	Better from an economical standpoint because of reutilization of the existing piles	Not economical because existing piles cannot be reutilized.	Not economical because existing piles cannot be reutilized.
Construction Standpoint	Necessary to find the method to reduce on-site work like the introduction of precast method because of high wave	Necessary to shorten the work from the erection of double sheet pile to back filling because of high wave. It may be rather hard work.	It may take longer time to construct the structure because the construction of a rubble mound and dredging needs to be carried out first.
Structural Standpoint	Uplift by wave should be considered. The volume of sand sedimentation is not severe.	×The volume of sand sedimentation is expected to be rather large and there is some fear of scouring problems at the bottom edge of the structure because of high wave and rapid tidal flow. Necessary to provide scouring protection, but the cost may be rather high because of the steep seabed in front of the pier.	×Structural design, especially rubble mound, may become large because of the steep seabed The volume of sand sedimentation is expected to be rather large and there is some fear of scouring problems at the bottom edge of the structure because of high wave and rapid tidal flow.
Maintenance Standpoint	○Easy maintenance work by corrosion protection such as cathodic protection, coating, petrolatum covering. ○No need for maintenance dredging	○Easy maintenance work by corrosion protection such as cathodic protection, coating, petrolatum covering. △Need for maintenance dredging	○Easy maintenance work by corrosion protection such as cathodic protection, coating, petrolatum covering. △Need for maintenance dredging
Overall Evaluation	◎	△	△

Table 2-2-6 Alternatives of Structural Design of the Slipway

Alternative	Case1: Slipway Type	Case2: Movable Bridge Type	Case3 : Floating Pier Type
Structural Image			
Outline	The same as the current boarding and landing way at Dili Port. There are some examples for small size ferries in Japan (Tomarine terminal in Naha Port etc.)	Popular type for ferry in Japan. Movable bridge is operated manually, not by electricity in order to reduce operation and maintenance cost.	Popular type for a small size ferry in a very calm sea.
Advantage	Small maintenance cost	Easy for vehicles to land and board on a ferry.	Easy for vehicles to land and board on a ferry.
Disadvantage	The incline of the ferry ramp is rather steep at L.W.L..	Necessary to provide a operator for the movable bridge at berthing.	Necessary to provide a steel gang way connecting the floating pier to the fixed pier. The area taken up by facilities is bigger than others. The incline of the gang way is steeper than others at L.W.L..
Construction	Necessary to wait for the right tide for the construction of the slip way.	Rather easy to construct the facility because there is no work in water for arrangement of reinforcement and concrete placing.	Floating pier is produced at a factory. The period of construction work on site is rather short.
Maintenance	A few maintenance works are necessary.	Necessary to maintain mecanical parts of the movable bridge periodically.	Necessary to maintain and repaint the floating pier and the gang way.
Cost	Cheapest	Expensive because it is necessary to construct a movable bridge and foundation posts for the movable	Expensive because it is necessary to make a floating pier and a gang way.
Evaluation	○	△	×

(L.W.L. & Full Load)



(H.W.L. & Light Load)

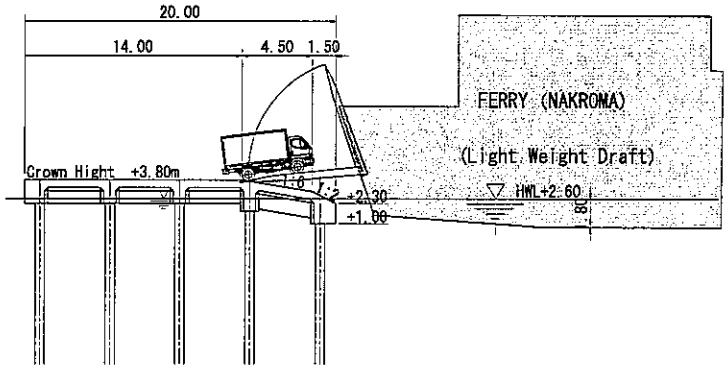


Figure 2-2-3 Vehicle Running Condition on the Slipway

(8) Trestle

A new trestle shall be constructed at the western edge of the jetty parallel to the existing trestle, connecting to the slipway in order to drive to and out of the ferry smoothly. The existing trestle shall be repaired and in case of being used by cargo vessels, vehicle traffic shall be one way by using both trestles. The width of the trestle shall be the same 6m as the existing trestle. Since curbs shall be set on both edges of the trestle, the actual width will be 6.6m.

(9) Fender

Fender is designed on the basis of berthing speed graph in 'Guidelines for the Design of Fenders Systems: 2002'.

/Ferry (NAKROMA: 287.09DWT)

Berthing Velocity:	0.35 m/sec
Berthing Angle	10 degree
Berthing Energy	77.3 kN/m
Reaction Force of Fender	279 kN (Low-reaction type 800H attached defensive board)

/Cargo Vessels (2,000DWT)

Berthing Velocity	0.30 m/sec
Berthing Angle	10 degree

Berthing Energy	133.1 kN/m
Reaction Force of Fender	418 kN (Low-reaction type 800H attached defensive board)

The size of defensive board is determined in consideration of the crown height of the jetty (LWL+3.8m), tidal differences (2.4m) and vessel's drift (full load and empty load). The length of the defensive board is 3.4m. The image of fender is showed on Figure 2-2-4.

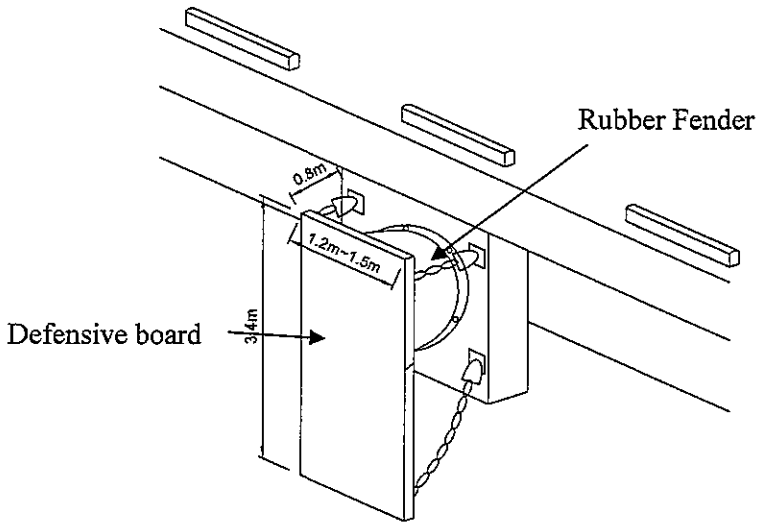


Figure2-2-4 Image of fender

(10) Bollards

The disposition of fenders and a bit is decided on the basis of gross tonnage of the planned maximum vessel

/Ferry: 260DWT(1,134GT)	Regression Equation	GT=2.146DWT＝520GT
/Cargo vessel: 2,000DWT		GT=0.529DWT＝1,058GT

Based on the gross tonnage, the size of bollard is 250kN type and tractive force by ships is 250kN per unit.

The size of bollard is 350kN type and tractive force by ships is 350kN per unit.

(11) Others

(Live load)

Maximum live load is considered to be the following vehicles when a cargo vessel calls at Oecusse Port.

Table 2-2-7 Design live load (Truck load)

Type of Truck	Width (m)	Length (m)	Weight (kN)
Truck (T-25)	2.750	7.000	80.000
Tractor trailer (for 40ft container)	3.000	14.800	80.000

(Uplift)

Since the jetty faces the open sea, it is necessary to check the safety of concrete floor of the jetty against the uplift by waves. The jetty has a transmitted structure against incident waves. So the force by uplift is considered to be reduced from the result of the general formula.

The uplift is calculated by using the maximum design wave height of 2.5m (significant wave height $H_{1/3}$) which attacks the jetty. (L.W.L., NW)

P = 2 * unit weight of sea water*gravitational acceleration*incidental wave height

$= 2 \times 1.03 \times 9.81 \times 2.50 = 50.52$kN

(12) The result of the structural analysis

Based on the before-mentioned considerations, the design conditions on the pier are as follows.

(Specifications of jetties and trestles)

Jetty: Length100m, Width12m, Crown Height; LWL+3.8m

Slipway: Length of horizontal area14m, Length of slipway6m (incline 1/6 and 1/2), Width12m

Trestle: Length33.2m and 33.4m, width6.6m

(Utilization conditions)

Planned vessel: Ferry 'NAKROMA' (260DWT)

Cargo vessels of 2,000DWT class

Fender reaction force: Perpendicular direction to the face line; 418kN/unit

(Berthing speed 0.1m/sec)

Tractive force: Perpendicular direction to the face line; 250kN/unit

Surcharge: Normal condition: 20kN/m^2. During earthquake; 10kN/m^2

Live Load: Truck (T-25), Tractor trailer (for 40ft container)

(Natural conditions)

Design tidal level: HWL+2.6m, LWL+0.2m

Design Wave: Design wave of jetty is shown in Table 2-2-8.

Table 2-2-8 Design wave of jetty

Location	Hmax	Wave Frequency (T)	Wave Direction
Slip Way	4.36 m	6.93 sec	323.4°
Jetty	4.28 m	6.93 sec	326.6°

Design seismic factor: 0.15

Soil condition: N value of the ground to 10m depth from the ground surface = 10,
N value of the ground of 10m depth or more from the surface = 16

Uplift force: 48.9 kN/m²

(Condition of materials)

Corrosion rate: Submerged zone (from LWL -1.0m to seabed); 0.1mm/year
Under seabed; 0.03mm/year

Note:1. There is considered to be no corrosion on steel pile at -1.0m and higher location because it is provided with concrete lining

2. Cathodic protection method shall be adopted at submerged zone and its corrosion control rate is estimated at 90%, so the controlled corrosion rate is estimated at 0.01mm/year (= 0.1x (1-0.9))

(Acceptable limits on structural analysis)

Allowable stress of partial component which is exerted by axial force and bending moment simultaneously;

(in case of axial compression force) $\sigma c/\sigma ca+\sigma bc/\sigma ba \leqq 1$

σc: Compressive stress due to axial compression forces (N/mm²)

σca: Allowable axial compressive stress (N/mm²)

σbc: Maximum compressive stress due to flexural moment acting on the cross-section(N/mm²)

σba: Allowable bending compressive stress (N/mm²)

Safety factor of axial bearing capacity:

Items	Normal condition	During short-time loading
Berthing force	2.5 and more	2.0 and more (in case of friction pile)
Tractive force	3.0 and more	2.5 and more

Allowable displacement of pier head: Normal condition; 50mm or so,
During short-time loading; 100mm or so

Note: Short-time loading means berthing force, tractive force by vessels and seismic force.

Structural analysis was conducted by the calculation method on three-dimensional pile structures using stiffness equation for composite structure with concrete floor and piers as shown in Figure 2-2-5. An example of the result of verification is shown in Table 2-2-9.

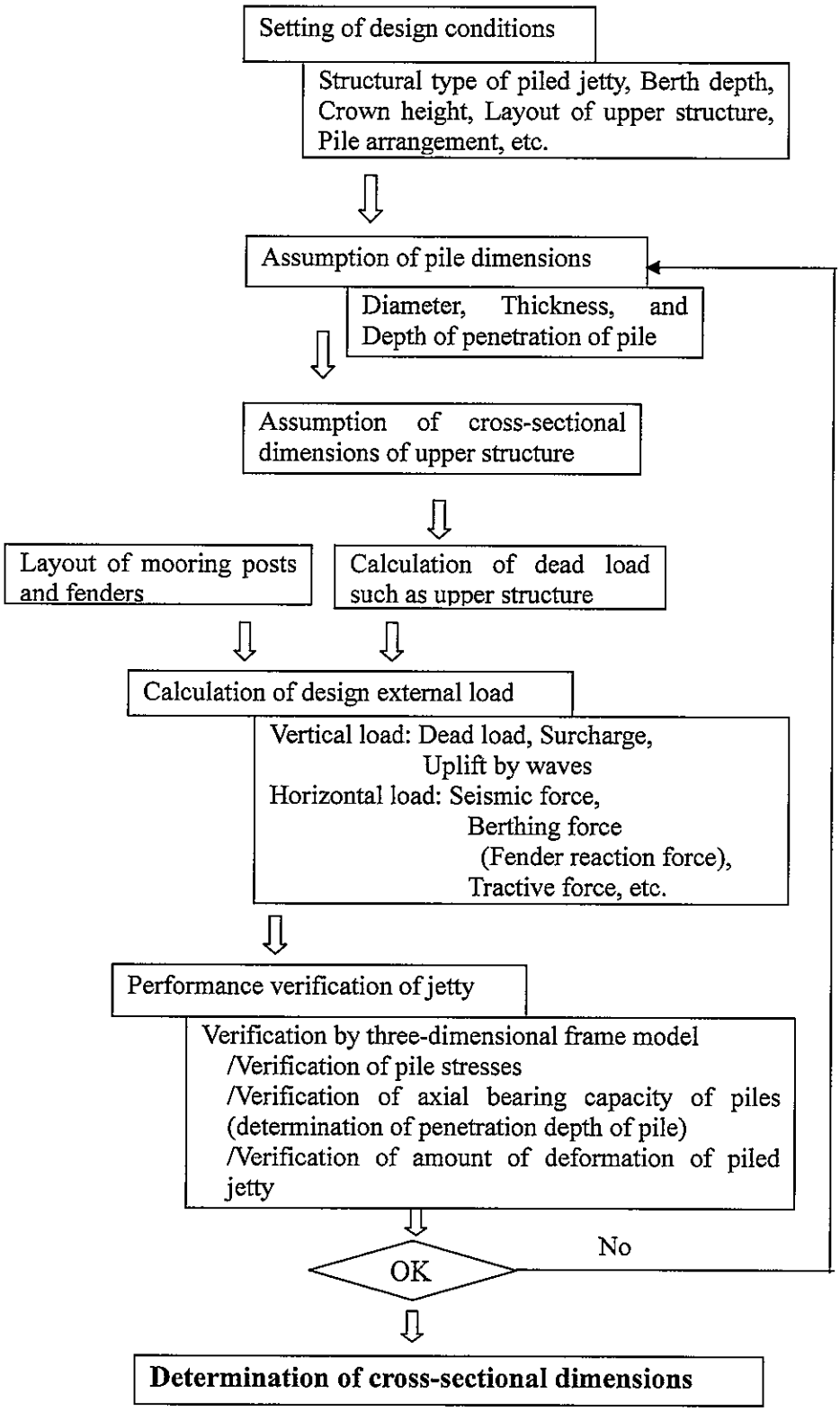


Figure 2-2-5 Sequence of Performance Verification of Piled Jetty

Table 2-2-9 Typical examples of performance verification result of piled jetty

Facility	Pile dimension	Loading condition	Stress verification	Verification of bearing capacity	Amount of deformation of upper structure (mm)
Existing Jetty	New pile (vertical pile) φ711.2×t12mm (SKK400)	Normal condition	0.207<1.0 OK	6.1>2.5 OK	4.7
		Berthing force	0.610<1.0 OK	13.1>2.0 OK	53.6
		Tractive force	0.531<1.0 OK	6.3>2.0 OK	35.1
		During earthquake	0.867<1.0 OK	5.4>2.0 OK	68.3
		During uplift acting	0.161<1.0 OK	2.6>2.5 OK	4.0
	Existing pile (vertical pile) φ450×t9mm (SKK400)	Normal condition	0.434<1.0 OK	4.0>2.5 OK	4.7
		Berthing force	0.708<1.0 OK	4.0>2.0 OK	53.6
		Tractive force	0.551<1.0 OK	7.0>2.0 OK	35.1
		During earthquake	0.981<1.0 OK	3.8>2.0 OK	68.3
		During uplift acting	0.222<1.0 OK	2.7>2.5 OK	4.0
	Existing pile (Raking pile) φ450×t9mm (SKK400)	Normal condition	0.368<1.0 OK	5.2>2.5 OK	4.7
		Berthing force	0.824<1.0 OK	4.0>2.0 OK	53.6
		Tractive force	0.608<1.0 OK	4.9>2.0 OK	35.1
		During earthquake	0.999<1.0 OK	2.2>2.0 OK	68.3
		During uplift acting	0.197<1.0 OK	3.3>2.5 OK	4.0
New Jetty	New pile φ711.2×t12mm (SKK400)	Normal condition	0.627<1.0 OK	4.0>2.5 OK	6.2
		Berthing force	0.645<1.0 OK	6.5>2.0 OK	20.0
		Tractive force	0.360<1.0 OK	5.1>2.0 OK	8.0
		During earthquake	0.685<1.0 OK	5.3>2.0 OK	29.9
		During uplift acting	0.152<1.0 OK	2.5≧2.5 OK	3.7
Slip way	New pile φ711.2×t12mm (SKK400)	Normal condition	0.177<1.0 OK	5.1>2.5 OK	4.3
		During earthquake	0.946<1.0 OK	4.7>2.0 OK	61.9
		During uplift acting	0.217<1.0 OK	2.5≧2.5 OK	7.6
Existing Trestle	New pile φ558.8×t12mm (SKK400)	Normal condition	0.259<1.0 OK	5.9>2.5 OK	5.0
		During earthquake	0.793<1.0 OK	8.0>2.0 OK	57.3
		During uplift acting	0.236<1.0 OK	3.4>2.5 OK	9.6
	Existing pile φ450×t9mm (SKK400)	Normal condition	0.281<1.0 OK	6.2>2.5 OK	5.0
		During earthquake	0.843<1.0 OK	4.4>2.0 OK	57.3
		During uplift acting	0.237<1.0 OK	3.6>2.5 OK	9.6
New Trestle	New pile φ558.8×t9mm (SKK400)	Normal condition	0.295<1.0 OK	5.1>2.5 OK	5.8
		During earthquake	0.826<1.0 OK	4.6>2.0 OK	48.0
		During uplift acting	0.278<1.0 OK	2.5≧2.5 OK	9.6

2-2-2-2 Design of Revetments

(1) Cause of the damage to the revetment

There is little damage to western revetment adjacent to the trestle. Its condition is rather sound except for small partial breakage of stones embedded in the surface of the revetment. On the contrary, the eastern revetment is damaged severely. Parapets have collapsed, some of stone pitching are missing and earth and sand have been sucked out.

It is thought that the main cause of these damages is that the parapets have not been strong enough to withstand attacking waves. And after the collapse of the parapets, the grounds behind the parapets were scoured heavily. Therefore, parapets should be strengthened and concrete aprons and drain ditches should be constructed in the background.

The revetment of the transitional part of the trestle is subject to more severe wave attacks than other revetments. The existing concrete pavement has been destroyed and the sand in the background has been sucked out. A firm concrete apron should be constructed.

(2) Design wave

Design waves for the revetment are determined on the basis of Japanese Technical Standards on port facilities as shown in Table 2-2-10. Quantity of wave overtopping is estimated by using equivalent deepwater wave. It is based on the determination of the crown height of the parapet. Highest wave height is used for examining the stability of the parapet. The stability of wave dissipating concrete block is examined by using Hudson formula based on significant wave height.

Table 2-2-10 Design Wave of Revetment

Location	Wave Height			Wave Frequency	Wave Direction
	Wave overtopping volume (Ho')	Stability of parapet (Hmax)	Stability of wave dissipating block ($H_{1/3}$)		
Eastern Revetment	1.26 m	2.78 m	2.12 m	11.33 sec	347.3°
Western Revetment	1.59 m	1.99 m	-	11.33 sec	352.2°

Note: Ho' means equivalent deepwater wave height.
Hmax means the highest wave height.
H1/3 means significant wave height.

(3) Basic Policy of Repair

The crown height of revetments is decided as the quantity of overtopping wave is restrained less than the permissible wave overtopping rate (q=0.02 m^3/sec). The necessity of wave-breaking blocks is examined on the basis of the design wave height attacking the revetments. The back side floor of the revetment shall be made of concrete and a trench shall be made for dealing with the overtopping wave water. Design policy for repairing each section of revetment is shown in Table 2-2-11.

Table 2-2-11 Repairing Policy of Revetment

Location	Repairing Policy
Revetment at the eastern area	To put wave-breaking blocks (2ton type) in front of the revetment. The crown height of the parapet is 4.5m. (4.2m of current facility) Damaged stone masonry parts are repaired by using the same size of stone. To put concrete floor and drainage trench at back of the revetment.
Revetment at the western area	No wave-breaking blocks Other items are the same as the eastern area.
Transitional part of trestle	The back side floor is made of concrete pavement.

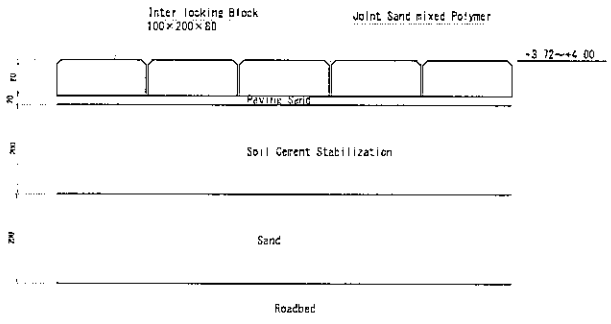
2-2-2-3 Pavement Design of Road and Yard

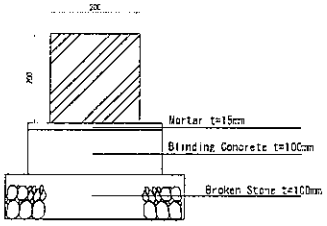
(1) Pavement configuration

Pavement type of the road and terminal at Oecusse Port is interlocking blocks; the pavement structure design is based on the expected traffic volume (more than 100 vehicles per day but less than 250). Since CBR test was not conducted and it is predominantly a mixture of coral with sand and silt, and intensity variation of existing ground can be observed, the design CBR is determined as 3 to be on the safe side.
Pavement design based on it is shown in Figure 2-2-6.

(2) End Stopper

To get effective bite force and prevent the movement of interlocking blocks due to the traffic load, an end stopper of concrete is placed. Cross Section of Interlocking Block Pavement and End Stopper is shown in Figure 2-2-6.





(End Stopper of Concrete)

Figure2-2-6 Cross Section of Interlocking Block Pavement

2-2-2-4 Drainage Plan

(1) Drainage Plan

Drain ditches are located 61.45m from the revetment as shown in the Figure 2-2-7. Though the size of the cross section of this drain ditch is B450×H450, the overall shape including underground, the strength of concrete, state of deterioration etc. have not been confirmed. Considering the safety and the difference of specification between the old drain and the new one, and the life period of the facility, the existing drain ditch should be replaced with a new one. The water in Drainage Area 2 will drain away to the sea through this drain ditch. And the water in Drainage Area 1 will drain away to the sea by a new drain ditch located 8.5m from the revetment.

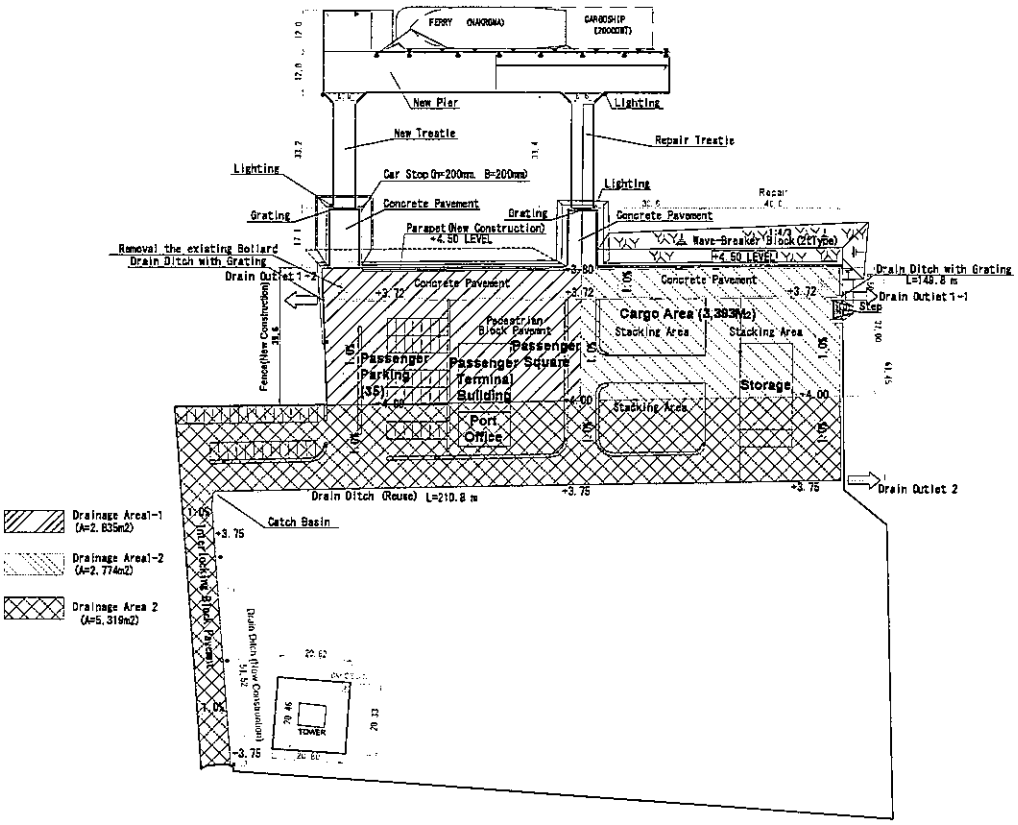


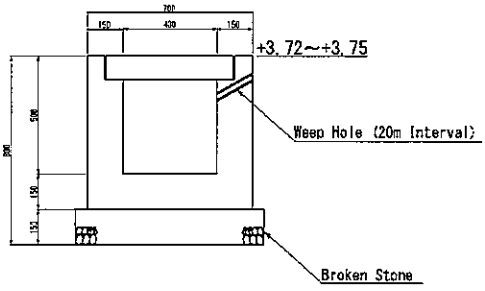
Figure 2-2-7 Drainage Plan

(2) Intensity of rainfall

Annual rainfall in Oecusse is 1,108mm which is similar to the Tohoku region in Japan. Accordingly, rainfall intensity of the Tohoku region, 70 mm/h, is adopted for design purpose.

(3) Cross-section area of flow

Drainage facilities are planned assuming a 30 percent increase in the design flow, allowing a margin for silt and other suspended solids. However, flow calculation is carried out at the state of full flow. (See Figure 2-2-8)



Drain Ditch (B400×H500)

Figure 2-2-8 Cross Section of Drain Ditch

2-2-2-5 Terminal Buildings Design

(1) Site for Terminal Buildings

Terminal Buildings are allocated on the 10,000m^2-wide site which is wedged between existing the drain ditch and coast line. 3-zoning system (Cargo zone, Passenger zone, and Public Vehicle zone starting from the east) makes traffic control easy for passengers and vehicles, or users and guests, or user vehicles and guest vehicles. In addition, the gates or a movable fence at the entrance of the Trestle shall be used for access control.
A southern area of around 18,000m^2 which is land reserved for future development is being temporarily used as a parking lot for mini-buses and trucks. During the construction stage, it will also be utilized for a field office, material stock yard, and parking lot for construction vehicles. (See Figure 2-2-9)

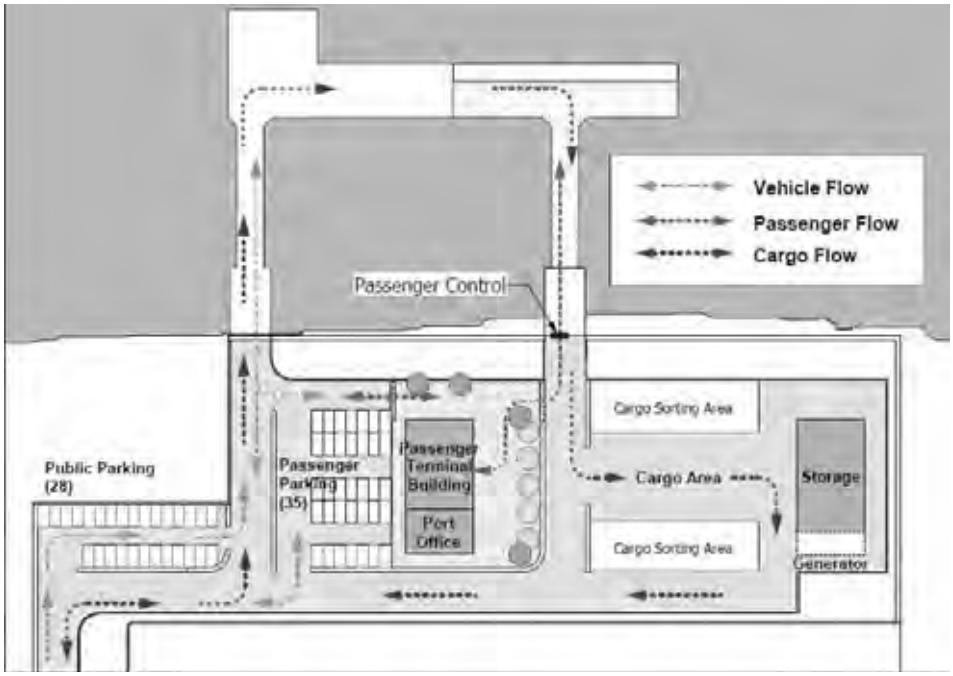


Figure 2-2-9 Proposed Traffic Flow

(2) Arrangement and Design for Terminal Buildings

According to the 3-Zoning system, the port office and the passenger terminal are located in the passenger zone, while the warehouse and the generator room are located in the cargo zone.
Moreover, the number of buildings was decreased in consideration of convenience and the cost reduction; one building includes the port office and passenger terminal and another is used for the warehouse and generator room.
The passenger terminal building including port office is designed to harmonize with the climate of Oecucce. The triangle shaped roof rises from the sea toward the mountain side considering wind direction. The piloti system is adopted in consideration of multi-access.(See Figure 2-2-10)

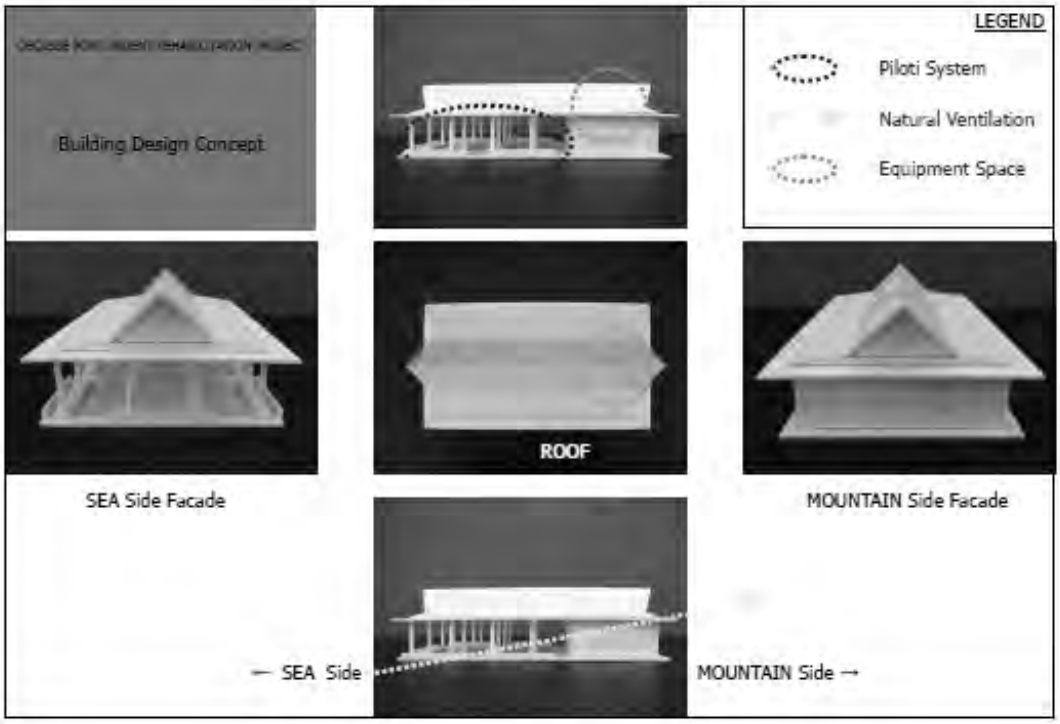


Figure2-2-10 Image of Terminal Building Design

(3) Necessary Floor Area for Buildings

1) Passenger terminal building

Since the main function of this space is as a waiting area for the ferry, appropriate floor area is designed based on the capacity of the operating ferry, NAKROMA.

ⅰ） NAKROMA has a 300 person capacity. However, it often exceeds its capacity by 30% according to the preliminary study report. Therefore, actual capacity is assumed to be around 400 persons.

ⅱ) Waiting area for passengers

Usually, boarding commences one hour before sailing.

It is assumed that 75% of passenger will arrive prior to boarding time.

Therefore, a waiting area for 300 passengers (=400x75%) should be secured.

ⅲ) Generally, personal space required by one person is $0.5m^2$(= 70cmx70cm).

Accordingly the total required area would be 300 passenger x $0.5m^2$ = $150m^2$.

ⅳ) Moreover, the same space is needed for walking. Therefore, required floor area is $150m^2$ for sitting plus 150m2 for walking, $300m^2$ in total.

(The required floor area is 400 ㎡.)

2) Port office

According to APORTIL, the staff size will not exceed 14 persons (5 or 6 administrative staff who are dispatched from Dili, 7 or 8 operating staff when the ferry is in operation). A total area of $150m^2$ is sufficient as an exclusive area for 14 employees including common space, meeting room, restroom, and ticketing office.

Moreover, an area of 25m2 for the ticketing office which resembles that at Oebau port has been secured.

3) Warehouse

The annual cargo handling volume is assumed to be 16,700 tons. Seventy percent of the cargo is stored in the warehouse, and a turnover ratio 1/12 per month is assumed a month. Therefore, the average amount of the stock is around 1,000 tons.(16,700x0.7/12) Available unit storage volume per area is stipulated as 5 ton/m2 in Japanese Technical Standard of Port Facility. In consideration of the following two parameters, 0.7 as a load efficiency and 0.7 as a proportion of stock space on the warehouse, the required area for the warehouse is around 400m2. (1,000/5/0.7/0.7)

4) Generator room

Since there is currently no power supply in daytime, a generator should be installed outdoors. However, a roof needs to be built to protect the generator from wind and rain. Moreover, a fuel tank room with a security fence and door with a locking mechanism is required.

(4) Building Design

1) Floor plan

i) Passenger terminal building (including a port office)

The waiting space for passengers and guests tends to concentrate at the entrance.

Narrow entrance can lead to congestion when there are many passengers and guests. Therefore, Piloti system, that is, no wall system, is effective to mitigate congestion due to its multi access.

A concrete bench will be installed to effectively utilize space.

To prevent rain from being blown into the Piloti area, chiseled eaves and the wainscot made of concrete blocks along the outer line will be installed.

A port office consists of working space for 14 persons or less who are administrative staff dispatched from Dili and field staff and common space (meeting room, restroom, ticketing office).

Two restrooms are separately installed for the staff and passengers.

The floor area and specifications for each room are shown in Table 2-2-12.

(※Neither furniture nor air-conditioning are included in this work.)

Table 2-2-12 Floor Area and Specifications of Terminal Building

Building/Room name		Usage	Required area	Designed area	Remarks
Passenger Terminal		waiting hall	400 ㎡	300 ㎡	Piloti, Fixed concrete bench
Port Office	Office A	Installed partition for divided into two zones	200 ㎡	49 ㎡	with Conduit pipe and electricity supply for air-conditioning machine
	Office B				
	Guest room	with rest room		10 ㎡	ditto
	Resting room			7 ㎡	ditto
	Meeting room	Capacity for 14 persons		25 ㎡	ditto
	Ticketing room			25 ㎡	ditto
	Rest room A	for passengers		12.5 ㎡	
	Rest room B	for staffs		12.5 ㎡	
	Corridor			9 ㎡	
Total			600 ㎡	450 ㎡	

ii) Warehouse Building (including Generator space)

Two hanger-doors will be installed for taking in luggage at the front of the building.

The floor is planned in consideration of the load of the lift car.

Based on a natural ventilation concept, supply air grille will be installed near the floor to accelerate air circulation.

The generator is installed at the niche space (outdoors) south of the warehouse building to better cope with exhaust airs.

The fuel tank room with a security fence and door with a locking mechanism will be designed. (The fuel tank is prepared by Timor-Leste Government)

The floor area and specifications of storage building are shown in Table 2-2-13.

Table 2-2-13 Floor Arean and Specifications of Storage Building

Building/Room name	Usage	Required area	Designed area	Remarks
Warehouse	temporary stock	400 ㎡	419 ㎡	Natural ventilation
Fuel tank room	fuel for generator		6 ㎡	Tank is prepared Timor
Generator room		50 ㎡	25 ㎡	Piloti
Total		450 ㎡	450 ㎡	

2) Section plan

i) Passenger terminal building (including a port office)

The floor height of 5 meters will be secured.

The outdoor air-conditioning unit will be installed on the rooftop for efficient land use and security.

ii) Warehouse (including a generator space)

The floor height of 5.5 meters shall be secured based on the existing WFP building.

15 meter span system is in consideration of effective activity.

3) Structural plan

i) Standard

The building code and standards of Japan will be applied.

ii) Design concept

The allowable stress is determined for each loading condition.

iii) Design load

① Live load

Design live loads for buildings are shown in Table 2-2-14.

Table 2-2-14 Design Load for Building (Unit: N/㎡)

Room	Floor	Beam	Seismic
Office	2,900	1,800	800
Terminal	3,500	3,200	2,100
Warehouse	30,000	30,000	-
Roof	1,000	600	400

② Seismic load

Seismic load is designed that the coefficient of seismic shear is 0.15.

③ Wind load

The wind load is 24m/sec which is half that of Tokyo since there are fewer typhoons here.

Tokyo wind speed (V0) is 34m/sec, therefore it is assumed $34/\sqrt{2} = 24$m/sec.

The factor of rough condition is Ⅰ as here is against the coast.

iv) Structural planning of each building

① Passenger terminal building (including a port office)

Exposed piloti columns are made of reinforced concrete to prevent corrosion.

The roof steel beams are covered ceiling to avoid the influence of weather.

<Main structure>

Base: Spread foundation

Exterior wall: Concrete block masonry

Frame: Reinforced rigid frame

Roof: Galvanized steel plate

② Warehouse (including a generator room)

To enhance the storage function, the internal column is removed.

＜Main structure＞

Base: Spread foundation
Exterior wall: Concrete block masonry
Frame: Reinforced rigid frame
Roof: Galvanized steel plate

v) Structural material

Structural material is selected in consideration of building volume, structure, application and local availability, material quality, construction method, condition of transportation, and price.

For this project, most materials will be procured from Indonesia.

① Concrete

Base, Column, Beam: 24N/mm2 for 4 week age strength
Floor: Slab-on-grade: 24N/mm2 for 4 week age strength

② Steel bars

Steel bars are procured from Surabaya, Indonesia

③ Steel beam

Steel beams are procured from Surabaya, Indonesia

vi) Construction material plan

① External Finishing

Roof: Short pitch corrugated galvanized steel
External wall: Concrete block with AEP paint
Scarcement: Concrete

② Internal finishing

Floor 1: Concrete(waiting room, storage, generator room, fuel tank)
Floor2: Ceramic tile （other area)
Baseboard: Ceramic tile
Wall: AEP paint
Ceiling: Gypsum board

vii) Electrical design

① Standard

The building code and standards of Japan will be applied.

② Design concept

a) Main power line

The installed Generator (capacity 75KVA) distributes power to all facilities including exterior security lamp.

b) Lighting

The luminous intensity is set as follows and corresponds to Japanese standards.

office, meeting area : 300Lx
waiting area : 100Lx
storage : 50Lx

c) Power outlets

Power outlet plan in the office area is designed in consideration of computer use.

d) Telephone

Telephone installation is not included in this project as no public land line is available. The use of cellular phones is widespread here.

viii) Mechanical design

① Standard

The building code and standards of Japan should be applied.

② Design concept

a) Water supply

Existing public water services will be used to supply the new facilities. However a water tank (4ton) is installed on the roof in consideration of water outage. (A pressure pump and lifting pump are installed)

b) Water discharge

Waste water from rain water and the building is discharged to the existing drain ditch. Sewage is processed in the septic tank, and collected several times a month by the local government.

c) Ventilating facilities

Ventilating facilities are installed in the room and the rest room.

d) Others

The office space and meeting room in the Passenger Terminal Building are equipped with conduit pipe and electricity supply for air-conditioning machine.

(※ The air-conditioning machine itself is not included in this work)

2-2-2-6 External lighting facilities

Lighting poles (H=8 meter) are installed along the road and in the cargo area. The luminous intensity of 5 Lux is secured for road and 10 Lux for cargo area. Mercury lamps are selected in consideration of durability and availability. The lamps have a 12000 hour service life which means no maintenance is required for ten years. (See Figure 2-2-11)

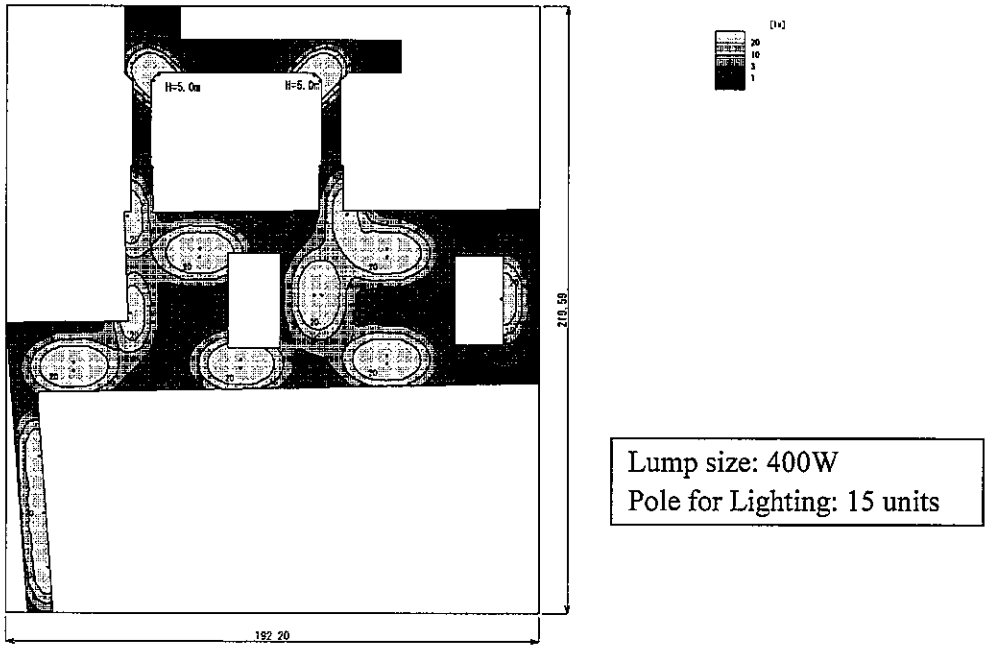


Figure 2-2-11 Location of Lighting Facility and Luminous Intensity

2-2-2-7 Navigation Aid Facilities

A beacon light of which luminous range is about 12 nautical miles shall be installed at the top of the about 30m high tower in order to assist vessels calling at Oecusse Port. And two other sets of light beacons of which luminous range is about 4 nautical miles shall be installed at both edges of the jetty in order to make it easier for vessels to verify the location of the jetty.(refer to Figure 2-2-12)

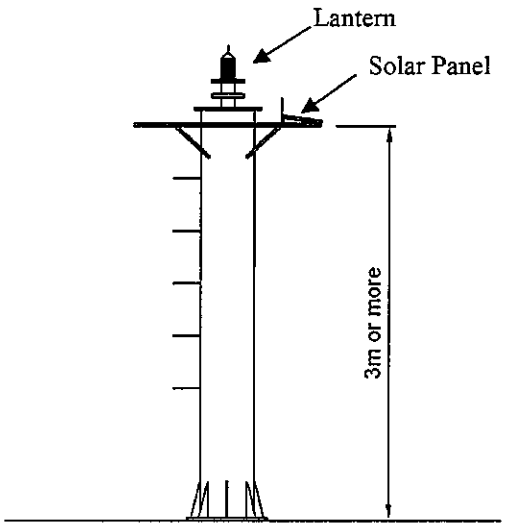


Figure 2-2-12 Image of Beacon Light on Jetty

Those beacon lights shall be white color and flashing type. The power source shall be solar the same as such facilities in Dili Port. Light source shall be LED which doesn't require any maintenance. But it is important to clean the surface of the solar panel periodically. Table 2-2-15 shows the specifications of navigation aid facilities.

Table 2-2-15 Specifications of Navigation Aid Facility

Item	Leading Light on the Tower	Leading Light on the Jetty
Light Color	White	White
Luminous effective range (T=0.85)	12 N. miles	4 N. miles
Light source	LED Not less than 3700cd	LED Not less than 37cd
Light character	Flashing type 4sec	Flashing type 4sec
Power source	Solar panel with battery charger	
Solar Panel	The capacity of solar panel should be determined on the basis of the calculation of the necessary electric energy consumptions.	
Battery	Shield Type. Battery life is more than 14 days without charge.	
Number of Equipment	1 unit	2 units
Note	Specifications of a lightning rod should be based on the standards on protection level against lightning stipulated in JIS of 2003. The protection level should be level IV. (JIS: Japan Industrial Standards)	The light should be installed at a height of more than 3 meters above the jetty. The facility should be wave-proof and protective against corrosion.

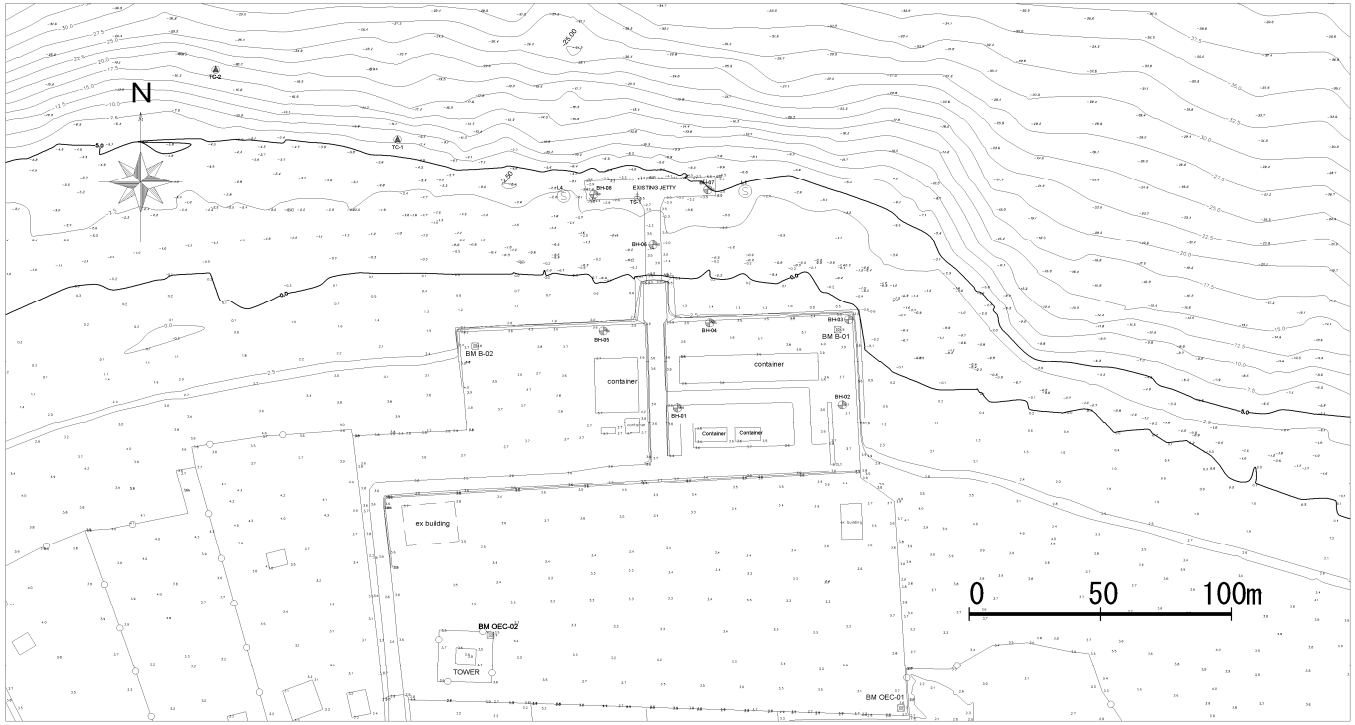
2-2-3 Outline of Design Drawing

Outline of Design Drawings is showed as follows.

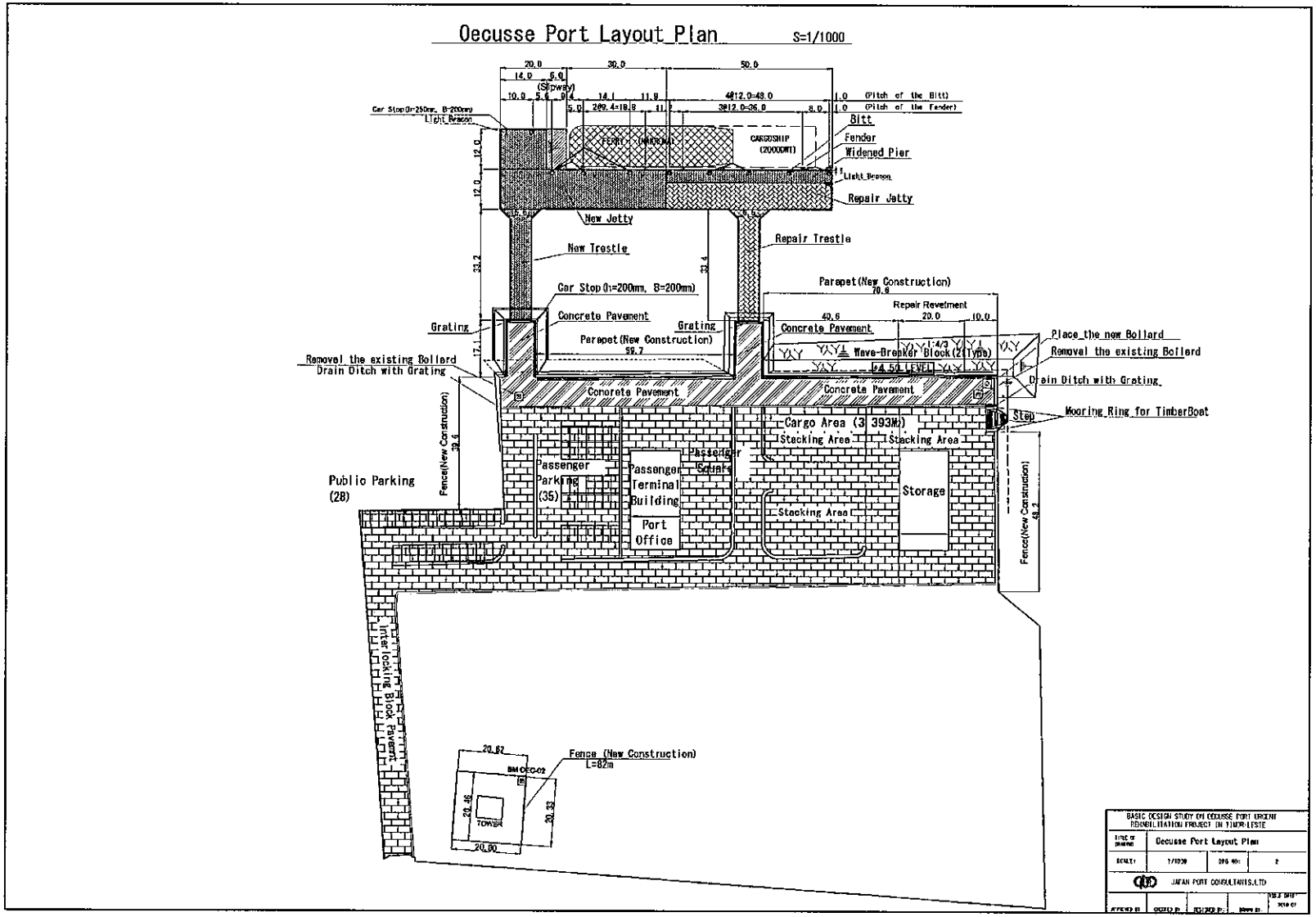
Inventory of Drawings

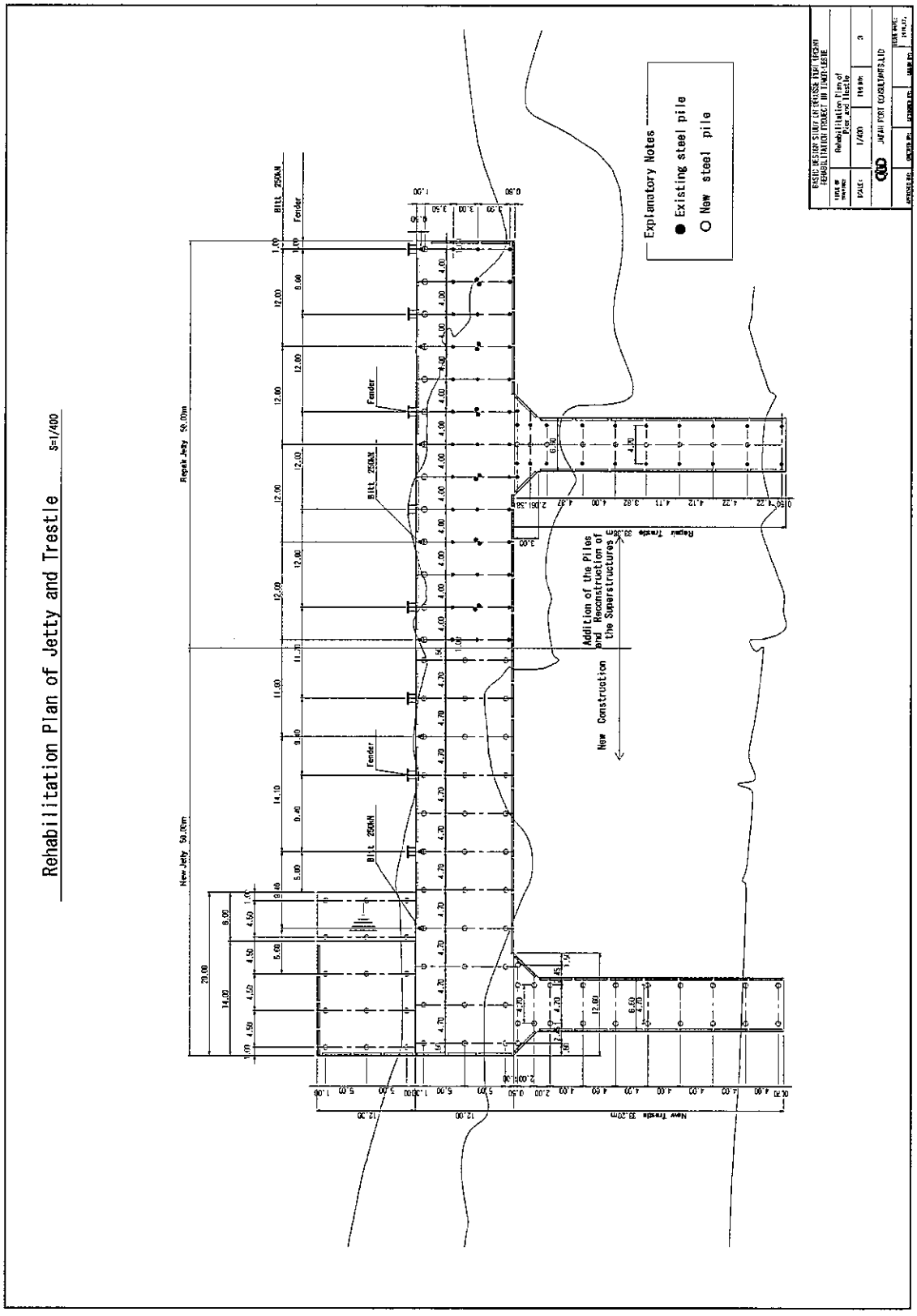
Drawing No.	Title of Drawing	Scale
1	Site Location Map	–
2	Oecusse Port Layout Plan	1/1000
3	Rehabilitation Plan of Jetty and Trestle	1/400
4	Elevation of Jetty and Trestle	1/400
5	Layout Plan and Standard Section of Jetty	1/400
6	Layout Plan and Standard Section of Trestle	1/300
7	Rehabilitation Plan and Standard Section of Revetment	1/500
8	Terminal Building Plan	1/200
9	Terminal Building Elevation	1/200
10	Terminal Building Section	1/200
11	Warehouse Building Plan	1/200
12	Warehouse Building Elevation	1/200
13	Warehouse Building Section	1/200
14	Pavement Plan	1/1000
15	Drainage Plan	1/1000

Site Location Map

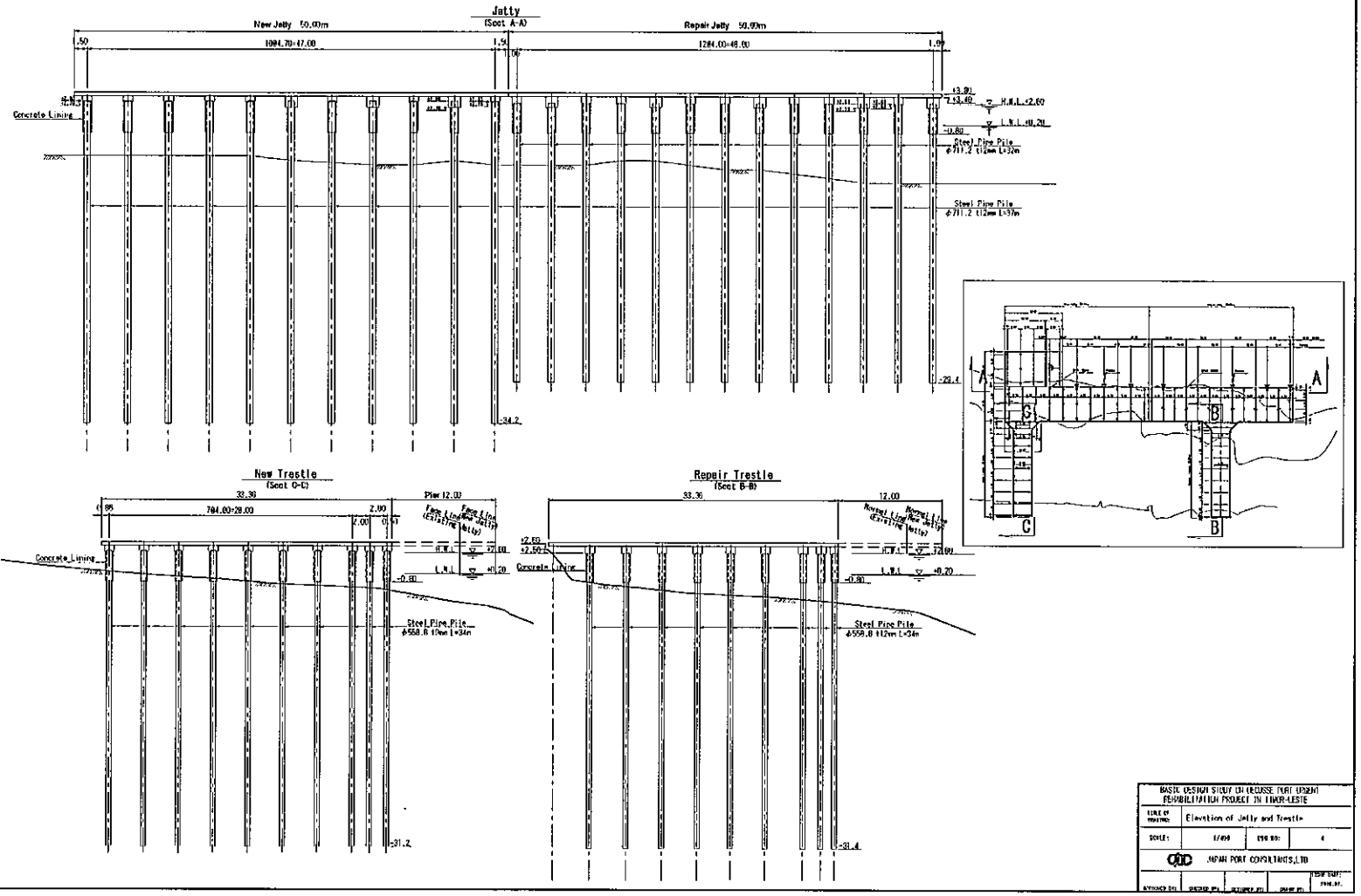


BASIC DESIGN STUDY ON OECUSSE PORT URGENT REHABILITATION PROJECT IN TIMOR-LESTE				
TITLE OF DRAWING:	Site Location Map			
SCALE:		DWG NO:	1	
JAPAN PORT CONSULTANTS, LTD				
APPROVED BY:	CHECKED BY:	DESIGNED BY:	DRAWN BY:	ISSUE DATE: 2010.07.


Oecusse Port Layout Plan
S=1/1000
Car Stop(h=250mm, B=200mm)
Light Beacon
FERRY (MAROMAK)
CARGOSHIP (2000DWT)
Bitt
Fender
Widened Pier
Light Beacon
Repair Jetty
New Jetty
New Trestle
Repair Trestle
Car Stop(h=200mm, B=200mm)
Parapet(New Construction)
Repair Revetment
Concrete Pavement
Grating
Parapet(New Construction)
Wave-Breaker Block(2t Type)
Place the new Bollard
Removal the existing Bollard
Drain Ditch with Grating
Removal the existing Bollard
Drain Ditch with Grating
Concrete Pavement
Concrete Pavement
Step
Mooring Ring for TimberBoat
Cargo Area (3 393M²)
Stacking Area
Stacking Area
Passenger Parking (35)
Passenger Terminal Building
Passenger Safety
Port Office
Storage
Stacking Area
Public Parking (28)
Fence(New Construction)
Fence(New Construction)
Interlocking Block Pavement
Fence (New Construction) L=82m
TOWER
BASIC DESIGN STUDY ON OECUSSE PORT EROSION REHABILITATION PROJECT IN TIMOR-LESTE
Oecusse Port Layout Plan
JAPAN PORT CONSULTANTS,LTD


Rehabilitation Plan of Jetty and Trestle
S=1/400
Explanatory Notes
● Existing steel pile
○ New steel pile
Repair Jetty 50.00m
New Jetty 50.00m
Repair Trestle 33.30m
New Trestle 33.30m
Addition of the Pile and Reconstruction of the Superstructure
New Construction
Bitt. 250kN
Fender
JAPAN PORT CONSULTANTS,LTD

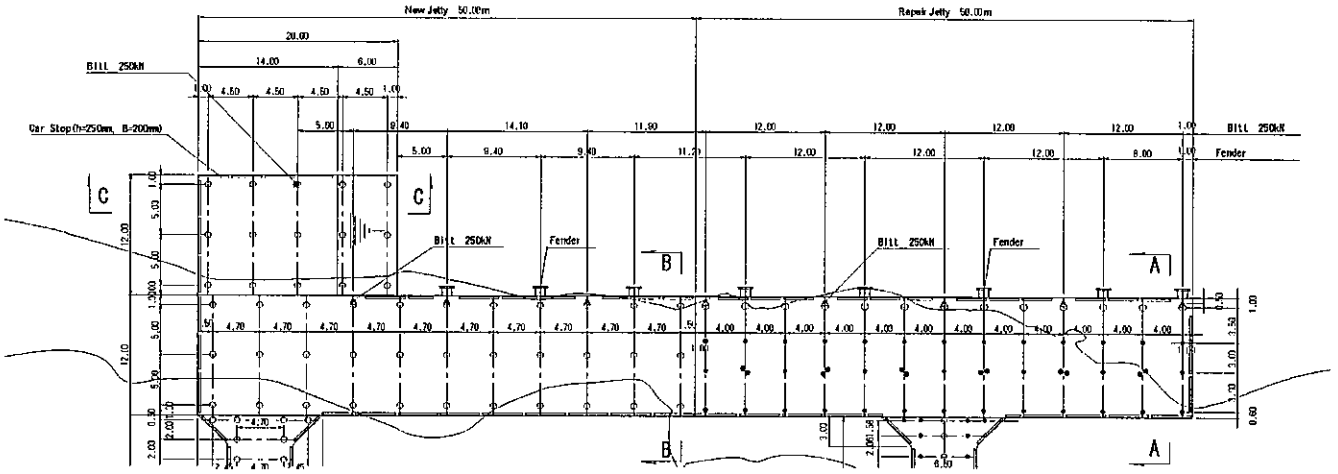
Elevation of Jetty and Trestle S=1/400



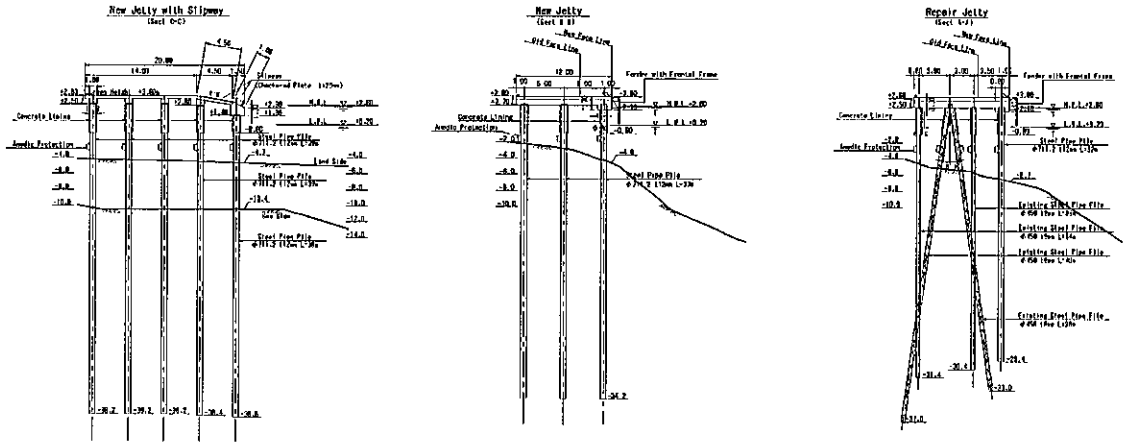
BASIC DESIGN STUDY ON DILI/SUAI PORT URGENT REHABILITATION PROJECT IN TIMOR-LESTE			
TITLE OF DRAWINGS	Elevation of Jetty and Trestle		
SCALE:	1/400	DWG NO:	4
JAPAN PORT CONSULTANTS,LTD			

Layout Plan and Standard Section of Jetty

Layout Plan of Jetty S=1/400



Standard Section S=1/500

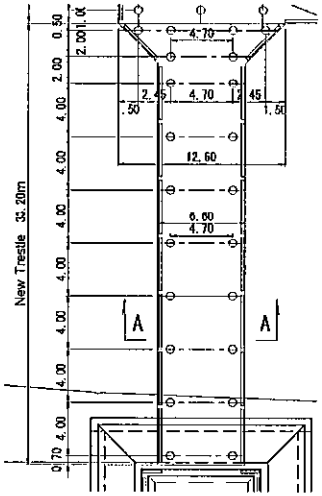


BASIC DESIGN STUDY ON DILI/SUAI PORT URGENT REHABILITATION PROJECT IN TIMOR-LESTE			
TITLE OF DRAWING	Layout Plan and Standard Section of Jetty		
SCALE	1/400, 1/500	SHEET No.	5
JAPAN PORT CONSULTANTS,LTD			
APPROVED BY	CHECKED BY	DESIGNED BY	DRAWN BY

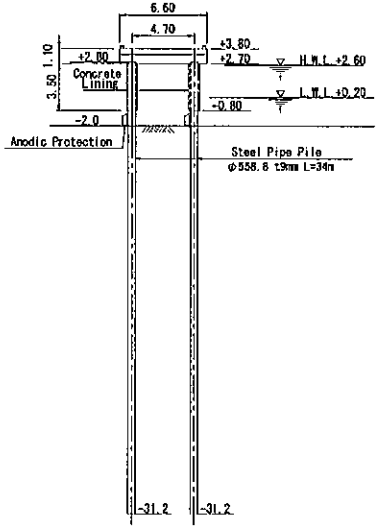
Layout Plan and Standard Section of Trestle S=1/300

West Side Trestle

Layout Plan

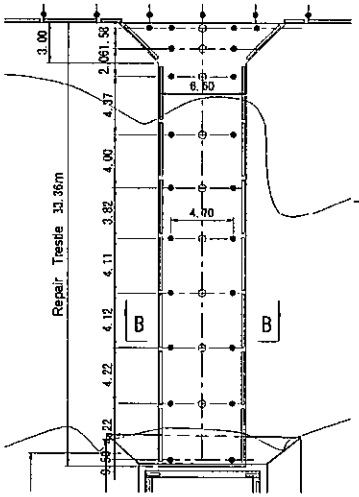


Sect A-A

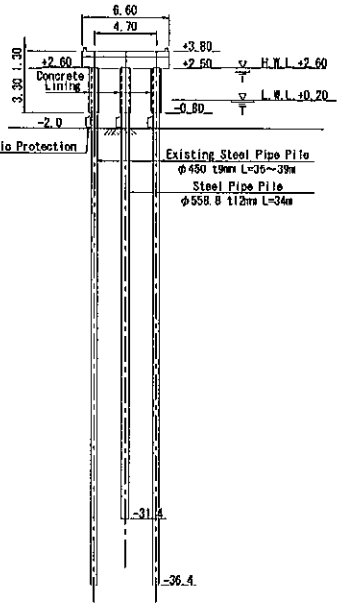


East Side Trestle

Layout Plan



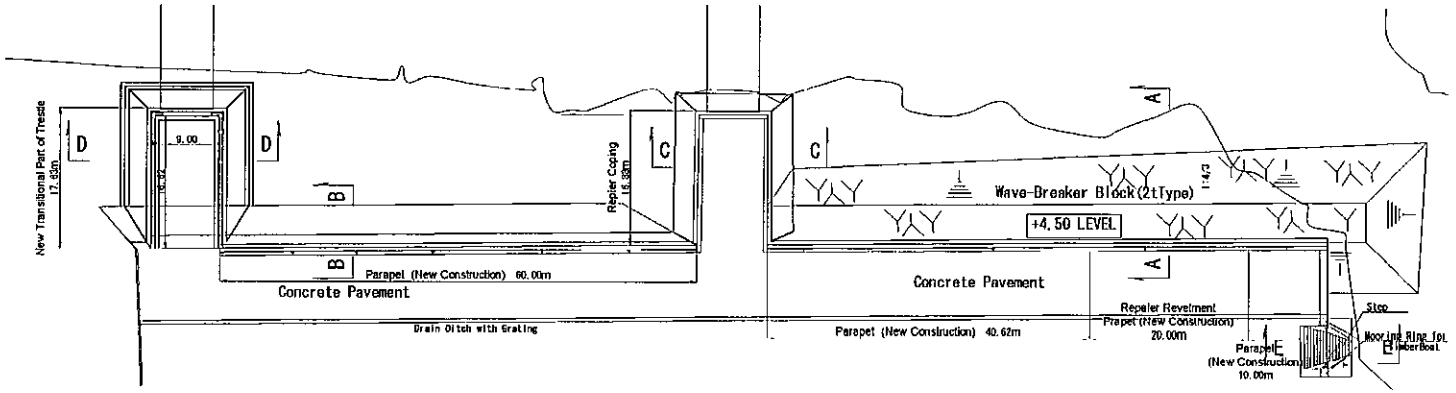
Sect B-B



BASIC DESIGN STUDY ON LEQUISE PORT URGENT REHABILITATION PROJECT IN TIMOR LESTE			
TITLE OF DRAWING	Layout Plan and Standard Section of Trestle		
SCALE:	1/300	DRG NO.	6
JAPAN PORT CONSULTANTS,LTD			

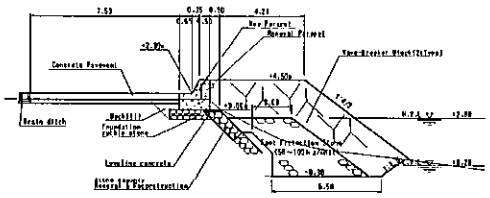
Reahabilitation Plan and Standard Section of Revetment

Layout Plan of Revetment S=1/500

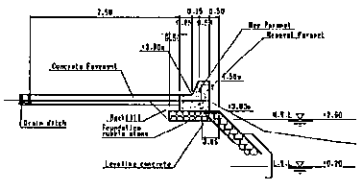


Standard Cross-section S=1/200

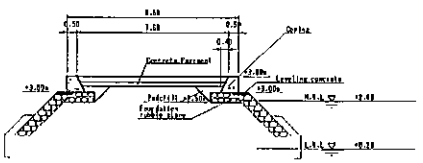
East Side Revetment
(Sect A-A)



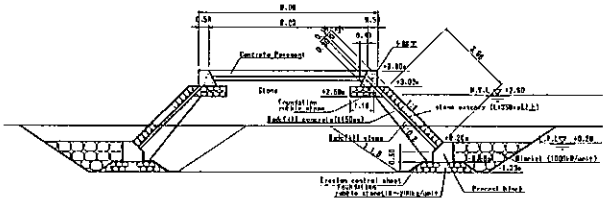
West side Revetment
(Sect B-B)



Existing Transitional Part of Trestle
(Sect C-C)



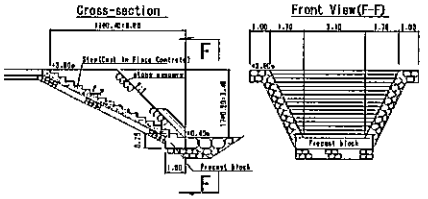
New Transitional Part of Trestle
(Sect D-D)



Step for Timberboat
(Sect E-E)

Cross-section

Front View(F-F)



BASIC DESIGN STUDY ON FISHERIES PORT URGENT REHABILITATION PROJECT IN TIMOR-LESTE	
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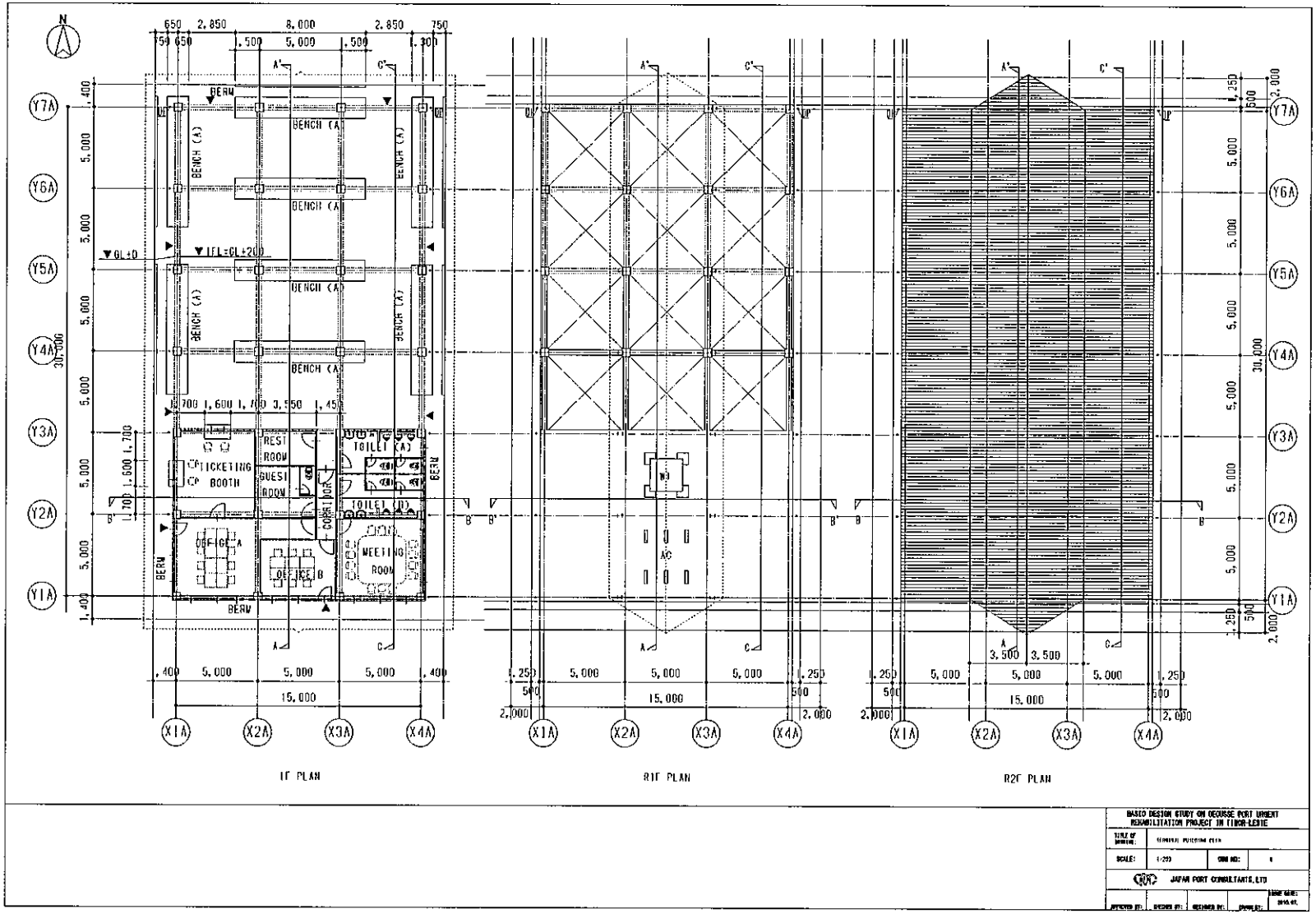
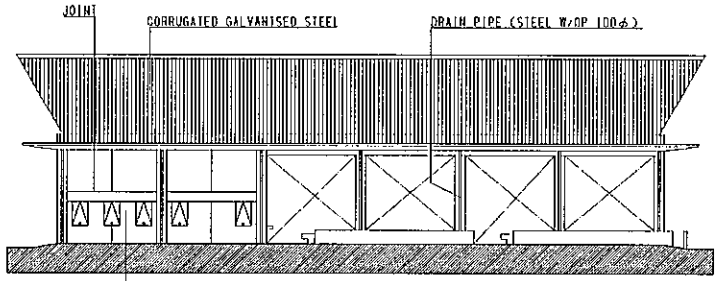
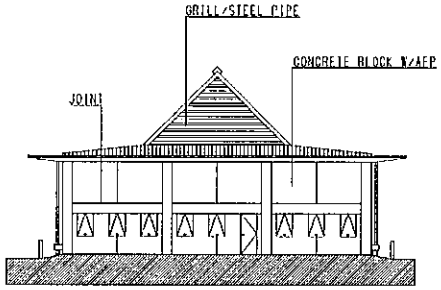
SCALE:	1/500,1/200
DRG NO:	7
JAPAN PORT CONSULTANTS,LTD	

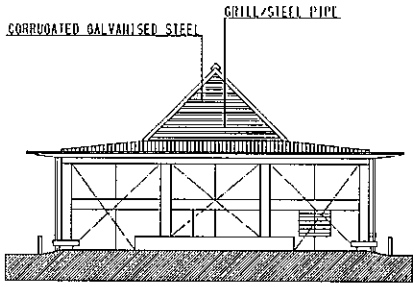

1F PLAN
R1F PLAN
R2F PLAN
BENCH (A)
TICKETING BOOTH
REST ROOM
GUEST ROOM
TOILET (A)
TOILET (D)
CORRIDOR
OFFICE A
OFFICE B
MEETING ROOM
BERM
▼GL±0
▼FFL=GL+200
15,000
30,000
BASIC DESIGN STUDY ON OECUSSE PORT URGENT REHABILITATION PROJECT IN TIMOR-LESTE
JAPAN PORT CONSULTANTS, LTD



EAST ELEVATION



SOUTH ELEVATION



NORTH ELEVATION

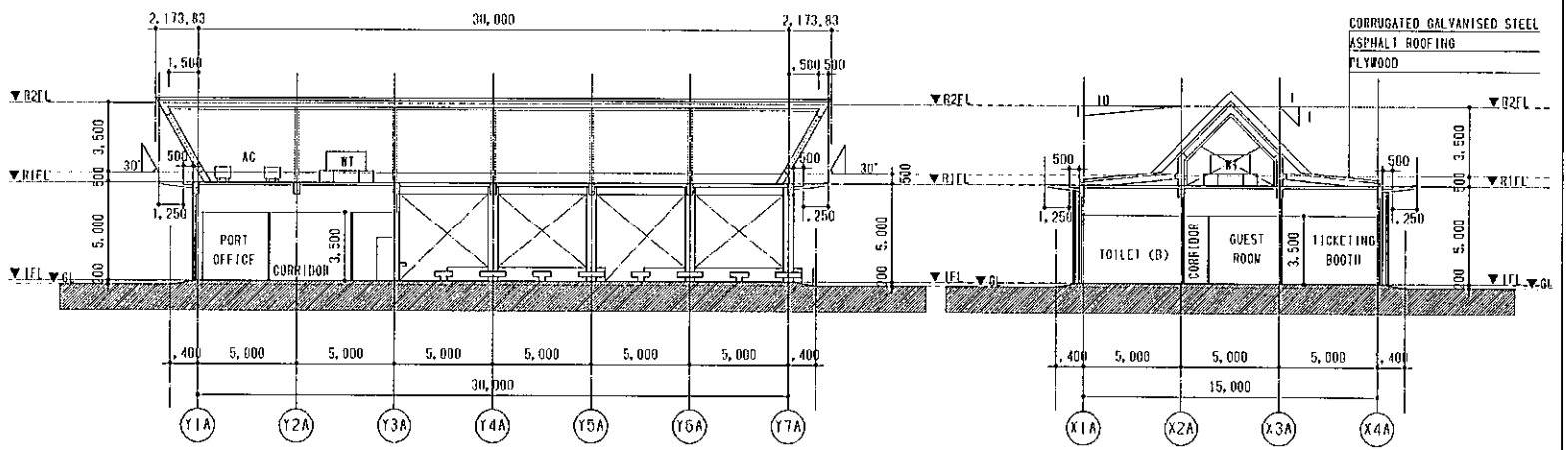
BASIC DESIGN STUDY ON OECUSSE PORT URGENT REHABILITATION PROJECT IN TIMOR-LESTE

TITLE OF DRAWING: [illegible]

SCALE: 1:200 DWG NO: 9

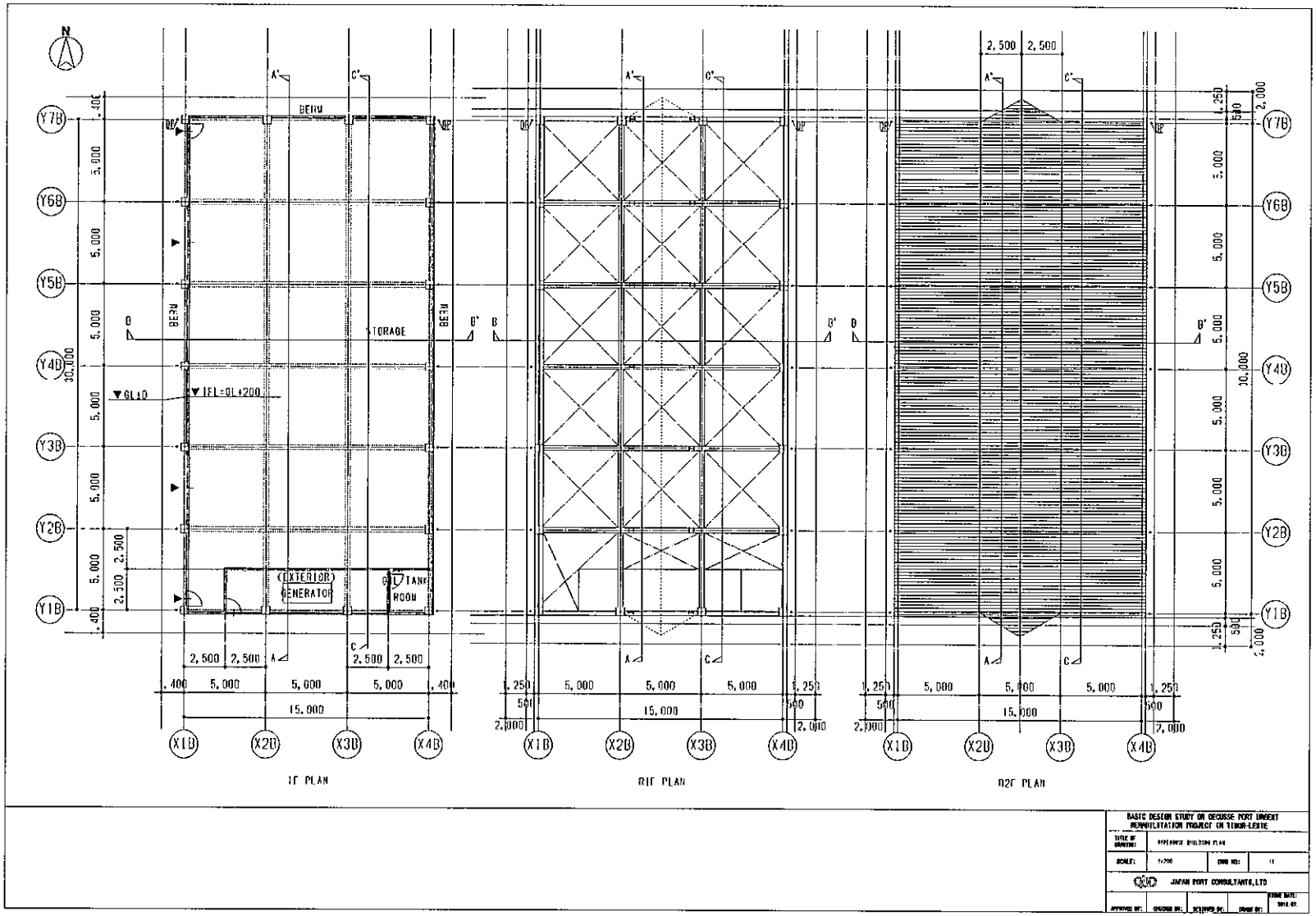
JAPAN PORT CONSULTANTS, LTD

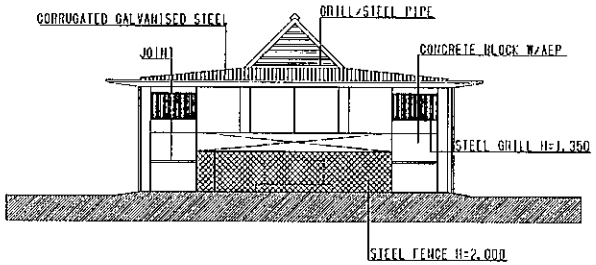
APPROVED BY: CHECKED BY: DESIGNED BY: DRAWN BY: DATE DATE: [illegible]



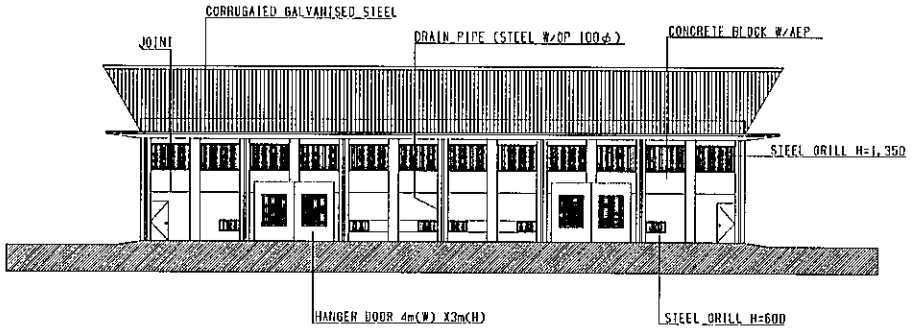
BASIC DESIGN STUDY ON OECUSSE PORT URGENT REHABILITATION PROJECT IN TIMOR-LESTE

JAPAN PORT CONSULTANTS, LTD


N
BEAM
STORAGE
(EXTERIOR) GENERATOR
TANK ROOM
▼GL±0
▼FL=GL+200
1F PLAN
R1F PLAN
R2F PLAN
BASIC DESIGN STUDY ON DECUSSE PORT URGENT REHABILITATION PROJECT IN TIMOR-LESTE
JAPAN PORT CONSULTANTS,LTD



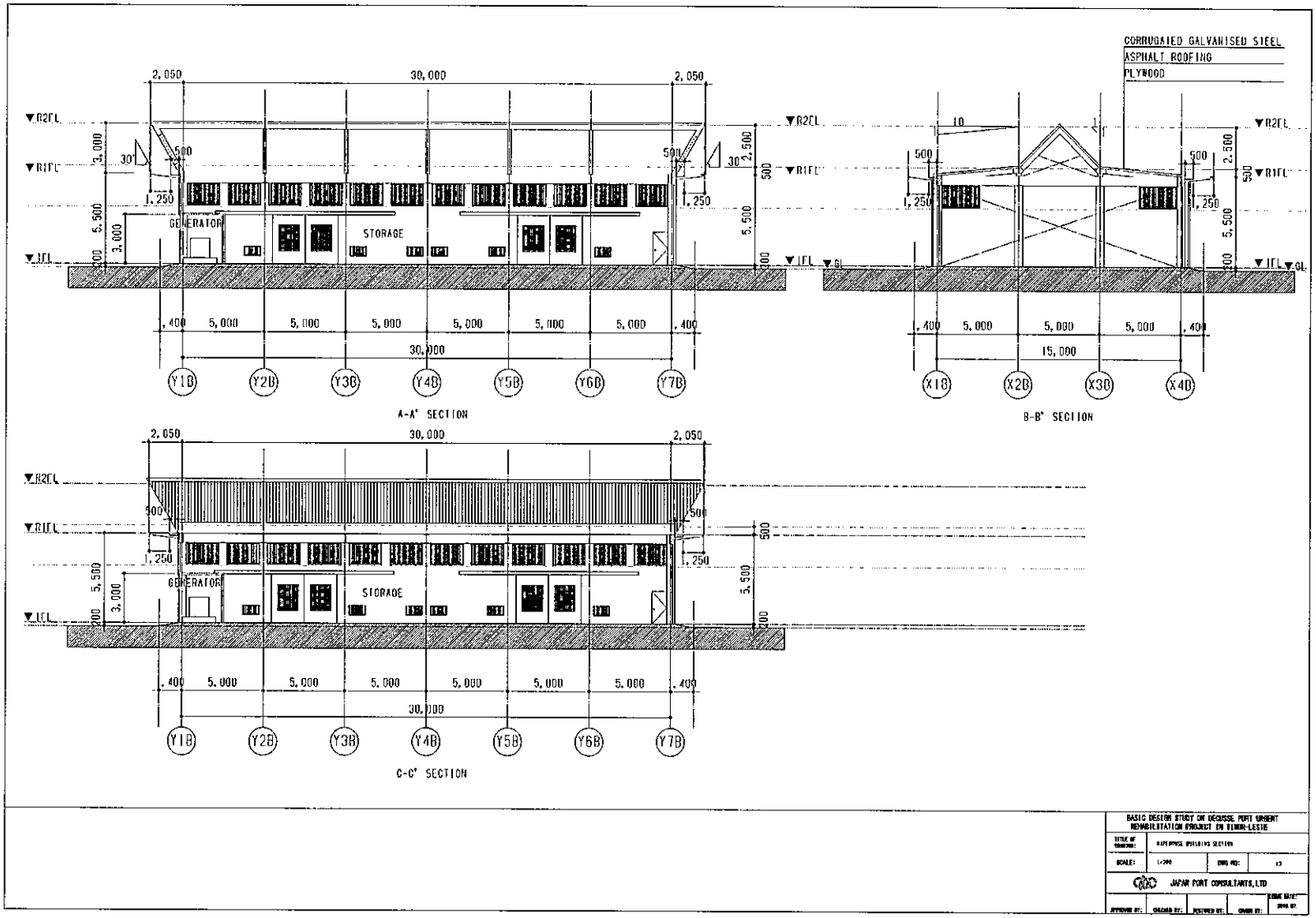
SOUTH ELEVATION



WEST ELEVATION

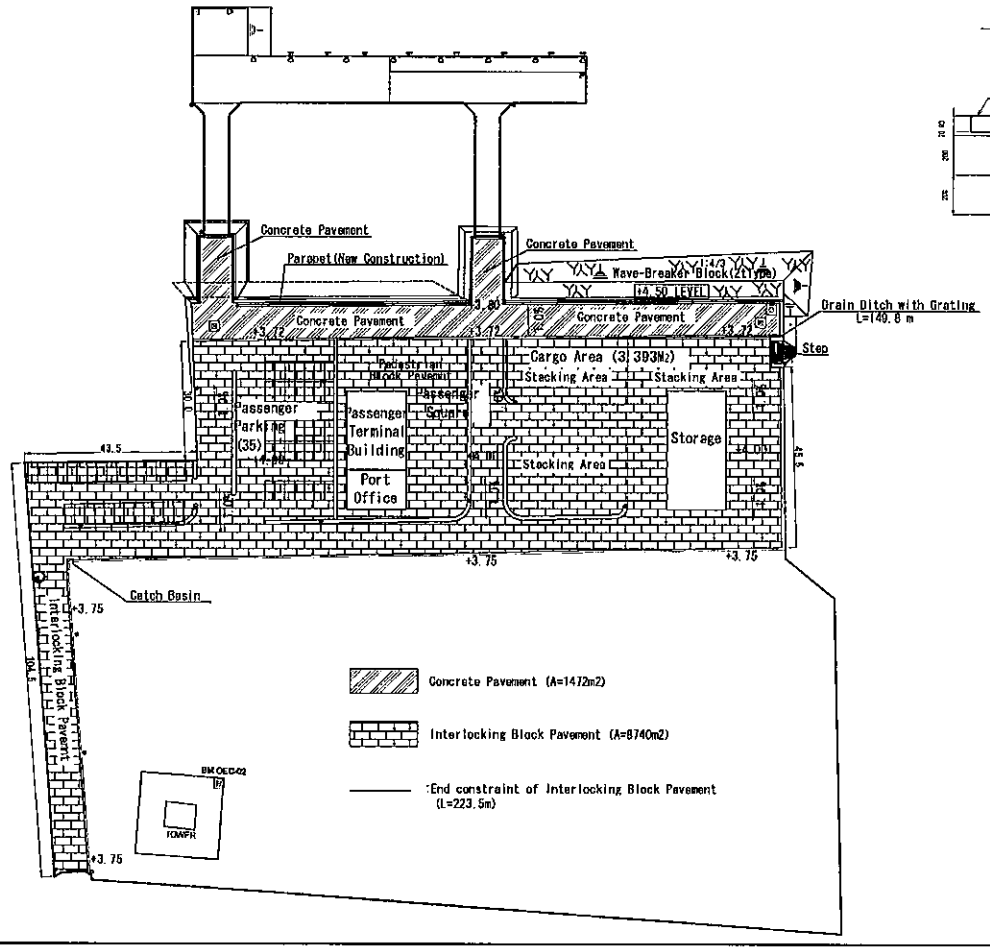
BASIC DESIGN STUDY ON DECOSSE PORT URGENT REHABILITATION PROJECT IN TIMOR-LESTE

TITLE OF DRAWING:	WAREHOUSE EXISTING ELEVATION		
SCALE:	1/200	DRG NO:	11
JAPAN PORT CONSULTANTS, LTD			
APPROVED BY:	CHECKED BY:	DESIGNED BY:	DRAWN BY:	ISSUE DATE: JUNE 07

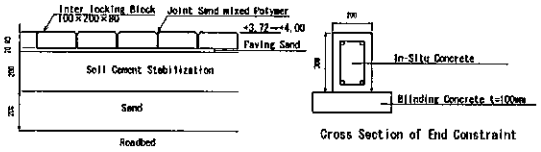

CORRUGATED GALVANISED STEEL
ASPHALT ROOFING
PLYWOOD
2,050
30,000
2,050
▼R2FL
▼R1FL
▼1FL
▼GL
3,000
5,500
200
500
2,500
30°
1,250
GENERATOR
STORAGE
1,400
5,000
30,000
Y1B
Y2B
Y3B
Y4B
Y5B
Y6B
Y7B
A-A' SECTION
10
15,000
X1B
X2B
X3B
X4B
B-B' SECTION
C-C' SECTION
BASIC DESIGN STUDY ON DECISSE PORT URGENT REHABILITATION PROJECT IN TIMOR-LESTE
JAPAN PORT CONSULTANTS, LTD

Pavement Plan

Paving Plan S=1/1000

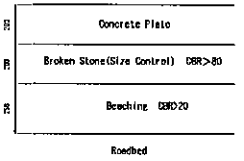


Pavement Cross Section S=1/200



Cross Section of Interlocking Block Pavement

Cross Section of End Constraint

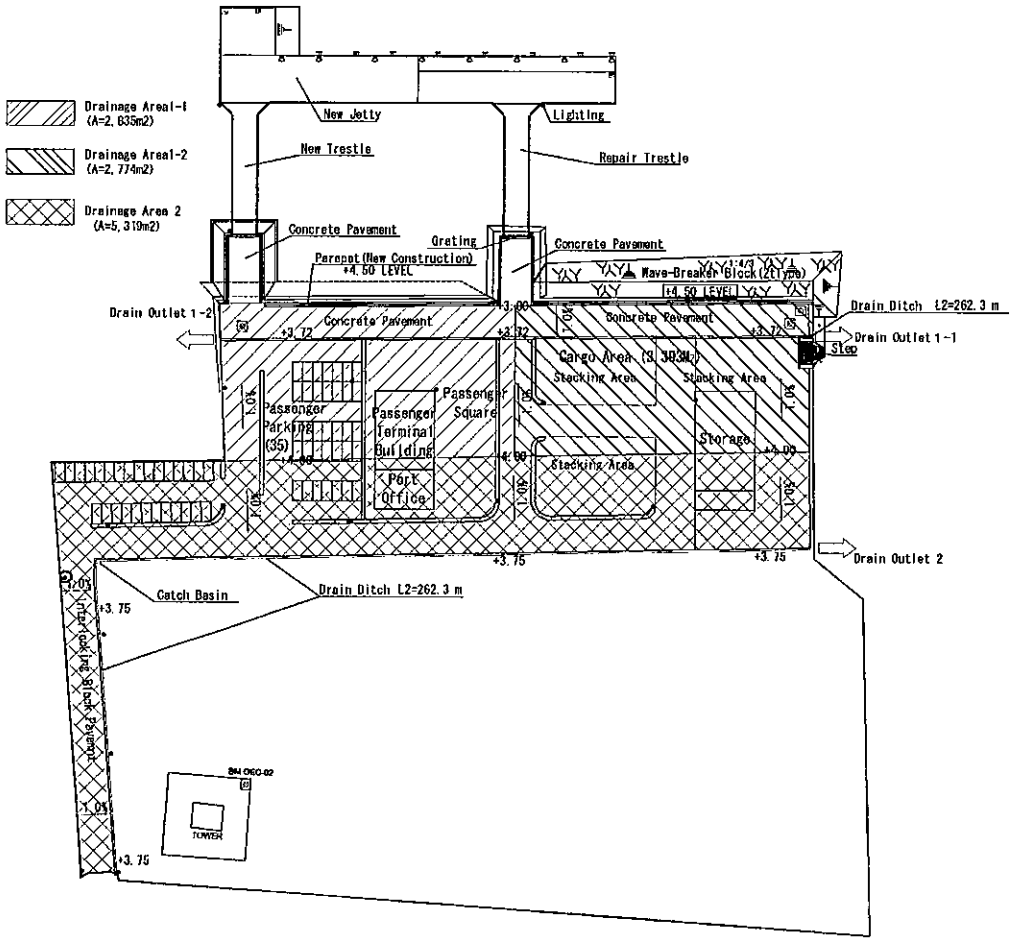


Cross Section of Concrete Pavement

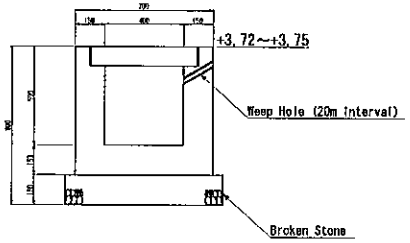
BASIC DESIGN STUDY ON OECUSSE PORT URGENT REHABILITATION PROJECT IN TIMOR-LESTE			
TITLE OF DRAWING	Pavement Plan		
SCALE=	1/1000, 1/200	DRG NO.	14
JAPAN PORT CONSULTANTS,LTD			
APPROVED BY	CHECKED BY	DESIGNED BY	DRAWN BY

Drainage Plan

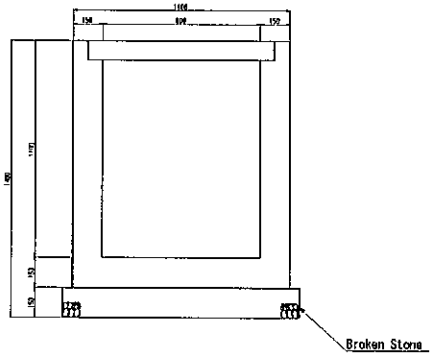
Drainage Plan S=1/1000



Drain Ditch Cross Section S=1/200



Drain Ditch (B400×H500)



Catch Basin (B800×L800×H1000)

BASIC DESIGN STUDY ON DECUSSE PORT URGENT REHABILITATION PROJECT IN TIMOR LESTE	
TITLE OF DRAWING	Drainage Plan
SCALE	DWG NO. 15
JAPAN PORT CONSULTANTS,LTD	

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

This Project will be carried out in compliance with the Japanese Grant Aid Guideline. After the Government of Japan approves the Project, both Governments will exchange the Notes. Then the implementation of the Project will start. East Timor's authority in charge is Port Authority (APORTIL), which is responsible for providing overall management of the Project, obtaining the required permits and licenses, and coordinating with the other organizations concerned.

(Basic Implementation Policy)

The Project will be implemented in accordance with the following basic policies.

① Since any Japanese Grant Aid project is required to be completed within a specified period, it is necessary to develop appropriate plans for construction methods, materials and equipment procurement, processes, and quality control and thereby carry out work under an appropriate execution management.

② Since Oecusse is an enclave, there is expected to be big constraints related to the procurement of machines and materials, arrangement of local contractors and communication with the client, APORTIL. Therefore, the consultants will deploy not only a resident engineer, but also a sub-resident engineer in order not to cause any trouble during the time the resident engineer is in Dili for discussions with APORTIL.

③ Electricity and water are in short supply in Oecusse. It is also feared that there is a lack of adequate accommodations. In order not to inconvenience the people of Oecusse, water, electricity and accommodation will be secured by the Japanese contractor himself as much as possible.

④ When it comes to employing local people, as many as possible will be hired. Local customs and traditions will be respected.

⑤ In executing the construction work, daily communication with the relevant local authorities and NGO bodies will be conducted in order to maintain good relations with local society and to take necessary action to prevent problems (such as those related to the environment) from occurring.

⑥ In executing the offshore construction work, it is necessary to get the weather forecast, especially hydrographic conditions, in advance in order to secure the safety of the offshore work.

2-2-4-2 Implementation Conditions

There is no natural or artificial breakwater at the site, and the calculated maximum wave height expected is some 5 m. (Visually observed maximum wave height is around 6m in the past). It is expected that there will be waves of 1 to 2 m height occasionally all throughout the year. Therefore a construction method safer against waves such as using precast beam and slab shall be adopted.

According to the local information and wave estimation it is expected that the sea condition will be rather rough during Dec. to March. And there is no suitable place for ship refuge in Oecusse. Ports which could offer refuge are Winny Port some 5 km away which is not shielded well from waves and Atapupu Port some 70km away which is shielded well. However both ports are in Indonesian territory. Therefore it is planned that the short-period marine works such as piling using working vessels will be avoided during 4 months from Dec. to March. The long-term marine works using working vessels such as floating crane will be avoided in principle and the on-land works utilizing temporary jetty will be chosen instead.

Attention will be paid to utilizing local materials such as manpower-made crushed stone and

sand as much as possible so that the project may contribute to the local economy. It will be important to obtain the opinions of local people to avoid unnecessary friction.

A residential area surrounds the project site and the noise and vibration of construction work will easily cause nuisance to the people. Therefore attention shall be paid to reducing the impact of noise and vibration.

Attention will be paid to the safety and health of employees with tropical diseases such as malaria, dengue fever.

2-2-4-3 Scope of Works

Summary of the work sharing between Timor-Leste and Japan is as follows.

(1) Work share of Japan

(a) Detailed design, Preparation of Tender documents, Tender assistance

(b) Facilities Development such as renovation of the jetty and construction of new facilities including :

renovation of existing jetty and trestle, expansion of jetty and trestle, renovation of revetment, installment of fenders and bollards, development of navigation aids, pavement of road and stacking yard, development of buildings (port office, passenger terminal, storage, generator room), installation of lighting, development of water supply and drainage .

(2) Work share of Timor-Leste

(a) Removal of existing temporary houses and equipment at site

(b) Repair of existing fence and construction of new fence

(c) Resetting of the ladder of the ferry NAKROMA to the left side

(d) Cost necessary for the procedures for various tax exemptions and bank commission fee for issuing Authorization to Pay

2-2-4-4 Consultant Supervision

After E/N is made and concluded, consultancy contract regarding the implementation of this project will be promptly made between APORTIL and a consultant. Thereafter the Consultant will conduct the services such as detailed design, preparation of tender document, tender assistance, construction supervision etc. and will be responsible thereof until the handover of facilities, implementation of soft components, and the defect liability period are finalized.

(1) Consultancy Service Execution Plan

1) Detailed design

The consultant will implement the detailed design work following the results of basic design and survey work. The work will contain the following.

- Reviews of the findings of basic design and survey work
- Preparation of the Tender documents

2) Selection of contractor

After the completion of the tender document preparation APORTIL will implement the selection of a Japanese contractor with the assistance of a consultant. The assistance work will include:

- Public announcement of tender

- Pre-qualification of tender
- Pre-tender meeting
- Answering to tender's question
- Evaluation of tenders
- Contract negotiation

3) Construction supervision

After receiving the order for commencement from APORTIL, Consultant will start the construction supervision work.

The construction supervision work will be performed in accordance with the specifications of the contract and observing the power and authority given to consultant in the contract.

To fulfill his rights and obligations under the contract the Consultant will periodically report to APORTIL the progress of the work and APORTIL will instruct the contractor basically in writing to improve the situation regarding progress, quality, safety, payment etc.

(2) Project Personnel Plan

Necessary personnel and their services to implement tender assistance and construction supervision services are described hereunder.

- Team leader (Responsible for the whole work)
- Document specialist (Preparation of tender document)
- Contract engineer (Contract)
- Resident engineer
- Assistant resident engineer
- Architect, Equipment engineer, Electrical engineer (short period)

2-2-4-5 Quality Control Plan

Quality control is basically in accordance with the Japanese "Common Specifications for port and harbor construction".

Attention is specifically to be paid to "Table 2-2-16 Quality Control Items" to secure the quality which will be specified in the Tender (Contract) Document.

Table 2-2-16 Quality Control Items

Work		Item	Description
Concrete Mixing & Casting	Site	Compression Strength Test & etc.	• Trial mix to be performed 35days before casting concrete. Test samples to be taken each 3 for 7, 28 days compressive strength test. Trial mix with new mix proportion to be performed again in case it is expected that the design mix has failed to attain the required strength judging from 7days strength and air content. • During construction work every 100m3 or once a day similar test as described above to be performed. • Temperature of concrete during casting to be kept within 5℃～35℃.
	Plant	Particle size Distribution Test of Aggregate	• Results of particle size distribution test to be submitted upon arrival of aggregates
		Salinity Test	• Results of salinity test to be submitted regularly during casting concrete
Re-bar Bend Erection		Material	• Check of length, diameter, number • Check of defect such as rust • Check of storing measure such as support, sheet-covering and etc.
		Bend	• Check differences from drawings
		Erection	• Check differences from drawings regarding space, lap location, lap length • Check of rust and contamination
Formwork Support		Before Installation	• Confirm the capacity checking design calculation of support and form work in advance • Re-check of rust and contamination of re-bars
		After Installation	• Check covering of re-bar • Check dimension of concrete structure whether within allowable tolerances
Steel Pipe Pile		Material	• Check length, diameter, number • Check of rust and contamination
		Driving	• Pile driving record to be made with all piles • Rebound record to be measured with all piles

2-2-4-6 Procurement Plan

(1) Material Procurement Plan

Presently in Timor-Leste most construction materials are imported except sand and stone. And most are imported from neighboring Indonesia. In this project as well most materials will be imported from Indonesia. In addition plywood, timber, and cement are import products, however these materials can be procured like domestic products.

As to those materials not produced in Indonesia such as rubber fender and bollard, those will be imported from Japan. Table 2-2-17 shows the possible major supply source of materials. Australia could be considered as a possible material supply source country, however it has been excluded as the practicality of importing goods from Australia could not be confirmed in hearings in Timor-Leste.

Table 2-2-17 Source Country of Major Materials

Material \ Source	Timor-Leste	The 3rd Country	Japan	Remarks
Cement		o		40kg
Aggregate	o			
Re-bar		o		
Plywood	o			
Timber	o			
Steel pipe pile		o		
Steel(H-shaped)		o		
Oil(fuel)	o			Including O_2, C_2H_2
Special			o	Rubber Fender, Bollard

(2) Equipment Procurement Plan

Construction equipment which can be procured in Timor-Leste is limited, especially working vessels for marine works since this type of work has rarely been conducted here. Most of the construction equipment in Timor-Leste is brought from Indonesia and most of the equipment was originally made in Japan. Therefore on-land multipurpose equipment such as truck-crane and backhoe will be planned to be imported as used equipment from Japan taking import tax into account. Working vessels such as pile driving barges are planned to be mobilized from Indonesia. (See Table 2-2-18)

Table 2-2-18 Source Country of Major Equipments

Equipment \ Source	Timor-Leste	The 3rd Country	Japan	Remarks
Backhoe 0.6m3			o	Excavating/Loading/Breaking
Breaker 600kg			o	Breaking Concrete
Wheel Crane 40t			o	2units, Multipurpose
Pile Driving Barge D45		o		Pile Driving
Batcher Plant 10 – 20m3/h			o	Concrete
Agitator Car 3m3			o	Concrete
Truck 8 t			o	Material & PC member Transportation of vehicles
Dump Truck 4t			o	Sand/Stone/Soil, Transportation
Shovel Loader 1m3			o	Batcher Plant, Pavement
Vibration Roller 1t			o	Pavement
Generator 10, 100KVA			o	

2-2-4-7 Operational Guidance Plan

The project shall not have any initial operation guidance.

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

(1) Background

There are some points to be tackled about the terminal operation.

①Since the pier faces open sea, vessels may be sometimes constrained from using the pier

because of high waves.
②Since the pier is shared by the ferry and cargo vessels, APORTIL sometimes should inform cargo vessels of their due arrival time and cargo handling time.
③Since a lot of passengers and guests for greeting and sending-off, many ferry-using vehicles and vehicles for pick-up gather in the terminal in a certain short time, traffic control in the yard should be managed appropriately.
④Pier management will be done by Oecusse Port office which will be newly established in time of the pier opening. Most of staffs will be new employees.

Based on those backgrounds, it is important to instruct APORTIL staffs in how to manage and operate the new terminal in order to establish appropriate management system on the terminal. The instruction will be done through operation manuals of the pier and the yard which will be prepared in advance by a Japanese consultant.

(2) Activities

Outline of the soft component activities are as follows.

Target:

The target of the Soft Component Plan is to set up the Oecusse Port office and to establish a safe and efficient management system of the terminal by APORTIL

Outcome:

①Establishment of jetty management and operation system
②Establishment of yard management and operation system

Activities:

①-1; Guidance on safe use of pier
①-2; Establishment of information acquisition system on weather data
①-3; Drafting of management and operation manual on pier
①-4; Guidance on regular walk-around inspection of pier
②-1; Guidance on traffic rule in the yard
②-2; Drafting of operation manual on passenger terminal and parking lots
②-3; Drafting of operation manual on warehouse and stacking yard
②-4; Guidance on regular walk-around inspection of relevant facilities in the yard

A consultant capable of giving total advice on the operation of the port terminal cannot be found locally. In addition, the operation of the terminal is closely related to the facility design. From those reasons, it is desirable to assign a Japanese consultant who was involved in the Project' basic design study as the instructor of the soft component plan. The Japanese consultant will instruct APORTIL staffs in Oecusse office in how to manage and operate the pier and the yard.

(3) Schedule of the soft component plan

Japanese experts shall prepare the draft manual of the terminal operation in Japan in advance. The instructions to APORTIL staffs will start 0.5 months before the terminal opening by using the draft manual. After the terminal opening, on-site evaluation about their management and operation will be done and some recommendations shall be done to APORTIL based on the evaluation.

Tentative schedule of the soft component plan is shown in Figure 2-2-13.

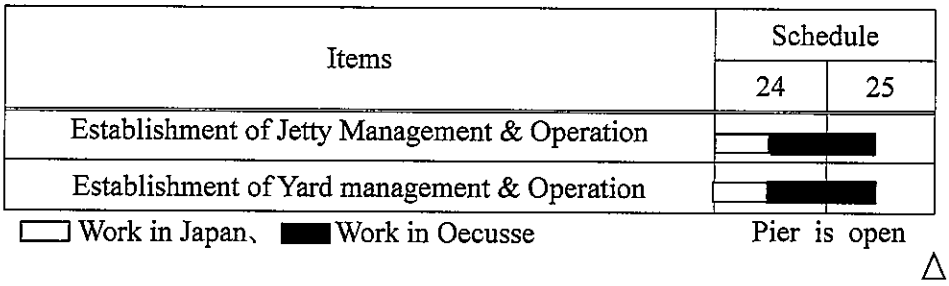


Figure 2-2-13 Tentative Schedule of the Soft Component Plan

2-2-4-9 Implementation Schedule

The construction work of this project consists mainly of repair of the damaged jetty, extension of the jetty, repair of the revetment, construction pf buildings, road & yard pavement, and installation of navigation aids. Implementation schedule of this project is summarized in Figure 2-2-14.

It is estimated that the implementation of this project will take 6 months from signing the consultancy agreement through the detail facilities designing, the preparation of the tender documents and the assistance on the subsequent bid tendering. Construction work at site is scheduled to be completed within 18.0 months after commencement. The entire project period including soft component plan is approximately 24.0 months.

Implementation Design Time Schedule

	2010	2011					
	12	1	2	3	4	5	6
Work	1	2	3	4	5	6	7
Grant Agreement (G/A)	△						
Field Survey		■					
Detailed Design		▭	▭				
Preparation of Tender Document			▭				
Approval of Tender Document				■			
Prequalification Process				▭			
Tender Process					▭	▭	
Tender, Evaluation of Tender							■

Construction Work Time Schedule

	2011							2012											
	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Work	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
(Initial Work)																			
Preparation	■	■																	
Mobilization		▭	▭	▭	▭														
Temporary Work				▭	▭														
(Marine Work)																			
(Jetty)																			
New Jetty					▭	▭	▭	▭	▭	▭	▭	▭	▭	▭	▭	▭			
(Existin Jetty)																			
Existing Jetty					▭	▭	▭	▭	▭	▭	▭	▭	▭	▭	▭	▭	▭		
(Revetment)																			
Revetment					▭	▭	▭	▭	▭	▭	▭	▭	▭	▭	▭	▭	▭		
(On-land Work)																			
Pavement, Drainage									▭	▭	▭	▭	▭	▭	▭	▭	▭	▭	
(Building)																			
Passenger terminal, Storage								▭	▭	▭	▭	▭	▭	▭	▭	▭	▭		
(others)																			
Lighting, Navigation Aid												▭	▭	▭				▭	
Site Clearance																		■	
(Soft Component Plan)																		▭	▭
	△																		△

Commencement mid-June, 2011 — Completion mid-Dec, 2012

Figure2-2-14 Tentative Implementation Schedule

2-3 Obligations of Recipient Country

The Government of Timor-Leste should execute the following procedures and undertakings in accordance with Japanese Grant Aid Scheme.

(1) Procedural Matters

①To secure necessary permissions, licenses be specified in the law on Environmental Impact Assessment for implementing the Project, if necessary,
②To open an account in the name of the Government of the Democratic Republic of Timor-Leste in a bank in Japan (hereinafter referred to as "the Bank") for the acceptance of Japanese Grant Aid and payment to a Japanese consultant and a Japanese contractor,
③To issue an Authorization to Pay (A/P) to the Bank soon after making an agreement with the Japanese consultant and making a contract with the Japanese contractor, and to make a contract of Banking Arrangement with the bank which will be a proxy for the Government of Timor-Leste,
④To bear an advising commission of an Authorization to Pay and payment commissions to the Bank,
⑤To provide the space for the site office, warehouse, materials stock yard and disposal yard for waste concrete and others for the execution of the Project,
⑥To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,
⑦To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the Democratic Republic of Timor-Leste with respect to the supply of the products and services under the verified contracts,
⑧To accord Japanese nationals, whose services may be required in connection with the supply of the products and services under the verified contracts, such facilities as may be necessary for their entry into the Democratic Republic of Timor-Leste and stay therein in safety for the performance of their work.

(2) Undertakings

①To clear the container houses and other equipment which was used by Japanese PKO and the remains of old port office in the project site prior to commencement of the construction,
②To repair some broken parts of the fences which surround the project site and to improve the fences which surround the beacon light tower,
③To issue a permission to the contractor on pumping up groundwater in the project site at the time of starting the project,
④To provide facilities for the distribution of electricity in and around the site by the completion of the construction,
⑤To prohibit people other than those related to the construction from entering into the site without any permission,
⑥To provide necessary office equipment, air conditioners and office furniture by the time the terminal opens,
⑦To ensure other necessary expenses which won't be covered by Japanese Grant Aid

2-4 Project Operation Plan

(1) Operation Plan

The jetty is located at open sea. Large waves are expected to attack it during the rainy season. In general, a ferry and a cargo vessel can berth and carry out handling works when wave height is less than 50 cm. The wave height in front of the jetty was estimated for the past 5 years. Waves less than 50 cm high occur 85 % of the time throughout the year. It may not be safe to use the jetty at other times. (See Table 2-4-1)

Table 2-4-1 Annual rate of safe operation
(Rate of wave less than 50cm high appearing in front of the jetty)

Season	Rate of Safe Operation
Dry Season (May~October)	82.5
Rainy Season (November~April)	86.8
Year-around	84.8

If a vessel tries to continue to berth and handle cargoes when large waves attack the jetty, there is a danger that cargo could be damaged and that fenders and curbs on the jetty might also be damaged by bad cargo handling works. Furthermore, the hull of the vessel itself may also be damaged. A full-time staff in charge of safety navigation and jetty operation should be deployed. He/she should get the weather information, especially wind and wave data in the sea, from Meteorological Agency prior to a vessel arriving. He/she should instruct the vessel to evacuate from the jetty, if necessary.

There is no person to manage the ferry terminal at Oebau at present. Some crews stand at the entrance of the ferry ramp and instruct people not to get on board at their discretion. But once people start to get on board or land, the traffic flow is not well controlled. The traffic flow of passengers, people who have come to meet or send off others, ferry-using vehicles and pick-up buses and trucks should be controlled separately to ensure the prompt boarding and landing time and safety by terminal staff.

People and vehicles gather at the yard for a short time when the ferry arrives at or leaves the jetty. In order to avoid congestion in the yard, traffic control staff should be deployed and guide people and vehicles for securing safe traffic flow.

As mentioned above, the terminal operation should be conducted in such a way that safe maritime and land traffic can be realized.

Other staff, such as ticket counter staff, line handling staff and warehouse keeper, should be deployed at the port office. And it will be very important to establish a system to collect data for various port statistics, such as ferry traffic, cargo vessel traffic, cargo handling volume and warehouse storage volume.

The organization chart of the new port office is proposed as shown on Figure 2-4-1. Some staff can hold other posts. The total number of staff is estimated to be 10~15persons.

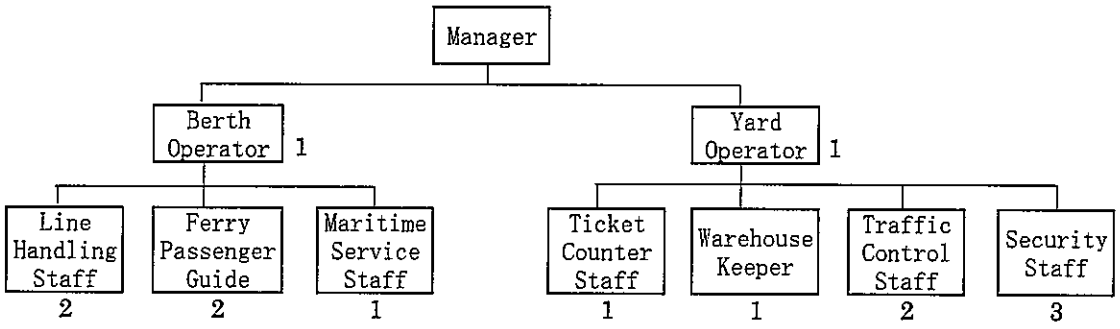


Figure 2-4-1 Organization Chart of Oecusse Port Office

(2) Maintenance Plan

Periodical walk-around inspection is a key part of a maintenance plan. If a big earthquake, a tsunami or a collision by a vessel happens unexpectedly, immediate inspection should be conducted to check the safety of the port facility. The contents of routine maintenance are shown in Table 2-4-2. Civil engineering facilities and buildings are necessary to be checked by walk-around inspections once a year. But the most important thing is that every staff should observe the facilities daily, especially when the ferry and cargo vessels arrive, and verify whether or not there is any damage to facilities. The daily check can be done at the time when the ferry or cargo vessels arrive and leave, when passengers and vehicles get on board and land and when cargo is handled at the jetty and carried into the warehouse. If any unsoundness is found, a quick-fix measure should be taken, if possible. Then full-scale measure should be examined. It is necessary to outsource the inspection works to check the steel pile condition in the sea because it is difficult for office staff to check it. Those inspection works should be once every 3 years.

Table 2-4-2 Routine Maintenance

Facility	Routine Maintenance
Jetty	Once a year walk-around inspection including the check of the concrete at the under side of the jetty by using a boat
	Inspection carried out every three years by divers including the measurement of the thickness of the steel pile and the confirmation of the effectiveness of electrolytic protection method by electric potential method.
Fender	Daily walk-around visual confirmation
Bollard and Bollard	Daily walk-around visual confirmation
Building	Once a year walk-around inspection
Navigation Aid Facility	Once a year walk-around inspection, Periodical cleaning of solar panel
Lighting	Daily walk-around inspection
ICB Pavement	Daily walk-around inspection
Drainage	Periodical scavenge

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

(1) The Amount to be Borne by the Government of Timor-Leste

① Removal of container houses, idle materials and equipment, and the ruins of the old port office building:	US$ 35,000
② Repair of fences:	US$ 45,000
③ Relocation of the ladder on the ferry 'NAKROMA':	US$ 90,000
④ Commission fee to the bank for issuing A/P	US$ 11,000
⑤ Environmental Monitoring	US$ 49,500
TOTAL	US$ 230,500

There is no charge for opening a bank account based on Banking Arrangement (B/A). However it is necessary for the Government of Timor-Leste to pay a commission for notifying a consultant and a contractor at the issuance of Authorization to Pay (A/P) and commission for paying based on A/P to a bank. The total cost for the bank is roughly estimated as US$ 11 thousand.

The amount to be borne by the Timor-leste side is roughly US$ 230,500 in all.

(2) Conditions of Cost Estimation

The main conditions of the cost estimation are as follows.

1. Date of estimation	February 2010
2. Exchange rate	US$ 1 = 92.15 Japanese Yen
3. Execution term of work:	The period of the project is within 24 months. The schedule of bidding and procurement is shown on the execution schedule.

2-5-2 Operation and Maintenance Cost

The port office will have a staff of 10-15 persons to manage, operate and maintain the jetty and the terminal. The salary of those staffs should be provided as the operation and maintenance cost. The number of staffs at Dili Port is now 55 persons. The number of staff at Oecusse Port is about 1/5 of that of Dili Port. That means the salary cost of Oecusse Port can be estimated 1/5 of that of Dili Port (US$30,000 based on the actual budget of 2009 fiscal year). Some of the staffs who now work in Dili Port may be dispatched to Oecusse Port for the port management and operation of Oecusse Port. The actual increase of salary cost may be smaller than that. But the necessary salary cost for the Oecusse Port management is estimated as the above-mentioned method.

The periodical maintenance should be conducted by APORTIL staff directly. The necessary maintenance cost is estimated at 1% of the initial construction cost of each facility. Those are exchange costs of consumables and spare-parts. The inspection of the steel piles should be outsourced and those outsourcing costs are estimated respectively. And the replacement cost of expensive equipment such as fenders and batteries should be provided periodically.

Consumption cost of electricity and water is estimated by multiplying annual consumption

volume by unit rate. But the increase of ferry users is not assumed here. The user volume is assumed to be constant from the first year. (See Table 2-5-1)

Table 2-5-1 Operation and Maintenance Cost Estimation

Items	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year	Total	Note
Salary	30	30	30	30	30	30	30	30	30	30	300	Estimate 1/5 of personnel cost of Dili Port
Inspection of Steel Pile				10			10			10	30	Outsource to a specialized firm every 3 years
Inspection of Building	10	10	10	10	10	10	10	10	10	10	100	Estimate of about 1% of the initial construction cost
Exchange of Fender				*			*			*		Estimate to exchange one unit every 3 years
Bollard/Bitt	10	10	10	10	10	10	10	10	10	10	100	Estimate of about 1% of the initial construction cost
Repair of Revetment												
Repair of Revetment												
Inspection of Lighting												
Inspection of Navigation Aid Facility				*			*			*		Estimate to exchange one unit every 3 years
Consumption of Electricity, Water	5	5	5	5	5	5	5	5	5	5	50	Multiply consumption volume by unit price
Total	55	55	55	65	55	55	65	55	55	65	580	

(Unit: 1,000US$)

2-6 Other Relevant Issues

Container houses and other equipment which were used by Japanese PKO and the ruins of the port office building which was used by the Indonesian Government remain in the project site. Those facilities and building should be removed and cleared prior to the commencement of the construction work in order to implement the project.
The Government of Timor-Leste should disclose information of the project and have some meetings with residents around the site in order to impose an effective check on the construction work in advance. And a security system for Japanese staff should be provided, if necessary.

Chapter 3 Project Evaluation

Chapter 3 Project Evaluation

3－1 Recommendations

3-1-1 Obligations of the Government of Timor-Leste

The Government of Timor-Leste should tackle the following matters in advance to implement the project.

①To open an account in the name of the Government of the Democratic Republic of Timor-Leste in a bank in Japan (hereinafter referred to as "the Bank") for the acceptance of Japanese Grant Aid and payment to a Japanese consultant and a Japanese contractor as soon as possible after signing Exchange Notes,

②To clear the container houses and other equipment which was used by Japanese PKO and the remains of old port office in the project site prior to commencement of the construction, except for a water tank, (The water tank will be utilized by the Japanese contractor.)

③To issue a permission to the contractor on pumping up the groundwater in the project site prior to commencement of the construction

④To issue working visas to Japanese persons concerned to the Project

⑤To finish the necessary procedure on tax exemption of the products purchased under the Grant Aid before the arrival of those import products in Timor-Leste.

3-1-2 Recommendations to the Government of Timor-Leste

The Government of Timor-Leste is recommended to tackle the following matters to implement the project effectively.

①The new jetty shall be a shared berth. It is important to establish liaison system between APORTIL and port users, such as ship owners, cargo owners and others. Cargo vessels must not influence the ferry berthing and the berth should be utilized effectively by cargo vessels.

②People and vehicles gather at the yard for a short time when the ferry arrives at or leaves the jetty. In order to avoid the congestion on the jetty and in the yard, the terminal should be managed properly for securing safe traffic flow.

③The jetty is located at open sea. Large waves that can cause damage to ferry and cargo vessels are expected to attack sometimes. APORTIL should observe carefully the wave condition during stormy weather. APORTIL should establish a system to instruct the vessels to evacuate from the jetty, if necessary.

④As the jetty faces the open sea, the fenders may be damaged severely because of the rolling and pitching of vessels during berthing. Fenders are very important for preventing damage to vessel hulls and for the load-bearing capacity of the jetty. APORTIL should conduct walk-around inspections often and prepare the necessary maintenance budget to be able to replace them soon if found to be damaged.

⑤The port management and the ferry operation have been assisted by other donors. After the opening of Oecusse new terminal, a comprehensive maritime transport management system should be established in order to improve the maritime condition between Dili and Oecusse.

3-2 Project Evaluation

3-2-1 Suitability of the Project for Japanese Grant Aid

Suitability of the Project in terms of qualifying for Japanese Grant Aid is evaluated from various points of views, such as benefit group of the Project, the target and effect of the Project, management system of the implementation agency, profitability of the Project, environmental impact etc.

(1) Benefit group of the Project

Oecusse is an enclave surrounded by East-Timor in Indonesia. It is necessary to pass through both borders with Indonesia when traveling back and forth to Dili and for the purpose of trade with other domestic areas. Road transportation causes heavy economic and time burdens on people in Oecusse. Therefore the improvement of the ferry transportation system is indispensable for Oecusse People. The completion of the new jetty will have a direct positive effect on ferry passengers (35,000 people as of 2008). It will also benefit the 68,000 people of Oecusse by securing safe and stable seaborne cargo traffic for daily commodities and construction materials which are necessary for the Oecusse economy. That will lead Oecusse to become economically independent in future. Furthermore the Project will contribute to the stable economic and social development of the whole of Timor-Leste (the population is 1.08 million people in 2008).

(2) The target and effect of the Project

The Project aims to improve the maritime infrastructure on ferry transportation between Dili and Oecusse, and to develop a seaborne gateway of cargo transportation at Oecusse. At present, there are ferry services between Dili and Oecusse twice a week. But the berthing conditions are not safe and stable. After the completion of the new terminal, the berthing conditions will be improved and that will lead to increased frequency of ferry service and greater capacity of passenger transportation. Direct calling of cargo vessels will lead to a reduction in transportation costs for commodities and materials in Oecusse.

(3) Compatibility with superior national development plans

The Government of Timor-Leste is now revising the National Development Plan targeted at 2020. By the time of publishing the new plan, most projects are implemented on the basis of a tentative national development plan which is revised every year. Among those plans, the improvement of Oecusse Port is ranked as one of the important national projects in order to improve the safety of maritime transportation and social welfare of Oecusse people. It is also recognized that the Project will have a positive impact on the national economy due to the improvement of maritime transportation network.

(4) Management and maintenance system of the implementation agency

APORTIL, which manages Oecusse Port, has an engineering division. The management and maintenance works are done mostly by the division which has mechanical, electrical and civil engineers. After opening the new terminal, APORTIL has a plan to establish a permanent office by dispatching a person concerned from the head office and employing local staffs. There will be no problems on personnel assignment.
As for its port administration, APORTIL depends on the subsidies from the central government for capital investment and ferry operation. It will need some time to reduce the subsidies, but

other necessary expenses are covered by the incomes from the port operation. The maintenance cost is also covered with those incomes. This means that no major financial problems are envisaged regarding port management.

(5) Profitability of the Project

The project aims to establish a safe and stable maritime transportation system between Dili and Oecusse. The ferry fare is set up in consideration of the amount which ferry users are able to bear. Judging from the amount of the subsidy from the central government for the ferry operation cost, the subsidy will continue for the time being, even if the number of ferry passengers greatly increases due to the improved system. The Project will not produce any profit at all.

(6) Environmental Impact

The construction site is located in the same area where the old facility was used. The area is not used for any specific purpose. Because some debris will be generated during the demolition work of the concrete slab of the old jetty, an environmental management plan, such as providing a countermeasure to prevent water pollution and dumping debris into a designated area, will be prepared in advance. And the environmental surveys related to the construction work will be done during the construction period. The environmental impact can be minimized through those measures.

(7) Difficulty of implementing the Project

The project is to construct a jetty for ferry and some buildings such as a passenger terminal in the old port terminal which was utilized during Indonesian rule. There are no major problems from the standpoints of construction technique and cost. The project is suitable for a Japanese Grant Aid scheme.

(8) Necessity of Japanese Technical Assistance

There is no special technical point in the Project. But the jetty will be constructed in the open sea. It is necessary to secure the safety of the construction work and to confirm the safety of utilizing the jetty. Japan has a lot of knowhow in constructing jetties on islands which face the open sea, and management knowhow on their terminal operations. That experience will be utilized in the Project effectively.

As mentioned above, suitability of the Project for Japanese Grant Aid is evaluated from 8 points of view. There is no serious problem from all 8 points of view. The Project is urgent and indispensable to improve civil minimum in Oecusse. The project will contribute to enhancing economic development and improving the social stability in Oecusse. Furthermore, the economy of the whole country will be improved through the improvement of the social and economical stability in Oecusse and the regional disparities in income shall be greatly rectified. That will bring peace and social stability to Timor-Leste at large. It is thus suitable that the Project will be implemented under Japanese Grant Aid.

3-2-2 Evaluation of the Project

(1) Direct effects

(Improve the safety of port use)

Currently, because water depth in front of Oebau terminal is shallow by the influence of sand drift, ferry sometimes can not close to slope sufficiently, when tide is low. Therefore, passengers and vehicles are often forced to get on and off by immersing themselves to the waves, and the situation of safety to use port is very low. By ferry enter service at jetty constructed in this project, the present berthing time taking more than 30 minutes can be reduced and passengers and vehicles are able to get on and off safety. And since the jetty is designed to be able to separate the doorways for passengers and vehicles, There will be also encouraged to board ferries faster than before.

(Commencement of cargo vessel service)

Daily commodities and construction materials which are used in Oecusse have so far mostly been carried in by ferry except dangerous cargoes which are prohibited to be carried by ferry. Some cargoes are imported from Indonesia by road. The construction of the jetty will allow cargo vessels to call at Oecusse Port. That means some cargoes can be imported by ocean going vessels directly, instead of the ferry. This will reduce the transportation cost of cargoes and expedite the procurement of those cargoes. In order to secure those cargoes for Oecusse people, cargo vessels are expected to call at Oecusse Port at least once a month. The volume of handling cargo at Oecusse Port is also expected to increase year by year after opening the terminal.

(2) Indirect effects

(Reduce the gap between domestic)

Because supplies in Oecusse district are transported by ferry and road through Timor of Indonesian territory, there are constraints about supply of daily commodities, and the commodity price in Oecusse district is relatively expensive compared to the capital region.

If 2000DWT scale cargo ship enter service at the jetty constructed in this project, transport cost of cargo would reduce, and it leads to stable supply of goods and stable prices. And it is expected to promote correction of living gap between Oecusse district and the mainland.

(Improvement of security)

Because Oecusse district is enclave surrounded by Timor of Indonesian territory, marine traffic is the only way to connect capital Dili without through other countries.

Implementing this project encourages the maritime traffic to be established appropriately, and it is expected to improve the security of residents in Oecusse district.