ADMINISTAÇÃO DOS PORTOS DE TIMOR-LESTE (APORTIL)
THE DEMOCRATIC REPUBLIC OF TIMOR-LESTA

PREPARATORY SURVEY REPORT
ON
THE PROEJCT FOR URGENT SHIFT OF FERRY TERMINAL IN DILI PORT
IN
THE DEMOCRATIC REPUBLIC OF TIMOR-LESTE

APRIL 2016

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

IDES INC.
JAPAN PORT CONSULTANTS, LTD.

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PREFACE

Japan International Corporation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to Joint venture of Ides Inc. and Japan Port Consultants, Ltd.

The survey team held a series of discussions with the officials concerned of the Government of Timor-Leste, and conducted a field investigation. 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 cooperation extended to the survey team.

April, 2016

Mr. Akira Nakamura
Director General,
Infrastructure and Peace building Department
International Corporation Agency

Summary

1. Outline of the country

The Democratic Republic of Timor-Leste (hereinafter, “Timor-Leste”) consists of the eastern half of the island of Timor where is located in the eastern end of Sundae archipelago at the center of Indonesian Islands group and Oecussi, an enclave in Indonesian territory in the western Timor. The population is about 1.21 million (World Development Indicator, 2014). About 20 percent of the entire population lives in the metropolitan Dili. The land area is about 14,900km2. Mountainous area constitutes about 60 percent of the land. The half of the land consists of steep slopes at a slope of more than 40 percent. In the rainy season, natural disasters such as landslides and floods occur because the land consists of fragile sedimentary layers.

Timor-Leste is a young nation which achieved independence in May, 2002 after colonization by Portugal for more than 400 years and annexation by Indonesia for 24 years. Since 2006, the political situation had become stable for about 10 years. Timor-Leste has kept going as a new nation. 70 percent of the population of Timor-Leste lives in the rural areas. They live on agriculture including coffee which is the sole exported product. The population under 15 years old is over 44 percent of the total population. The birth rate in 2012 is as high as 5.3 and 470,000 people will enter labor market in 2030. On the other hand, more than 40 percent of the country’s population lives under poverty and more than 50 percent does in rural area.

75,000 employments were created mainly by the demand of the public sector and 12 percent of the labor force is employed by the public sector in 2010. The labor force of the private sector except the oil sector is 63,200 in 2012 and it is expected that the employment of private sector will increase as the development of the sector.

The growth of GDP of Timor-Leste except for oil sector had been as high as over 10 percent until 2011, but since 2012, the growth rate has reduced to around 7%, which is half of the rate before 2011, due to the effects by the slowdown of the world economy. The annual rate of inflation until 2012 had been 10 to 12 percent but the government of Timor-Lest successfully restrained inflation by a policy called "Yellow Road framework in 2013". According to the policy, the government utilized the oil fund to control expenditure frame and secure financial stability for a long term. The government of Timor-Leste plans to spend US$364million except for Loans in the large-scaled public investments in 2015 based on the Strategic Development Plan: SDP. The main part of investments in the port sector is planned to be completed by 2018 and its amount is planned to be US$ 101.9 million from 2016 to 2018.

2. Background of the Project

Dili Port is the sole and the largest port located in the capital city of Timor-Leste. Japanese government has implemented various types of improvement projects including “The project for implementation of navigation aids and fenders” based on the development study for “Urgent restoration plan” in 2000. Asian Development Bank (ADB) implemented the Project for Improvement of Eastern Container Yard for the same period as a component of “Emergency Infrastructure Rehabilitation Project I” funded by Trust Fund for East Timor (TFET).

However, Dili port which is handled the international cargo does not establish the system of port security based on the SOLAS treaty. The safety operation for ferry passenger is needed in an urgent manner because of crossing problems between the container handling and passenger route. In addition the cargo handling volume is rapidly growth in connection with the economic growth in Timor-Leste. The lack of function in Dili Port becomes concerned about the adverse influence of economic activities in Timor –Leste because of the poor maintenance of the facilities and non-safety and inefficiency of operation. The government of Timor-Leste has been planned the new port development in Tibar which is located in west of Dili Port. It is prospected that Tibar Project will be completed in for 5 to 10years. Therefore, it is very important that Dili Port is used effectively now and in the near later future.

The government of Japan has been conducted the study of Data Collection and verification of Port and harbor sector in Timor-Leste in 2013 for clarify the policies and agenda of safety operation of Dili Port facilities in immediate need. The followings were indicated for the argent agenda;

1. To resolve the confusion of crossing between cargo handling and ferry passenger by the relocation of existing ferry terminal in the port of Dili,
2. To construct the fundamental infrastructure for future expansion of Dili Port as the passenger terminal in future by implement the multi ferry berthing jetty at once.

The government of Timor-Leste decided to purchase a new ferry from Portugal (hereinafter, “Portugal”) in 2015 and New ferry from Germany (hereinafter, “Nakroma2”) in 2018 to reduce the over crowed passengers and cargoes of the existing Ferry (hereinafter, “Nakroma”) and for the future demand. Therefore it is necessary to implement the multiple berthing jetty to accommodate two ferries at one time. The government of Timor-Leste requested the grant aid of “The project for Urgent Shift of Ferry Terminal in Dili Port (hereinafter, “The Project”) in November, 2013 to the Government of Japan (hereinafter, GOJ). The GOJ has decided to conduct the Preparatory Survey for the Project.

3. Outline of the study and Contents of the Project

JICA dispatched a team for Preparatory Survey for the Project for Urgent Shift of Ferry Terminal in Dili Port (hereinafter, "survey team") to Timor-Leste from June 29 to August 14, 2015 following the decision by GOJ. The survey team reconfirmed the contents of the request through the field survey and discussions with the Government of Timor-Leste. The government of Timor-Leste requested a ferry terminal as the mother port for three ferries including the existing ferry (Nakroma) and two ferries to be introduced. The survey team proposed JICA a plan for a terminal for the three ferries based on analysis in Japan following the survey in Timor-Leste. The specification of the jetty and platform, the method of construction and the cost estimation were determined based on the results of field investigation. JICA dispatched the survey team to discuss the results of the preparatory survey including Outline Design of the Project with the government of Timor-Leste from Jan 25 to 31, 2016. The government of Timor-Leste agreed to the Outline Design and the obligations of the both parties. Table 3-1 shows the outline of the Project.

Table 3-1 Outline of contents and scale of the Project

Name of Facility	Configuration and Dimension	Unit	Quantity
1.The jetty for Ferry	Main intended purpose is for mooring of Ferry and embarkation and disembarkation of the passengers and cargo vehicles		
	Jetty(Pier)	berth	2
	Design water depth：-11.5m		
	Length of Jetty (Mooring length：100m x 2 berth)	m	100
	Main part of jetty：20m width、100m length	m^2	2,000
	Foundation pile：Steel pipe pile D900xt14, Length=45.5m -39.0m	Number of pile	60
	Super structure of bridge pier：In-situ concrete	m^3	1,060
	Super structure：PC beam plus paving concrete	Number of PC beam	160
	Bollard：250kN Type	Number of Bollard	12
	Fender：V-500H, L=3.5m	Number of Fender	12
	Concrete curb：RC concrete	m^3	220

	Corrosion prevention : Cathodic protection (50yeras, 3.5Aanodic corrosion)	Number of cathodic	94
	Light beacon : Reach length of beacon light is 12miles	Number of Light beacon	1
2. Platform	Main intended purpose is for embarkation and disembarkation of the passengers and cargo vehicles from slope area		
	Dimension : 55mx52m + Deformed area (Irregular trapezoid type)	m^2	2,695
	Foundation pile : Steel pipe pile D800 x t12, L=31.0m PC pile D800, L=31.0m	Number of pile	30 80
	Super structure : RC concrete	m2	2,358
	Bollard : 250kN Type	Number of Bollard	4
	Corrosion prevention : Cathodic protection (50yeras, 3.0Aanodic corrosion	Number of cathodic	25
3.Adjusting Concrete	Hard core + Pavement concrete	m^2	400
4.Others (Accessories)			
Illumination	To be illuminating the platform and jetty	Unit	1
Water supply	To be suppling to Ferry at jetty	Unit	1
Power supply	To be suppling to Ferry alongside the jetty	Unit	1
Fire hydrant	To be installing at the jetty	Unit	1
Security equipment	To be securing the safety handling the vehicles and passengers using by CCTV and others	Unit	1

4. The implementation schedule

Expected implementation period is 29 months including the tender process. The expected period of detailed design is 8 months and the construction period is 21 months.

5. Project Evaluation

5-1 Relevance

The relevance of the project is considered high for the follows reasons;

1. Benefit

The benefits of the Project are expected to make impacts not only on the residents of the north coast but on all the people in Timor-Leste through contribution to the country's economic development.

2. Consistency of Strategic Development Plan: SDP

The development of the port infrastructure is determined in SDP as the essential implementation policy to ensure the growth of national economy. Therefore, the consistency with SDP is high. In addition, Dili Port will function as the traffic nodal point between land and maritime transportations after cargo handling will transfer to the new port in Tibar. After the transfer, Dili Port will play roles as the International Passenger terminal and ferry terminal.

3. Consistency of Japan's Aid Policy

"Making the base of economic activation" is one of the Japan's Aid policies for Timor-Leste. The Project satisfies the demand for Ferry transportation in the northern coast of the country. The Project will also build the base to activate economic relations between the capital region and rural areas as well as relations with the neighbor country, Indonesia.

5-2 Effectiveness

1. Quantitative effect

The Project is based on the plan to respond the future demand of ferry passengers. Table 5-1 shows the indicators of quantitative effects of the Project. The berthing hours of ferry and the number of passengers are the two indicators. The reference value is the actual record in 2014 and the target value is the prospect of figures in the 2021, in three years from the Project completion.

Table 5-1 Indicators of quantitative effect

Indicators	Actual Record in 2014	Target Value in 2021 【3 years after completion】
Berthing hours of Ferry (hours per day)	3 hours per day	24 hours
Annual number of Passenger	Atauro：21,634 passenger Oecussi: 44,036 Passenger	Atauro：28,392 passenger Oecussi: 70,985 passenger

Source: JICA survey team

2. Qualitative effect

a. Direct effect

- Improvement of safety for the passenger's embarkation and disembarkation

- Safe berthing of ferry regardless the tide level
- User-friendly terminal with the passenger terminal close by
- The jetty reduces the deflection of the ferry during the approach to the terminal. As a result, flexibility in bunkering work will be highly increased.
- Better transportation services for people because of more flexible navigation schedule and larger transportation volume due to the double berthing jetty
- Contribution to the development of new international Ferry Routes because of the character pf the ferry (Ro/Ro type) to be introduced from Portugal.

b. In-direct effect

- Contribution to the economic development of the enclave, islands and the northern coast with increased commodity between the rural areas and the capital city
- Conducing the rural economic development as potential transportation measures for tourists which are expected to increase in the future
- Clear demarcation of the role of Dili Port as nodal port for the International tourists and for domestic ferry after transfer of cargo function to the new port in Tibar.

3. Corporations with other JICA Project

JICA implemented Grant Aid projects, “The Project for the Rehabilitation of Dili Port in Timor-Leste (2006)” and “The Project for the Urgent Rehabilitation of Oecussi Port (2010) ” The port facilities rehabilitated by these two projects will be utilized more effectively if the Ferry Terminal will be improved by the Project. In addition, JICA has dispatched a long-term expert, “Port Facility and Safety Advisor (2012-2015)” and a short-term expert on maintenance of port facilities. These experts currently are on duty. The activities of the experts would contribute to strengthen capacity of APORTIL for proper maintenance of the facilities to be introduced by the Project.

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Abbreviations

ADB	Asian Development Bank
A/P	Authorization to Pay
APORTIL	Administração dos Portos de Timor Leste
B/A	Banking Agreement
DNTN	Director Nacional dos Transportes Maritimos
DWT	Deadweight Tonnage
EIA	Environmental Impact Assessment
E/N	Exchange of Notes
G/A	Grant Agreement
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft fur Internationale Zusammenarbeit
GT	Gross Tonnage
HPC	Hamburg Port Consultants
IDA	International Development Association (World Bank Group)
IFC	International Financial Corporation (World Bank Group)
IMO	International Maritime Organization
IUCN	International Union for Conservation of Nature and Natural Resources
JICA	Japan International Corporation Agency
JIS	Japan International Standards
KfW	Kreditanstalt für Wiederaufbau
MDE	Ministry of Development and Environment
MPF	Ministry of Planning and Finance
MTC	Ministry of Transport and Communication
NDE	National Directorate for Environment
ODA	Official Development Assistance
RC	Reinforced Concrete
SDP	Strategic Development Plan
SEIS	Simplified Environmental Impact Statement
SOLAS	International Convention for the Safety of Life at Sea
TFET	Trust Fund for East Timor, Asian Development Bank
TOR	Terms of Reference
UNTAET	UN Transition Administration in East Timor

Chapter 1. Background of the Project

1-1 Background of the Project

Dili Port is the sole and the largest port located in the capital city of the Democratic Republic of Timor-Leste (hereinafter, "Timor-Leste"). Japanese government has implemented various types of improvement projects including "The project for implementation of navigation aids and fenders" based on the development study for "Urgent restoration plan" in 2000. Asian Development Bank (ADB) implemented the Project for Improvement of Eastern Container Yard for the same period as a component of "Emergency Infrastructure Rehabilitation Project I" funded by Trust Fund for East Timor (TFET).

Dili Port is handling the international cargo but it is not established the system of port security in connection with SOLAS treaty. The safety operation for ferry passenger is needed in an urgent manner because of route crossing problems between the container handling and passenger. In addition the cargo handling volume is rapidly growth in connection with the economic growth in Timor-Leste. In Dili Port the poor maintenance of the facilities and non-safety and inefficiency operation becomes the adverse impact for the economic growth in Timor–Leste. The government of Timor-Leste has been planned the new port development in Tibar which is located in west of Dili Port. It is prospected that Tibar Project will be completed in for 5 to 10years. Therefore, it is very important that Dili Port is used effectively now and in the near later future.

The government of Japan conducted the study of Data Collection and Verification of Port Sector in Timor-Leste in 2013 to clarify the policies and agenda of safety operation of Dili Port facilities in immediate need. The followings were indicated for the argent agenda;

1. To resolve the confusion of the movement of container handling equipment and ferry passengers by the relocation of existing ferry terminal in the port of Dili,
2. To construct the fundamental infrastructure for future expansion of Dili Port as the function of passenger terminal by the implementation of the multi ferry berthing jetty.

The government of Timor-Leste decided to purchase a new ferry from Portugal (hereinafter, "Portugal") in 2015 and New ferry from Germany (hereinafter, "Nakroma2") in 2018 to reduce the over crowed passengers and cargoes of the existing Ferry (hereinafter, "Nakroma") and for the future demand. Therefore it is necessary to implement the multiple berthing jetty to accommodate two ferries at one time. The government of Timor-Leste requested the grant aid of "The project for Urgent Shift of Ferry Terminal in Dili Port (hereinafter, "The Project") in November, 2013 to the Government of Japan (hereinafter, GOJ). The GOJ has decided to conduct the Preparatory Survey for the Project.

1-2 Natural Conditions

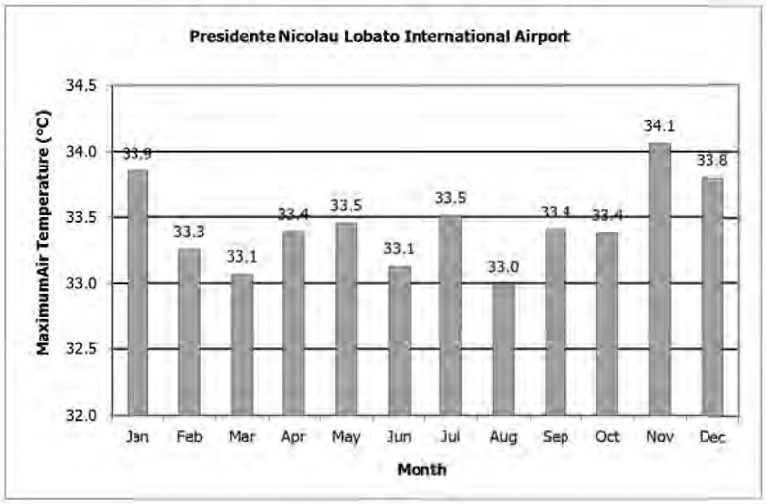
1-2-1 Meteorological Phenomenon

Observation of meteorological phenomena around Dili Port was carried out at President Nicolau Lobato International Airport (hereafter simply called "Dili Airport") as shown in Figure 1-2-1. Meteorological conditions based on the data which is obtained from observation for the last 12 years (2003 to 2014) are shown below.

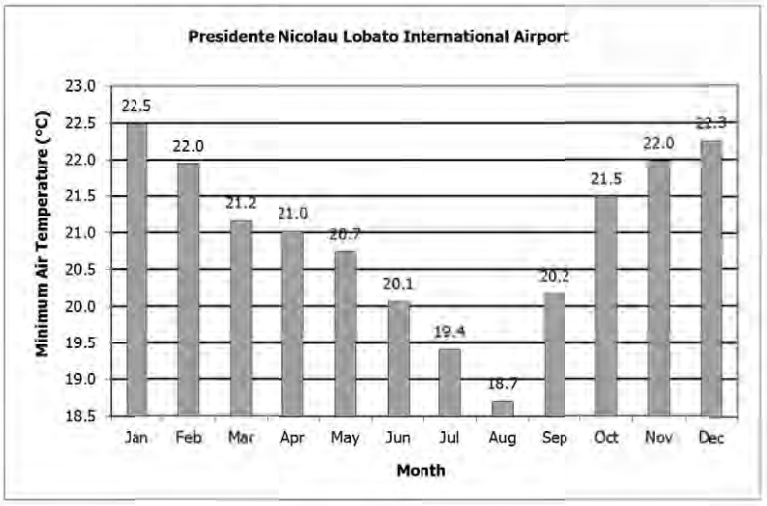
Figure 1-2-1 Meteorogogical Observation Equipments in Presendt Nicaly Lobato International Airport

1-2-1-1 Air Temperature

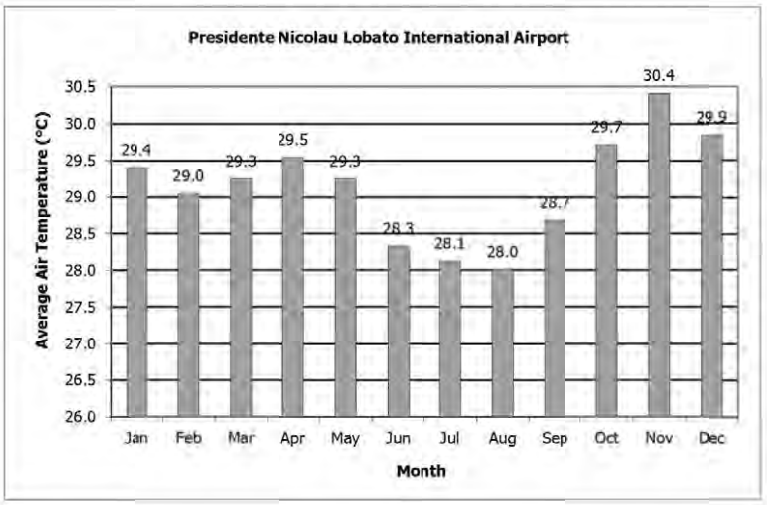
Maximum, minimum and average air temperatures are shown in Figure 1-2-2. Maximum air temperature was recorded at 34.1℃ in November with minimum temperature at 18.7℃ in August. Minimum average air temperature was 28℃. Climate in Timor-Leste is tropical savannah climate, and basically of high temperature.



(Maximum Air Temperature)



(Minimum Air Temperature)



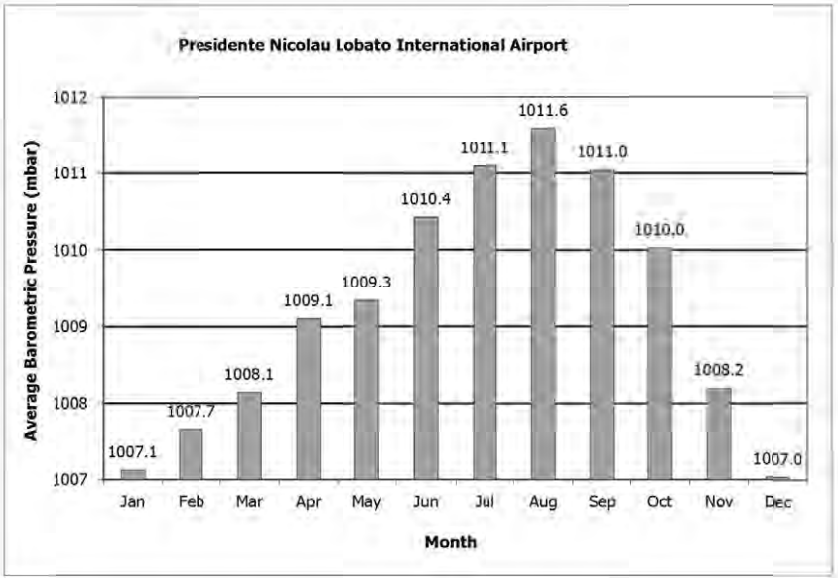
(Average Air Temperature)

Source: Observed at President Nicolau Lobato International Airport, and complied by JICA Survey Team

Figure 1-2-2 Maximam, Minimum and Average Air Temperature

1-2-1-2 Barometric Pressure

Average barometric pressures by month are shown in Figure 1-2-3. Pressures of all the months do not exceed 1,000 mbar and are slightly below one atmospheric pressure (1,013 hPa). In general, high atmospheric pressure brings fine weather.

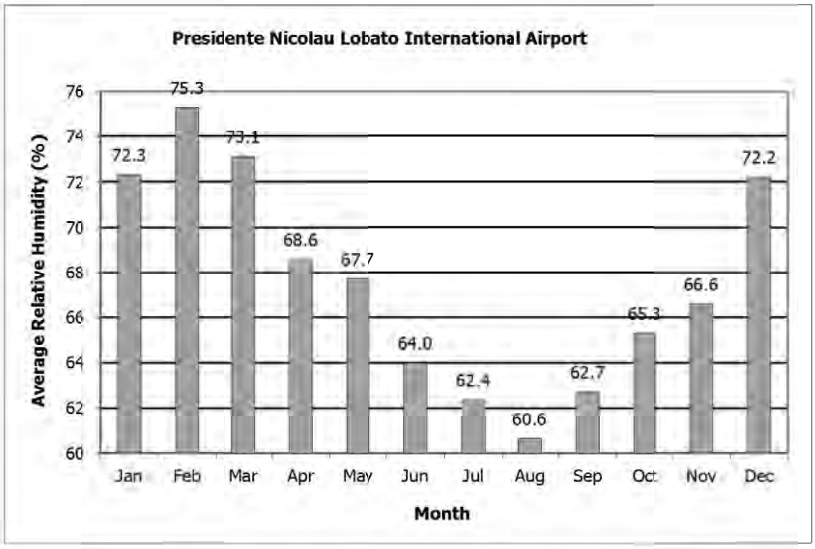


Source: Observed at President Nicolau Lobato International Airport, and complied by JICA Survey Team

Figure 1-2-3 Average Barometric Pressure

1-2-1-3 Relative Humidity

Average relative humidity by month is shown I Figure 1-2-4. During the dry season (June to August), humidity is low with a minimum of 60.6% in August. In the rainy season that begins in September, humidity increases gradually and reaches a maximum of 75.3% in February.

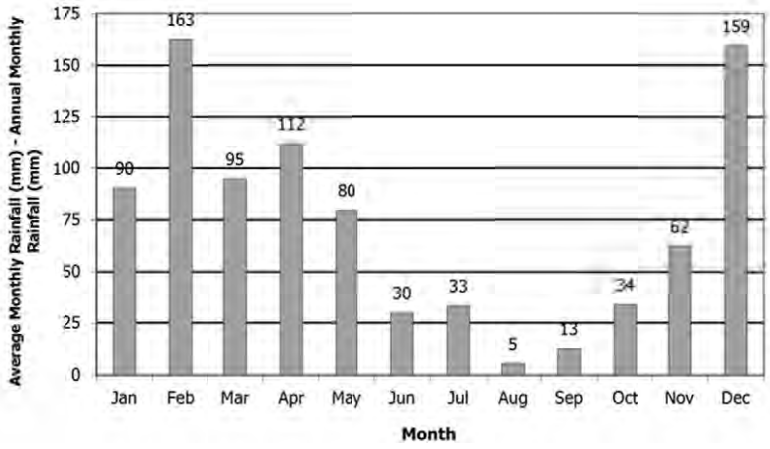


Source: Observed at President Nicolau Lobato International Airport, and complied by JICA Survey Team

Figure 1-2-4 Average Relative Humidity

1-2-1-4 Rainfall

Rainfalls by month are shown in Figure 1-2-5. Rainfalls during the dry season (June to August) are less and 5 to 30 mm a month. On the other hand, rainfalls in the rainy season (September to May) increase to around 100 mm a month.



Source: Observed at President Nicolau Lobato International Airport, and complied by JICA Survey Team

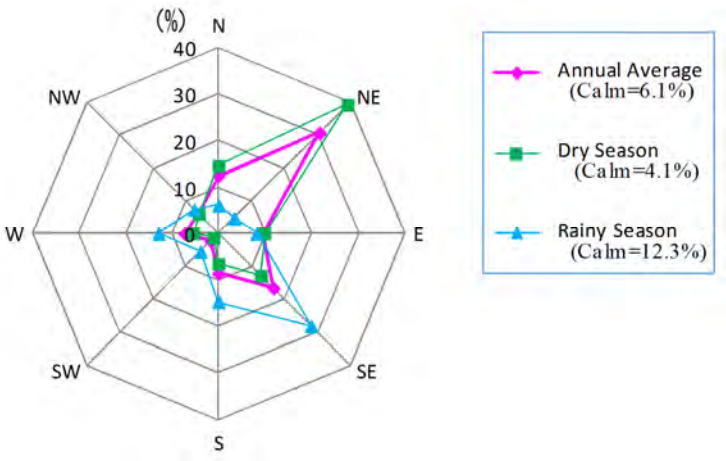
Figure 1-2-5 Average Monthly Rainfall

1-2-1-5 Wind Conditions

Data related to wind in terms of speed and direction observed three times a day (at 09:00, 15:00 and 18:00) during ten years from January 2005 to December 2014 at Dili Airport are summarized in Figure 1-2-6 (Wind Rose) and Table 1-2-1 and Table 1-2-2 (Average Wind Speed

and Maximum Wind Speed for the Year). During the dry season, wind directions tend to originate in the north east, while in the rainy season south-eastern winds are overwhelming. Average wind speed is 3 to 4 m/s throughout a year, and monthly changes are not remarkable. Maximum wind speed, 13.3 m/s (direction: NW) was observed in January 2010.

Taking the generally assumed gust factor (1.6 to 1.8) and wind above the sea into consideration, maximum wind speed at more or less 25m/s occurs in the rainy season is estimated more or less 25 m/s, with westerly direction.



Source: Observed at President Nicolau Lobato International Airport, and complied by JICA Survey Team

Figure 1-2-6 Wind Rose

Table 1-2-1 Average Wind Speed

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
9:00	2.4	1.6	2.0	1.9	2.1	1.8	2.2	2.2	2.2	2.3	2.2	2.1	2.1
15:00	5.1	4.5	4.0	3.5	3.8	4.0	4.1	4.7	4.4	4.3	4.0	3.8	4.2
18:00	3.6	3.2	3.1	2.8	3.3	3.1	3.6	4.1	3.4	3.1	2.8	2.7	3.2
Ave	3.7	3.2	3.1	2.8	3.0	3.0	3.3	3.7	3.4	3.2	3.0	2.9	3.2

Source: Observed at President Nicolau Lobato International Airport, and complied by JICA Survey Team

Table 1-2-2 Maximum Wind Speed for the Year

Unit: m/s

year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Speed	11.4	12.0	12.3	12.0	10.8	13.3	12.8	8.6	9.7	10.3
Direction	W	N	W	NW	W	NW	SE	W	E	NW
Month	Mar	Aug	Feb	Jan	Feb	Jan	Now	Mar	Sep	Jan

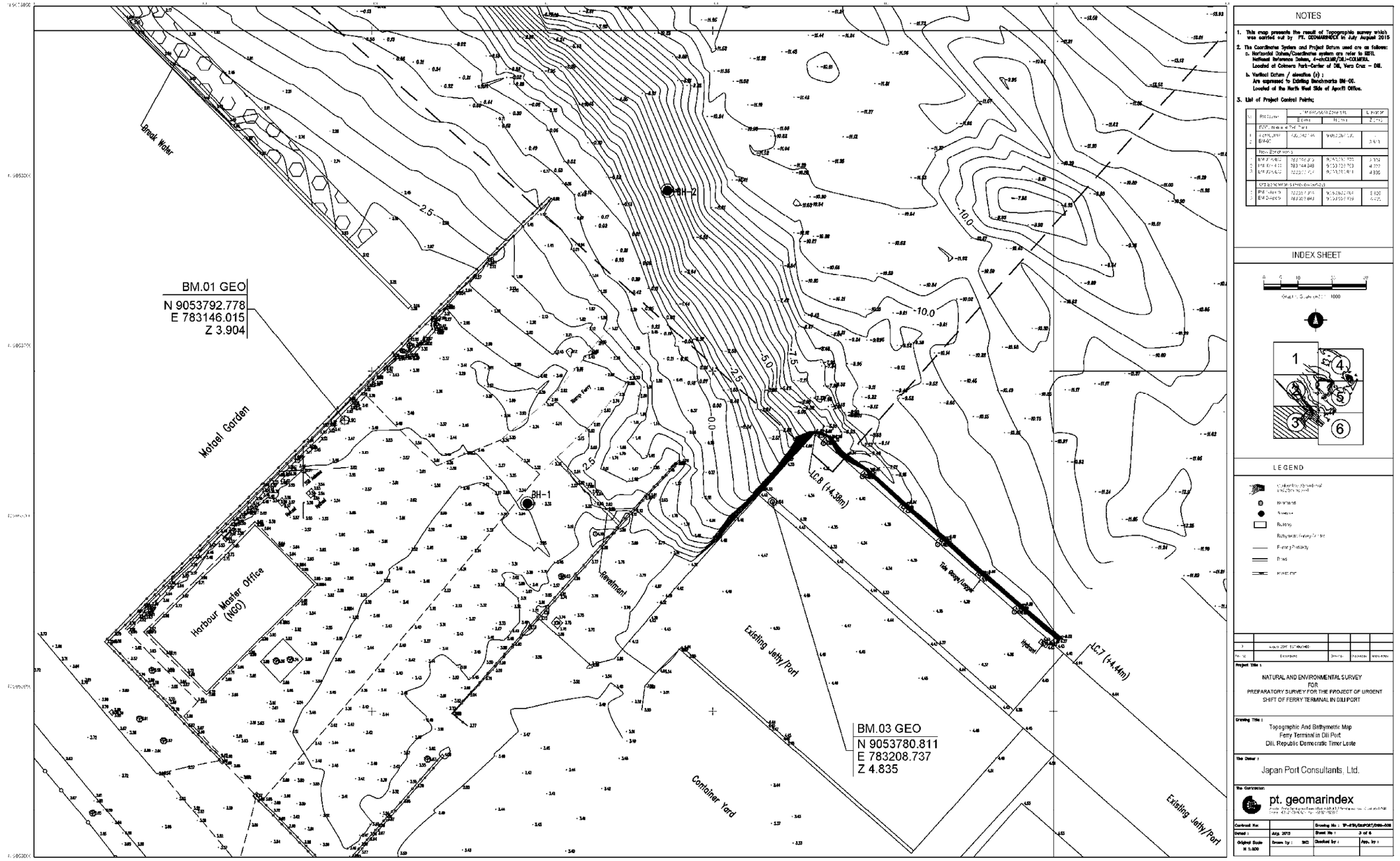
Source: Observed at President Nicolau Lobato International Airport, and complied by JICA Survey Team

1-2-2 Topographic and Bathymetric Maps

The results of the topographic and the bathymetric survey carried out by local consultants from 31st July to 4th August 2015 are shown in Figure 1-2-7 to Figure 1-2-9.

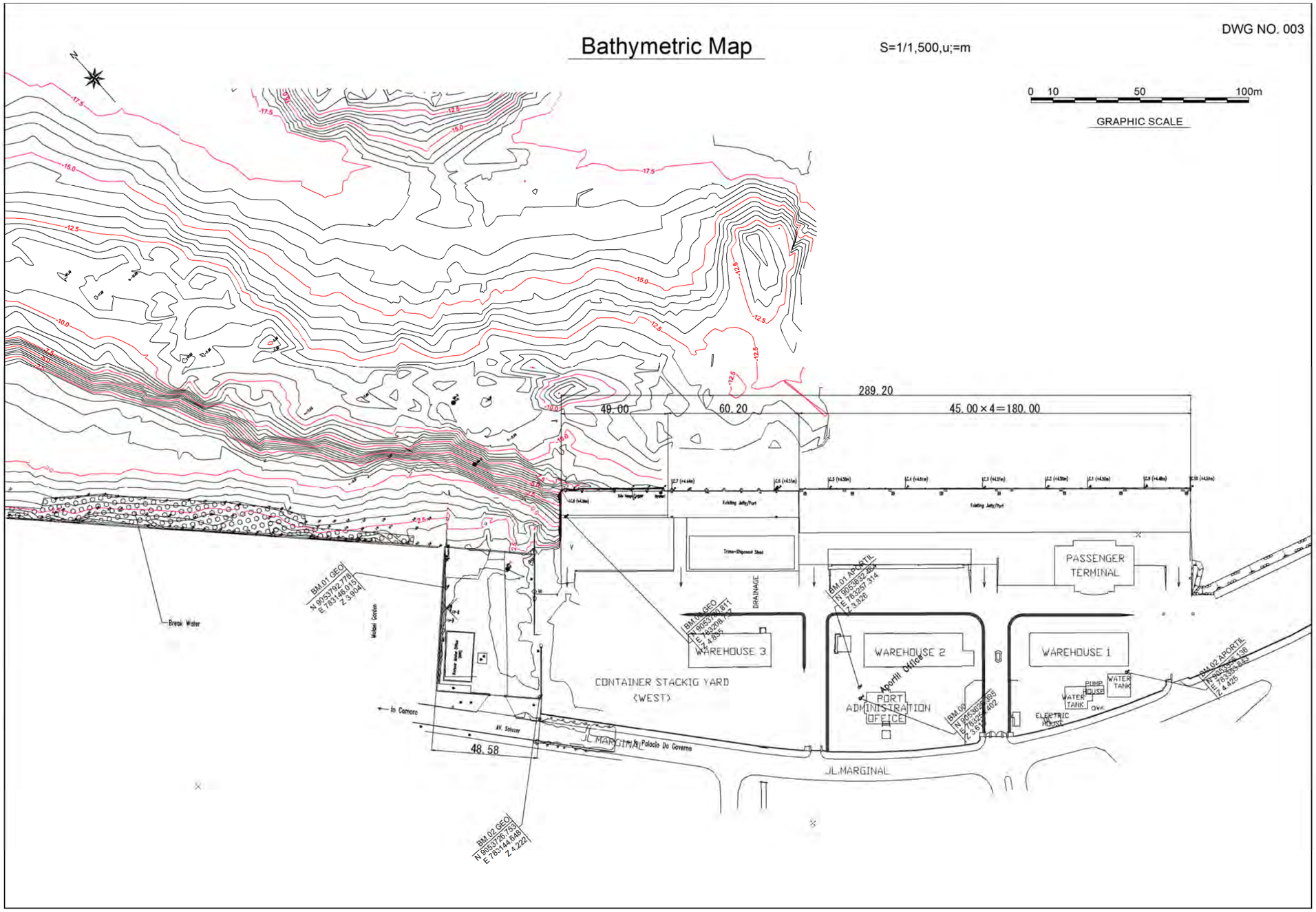
1-2-2-1 Topographic Map

The ground surface levels in the vicinity of Ferry Terminal project site are about +3.7 m near the route outside Dili Port and about +3.5 m inside the Port area.



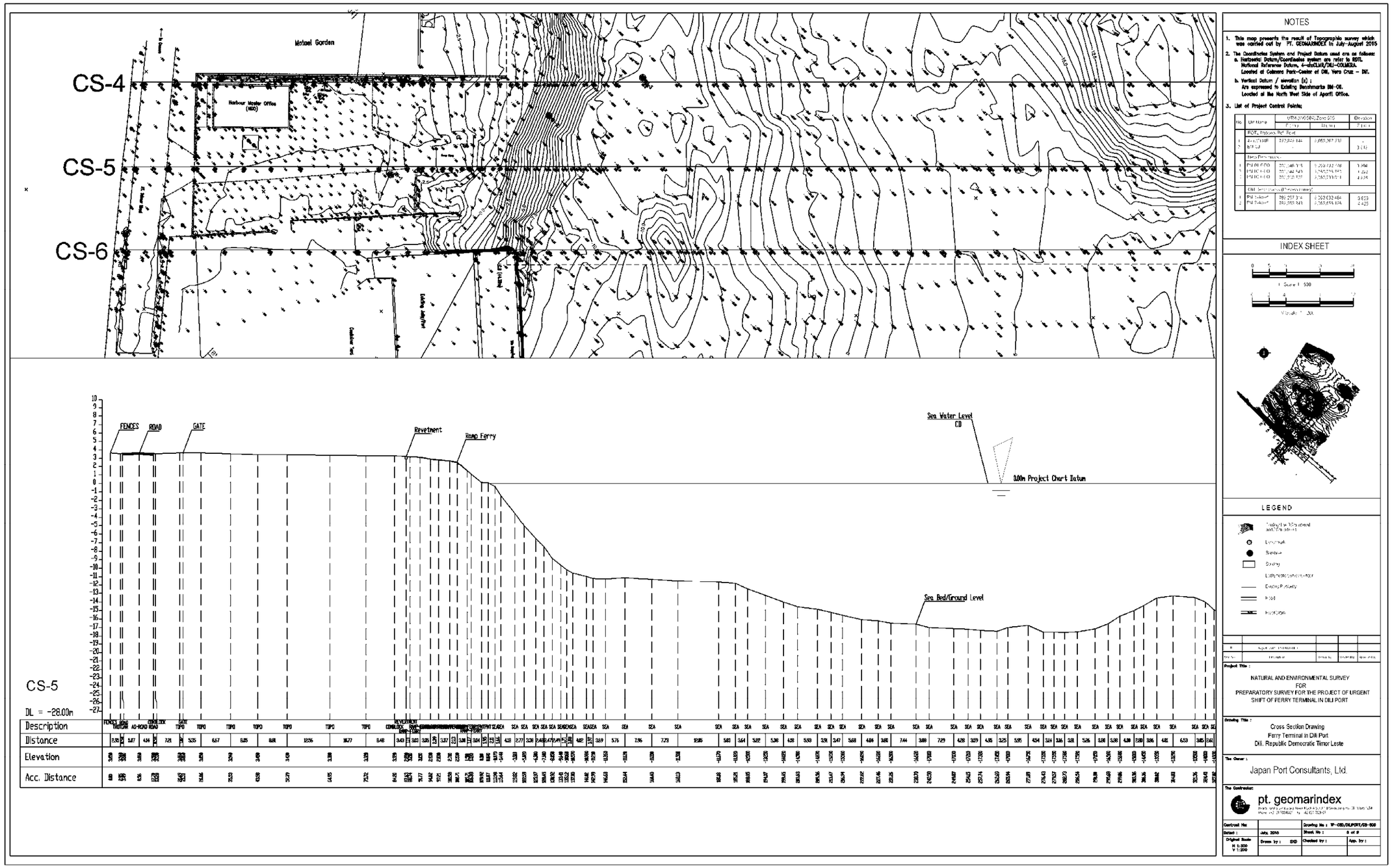
Source: JICA Survey Team

Figure 1-2-7 Topographic and Bathymetric Map



Source: JICA Survey Team

Figure 1-2-8 Bathymetry Map



Source: JICA Survey Team

Figure 1-2-9 Cross Section Drawing (CS-5)

1-2-2-2 Bathymetric Map

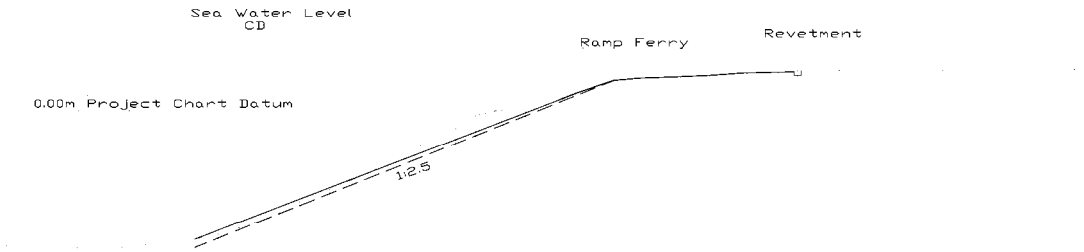
A bathymetric map has been prepared according to the results of bathymetric survey. The bathymetric map is shown in Figure 1-2-8. A longitudinal sea - land profile in the proximity of the central part of the Ferry Terminal project site is provided in Figure 1-2-9. The sea bottom topography in the front of the project site has turned out to be steep. As the sea bottom slope in Table 1-2-3shows, the beachline at (±0.0 m) to -10 m steeply plunges into depth. The slope is approximately 1 : 2. The offing bottom slope beyond -10 m is steep as well with an incline of 1:10 to 1:20. The water depth 100 m away from near the beachline reaches -15 m.

Table 1-2-3 Slope of the Sea Bottom

Water Depth（m）	±0.0 to -10 m	-10 to -12.5 m	-12.5 to -15.0 m	-15.0 m to-17.5 m
Sea Bottom Slope	1 : 2	1 : 20	1 : 10	1 : 20

Source: JICA Survey Team / Tentative Report on Results of Local Reassignment Surveys

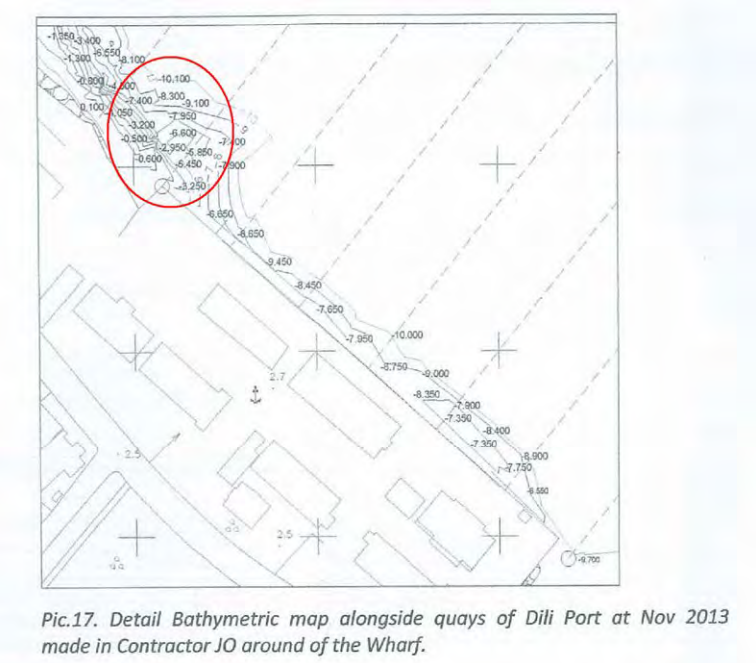
Figure 1-2-10 shows the cross section of the area from the existing Ramp Ferry to the sea. Since various factors can affect generating conditions for impact breaking wave force, generalized stipulation is difficult, but multiple kinds of experiments have yielded the following results: Impact breaking wave force is said to arise, when (a) the angle of intersection between the vertical line of Face Line of a structure and wave direction (β) is 20^{o} or less, (b) the sea bottom slope is steeper than say 1:30, (c) the sea carries waves that break in the offing not far away from the structure, and (d) the slope in offing wave shape equivalent is 0.03 or below. When the above conditions are in place, there is a possibility of generating the impact breaking wave force.



Source: JICA Survey Team

Figure 1-2-10 Cross Section Drawing Near Existing Ramp Ferry

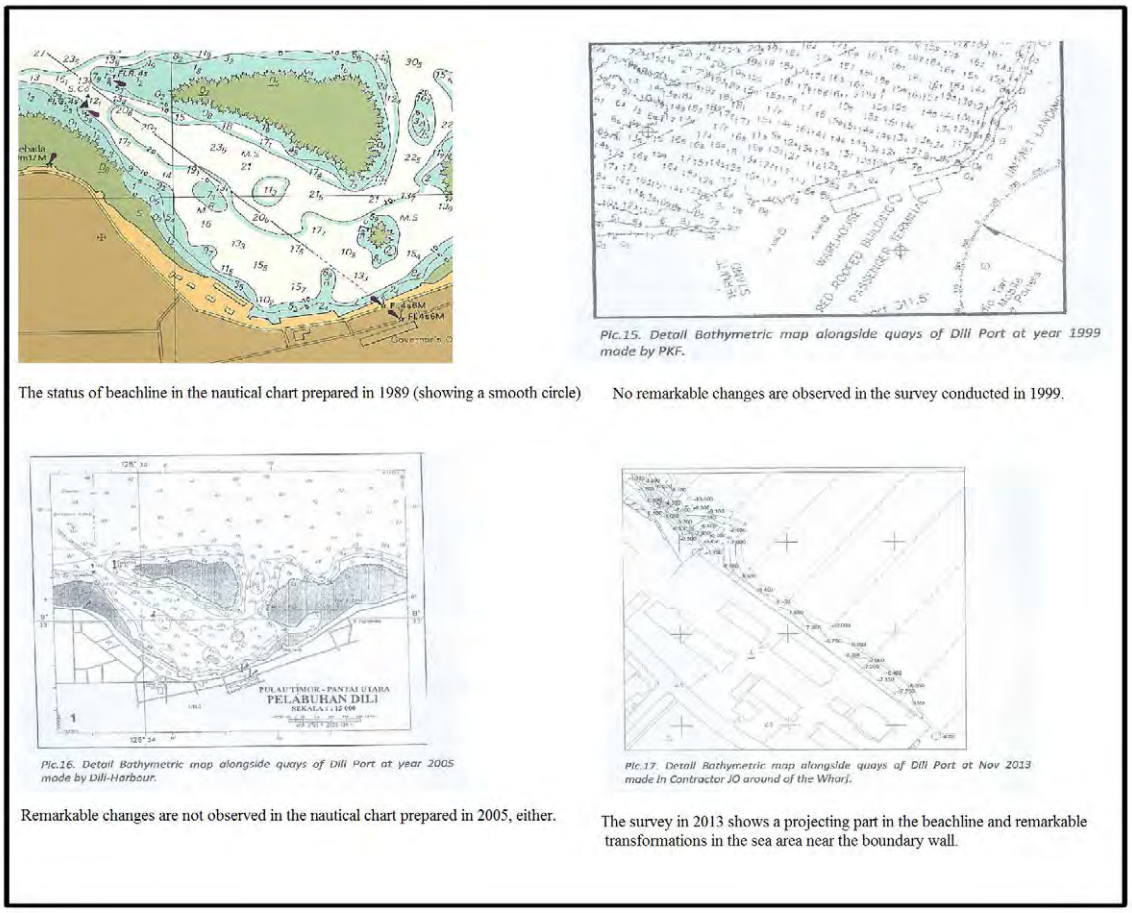
Figure 1-2-11 shows bathymetric maps that are based on the surveys conducted in 2013. The sea area near the project site tends to give rise to deposit being affected by the seawall constructed in 2007. As shown in Figure 1-2-12, the area along the shoreline before the installation of the seawall in 2007, no remarkable deposit tendency was observed and formed a naturally balanced beachline. The cause of the sand deposit in progress is apparently attributable to the seawall. It is, therefore, a naturally balanced beachline will be restored by removing the seawalls on the western side and eastern side of the Ramp Ferry.



Pic.17. Detail Bathymetric map alongside quays of Dili Port at Nov 2013 made in Contractor JO around of the Wharf.

Source; DREDGING WORKS OF DILI PORT PROJECT. The General of Project Final Report 141028-RTS-PQM-A-PFR-0011

Figure 1-2-11 Bathymetry Map (2013)



The status of beachline in the nautical chart prepared in 1989 (showing a smooth circle)

Pic.15. Detail Bathymetric map alongside quays of Dili Port at year 1999 made by PKF.

No remarkable changes are observed in the survey conducted in 1999.

Pic.16. Detail Bathymetric map alongside quays of Dili Port at year 2005 made by Dili-Harbour.

Remarkable changes are not observed in the nautical chart prepared in 2005, either.

Pic.17. Detail Bathymetric map alongside quays of Dili Port at Nov 2013 made in Contractor JO around of the Wharf.

The survey in 2013 shows a projecting part in the beachline and remarkable transformations in the sea area near the boundary wall.

Source: Prepared by JICA Survey Team based on nautical charts and the results of bathymetric survey

Figure 1-2-12 Bathymetry Map (1989, 1999, 2005)

1-2-3 Tidal Level

The tidal level of Dili Port is shown in Table 1-2-4. Mean Sea Level (MSL) is +1.4 m, and the tidal level difference between the Mean Higher Hai Water (MHHW) and Mean Lower Low Water (MLLW) is 1.8 m.

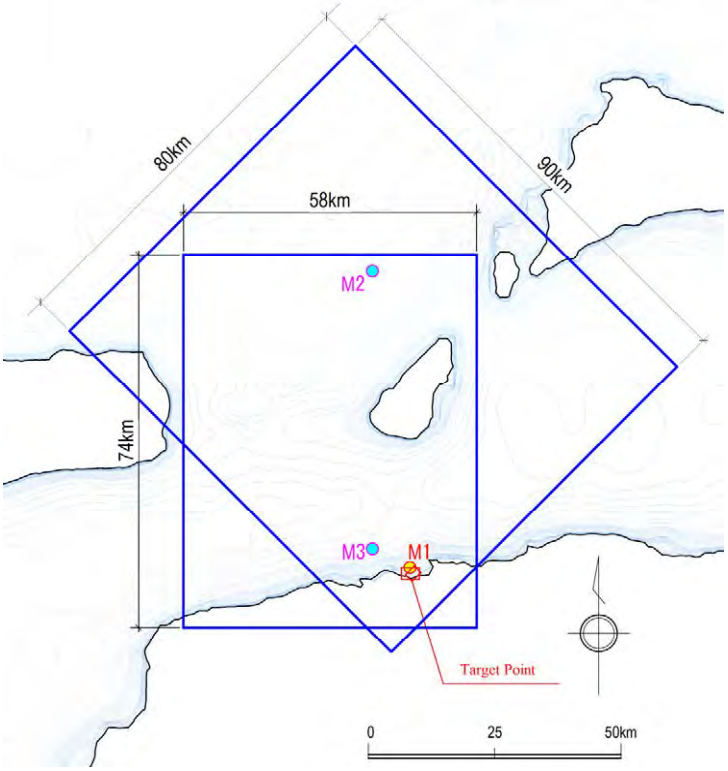
Table 1-2-4 Tidal Level

Nomenclature	Tidal Level
High Water Spring (HWS)	+ 2.8 m
Mean Higher High Water (MHHW)	+ 2.3 m
Mean Lower High Water (MLHW)	+1.8 m
Mean Sea Level (MSL)	+ 1.4 m
Mean Higher Low Water (MHLW)	+1.0 m
Mean Lower Low Water (MLLW)	+0.5 m
Low Water Spring	±0.0 m
Chart Datum (CD)	±0.0 m

Source: Kepanduan Bahari Indonesia Wilayah III (Bahari Indonesia Scout Region III, Page 183), Indonesian Navy 2013

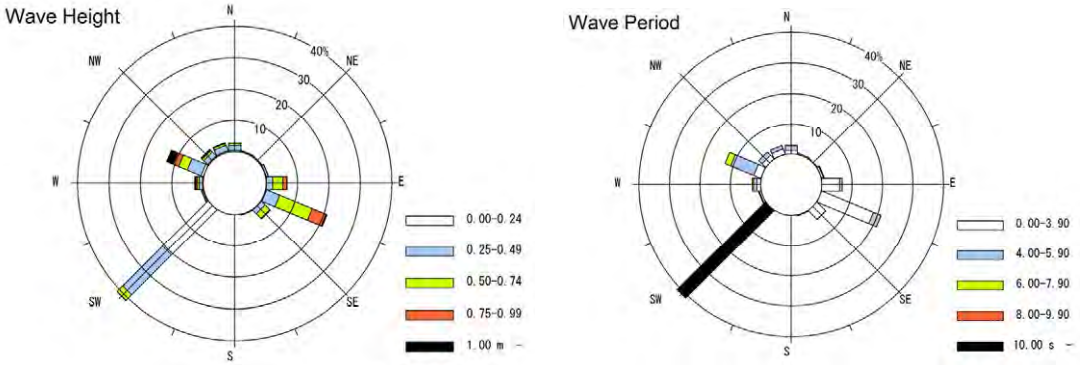
1-2-4 Ocean Waves

There are no available ocean wave data because ocean wave observation inside Dili Port has not conducted. Wind waves and surging waves have been estimated based on the data of wind and global ocean waves. As ocean wave data in the neighborhood of Dili Port, there are data estimated by NOAA (National Oceanic and Atmospheric Administration) as shown Figure 1-2-13 at Point M2 (lat. 8° S. and long. 125.5° E.) and at Point M3 (lat. 8.5° S. and long. 125.5° E.). Wave heights and wave frequencies by direction of wave period at Spot M3 are summarized in Figure 1-2-13 to Figure 1-2-14. These figures show that waves from the Indian Ocean have surged between Allor Island and Timor Island. Wave frequencies from NNE and ENE directions have turned out to be extremely low apparently because of the influence by Wetar Island.



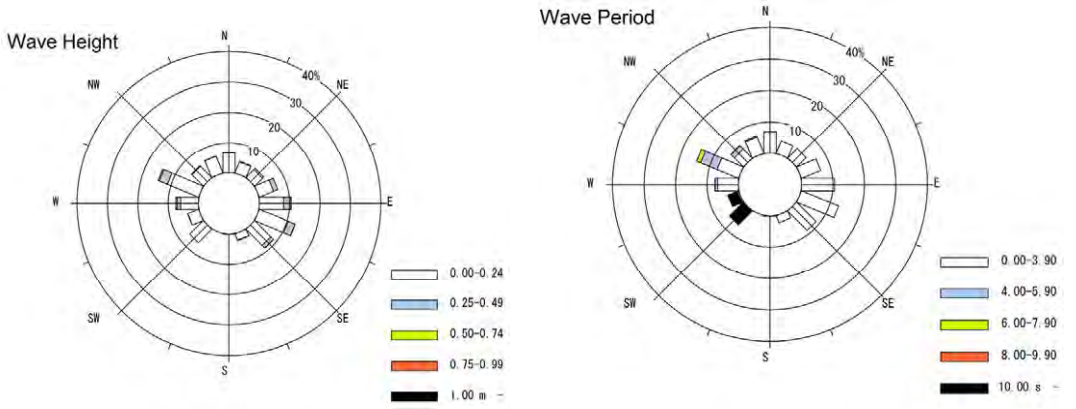
Source: JICA Survey Team based on data from NOAA

Figure 1-2-13　Estimation Point near DILI Port（NOAA）



Source: JICA Survey Team based on data from NOAA

Figure 1-2-14　Frequency distribution (Point M2）



Source: JICA Survey Team based on data from NOAA

Figure 1-2-15　Frequency distribution（Point M3）

Wave height factors by water depth in respect to the seven wave directions of WNW, NW, NNW, N, NNE, NE and ENE are shown in Table 1-2-5. These factors have been analyzed with waves of 50 year return period. The factors indicate that in the shallow sea areas, both $H_{1/3}$ and H_{max} are higher in WNW, and that in other water depths high values are found with N.

$H_{1/3}$ and H_{max} are 1.1 m and 2.0 m, respectively, in the wave direction of N and at the water depth of -16 m.

Table 1-2-5 Design Waves (Return Period 50 years) (1/2)

M2 Wave direction (°)		Wave height	Wave period	Tidal level (m)	Wave length L_o	Slope (1/x x=)	Water depth h(m)	H_o'(m)	$H_{1/3}$(m)	H_{max}(m)
WNW	324	3.17	9.2	2.30	132.04	10	16.0	0.87	0.80	1.40
							15.0	0.84	0.80	1.40
							12.5	0.80	0.70	1.30
							11.5	0.78	0.70	1.30
							10.0	0.76	0.70	1.30
							9.0	0.76	0.70	1.30
							8.0	0.76	0.70	1.30
							7.0	0.76	0.70	1.30
							6.0	0.76	0.70	1.30
							5.0	0.76	0.80	1.40
							4.0	0.76	0.80	1.40
							3.0	0.76	0.80	1.50
							2.0	0.76	0.80	1.50
							1.0	0.76	0.90	1.70
							0.0	0.76	1.20	2.10
							-1.0	0.76	1.30	1.80
							-2.0	0.76	0.50	0.80
NW	327	1.78	6.3	2.30	61.92	10	16.0	0.70	0.70	1.20
							15.0	0.68	0.60	1.20
							12.5	0.66	0.60	1.10
							11.5	0.64	0.60	1.10
							10.0	0.63	0.60	1.00
							9.0	0.61	0.60	1.00
							8.0	0.61	0.60	1.00
							7.0	0.61	0.60	1.00
							6.0	0.60	0.50	1.00
							5.0	0.60	0.60	1.00
							4.0	0.59	0.50	1.00
							3.0	0.59	0.60	1.00
							2.0	0.58	0.60	1.00
							1.0	0.58	0.60	1.10
							0.0	0.58	0.60	1.20
							-1.0	0.58	0.90	1.50
							-2.0	0.58	0.40	0.60
NNW	330	1.81	6.4	2.30	63.90	10	16.0	0.74	0.70	1.30
							15.0	0.72	0.70	1.20
							12.5	0.70	0.60	1.20
							11.5	0.68	0.60	1.10
							10.0	0.67	0.60	1.10
							9.0	0.67	0.60	1.10
							8.0	0.66	0.60	1.10
							7.0	0.66	0.60	1.10
							6.0	0.65	0.60	1.10
							5.0	0.55	0.50	0.90
							4.0	0.64	0.60	1.10
							3.0	0.64	0.60	1.10
							2.0	0.63	0.60	1.10
							1.0	0.63	0.60	1.20
							0.0	0.62	0.70	1.30
							-1.0	0.62	0.90	1.50
							-2.0	0.62	0.40	0.60
N	360	1.70	6.1	2.30	58.05	10	16.0	1.14	1.10	2.00
							15.0	1.11	1.10	1.90
							12.5	1.08	1.00	1.80
							11.5	1.07	1.00	1.80
							10.0	1.05	1.00	1.70
							9.0	1.05	1.00	1.70
							8.0	1.04	1.00	1.70
							7.0	1.04	0.90	1.70
							6.0	1.03	0.90	1.70
							5.0	1.03	0.90	1.70
							4.0	1.02	0.90	1.70
							3.0	1.02	1.00	1.70
							2.0	1.01	1.00	1.80
							1.0	1.00	1.00	1.90
							0.0	0.99	1.20	2.10
							-1.0	0.99	1.20	1.70
							-2.0	0.99	0.50	0.70

Design Waves (Return Period 50 years) (2/2)

M3 Wave direction (°)		Wave height	Wave period	Tidal level (m)	Wave length L_o	Slope (1/x x=)	Water depth h(m)	H_o'(m)	$H_{1/3}$(m)	H_{max}(m)
NNE	22.5	0.80	3.8	2.30	22.53	10	16.0	0.80	0.80	1.40
							15.0	0.80	0.80	1.40
							12.5	0.79	0.80	1.40
							11.5	0.79	0.80	1.40
							10.0	0.78	0.80	1.40
							9.0	0.78	0.80	1.40
							8.0	0.77	0.80	1.40
							7.0	0.77	0.80	1.40
							6.0	0.76	0.70	1.30
							5.0	0.76	0.70	1.30
							4.0	0.75	0.70	1.30
							3.0	0.75	0.70	1.30
							2.0	0.74	0.70	1.20
							1.0	0.74	0.70	1.20
							0.0	0.73	0.70	1.20
							-1.0	0.73	0.80	1.30
							-2.0	0.73	0.40	0.50
NE	45	0.90	3.8	2.30	22.53	10	16.0	0.86	0.90	1.50
							15.0	0.85	0.80	1.50
							12.5	0.85	0.80	1.50
							11.5	0.84	0.80	1.50
							10.0	0.83	0.80	1.50
							9.0	0.83	0.80	1.50
							8.0	0.83	0.80	1.50
							7.0	0.82	0.80	1.40
							6.0	0.82	0.80	1.40
							5.0	0.82	0.80	1.40
							4.0	0.82	0.80	1.40
							3.0	0.81	0.80	1.40
							2.0	0.81	0.70	1.30
							1.0	0.81	0.70	1.30
							0.0	0.80	0.80	1.40
							-1.0	0.80	0.90	1.40
							-2.0	0.80	0.40	0.50
ENE	67.5	0.90	3.8	2.30	22.53	10	16.0	0.74	0.70	1.30
							15.0	0.73	0.70	1.30
							12.5	0.72	0.70	1.30
							11.5	0.72	0.70	1.30
							10.0	0.71	0.70	1.30
							9.0	0.71	0.70	1.30
							8.0	0.71	0.70	1.30
							7.0	0.71	0.70	1.30
							6.0	0.71	0.70	1.20
							5.0	0.70	0.70	1.20
							4.0	0.70	0.70	1.20
							3.0	0.70	0.60	1.20
							2.0	0.70	0.60	1.20
							1.0	0.70	0.60	1.20
							0.0	0.69	0.70	1.20
							-1.0	0.69	0.80	1.30
							-2.0	0.69	0.40	0.50

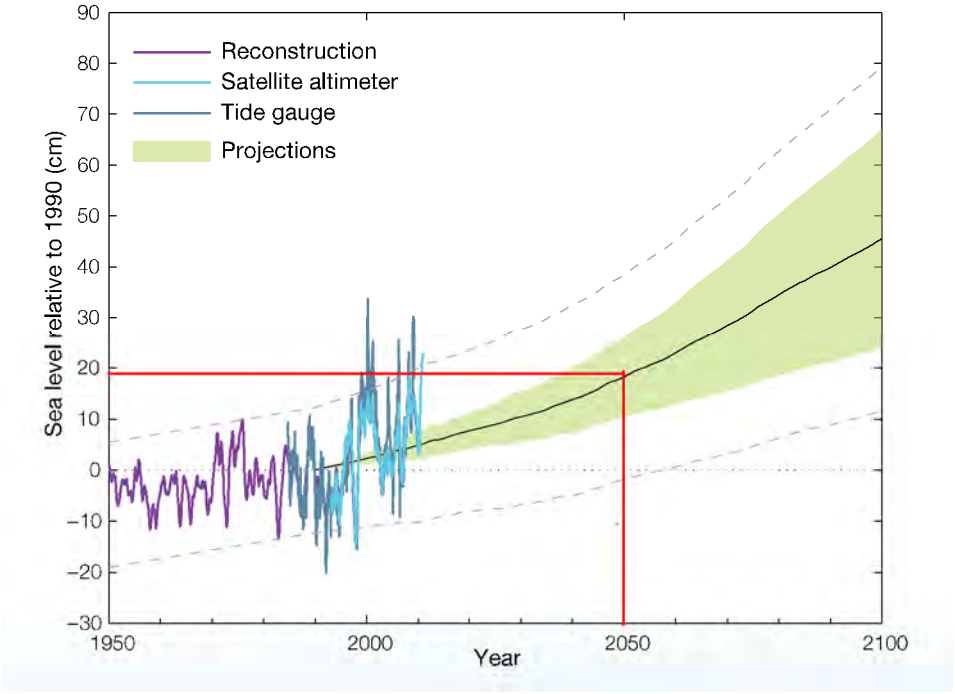
Wave directions are clockwise angles from N.

Source: JICA Survey Team

1-2-5 Sea Level Rise

The climate of Timor-Leste is influenced by Western Pacific monsoons that start to blow by the large temperature difference between land area and sea area. Figure 1-2-16 and Table 1-2-6 how sea level rises occurring near Timor-Leste. These materials have taken into account the impacts of global warming related to the emission of carbon dioxide. Tidal levels from 1950

up to the present have shown a seal level rise of approximately 5 cm. Furthermore, 12 to 30 cm is estimated to rise in 2055 following the scenario of average emission.



Source：Pacific Climate Change Science Program, Australian Government

Figure 1-2-16　Observed and Projected Relative Sea-Level Changes near Timor-Leste

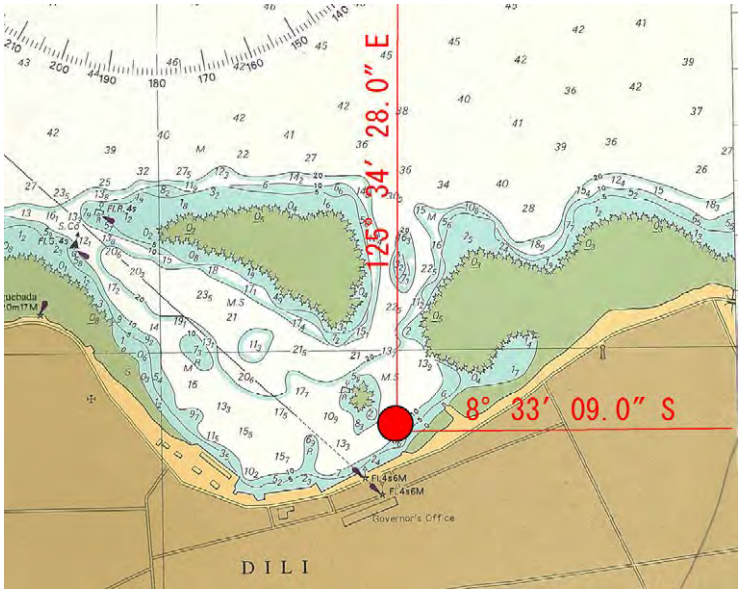
Table 1-2-6　Sea-level Rise Projections for Timor-Leste for Three Emissions Scenarios

Case	2030 (cm)	2055 (cm)	2090 (cm)
Low emissions scenario	6-15	10-27	17-47
Medium emissions scenario	6-15	12-30	21-59
High emissions scenario	6-15	12-29	22-62

Source: Pacific Climate Change Science Program, Australian Government

1-2-6　Current

Tidal current data are available in respect to the mean current speed and current direction observed in 2013 to 2014 at the point indicated in Figure 1-2-17 below. The data were collected from "Maritime Meteorology, Jakarta Tanjung Priok".



Source: Maritime Meteorology, Jakarta, Tanjung Priok

Figure 1-2-17 Location of the Point

Data for mean tidal current and maximum tidal current on the basis of the relevant data taken in 2013 and 2014 are summarized and shown in Table 1-2-7 and Table 1-2-8, respectively. As regards the mean tidal current, no remarkable tendencies were found in respect to the yearly and monthly changes. Minimum mean tidal current was observed at 6.3 cm/s (0.1 knot) in November 2014, with maximum of 41.5 cm/s (0.8 knot) in August 2014. The average of the mean tidal current was about 17 cm/s (0.3 knot). As regards the maximum tidal current, its minimum was 14.4 cm/s (0.3 knot) and maximum was 152 cm/s (3.0 knots), averaging 60 cm/s (1.2 knot).

Table 1-2-7 Mean Tidal Currents

Unit : (cm/s)

Month /Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug	Sep.	Oct.	Nov.	Dec.	Average
2013	28.0	20.4	8.0	8.2	10.7	18.4	37.6	26.6	18.8	9.0	6.5	9.3	16.8
2014	23.5	15.8	7.6	6.7	13.7	30.5	27.7	41.5	21.3	18.6	6.3	10.1	18.6

Source: Maritime Meteorology, Jakarta, Tanjung Priok

Table 1-2-8 Absolute Maximum Tidal Currents

Unit : (cm/s)

Month/ Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug	Sep.	Oct.	Nov.	Dec.	Average
2013	152.7	119.8	32.0	23.2	48.9	74.3	80.9	84.7	62.5	24.1	16.1	56.2	64.6
2014	135.6	68.2	26.9	24.6	57.0	83.7	83.8	115.4	34.5	38.8	14.4	34.2	59.8

Source: Maritime Meteorology, Jakarta, Tanjung Priok

1-2-7 Ground

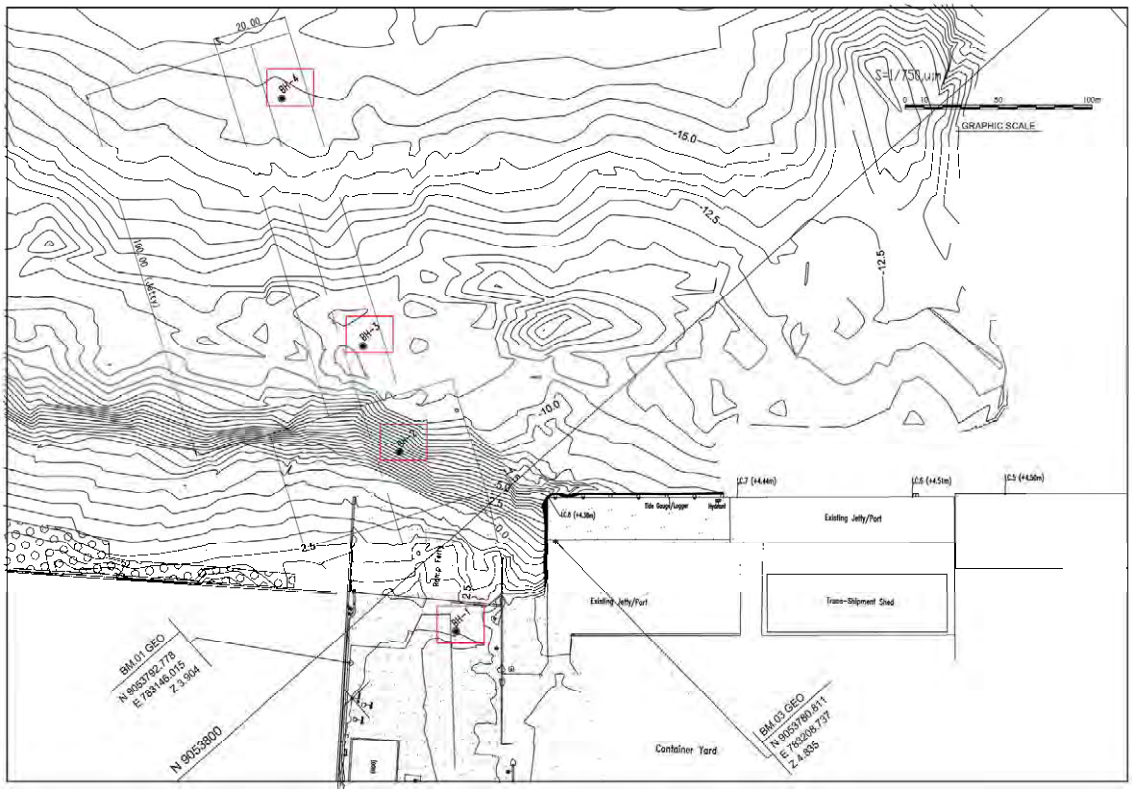
Ground conditions shall be set on the basis of the results of "Package-1 Geotechnical Investigation" that has been conducted as local reassignment work. Boring survey was carried out at four points in total comprising one onshore and three offshore as shown in Figure 1-2-18. Land-sea soil cross section and East-West soil cross section are shown in Figure 1-2-19 and Figure 1-2-20, respectively.

Regarding the onshore boring BH-1, since the layer up to 1 m from the present ground level is filled with reclamation soil, N value is not uniform up to the depth of -2.8 m and gravels and sandy soil are deposited therein. For the further deeper part, N value is around 5 up to the depth of -23.6 m. At -23.6 m below cohesive soil with an N value of about 20 is found.

Regarding the offshore boring BH-2, N value is about 12 from the sea bottom to -13.1 m, and increases along with the depth up to 20 at -44.6 m.

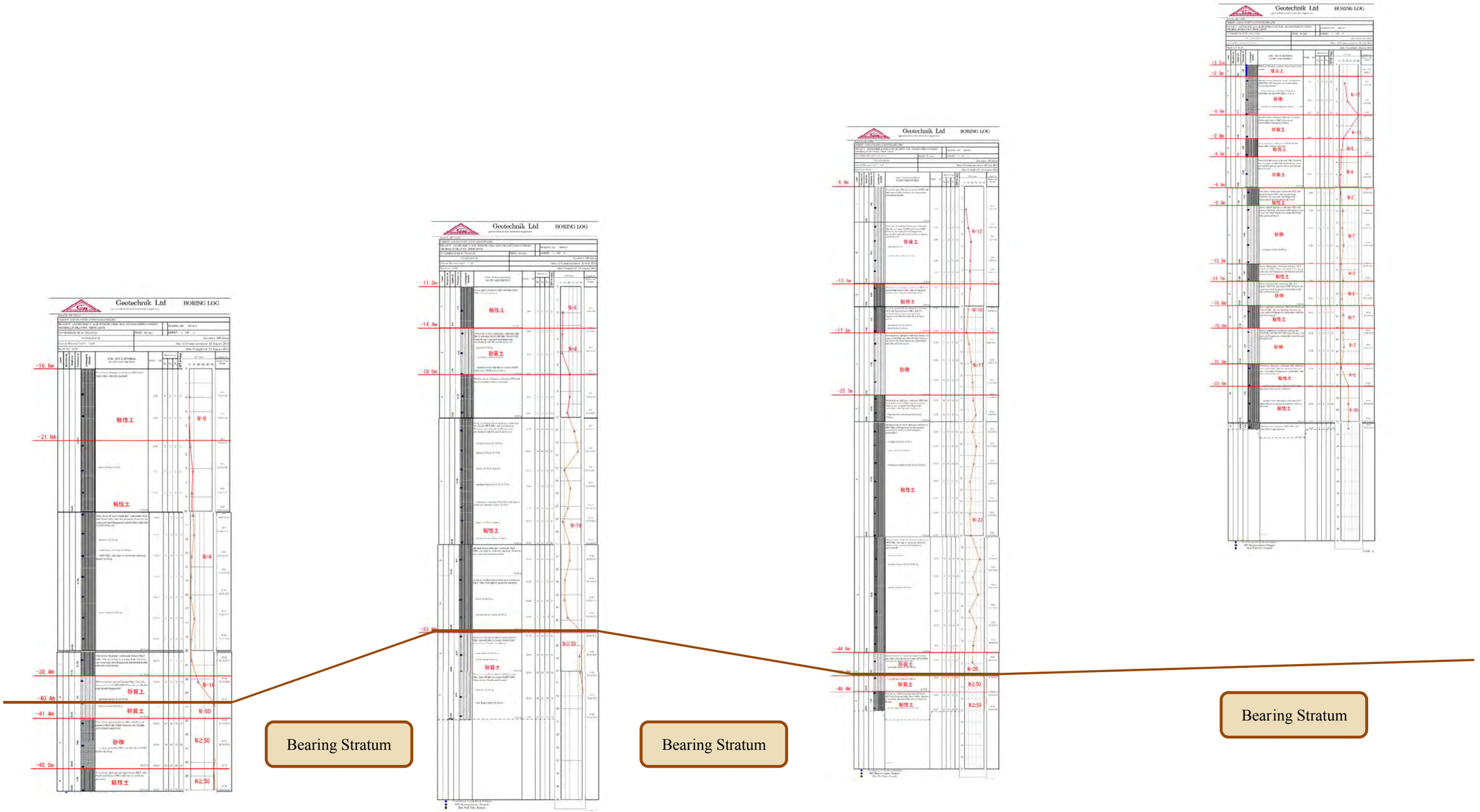
Regarding BH-3, N value is about 5 up to -18.0 m, and fluctuates between 10 and 40 for the depth range of -18.0 m to -33.8 m. N value of 50 or above begins to appear at the depth of -33.8 m or below. The load bearing stratum offshore begins to appear at the depth of -34 m to -47 m. Up to that depth, sandy soil, gravels and cohesive soil subsist alternately.

On the other hand, from the East-West soil cross section shown in Figure 1-2-20 the bearing stratum will start to appear at the depth of around -35 m at the existing boring point.



Source: JICA Survey Team

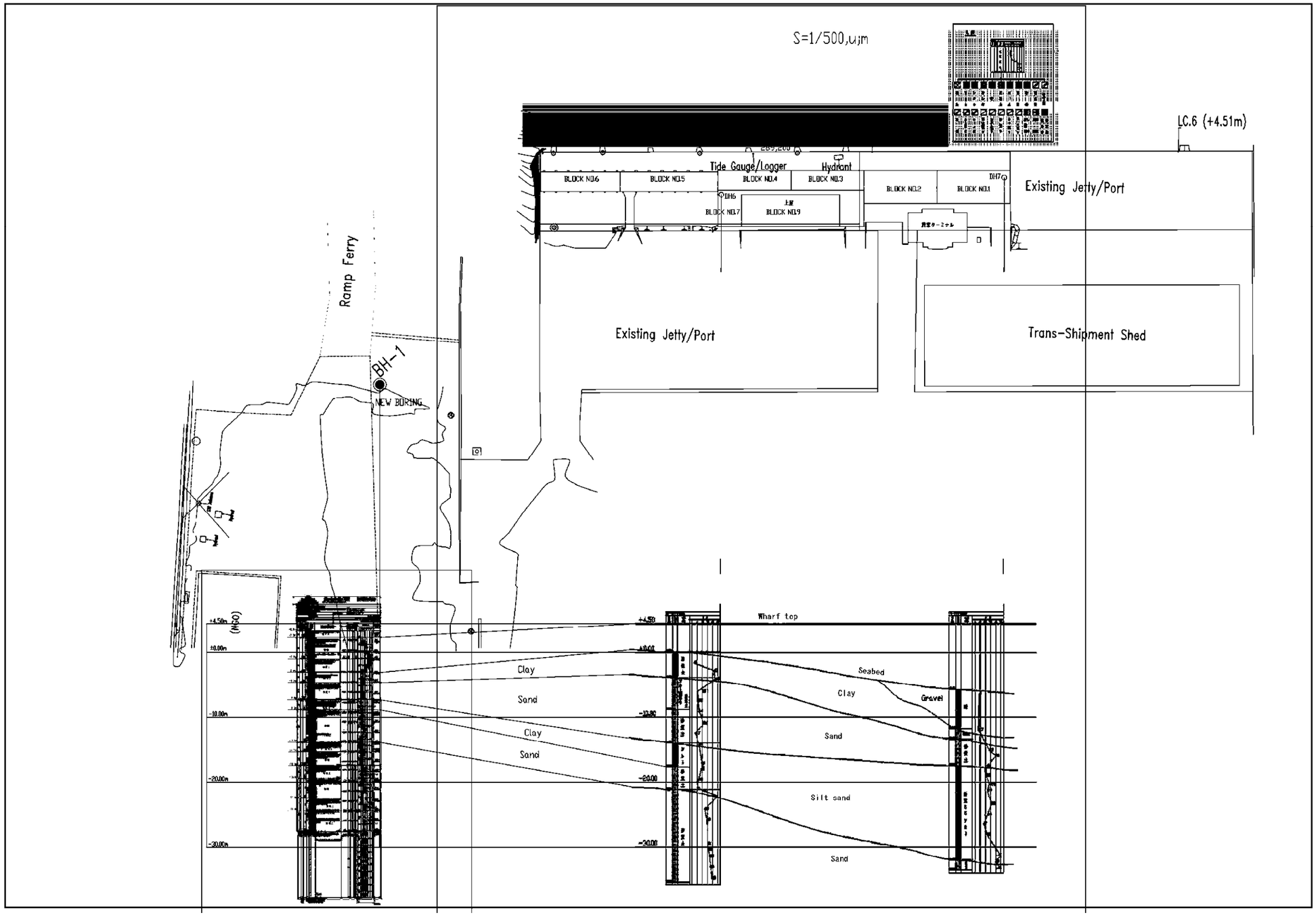
Figure 1-2-18 Locations of Boring Surveys



出典：Geotechnical Investigation Report

Source：Geotechnical Investigation Report

Figure 1-2-19　Land-Sea Soil Layer Cross Section



Source: BASIC DESIGN STUDY REPORT ON THE PROJECT FOR REHABILITATION OF DILI PORT OF THE DEMOCRATIC REPUBLIC OF TIMOR LESTE NOVEMBER 2005 JICA

Figure 1-2-20 East-West Soil Layer Cross Section

1-2-8 Earthquake Motion

Figure 1-2-21 shows a distribution map of seismic centers in and around Timor-Leste. Magnitude 4 to 7 earthquakes have been recorded with epicenters near Dili Port and at 47 to 162 km underground. As for very recent quakes, a magnitude 6 to 7 earthquake with the epicenter at 47 km underground occurred 78 km west of Dili city (lat. 8o36' S. and long. 126o16' E.) on 15th May 1995. This earthquake took a heavy toll of human lives, and caused damage to the seawalls of the Easter and Western Container Yards in Dili Port.

In addition, Dili Port is located in Zone II in the distribution map of seismic coefficient in Timor-Leste shown in Figure 1-2-22. The kind of ground, in view of the results of boring survey BH-4 which faced disadvantageous soil conditions, is classified into soft ground with gravity acceleration of 0.09G, since the cohesive soil of 0 to 4 N value turned out to be deposited in the layer thickness of 22 m above the sea bed surface.

The seismic coefficient for verification purpose shall, in accordance with "STANDARD DESIGN CRITERIA FOR PORTS IN INDONESIA, JAN. 1984 DGSC," be as follows:

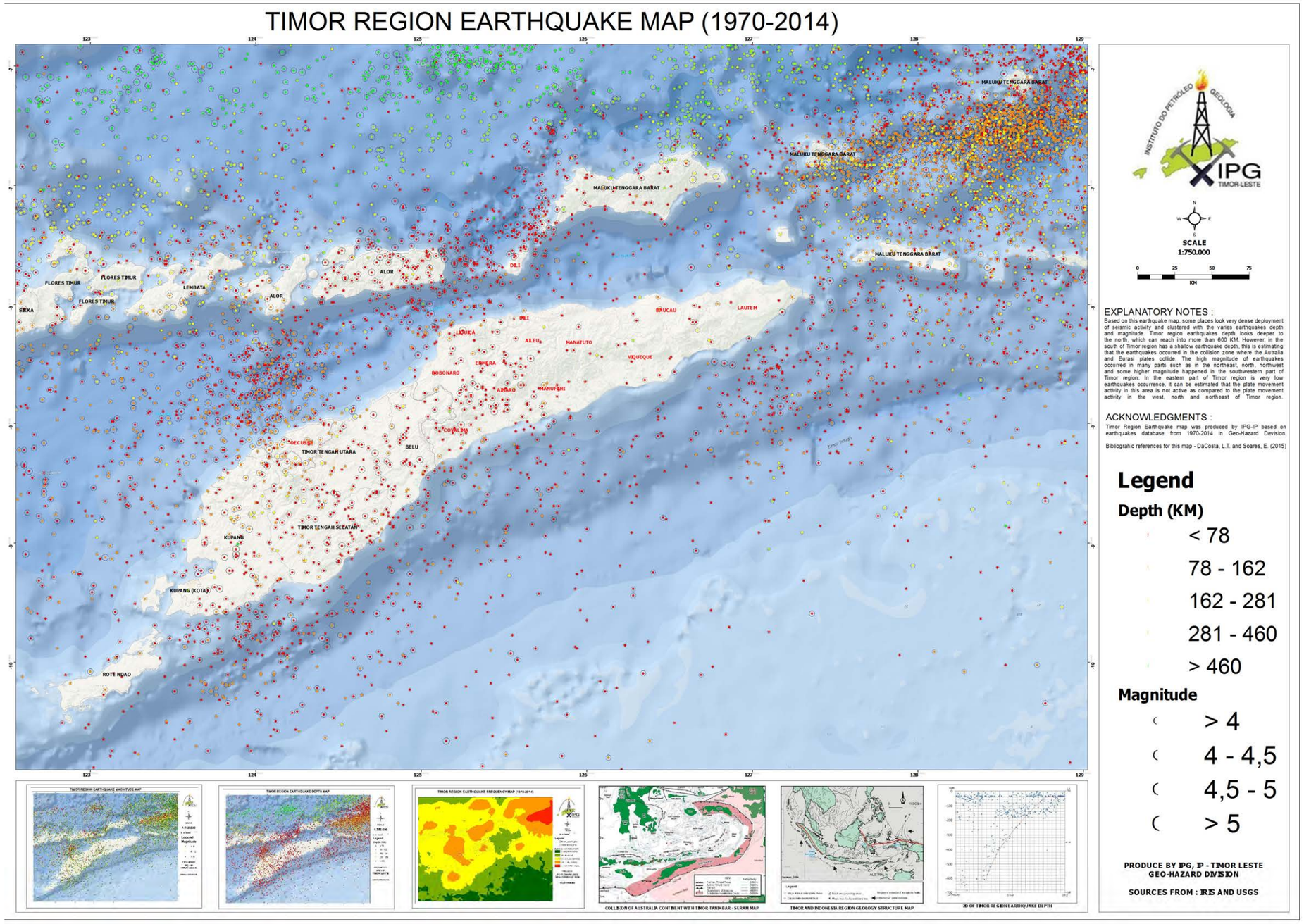
Design horizontal seismic coefficient kh = kr (Seismic coefficient by region) x ki (priority factor)

kr; 0.09, Dili (Zone II, soft soil)

ki; 1.5 (most important structure)

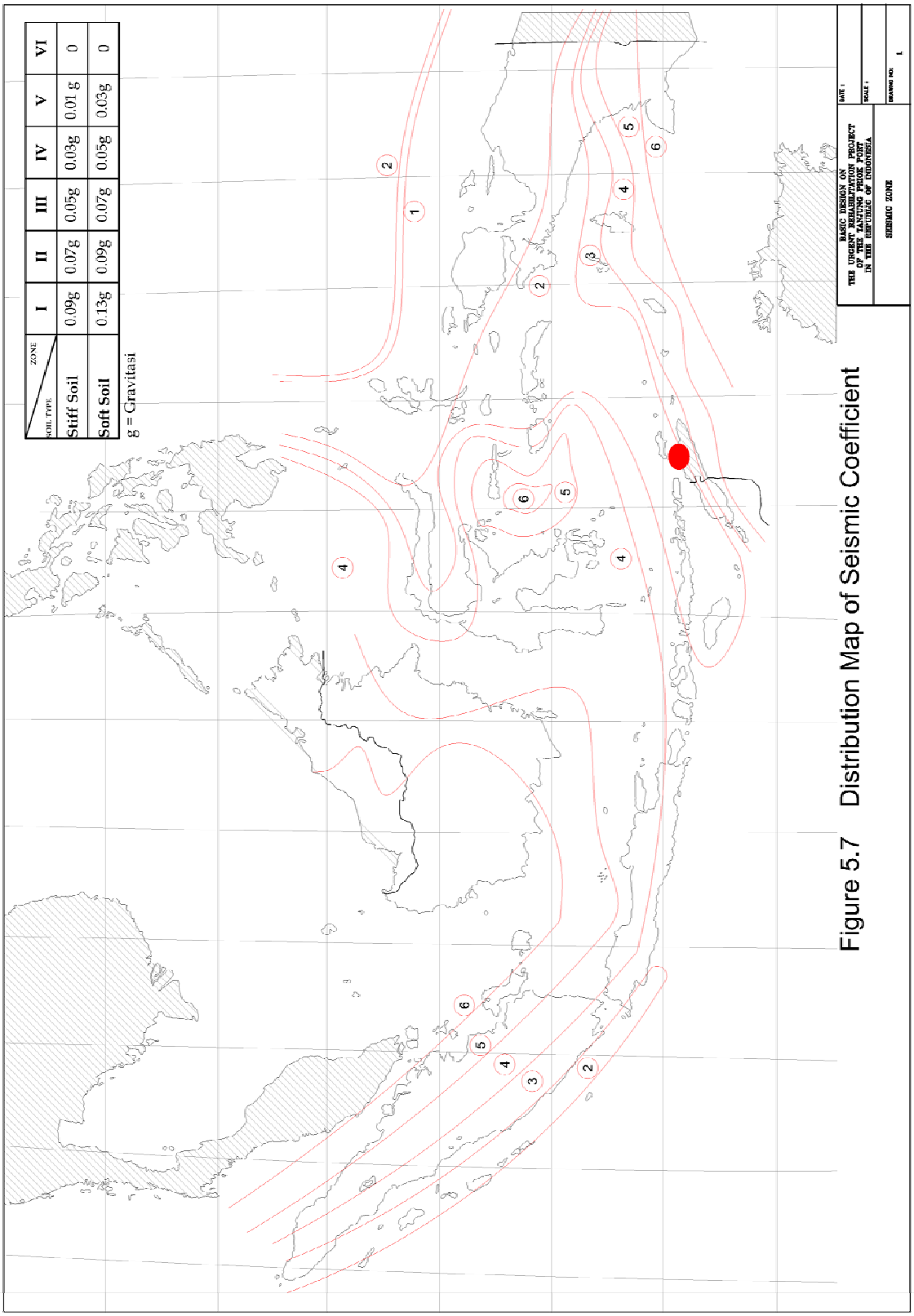
kh = 0.09 x 1.5 = 0.135

The seismic coefficient for verification purpose shall be kh = 0.15



Source：INSTITUTO DO PETROLEO GEOLOGIA IPG TIMOR-LESTE

Figure 1-2-21　Timor Region Earthquake Map



Source：BASIC DESIGN ON THE URGENT REHABILITATION PROJECT OF THE TANJUNG PRIOK PORT IN THE REPUBLIC OF INDONESIA

Figure 1-2-22 Regional Seismic Coefficient for Port Facility Design

1-3 Environmental and social considerations

1-3-1 Environmental Impact Assessment

1-3-1-1 Outline of project components which effect on Environment and Public

Source：Prepared by JICA Survey Team from picture image of Google Earth

Figure 1-3-1 Location map of existing port facilities of Dili Port

Source：Prepared by JICA Survey Team from picture image of Google Earth

Figure 1-3-2 Location map of existing port facilities and proposed ferry terminal location in Dili Port

a) Construction of new ferry terminal facilities

i) Installation and removal of temporary working yard

During the construction period, temporary site office cum canteen for workers and material storage yard will be installed and they will be removed upon the completion of the construction work. Water supply and sewerage system and the septic tank will be installed and removed.

ii) Removal of the existing concrete ramp at the proposed new ferry terminal location and a part of the existing retaining wall at both east and west side of Dili Port

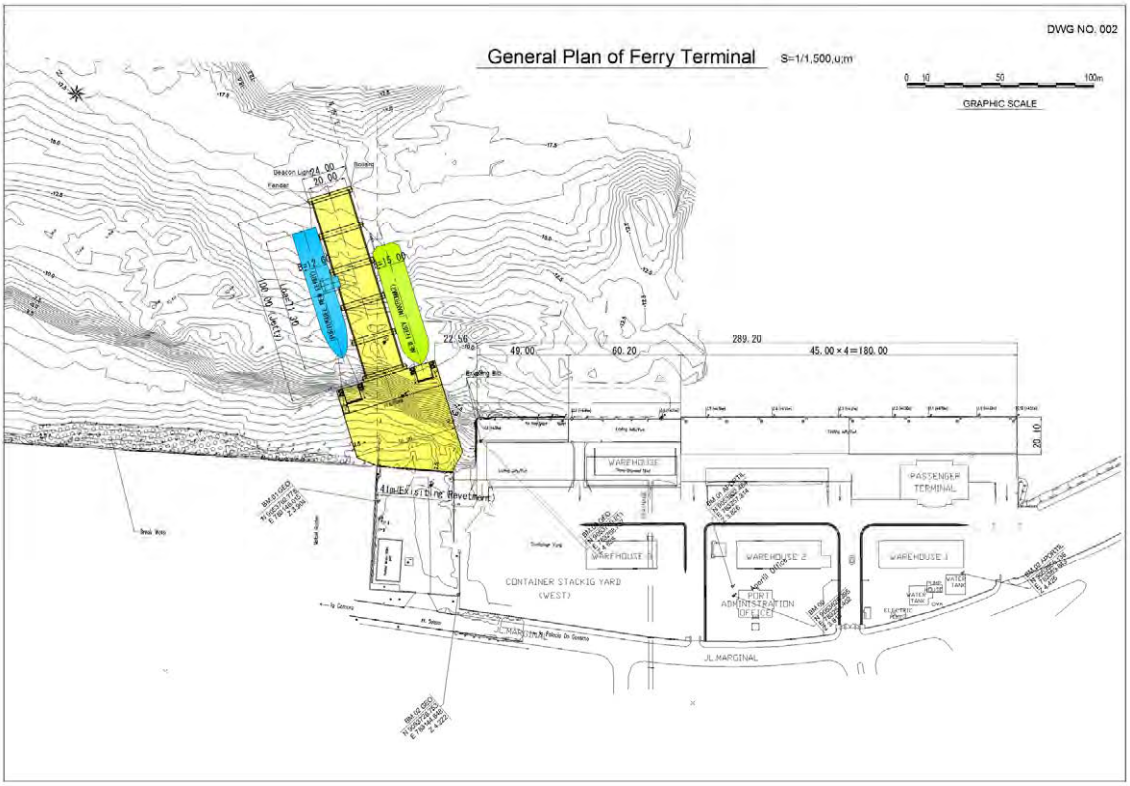
Steel sheet piles will be driven into the ground to provide the cofferdam in order to remove the existing concrete ramp of west side and retaining wall. The removed concrete will be delivered to the outside the port for dumping at the authorized dumping place.

iii) Construction of shore protection

In order to prevent the collapse of the existing onshore slope, rubble stone slope protection will be installed underneath the concrete platform.

iv) Construction of new ferry terminal facilities

New ferry terminal facilities supported by steel pipe piles and pre-stressed concrete (PC) piles will be constructed just sideways Berth No. 6 of the existing cargo vessel wharf. Dredging work may not be required for this new ferry terminal construction, however, the dredging work will be carried out in case the sand deposition will occur heavily. Disposal of the dredged material is described item c) below. Plan of proposed ferry terminal is shown in Figure 1-3-3.



Source：Prepared by JICA Survey Team

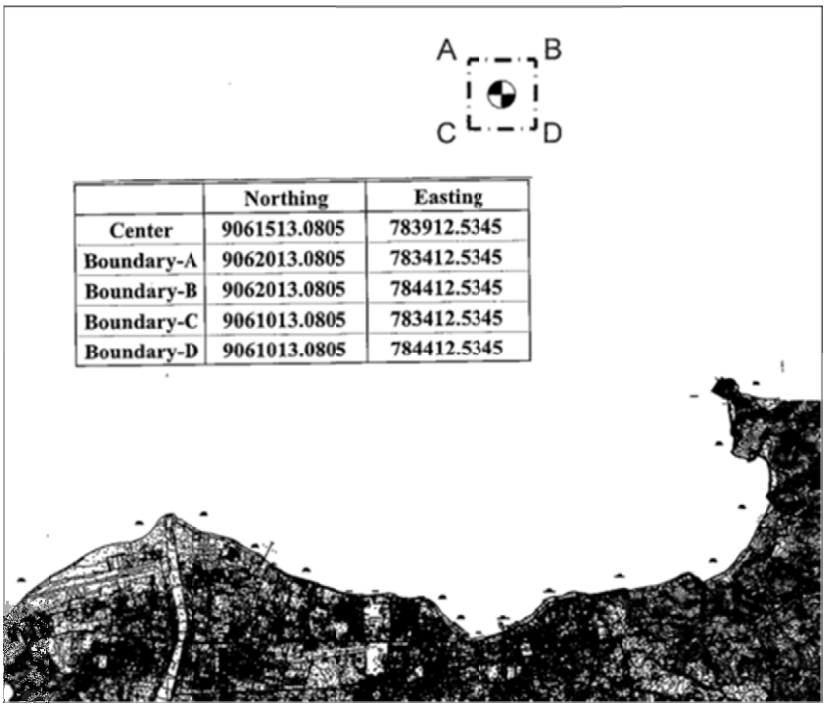
Figure 1-3-3 Plan of proposed ferry terminal

b) Removal of the existing ferry terminal facilities

Upon the completion of the new ferry terminal construction, the existing concrete ramp which is used as a ferry mooring facility will be removed. The removed concrete will be delivered to permissible disposal site for disposal.

c) Offshore dispose of dredged materials

In case the dredging work will be carried out, the dredged materials will be disposed of at the authorized location where Dili Port Dredging work used in 2014. Figure 1-3-4 shows the location and coordinates of the disposal area.



	Northing	Easting
Center	9061513.0805	783912.5345
Boundary-A	9062013.0805	783412.5345
Boundary-B	9062013.0805	784412.5345
Boundary-C	9061013.0805	783412.5345
Boundary-D	9061013.0805	784412.5345

Source：Prepared by JICA Survey Team based on drawing from APORTIL

Figure 1-3-4 Location map of disposal area for dredged materials

1-3-1-2 Current environmental and social conditions as the base line

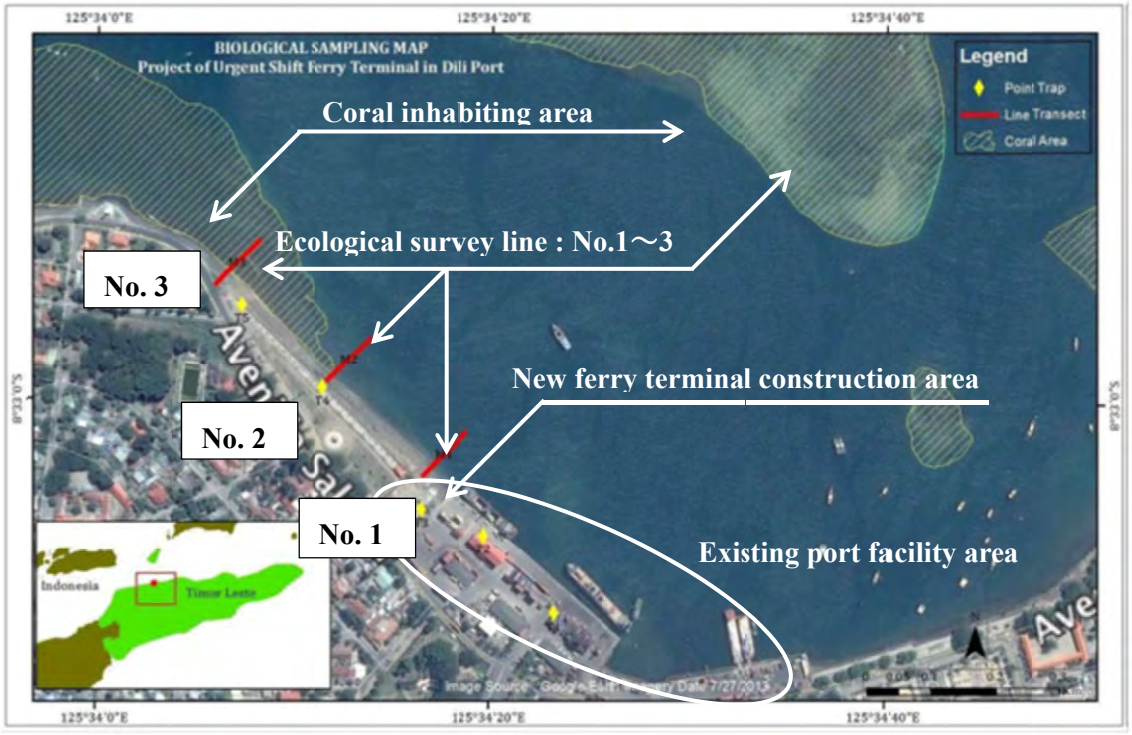
This project area basically locates within the existing port area which is under the control of APORTIL, therefore, land expropriation and involuntary resettlement is not required at all.

There are government buildings, church, school buildings, etc. along the road outside the port area.

Table 1-3-1shows the outline of land use, natural environment and social environment by categorized project components.

Table 1-3-1 Outline of land use, natural environment and social environment by categorized project components

Category	Construction of new ferry terminal facilities	Removal of the existing ferry terminal facilities	Dredging work and dispose of dredged materials
Land use	Water area within the existing port	Within the existing port area	Water area within and outside the existing port
Natural environment	Seabed elevation varies from zero to -11 meters at the proposed construction site of 30 meters distance from the shoreline. Seabed is covered by very loose calcareous silt. Dissolved oxygen and oil/grease content do not comply with the criteria, however, other items meet the requirements of the criteria.	Concrete ramp is constructed alongside the container storage area.	There is a place where corals are inhabiting in front of the existing port facilities, however, this area is out of the navigation route and the transportation of the dredged materials does not give any impact to ecological system.
Social environment	Only port related party uses the water area.	Only port related party uses the area.	Dredged material transporting vessels navigate the water area where ships calling Dili Port navigate, safe navigation can be maintained as long as the specified navigation method is observed.



Source：Prepared by JICA Survey Team from picture image of Google Earth

Figure 1-3-5 Location map of existing port facility area, ecological survey area and coral inhabiting area

Coral inhabiting areas are found at about 1,000 meters to north and 400 meters to west of the proposed ferry terminal area, however, any living beings (coral, seaweed, benthic organism, etc.) are not found at the proposed ferry terminal construction site as a result of the field survey.

1-3-1-3 Comparison of alternative proposals (including Zero-option)

Table 1-3-2 shows the comparison of the project alternatives which include (1) proposed new ferry terminal construction plan, (2) new ferry terminal construction at the existing ferry mooring location (concrete ramp) where Nakroma is now using, and (3) ferry terminal is not constructed and the existing concrete ramp is used.

From the comprehensive standpoint, the Alternative No. 1is the most realistic on safety, compatibility for demand variation, economical efficiency and natural and social environment aspects, therefore, it is appropriate to construct the new ferry terminal at the proposed location.

Table 1-3-2 Comparison table of alternative proposals

Item	Alternative No. 1 (Relocation within Dili Port)	Alternative No. 2 (New ferry terminal facility which can accommodate both front opening and side opening type ferries is constructed at the existing ferry mooring area)	Alternative No. 3 : Zero option (Project is not implemented)
Outline	New ferry terminal is relocated within the existing port area in order to enhance the safe operation.	New ferry terminal facility which can accommodate both front opening and side opening type ferries is constructed at the existing ferry mooring area	The existing facility is continued to use.
Operational aspect	New ferry terminal is constructed away from the container handling area in the existing port facility and the safe operation is enhanced. New terminal can accommodate both front opening and side opening type ferries and this makes ferry operation schedule planning more flexible.	Traffic line of container handling equipment and the movement of passengers intersect and the risks of accident cannot be circumvented. New terminal can accommodate both front opening and side opening type ferries and this makes ferry operation schedule planning more flexible.	Traffic line of container handling equipment and the movement of passengers intersect and the risks of accident cannot be circumvented. Side opening type ferry can be moored only at the existing cargo vessel wharf, however, time for embarkation and disembarkation is limited.
(Evaluation)	＋＋＋	＋＋	＋
Technical aspect	Both front opening and side opening type ferries can be accommodated and 2	Both front opening and side opening type ferries can be accommodated and 2	Front opening type ferries (existing and new) cannot be moored at the same time. Side

	ferries can be moored at the same time.	ferries can be moored at the same time. Safe traffic line for passengers is not secured.	opening type ferry is moored only at the existing cargo vessel wharf, however, time for embarkation and disembarkation is limited.
(Evaluation)	＋＋＋	＋＋	—
Cost aspect	Approx. 20 million USD.	Approx. 20 million USD (cost for separating the traffic lines of container handling and passenger movement is not included).	—
(Evaluation)	＋＋	＋	—
Natural environmental aspect	Coral inhabiting areas are found at about 1,000 meters to north and 400 meters to west of the proposed ferry terminal area. Prior to the commencement of the construction work, an area where the movement of working vessels shall not give negative effects to corals shall be identified by installing temporary buoys, and working vessels shall only move within the area surrounded with those buoys. It is possible to avoid any damages to corals by	Coral inhabiting areas are found at about 1,000 meters to north and 1,000 meters to west of the existing ferry terminal area, however, environmental impacts due to the construction work can be avoided through monitoring the situation.	—

	maintaining the buoys and monitoring the movement of working vessels.		
(Evaluation)	++	+++	—
Social environmental aspect	This project is relocation of the ferry terminal within the existing port area, therefore, no resettlement of the residents nor the compensation for fishing people are required. Negative impacts for the social environment is minimal.	New ferry terminal is constructed at the existing ferry mooring place, therefore, no resettlement of the residents nor the compensation for fishing people are required. Negative impacts for the social environment is minimal.	—
(Evaluation)	＋＋＋	＋＋＋	—
Comprehensive evaluation	Alternative No. 1 has no advantage over Alternative No. 2 on the natural environmental aspect, however, Alternative No. 1 has superiority of securing passengers' safety and convenience of the operational aspect over Alternative No.2. Therefore, this planning is recommended.	Alternative No. 2 has precedence on natural environmental aspect over Alternative No. 1, however, Alternative No. 2 has no advantage over Alternative No. 1 on operational aspect, technical aspect and cost aspect. Therefore, Alternative No. 2 is not recommended.	Alternative No. 3 has no advantage over other Alternative No. 1 and No. 2 on the safety of the passengers and operational aspect, such as compatibility for demand variation. Therefore, Alternative No. 3 is not recommended.
(Evaluation)	＋＋＋	＋	＋

＜Explanatory note＞ +++ : Optimum, ++ : Better than others, + : Worse than others, － : Not applicable

Note : Cost above is calculated by JICA Survey Team

1-3-1-4 Scoping

Scoping was carried out about Alternative No. 1 above in order to identify the items of environmental considerations in this project. Table 1-3-3 shows the result of the scoping.

Table 1-3-3 Scoping matrix

Category		Impact item	Evaluation		Reason for evaluation
			Before and during construction	During operation	
Measures for pollution control	1	Air pollution	B-	C-	**Before and during construction** : It is assumed that air pollution may be occurred temporarily due to the movement of construction machine. Dust will be generated temporarily when concrete ramp and retaining wall is removed. **During operation** : Running vehicles will generate air pollution due to the increase of ferry voyages.
	2	Water pollution	B-	C-	**Before and during construction** : There is a possibility that the drainage and oil leak from the construction site, construction machine, site office and work vessels may occur water pollution. When it rains, rain water containing hazardous substance and mud may flow out directly to the sea. **During operation** : New ferry terminal can accommodate plural number of ferry at one time. It is assumed that the number of ferry call will be increased and there is a possibility that water pollution may occur due to the drainage from the ferries.
	3	Waste	B-	C-	**Before and during construction** : It is assumed that waste materials from the construction work may be generated. **During operation** : It is assumed that the waste may be increased due to the increase of passengers and ferry voyages.
	4	Soil pollution	B-	D	**Before and during construction** : When the fuel is filled to construction machine, there is a possibility that outpoured fuel may pollute the soil. **During operation** : It is not assumed that some work may pollute the soil.
	5	Noise / vibration	B-	C-	**Before and during construction** : It is assumed that the movement of construction machine and vehicles may generate noise and vibration.

Category	Impact item		Evaluation		Reason for evaluation
			Before and during construction	During operation	
					During operation : It is assumed that the noise and vibration at the surrounding area may be generated due to increase of passengers and ferry voyages.
	6	Ground settlement	D	D	**Before and during construction and during operation** : It is not assumed that any works make ground settlement.
	7	Bad smell	B-	D	**Before and during construction** : In case dredging work will be carried out, there is a possibility that the dredged material may generate bad smell. **During operation** : It is not assumed that any works generate bad smell.
	8	Bottom sediment pollution	B-	C-	**Before and during construction** : It is assumed that the bottom sediment pollution may be generated by removal of concrete structure, such as existing concrete ramp and retaining wall, drainage from work vessels and ship bottom paint. It is assumed that dredged material may proliferate and cause bottom sediment pollution. **During operation** : It is assumed that drainage from ships and ship bottom paint may generate the bottom sediment pollution due to the increase of calling ships.
Natural environment	1	Protected area	D	D	**Before and during construction and during operation** : Protected area as well as marine protected area do not exist around the proposed project area.
	2	Ecological system	B-	C-	**Before and during construction** : It is assumed that dredged material may proliferate and cause negative environmental impact to ecological system.. **During operation** : It is assumed that drainage from ships may cause the negative environmental impact to ecological system due to the increase of calling ships.
	3	Hydrometeor	D	D	**Before and during construction and during operation :** Due to the removal of existing retaining

Category	Impact item		Evaluation		Reason for evaluation
			Before and during construction	During operation	
					walls of east and west side, it is assumed that the seabed sand may move to become the balanced seabed slope. Ferry terminal facility (jetty structure) is supported by steel and concrete piles, therefore, this jetty structure does not give any impact to the seawater and seabed sand.
	4	Topography / geology	D	D	**Before and during construction** : There is no construction work which has impact on topography and geology. **During operation** : There is no work which has impact on topography and geology.
	5	River	D	D	**Before and during construction and during operation** :There is no work which has impact on river.
	6	Groundwater	D	D	**Pre-construction / during construction and during operation** :There is no work which has impact on groundwater.
Social environment	1	Resettlement	D	D	**Before and during construction and during operation** : Resettlement of the residents does not occur.
	2	Livelihood	B-	B+	**Before and during construction** : It is assumed that there may be a little environmental negative impact temporarily to the residents around the project site due to the increase of passages of vehicle for construction works. **During operation** : Increase of ferry voyages and jumboizing ferry sizes will have positive impact on the livelihood.
	3	Cultural heritage	D	D	**Before and during construction and during operation** : There is no cultural heritage at the project

Category		Impact item	Evaluation		Reason for evaluation
			Before and during construction	During operation	
					site and the neighboring areas.
	4	Landscape	D	D	**Before and during construction and during operation** : Changes to landscape come out with relocation of ferry terminal, however, this change may not impact on usage of the surrounding facilities.
	5	Ethnic minority / indigenous people	D	D	**Before and during construction** : Port facility construction site including surrounding water area is under the control of APORTIL, therefore, there is no impact on the fishery. **During operation** : There is no work which impacts on ethnic minority and indigenous people.
	6	Working environment	B-	D	**Before and during construction** : It is necessary to take into account the working environment and hygiene. **During operation** : Any works which give negative impact on the working environment to workers during operation time is not planned.
Others	1	Accident	B-	C-	**Before and during construction** : It is necessary to take into account the marine and onshore traffic during the construction period. **During operation :** It is concerned that the occurrence of traffic accident may be increased due to the increase of passengers and voyages of ferries.

Evaluation: A: Strong impact is assumed. B: Certain level of impact is assumed. C: Magnitude of impact is unknown. Future verification is required. D: Impact is minor. No future verification is required.

＋: Positive impact —: Negative impact

Impact parameters are selected based on JICA Guideline.

1-3-2 TOR for environmental and social consideration survey

Table 1-3-4 shows the TOR for environmental and social consideration survey based on the results of the scoping.

Table 1-3-4 TOR for environmental and social consideration survey

Category	Impact item	Survey item	Survey method
Anti-pollution measures	Air pollution	Current situation analysis Future prospects of number of ferry voyage Work method	Field environmental survey / analysis Hearing Hearing
	Water pollution	Current situation analysis Future prospects of number of ferry voyage	Field environmental survey / analysis
	Waste	Waste disposal method	Hearing
	Soil pollution	Current situation analysis Work method	Field environmental survey / analysis Hearing
	noise / vibration	Current situation analysis Future prospects of number of ferry voyage Work method	Field environmental survey / analysis Hearing Hearing
	Ground settlement	Current situation analysis	Hearing
	Bad smell	Possibility to carry out dredging work Work method	Geographical and water depth survey Hearing
	Bottom sediment pollution	Current situation analysis Future prospects of number of ferry voyage Work method	Field environmental survey / analysis Hearing Hearing
Natural environment	Protected area	Current situation analysis	Hearing, Literature searching
	Ecological system	Current situation analysis Future prospects of number of	Field environmental survey / analysis Hearing

		ferry voyage	
	Hydrometeor	Current situation analysis	Hearing
	Topography / geology	Current situation analysis	Hearing
	River	Current situation analysis	Hearing
	Groundwater	Current situation analysis	Hearing
Social environment	Livelihood	Future prospects of number of ferry voyage	Hearing
	Ethnic minority / indigenous people	Current situation analysis	Hearing
	Working environment	Safety measure	Hearing
Others	Accident	Safety measure	Hearing

1-3-3 Environment and social consideration survey results (including predicted results)

Environmental Basic Law (Decree Law No. 26/2012) is descriptive of Environmental Standards (Article 14) and the Government to specify the various environmental standards as well as emission standards (from Article 32 to 42), however, those have not been officially established. Therefore, Indonesian Environmental Standards which had been used by the time of Timor-Leste's independence are mainly used for the evaluation of field environmental survey analysis.

Field environmental and social consideration survey was conducted based on the TOR shown above. Table 1-3-6 and Table 1-3-6 shows the results of the survey.

Table 1-3-5 Environment and social consideration survey results (measurement and analysis)

Air Pollution

No.	Parameter	Duration of Test	Unit	Reference criteria			Test Results					Method
				WHO	Japan	USA	Sample-1	Sample-2	Sample-3	Average	Determination	
1	Sulfur Dioxide (SO_2)	1 hour	µg/Nm^3	125: target-1 50: target-2 20: Guideline	100		25	23	15	21	pass	SNI 19-7119.7-2005
		24 hours			40		-	-	-	-	-	
2	Carbon Monoxide (CO)	1 hour	µg/Nm^3		20,000		3,357	3,299	2,795	3,150	pass	SNI 7119.10-2011
		24 hours		10,000	10,000		-	-	-	-	-	
3	Nitrogen Dixide (NO_2)	1 hour	µg/Nm^3	200: Guideline			23	21	14	19	pass	SNI 19.7119.2-2005
		24 hours			40～60		-	-	-		-	
4	Ozon (O_3)	1 hour	µg/Nm^3				35	34	34	34	pass	SNI 19-7119.8-2005
5	Hydro carbon (HC)	3 hours	µg/Nm^3				105	98	85	96	pass	SNI 19-7119.13-2009
6	Total Suspended Particles (TSP)	24 hours	µg/Nm^3			260	120	110	67	99	pass	SNI 19-7119.3-2005
7	PM_{10} (Particles <10 µm)	24 hours	µg/Nm^3	150: target-1 100: target-2 75: target-3 50: Guideline	100	150	50	40	29	40	pass	High volume air sampler
8	$PM_{2.5}$ (Particles <2.5 µm)	24 hours	µg/Nm^3	75: target-1 50: target-2 37.5: target-3 25: Guideline	35	35	28	22	13	21	pass	High volume air sampler
9	Lead (Pb)	24 hours	µg/Nm^3				0.1	0.05	0.02	0.06	pass	SNI 19-7119.4-2005

Reference Criteria : WHO, Japan and USA criteria Sampling and analysis method : Indonesian standards

Sea Water Quality Analysis

No.	Parameter	Unit	Reference criteria			Test Results							Method
			EU	Japan	USA	Sample-1	Sample-2	Sample-3	Sample-4	Sample-5	Average	Determination	
1	Total Phosphorus (PO_4)	mg/L	1	0.03		0.02	0.01	0.01	0.01	0.01	0.012	pass	18-27/IK/ALT
2	Salinity	‰				39	38	38	39	39	38.600	-	APHA Ed. 22nd 2520.B-2012
3	Oil & Grease	mg/L				0.2	0.2	0.2	0.2	0.2	0.200	fail	Extraction - spectrophotometry
4	Turbidity	NTU	5/one sample		1	1	2	1	3	2	1.800	pass	SNI 06-6989.25-2005
5	Disolved Oxygen (DO) (in situ)	mg/L		7.5		3	3	3	4	4	3.400	fail	SNI 06-6989.14-2004
6	pH (in situ)	-				8	8	8	8	8	8.000	pass	SNI 06-6989.11-2004
7	Temperature (in situ)	℃				29	29	30	29	29	29.200	pass	SNI 06-6989.23-2005
8	Total Coloforms	MPN/100 mg				3	4	4	3	3	3.400	pass	APHA Ed. 22nd 9221.B-2012
9	Total Suspended Solids (TSS)	mg/L	30	150	30	2	2	2	2	2	2.000	pass	SNI 06-6989.3-2004
10	Chemical Oxygen Demand (COD)	mg/L	125	120		45	46	40	34	26	38.200	-	SNI 06-6989.15-2004
11	Total Nitrogen (as N)	mg/L	10	3		2	5	2	2	2	2.600	-	Water reserch methods Chapter XI - 1984
12	Total Dissolved Solids (TDS)	mg/L				38.3	39.2	38.3	38.9	39.4	38.820	-	SNI 06-6989.27-2005

Reference Criteria : EU, Japan and USA criteria Sampling and analysis method : Indonesian standards

Bottom Sediment

No.	Parameter	Unit	Reference Criteria	Test Results							Method
				Sample-1	Sample-2	Sample-3	Sample-4	Sample-5	Average	Determination	
1	Total Organic Carbon (TOC)	%	-	0.85	0.79	0.7	0.79	0.78	0.782	-	SIN 13-4720-1998
2	Arsenic (As)	mg/kg	max. 9.8	0.5	0.5	0.5	0.5	0.5	0.500	pass	USEPA SW 846-3050B; APHA Ed 22nd 3111B-2012
3	Cadmium (Cd)	mg/kg	max. 0.99	0.5	3	0.5	2	0.5	1.300	pass	USEPA SW 846-3050B; APHA Ed 22nd 3111B-2012
4	Mercury (Hg)	mg/kg	max. 0.18	0.01	0.01	0.01	0.01	0.01	0.010	pass	USEPA SW 846-3050B; APHA Ed 22nd 3111B-2012
5	Zinc (Zn)	mg/kg	max. 120	21	143	29	26	78	59.400	pass	USEPA SW 846-3050B; APHA Ed 22nd 3111B-2012
6	Copper (Cu)	mg/kg	max. 32	5	20	5	7	19	11.200	pass	USEPA SW 846-3050B; APHA Ed 22nd 3111B-2012
7	Chromium (Cr)	mg/kg	max. 43	3	3	3	3	3	3.000	pass	USEPA SW 846-3050B; APHA Ed 22nd 3111B-2012
8	Lead (Pb)	mg/kg	max. 36	5	8	5	5	5	5.600	pass	USEPA SW 846-3050B; APHA Ed 22nd 3111B-2012
9	Nickel (Ni)	mg/kg	max. 23	3	3	3	4	4	3.400	pass	USEPA SW 846-3050B; APHA Ed 22nd 3111B-2012
10	Total Petroleum Hydrocarbon (TPH)	mg/kg	-	20	20	20	20	20	20.000	-	UESPA 8440 1996

Reference Criteria : Wisconsin Department of Natural Resources

Noise

No.	Location	Time	Criteria dB (A)	Test Results L_S dB (A)	Determination	Method
K1	Port Location - West	L1. 07^{00} L2. 10^{00} L3. 15^{00} L4. 20^{00}	60	66	fail	22-3/IK/UA-0

No.	Location	Time	Criteria dB (A)	Test Results L_M dB (A)	Determination	Method
K1	Port Location - West	L5. 2300 L6. 0100 L7. 0400	60	50	pass	22-3/IK/UA-0

No.	Location	Time	Criteria dB (A)	Test Results L_{SM} dB (A)	Determination	Method
K1	Port Location - West	L1. 07^{00} L2. 10^{00} L3. 15^{00} L4. 20^{00} L5. 2300 L6. 0100 L7. 0400	60+3	64	fail	22-3/IK/UA-0

No.	Location	Time	Criteria dB (A)	Test Results L_S dB (A)	Determination	Method
K2	Port Location - East	L1. 07^{00} L2. 10^{00} L3. 15^{00} L4. 20^{00}	60	58	pass	22-3/IK/UA-0

No.	Location	Time	Criteria dB (A)	Test Results L_M dB (A)	Determination	Method
K2	Port Location - East	L5. 2300 L6. 0100 L7. 0400	60	49	pass	22-3/IK/UA-0

No.	Location	Time	Criteria dB (A)	Test Results L_{SM} dB (A)	Determination	Method
K2	Port Location - East	L1. 07^{00} L2. 10^{00} L3. 15^{00} L4. 20^{00} L5. 2300 L6. 0100 L7. 0400	60+3	57	pass	22-3/IK/UA-0

No.	Location	Time	Criteria dB (A)	Test Results L_S dB (A)	Determination	Method
K3	Outside of Port	L1. 07^{00} L2. 10^{00} L3. 15^{00} L4. 20^{00}	60	54	pass	22-3/IK/UA-0

No.	Location	Time	Criteria dB (A)	Test Results L_M dB (A)	Determination	Method
K3	Outside of Port	L5. 2300 L6. 0100 L7. 0400	60	43	pass	22-3/IK/UA-0

No.	Location	Time	Criteria dB (A)	Test Results L_{SM} dB (A)	Determination	Method
K3	Outside of Port	L1. 07^{00} L2. 10^{00} L3. 15^{00} L4. 20^{00} L5. 2300 L6. 0100 L7. 0400	60+3	53	pass	22-3/IK/UA-0

Reference Criteria : Indonesian Environmental Ministry Decree No. 48 of 1996 about Noize in Public Facilities

Source: Prepared by JICA Survey Team based on field investigation

Table 1-3-6 Environment and social consideration survey results

Category	Impact item	Survey results
Anti-pollution measures	Air pollution	Air quality survey was conducted to analyze sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), hydro carbon (HC), dust (TPS), PM_{10}, PM_{25} and lead (Pb), and those samples of each item were collected at 3 locations. The analysis results show that all items cleared the WHO, Japan and USA reference criteria and no air pollution was found. It is assumed that about 10 units of vehicles will be used daily during the construction period, and those vehicles will not increase the exhaust gas and dust which will be discharged only within the port area, therefore, it is conceivable that the exhaust gas emission and dust will not cause any negative impact to the surrounded area. Quantity of the concrete of the existing ramp and retaining wall to be demolished is less than 1,000 m^3, and the concrete dust will be generated in a limited area as well as the distance from concrete demolishing point to the boundary of port area is about 80 meters to 200 meters. Therefore, there will be little possibility that construction activities will generate the air pollution to the neighboring people. Even though the number of ferry voyages will be increased, the number of cargo trucks to be loaded on the ferry at one time is limited, and this situation will not cause the increase of negative impact on air pollution comparing with current condition.
	Water pollution	Seawater quality survey was conducted to analyze total phosphate (PO_4), salinity, oil and grease, turbidity, dissolved oxygen (DO), pH, temperature, total coliforms, total suspended solids (TSS), chemical oxygen demand (COD), total nitrogen and total dissolved solids (TDS), and those samples of each item were collected at 5 locations. The analysis results show that all items clear the EU, Japan and USA reference criteria. In case dredging work will be carried out, it is assumed that turbid water may be generated due to the diffusion of dredged materials. Pollution preventing membrane must be installed to prevent the diffusion of turbidity. Outflow of rain water may not cause any negative impact as long as the existing facility is not altered, however, monitoring must be

Category	Impact item	Survey results
		carried out. Due to the increase of ferry voyages, measures must be ready for oil spill from ships.
	Waste	Wastes from Ferry Nakuroma are disposed of to steel dust bins installed just besides the existing concrete ramp. APORTIL collects wastes from dust bins installed in the port area including wastes from Nakuroma and delivers them to Tibar Landfill (public disposal facility). This wastes disposal method will be continued in the future without any negative impact, however, monitoring must be carried out.
	Soil pollution	When fuel oil is loaded to Ferry Nakuroma, there is a possibility that the remained fuel in the fuel delivery hose may be leaked to the ground. Nakuroma has a plan to modify fuel loading system when Nakuroma enters dock in August, 2015 for 2.5 months. If this modification is completed, the possibility of oil leak is reduced remarkably, however, monitoring must be carried out. When loading fuel oil to construction machine, there is a possibility that the ground may be contaminated with the leaked fuel oil. Monitoring must be carried out..
	Noise / vibration	When noise measurement was carried out on the existing cargo vessel wharf, cargo unloading work was ongoing and trucks for transporting the cargo were moving around. Therefore, noise level exceeds the criteria except the measurement at night time, however, the measurements carried out at the existing ferry mooring area and surrounding park area clear the Indonesian reference criteria which are mostly same numeric value as Japanese criteria. Pile driving work by hydraulic hummer and vibro-pile hummer will cause high level of noise and vibration during the construction work. The distance between neighboring church and piling site is about 300 meters, it is assumed that the distance decay effect will reduce the impact of noise and vibration.
	Bad smell	In case dredging work will be carried out, there is a possibility that dredged materials may cause bad smell. However, dredging work will be carried out at offshore and this bad smell will not give any negative impact to the people living near the port area.
	Bottom	Bottom sediment quality survey was conducted to analyze total

Category	Impact item	Survey results
	sediment pollution	organic carbon (TOC), arsenic (As), cadmium (Cd), mercury (Hg), zinc (Zn), copper (Cu), chromium (Cr), lead (Pb), nickel (Ni) and total petroleum hydrocarbon (TPH), and those samples of each item were collected at 5 locations. The analysis results show that only 1 sample of zinc collected at east side of the existing cargo wharf exceeds the United States reference criteria (119 % of criteria) and that another 4 samples clear those criteria. Therefore, it is understood that the zinc level will not give any negative impact. All of other items clear those criteria. When removing concrete of existing concrete ramp and retaining wall, it is necessary to take account of not remaining removed concrete fragments at the removal site. Even though the number of ferry voyages will be increased, it is not assumed that wastes from ships and ship bottom paint will give negative impact to the bottom sediments, however, monitoring must be carried out.
Natural environ-ment	Protected area	There is neither protected area nor marine protected area around the proposed project site.
	Ecological system	Rare flora and fauna are not identified at and around the proposed project site by literature survey. Ecological system field survey was carried out at 3 lines of 100 meters long each and 385 meters interval, base line (No. 1) is the proposed new ferry terminal construction area and shallow area of about 1,000 meters away to north is also included to the survey area for reference purpose (please refer to Figure 1-2-5). Any rare flora and fauna, seaweeds, coral, etc. which require environmental considerations were not identified on survey line No. 1 and No. 2. A kind of coral (so called as Cauliflower coral) was identified on survey line No. 3, however, International Union for Conservation of Nature and Natural Resources (IUCN) categorizes this coral as Least Concern. (Timor-Leste does not have own categories, therefore, IUCN's categories are referred to.). Other seaweeds and benthic organism which are not in Red List were identified. At the shallow area of about 1,000 meters away to north, Diploastrea heliopora (so called as Diploastrea brain coral or Honeycomb coral) categorized as Near Threatened, Heliofungia actiniformis

Category	Impact item	Survey results
		categorized as Vulnerable, Polyphyllia talpina（so called as Feather Coral）, Pachyseris speciosa（so called as mushroom coral）and Coeloseris mayeri categorized as Least Concern were identified. Other seaweeds and benthic organism which are not in Red List were identified. When ferries will arrive at Dili Port from Portugal and Germany and working vessels will arrive, there is a possibility that there may be living things contained in the ballast water or stuck to ship bottom which may damage ecosystems, it is necessary to take some measures to prevent importing those living things to Timor-Leste by cleaning ship bottom prior to mobilizing the ferries and work vessels.
Social environ-ment	Livelihood	It is assumed that about 10 units of vehicles will be used daily during the construction period, and those vehicles will not increase the exhaust gas and dust which will be discharged only within the port area, therefore, it is conceivable that the exhaust gas emission and dust will not cause any negative impact to the surrounded area. Quantity of the concrete of the existing ramp and retaining wall to be demolished is less than 1,000 m^3, and the concrete dust will be generated in a limited area as well as the distance from concrete demolishing point to the boundary of port area is about 80 meters to 200 meters. Therefore, there will be little possibility that construction activities will generate the air pollution to the neighboring people. Even though the number of ferry voyages will be increased, the number of cargo trucks to be loaded on the ferry at one time is limited, and this situation will not cause increasing negative impact on air pollution comparing with current condition. On the other hand, there is a plan to attract cruise ships of large size and it can be assumed that visiting tourists will be increased. It is assumed that there is positive impact on the livelihood.
	Ethnic minority / indigenous people	Existing data shows that there is neither ethnic minority nor indigenous people around the proposed project area.
	Working	The project proponent is obliged to maintain good working

Category	Impact item	Survey results
	environ-ment	environment in accordance with the requirements of laws and regulations of Timor-Leste. It is obliged to say that the project proponent's level of understanding on workers' safety matter is unsatisfactory and it is necessary that workers' safety matter including measures for HIV must be secured.
Others	Accident	It is necessary to take measures to prevent land and marine traffic accidents caused by project related vehicles and vessels during the construction period. After the construction of new ferry terminal will have been completed, number of ferry voyages and passengers other than local people will be increased, therefore, it is necessary to take measures to prevent traffic accident taking account of the passage of tourists.

1-3-4 Impact statement

Scoping matrix(refer to Table 1-3-3 above) is revised as shown in Table 1-3-7 based on the field survey results and environmental and social consideration survey results (section 1-2-2 above). Major revision points and reasons for evaluation are described in this Table 1-3-7.

Table 1-3-7 Impact statement

Category		Impact item	Impact statement at time of scoping		Impact statement based on field survey results		Reason for evaluation
			Before & during construction	Operation time	Before & during construction	Operation time	
Measures for pollution control	1	Air pollution	B-	C-	B-	D	**Before & during construction :** It is assumed that air pollution may be occurred temporarily due to the movement of construction machine. Dust will be generated temporarily when concrete ramp and retaining wall is removed.

							Therefore, impact statement is B-. **During operation** : Number of ferry voyages will be increased, however, air pollution will not be generated because number of ferry voyages in a day is limited. Therefore, impact statement is D.
	2	Water pollution	B-	C-	B- (C-)	D	**Before & during construction** : Number of working vessel is not many and magnitude of water pollution caused by them is nearly null. When dredging work is carried out, impact area is very limited as long as turbidity control is well managed by using pollution preventing membrane. Therefore, impact statement is B- when no dredging work and C- when dredging is carried out. **During operation :** Number of ferry and ferry voyages are increased, however, it is no assumed that drainage from ferries facilitates the water pollution in the port water area. Therefore, impact statement is D.
	3	Waste	B-	C-	B-	D	**Before & during construction :** Impact statement is B- because concrete wastes and construction debris are generated. **During operation :** Waste control is managed by APORTIL in Dili Port and disposed of at the public disposal facility as currently done. Therefore, impact statement is D.
	4	Soil pollution	B-	D	C-	D	**Before & during construction:** There is some possibility of soil pollution caused by oil leakage when filling fuel to construction equipment. Therefore, impact statement is C-. **During operation** : It is assumed that any activities causing soil pollution are not

							carried out. Impact statement is D.
	5	Noise / vibration	B-	C-	C-	D	**Before & during construction** : Forecast of noise and vibration levels was calculated, and this forecast shows that the level of noise and vibration clears the criteria at the church (160 meters away from piling site). Therefore, impact statement is C-. **During operation :** There is no impact of the construction work. Therefore, impact statement is D.
	6	Ground settlement	D	D	D	D	**Before & during construction and during operation** :No impact is identified. Therefore, impact statement is D.
	7	Bad smell	B-	D	B- (C-)	D	**Before & during construction :** When dredging work is carried out, dredged materials may cause bad smell. Impact statement is B- when dredging work is carried out, and C- when dredging work is not carried out. **During operation :** It is assumed that any activities causing bad smell are not carried out. Impact statement is D.
	8	Bottom sediment pollution	B-	C-	B-	D	**Before & during construction :** It is assumed that the bottom sediment pollution may be generated by removal of concrete structure, such as existing concrete ramp and retaining wall, drainage from work vessels and ship bottom paint. It is assumed that dredged material may proliferate and cause bottom sediment pollution. Therefore, impact statement is B-. **During operation :** Number of ferry voyages will be increased, however, bottom sediment pollution will not be

							generated because number of ferry voyages in a day is limited. Therefore, impact statement is D.
Natural environment	1	Protected area	D	D	D	D	**Before & during construction and during operation :** Protected area as well as marine protected area do not exist around the proposed project area. Therefore, impact statement is D.
	2	Ecological system	B-	C-	B- (C-)	C (D-)	**Before & during construction :** When dredging work is carried out, it is assumed that dredged materials may proliferate and cause environmental impact to ecological system. When working vessels and new ferries arrive at Dili Port, necessary measures must be taken to prevent the import of adventive. Impact statement is B- when dredging work is carried out, and C- when dredging work is not carried out. **During operation :** Number of ferry voyages will be increased, however, impact to ecological system will not be generated because number of ferry voyages in a day is limited. Therefore, impact statement is D. However, when new ferry arrives at Timor-Leste from abroad, adventive adhered to ship bottom may impact on ecological system, therefore, impact statement only when new ferry arrives is C-.
	3	Hydrometeor	D	D	D	D	**Before & during construction and durong operation :** Due to the removal of existing retaining walls of east and west side, it is assumed that the seabed sand may move to become the balanced seabed slope. Ferry terminal facility (jetty structure) is supported by steel and concrete piles, therefore, this jetty

							structure does not give any impact to the seawater and seabed sand. Therefore, impact statement is D.
	4	Topography / geology	D	D	D	D	**Before & during construction:** There is no construction work which has impact on topography and geology. Therefore, impact statement is D. **During operation:** There is no work which has impact on topography and geology. Therefore, impact statement is D.
	5	River	D	D	D	D	**Before & during construction and during operation:** There is no work which has impact on river. Therefore, impact statement is D.
	6	Groundwater	D	D	D	D	**Before & during construction and during operation:** There is no work which has impact on groundwater. Therefore, impact statement is D.
Social environment	1	Resettlement	D	D	D	D	**Before & during construction and during operation:** Resettlement of the residents does not occur. Therefore, impact statement is D.
	2	Livelihood	B-	B+	B-	B+	**Before & during construction :** It is assumed that there may be a little environmental negative impact temporarily to the residents around the project site due to the increase of passages of vehicle for construction works. Therefore, impact statement is B-. **During operation:** Increase of ferry voyages and jumboizing ferry sizes will have positive impact on the livelihood. Therefore, impact statement is B+.
	3	Cultural heritage	D	D	D	D	**Before & during construction and during operation:** There is no cultural

							heritage at the project site and the neighboring area. Therefore, impact statement is D.
	4	Landscape	D	D	D	D	**Before & during construction and during operation:** Changes to landscape come out with relocation of ferry terminal, however, this change may not impact on usage of the surrounding facilities. Therefore, impact statement is D.
	5	Ethnic minority / indigenous people	D	D	D	D	**Before & during construction:** Port facility construction site including surrounding water area is under the control of APORTIL, therefore, there is no impact on the fishery and impact statement is D. **During operation:** There is no work which impacts on ethnic minority and indigenous people.
	6	Working environment	B-	D	B-	D	**Before & during construction:** It is necessary to take account of the working environment and hygiene. Therefore, impact statement is B-. **During operation:** Any works which give negative impact on the working environment to workers during operation time is not planned. Therefore, impact statement is D.
Others	1	Accident	B-	C-	B-	C-	**Before & during construction:** It is necessary to take account of the marine and onshore traffic during the construction period. Therefore, impact statement is B-. **During operation:** It is concerned that the occurrence of traffic accident may be increased due to the increase of passengers and voyages of ferries. Therefore, impact statement is C-.
Evaluation : A: Strong impact is assumed. B: Certain level of impact is assumed. C:							

Magnitude of impact is unknown. Future verification is required. D: Impact is minor. No future verification is required.
＋: Positive impact —: Negative impact
Impact parameters are selected based on JICA Guideline.

1-3-5 Mitigation measures and the cost for them

Based on field survey results and impact statement results, environmental impacts and their mitigation measures are shown on Table 1-3-8 and Table 1-3-9. Necessary costs and expenses to implement the mitigation measures are included in the construction cost for the items the contractor is responsible, and in the operation expenses of Ferry Operation Department of APORTIL for the items APORTIL is responsible.

Table 1-3-8 Environment impacts and mitigation measures (before and during construction period)

Impact item	Impact statement	Environmental impact	Mitigation measures	Imple-mented by	Super-vised by
Air pollution	B-	It is assumed that pollutant is exhausted from construction machine and vehicles during construction period and that dust is generated by concrete removal work.	Inspection and maintenance of construction machine must be carried out in order to keep the best condition. During construction period, the construction site and surrounding roads must be sprinkled with water and tire washing facility must be provided to prevent the generation of dust. Water must be sprinkled to concrete to be removed.	Contractor	APORTIL
Water pollution	B- (C-)	It is assumed that working vessels may give negative impact to water quality. In case dredging work is required, it is assumed that seabed soil may be agitated and that turbid water may be generated. Impact statement is B- when no dredging work is required and C- when dredging work is carried out.	Working vessels must be operated with due caution not to upset the seabed soil. When dredging work is carried out, pollution preventing membrane must be installed and turbidity control method must be clearly mentioned in Work Procedures. Measures for oil contamination must be prepared and made parties concerned well known. When unusual situation, such as generation of turbid water, oil spill, etc. is found, condition of water quality must be examined by conducting additional sample collection and water quality analysis.	Contractor	APORTIL
Waste	B-	Crushed concrete and construction debris are generated during construction period.	Wastes generated by construction works must be recorded and disposed of at the disposal place permitted by regulations of Timor-Leste.	Contractor APORTIL	APORTIL

Impact item	Impact statement	Environmental impact	Mitigation measures	Imple-mented by	Super-vised by
Soil pollution	C-	When the fuel is filled to construction machine, there is a possibility that outpoured fuel may pollute the soil.	Work procedures including filling fuel to equipment must be prepared before the commencement of construction work and this procedure must be publicized as best staff and workers can. Workers must comply with the procedure with due caution.	Contractor	APORTIL
Noise / vibration	C-	It is confirmed that the estimated level of both noise and vibration at the church, 160 meters away from the nearest piling location, are lower than the regulated level in accordance with results of "Noise and Vibration Forecast" calculated by JICA Survey Team. It is a possibility that levels of noise and vibration may exceed the regulated level due to the direction of the wind,	Construction work hour is limited in between 7am to 6pm. Working hour of construction machine must also be taken into account. Inspection and maintenance of construction machine and vehicles must be thoroughly carried out in order to minimize noise and vibration. Monitoring by using measuring equipment for noise and vibration must be carried out during piling work to check the level of noise and vibration.	Contractor	APORTIL
Bad smell	B- (C-)	Ammonia and hydrogen sulfide contained in dredged materials generate bad smell. Impact statement is B- when no dredging work is required and C- when dredging work is carried out.	In case bad smell is too strong, the measure to neutralize ammonia may be adopted.	Contractor	APORTIL
Bottom sediment pollution	B-	It is assumed that the bottom sediment pollution may be generated by removal of concrete structure, drainage from work	Working vessels and construction machine must be operated with due caution not to upset the seabed soil and monitoring by visual observation must	Contractor	APORTIL

Impact item	Impact statement	Environmental impact	Mitigation measures	Imple-mented by	Super-vised by
		vessels and ship bottom paint. It is assumed that dredged material may proliferate and cause bottom sediment pollution.	be carried out. When dredging work is carried out, pollution preventing membrane must be installed and turbidity control method must be clearly mentioned in Work Procedures.		
Ecological system	B- (C-)	Turbid water generated by construction work may flow and arrive at coral habitat area and give negative impact to coral. Turbid water may give negative impact to ecological system when dredging work is carried out. Adventive may be brought in due to the mobilization of work vessels and new ferries from foreign countries. Impact statement is B- when no dredging work is required and C- when dredging work is carried out.	In order to avoid to harm corals, navigable water area which is away from coral inhabiting area for working vessels must be established by installing temporary buoys, Working vessels can only within this limited area and corals can be protected. When dredging work is carried out, pollution preventing membrane must be installed and turbidity control method must be clearly mentioned in Work Procedures. Ship bottom cleaning must be carried out at origin prior to mobilization, and supervising organization must inspect the ship bottom after arrival.	Contractor APORTIL	APORTIL
Livelihood	C-	Passage of vehicles for construction works may give negative impact to residents living near the access road.	Project proponent must familiarize the residents near the project site with impacts generated by construction works, obtain consensus from the residents, hold roundtable conference and gain an understanding of complaints.	Contractor APORTIL	APORTIL

Impact item	Impact statement	Environmental impact	Mitigation measures	Imple-mented by	Super-vised by
Working environment	B-	It is necessary to take into account the working environment and hygiene.	Project proponent must prepare management and implementation plan for safety and health including measures for HIV and provide complete drill and exercise to workers. The requirements of Timor-Leste's regulations on labor must be observed.	Contractor APORTIL	APORTIL
Accident	B-	Vehicles related to construction works may occur traffic accidents when passing local streets. Work vessels may occur sea accident.	Traffic control men may be allocated when related vehicles are congested. Project proponent must prepare management and implementation plan for safety and health, implement the management and implementation plan thoroughly and provide regular training to parties concerned.	Contractor APORTIL	APORTIL

Table 1-3-9 Environment impacts and mitigation measures (during operation)

Impact item	Impact statement	Environmental impact	Mitigation measures	Imple-mented by	Super-vised by
Echo-logical system	C-(D)	When new ferry arrives at Timor-Leste from abroad, adventive adhered to ship bottom may impact on ecological system, therefore, impact statement only when new ferry arrives is C-.	Ship bottom cleaning must be carried out at origin prior to mobilization, and supervising organization must inspect the ship bottom after arrival.	APORTIL	APORTIL
Accident	C-	Vehicles related to ferry operation may occur traffic accidents when passing local streets. When passenger ship	Project proponent must prepare management and implementation plan for safety and health, implement the management and	APORTIL	APORTIL

		comes into the port, there is a possibility that passengers walking in the port may be suffered from traffic accident.	implementation plan thoroughly and provide regular training to parties concerned. When ferry comes into the port, the traffic line for passengers must be secured.		

1-3-6 Environmental management plan and monitoring plan (implementation system, method, cost, etc.)

Monitoring plan for "before and during construction period" and "during operation" is shown below.

Table 1-3-10 Monitoring plan (before and during construction period)

Impact item	Item	Monitoring method	Location	Timing / frequency	Responsible organization
Air pollution	Condition of air quality and dust	Visual observation	Around project site	Daily	Contractor to implement monitoring APORTIL to include monitoring requirement in Spec. of Tender Document
		Sampling and analysis		When construction starts, once in intermediate and when works completed. When any work generating pollution and dust is commenced, starting time, intermediate and completion of each work, sampling and analysis shall be carried out.	
Water pollution	Condition of water pollution	Visual observation	Around project site	Daily	Contractor
	Condition of turbid water after rain	Visual observation	Project site	When it rains	Contractor
	Water quality※ (SS, pH, T-N, T-P, COD, Oil, Chromium, Lead)	Collecting samples, laboratory analysis	Around project site (surface layer at 5 points)	When abnormal condition found, and after 3, 5 and 7 days, total 4 times	Contractor or APORTIL (depending on conditions of Contract)
Waste	Detail and weight of waste	Visual observation	Project site	Daily	Contractor
Soil pollution	Fuel leak	Visual observation	Around project site	When supplying fuel	Contractor
Noise / vibration	Noise / vibration	Measurement by equipment	Border line of port area, along road near the port	Twice/day during piling work	Contractor
Bad smell	Bad smell when dredging work is carried out	Smell check	Around project site	Daily when dredging work is carried out	Contractor
Bottom sediment pollution	Upsetting seabed soil, dropping crushed concrete into water	Visual observation	Project site	Daily	Contractor

Impact item	Item	Monitoring method	Location	Timing / frequency	Responsible organization
Restricted area	Combined with water pollution				
Ecological system	When dredging work is carried out	Visual observation by diver	Coral inhaviting area	Before dredging starts, once intermediate and completion of dredging	Contractor
Livelihood	Traffic jam, noise, vibration, etc.	Visual observation Hearing	Around project site	Once/ week	Contractor APORTIL
Working environment	Verification of safety and health management	Verification of monthly report of Project	Around project site	Once/ month	Contractor
Accident	Verification of safety and health management	Verification of monthly accident report	Around project site	Once/ month	Contractor

※ : When turbid water, oi; spill, etc. found

Monitoring results of which Contractor is responsible for monitoring must be reported to the department in charge of construction projects of APORTIL from Contractor (Environment Department has not been established in APORTIL) and monitoring results of which APORTIL is responsible for monitoring must be reported to the chief of department in charge of construction projects of APORTIL. If necessary, monitoring results will be reported to Director General of APORTIL.

Table 1-3-11 Monitoring plan (during operation)

Impact item	Item	Monitoring method	Location	Timing / frequency	Responsible organization
Ecological system	Shi bottom inspection of newly arrived ferries	Visual observation by diver	Ship bottom of newly arrived ferries	When ferries arrive	APORTIL
Accident	Verification of safety and health management	Verification of monthly accident report	Around project site	Once/month	APORTIL

Monitoring results must be reported to the chief of department in charge of construction projects of APORTIL. If necessary, monitoring results will be reported to Director General of APORTIL.

Chapter 2. Contents of the Project

2-1 Basic Concept of the Project

2-1-1 Goal of the Project

The Project goal is to contribute to enhance economic activities in Timor-Leste by relocating the ferry terminal in Dili Port to realize efficient and safe operation of passenger transportation.

2-1-2 Outline of the Project

2-1-2-1 Contents of Facilities and accessories

1. The jetty for two ferries which is possible to come alongside at same time
2. The platform for passenger and vehicles with cargo. The platform consists of zones of Landing and that of vehicles turning.
3. Access way for the passengers and vehicles
4. Accessories for above facilities such as water supply, power supply, fire hydrant, illumination and security equipment

Table 2-1-1 Contents and Dimension of the Facilities and Accessories

Name of Facility	Configuration and Dimension	Unit	Figure
1.The jetty for Ferry	Main intended purpose is for mooring of Ferry and embarkation and disembarkation of the passengers and cargo vehicles		
	Jetty(Pier)	berth	2
	Design water depth：-11.5m		
	Length of Jetty (Mooring length：100m x 2 berth)	m	100
	Main part of jetty：20m width、100m length	m^2	2,000
	Foundation pile：Steel pipe pile D900xt14, Length=45.5m -39.0m	Number of pile	60
	Super structure of bridge pier：In-situ concrete	m^3	1,060
	Super structure：PC beam plus paving concrete	Number of PC beam	160
	Bollard：250kN Type	Number of Bollard	12
	Fender：V-500H, L=3.5m	Number of Fender	12
	Concrete curb：RC concrete	m	220
	Corrosion prevention：Cathodic protection (50yeras, 3.5Aanodic corrosion)	Number of	94

		cathodic	
	Light beacon : Reach length of beacon light is 12miles	Number of Light beacon	1
2. Platform	Main intended purpose is for embarkation and disembarkation of the passengers and cargo vehicles from slope area		
	Dimension : 55mx52m + Deformed area (Irregular trapezoid type)	m^2	2,695
	Foundation pile : Steel pipe pile D800 x t12, L=31.0m PC pile D800, L=31.0m	Number of pile	30 80
	Super structure : RC concrete	m2	2,358
	Bollard : 250kN Type	Number of Bollard	4
	Corrosion prevention : Cathodic protection (50yeras, 3.0Aanodic corrosion	Number of cathodic	25
3.Adjusting Concrete	Hard core + Pavement concrete	m^2	400
4.Others (Accessories)			
Illumination	To be illuminating the platform and jetty	Unit	1
Water supply	To be suppling to Ferry at jetty	Unit	1
Power supply	To be suppling to Ferry alongside the jetty	Unit	1
Fire hydrant	To be installing at the jetty	Unit	1
Security equipment	To be securing the safety handling the vehicles and passengers using by CCTV and others	Unit	1

Source: JICA Survey Team

2-1-2-2 Contents of Consulting Services

1. Detailed design including assistance in Tender
2. Supervision of the construction works

2-1-2-3 Procurement and construction policies

1. The procurement shall be conducted based on procurement guideline of General Grant Aid of JICA.
2. The construction materials and equipment are basically procured in Timor-Leste. Materials will be procured in Japan or in a third country only in cases that the quality of local materials is considered inappropriate or the materials can be imported for reasonable prices with tax

exemption.

3. In the stage of implementation, the necessary measures for reducing the environmental impacts such as the installation of silt screen will be taken according to the result of environmental impact assessment by the government of Timor-Leste.

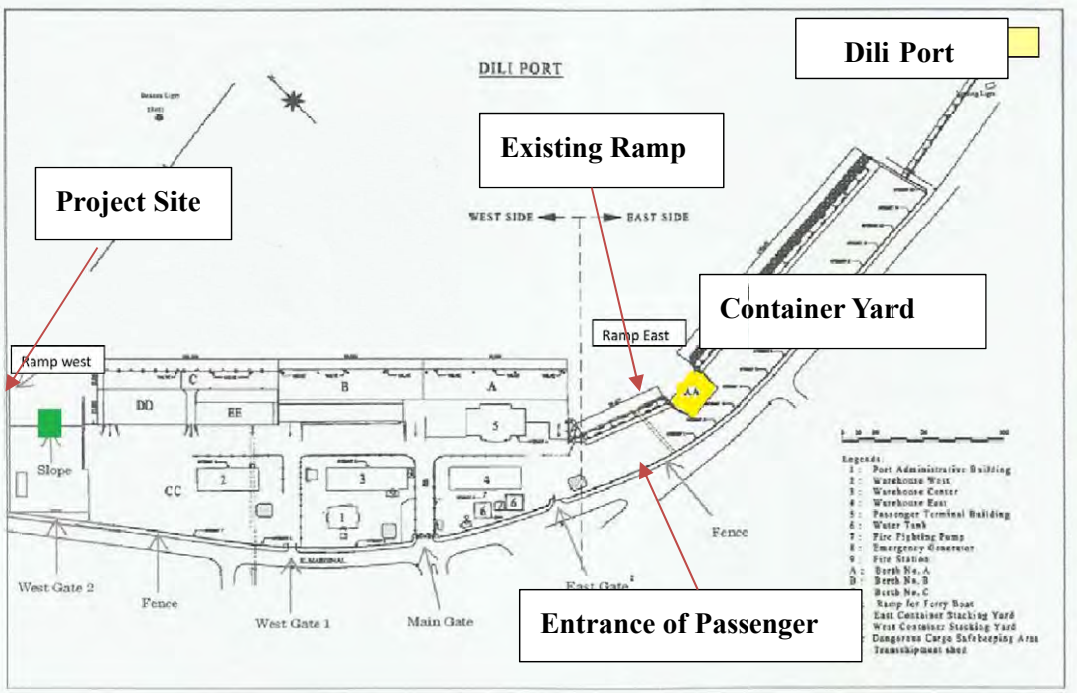
2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policy

2-2-1-1 Location of the Project

The Project site is located in the west end of Dili Port, next to the existing berth No.6. The reasons of selection of the site are as follows:

1. The existing ramp for ferry landing (hereinafter, referred as the ramp east) is located in the container yard. The ramp east is in very dangerous condition because the ramp east locates basically in a container yard, and moving line of the cargo and that of passengers are not separated.
2. The ramp west is isolated in the cargo wharf. Problems like in the ramp east are not observed.
3. The ramp east meets difficulties in loading and unloading vehicles due to steep angle between the bottom of hatch of Ferry and the top of the ramp caused by improper design of the edge of the ramp.
4. The government of Timor-Leste has a construction plan of a passenger terminal building behind the ramp west to be developed as the ferry terminal area jointly with the Project.



Source: JICA Survey Team

Figure 2-2-1 Location of Passenger's Facilities

Source: JICA Survey Team based on Google earth

Figure 2-2-2 Location of the Project site

2-2-1-2 Scale of Design

2-2-1-2-1 Prospect of the future demand for ferry transportation

APORTIL operates only one ferry, Nakroma, to Oecussi which is the enclave in Indonesian territory, and to Atauro Island to provide the residents transportation. The ferry is operated with over loaded and low price which is established based on a policy to make the ferry function as the basic infrastructure for the residents. The government of Timor-Lest has decided to purchase a new ferry based on the analysis of the future demand of passengers, vehicles and cargo in the maritime transportation study for the northern and southern coasts in Timor-Leste by Hamburg Port Consultants (hereinafter, referred as HPC) in 2012. The new ferry is under construction with the co-finance of KfW of Germany.

The report of HPC indicates the number of passengers will be increased to 39,252 in 2032. It is 1.9 times more than 21,002, the number in 2012. The volume of cargo will be increased about 5.5 times more in 2032 than 6,035 tons in 2012. The number of passenger will be also increased to 98,137 in 2032 from 52,509 in 2012 on the navigation route of Dili- Oecussi- Dili. The volume of cargo from Dili to Oecussi will be increased from 45,266 tons in 2012 to 251,141 tons in 2032. The cargo volume to Dili will also be increased from 3,599 tons in 2012 to 26,015 tons in 2032. For comparison, a JICA study prospects that the number of passenger will be increased from 7.9 thousand in 2012 to 8.1 thousand in 2018 and to 90 to 100 thousand in 2023. These figures are similar to the results of HPC's analysis. HPC's report shows three cases including Low Case, Base Case and High Case in consideration of progress in highway rehabilitation works in the northern coast. In this study, analysis on the demand of ferries in the northern coast is conducted according to the Base Case.

Figure 2-2-3 shows the location of the ports in the northern coast, Oecussi, Atauro Island and Kupang Port in Indonesia. The results of HPC's future demand analysis could be divided to three types of navigation routes based on the implementation plan of the port development by APORTIL, first, the existing navigation route (hereinafter, Existing Route), second, navigation route to be developed in order to connect other ports (hereinafter, Local Ports Development Route) and third, potential navigation route to be developed (hereinafter, Development Potential Route). The existing route consists of two routes, Dili – Atauro and Dili – Oecussi. The local ports development route is Dili – Caraveras – Com. The development potential route is Dili – Oecussi – Kupang. Table 2-2-1 shows the future demand of ferry of the above three types of navigation routes. It is necessary that side opening type Ro/Ro ferry which is be purchased from Portugal is in services because Kupang Port has not any landing facilities for bow operating type Ro/Ro ferry. The transition of the passenger demand for ferry by navigation route from 2012 to 2030 is indicated in Figure 2-2-4 to Figure 2-2-6.

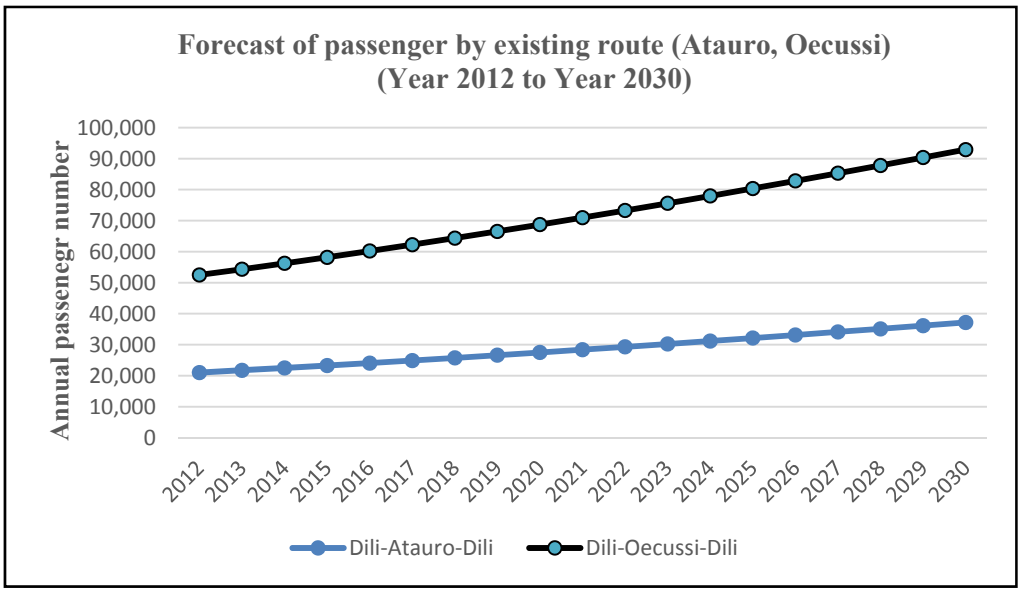
Source: JICA Survey Team

Figure 2-2-3 Allotment plan of ports in the northern coast in Timor-Leste

Table 2-2-1 Future demand of passenger, vehicle and cargo by each navigation route

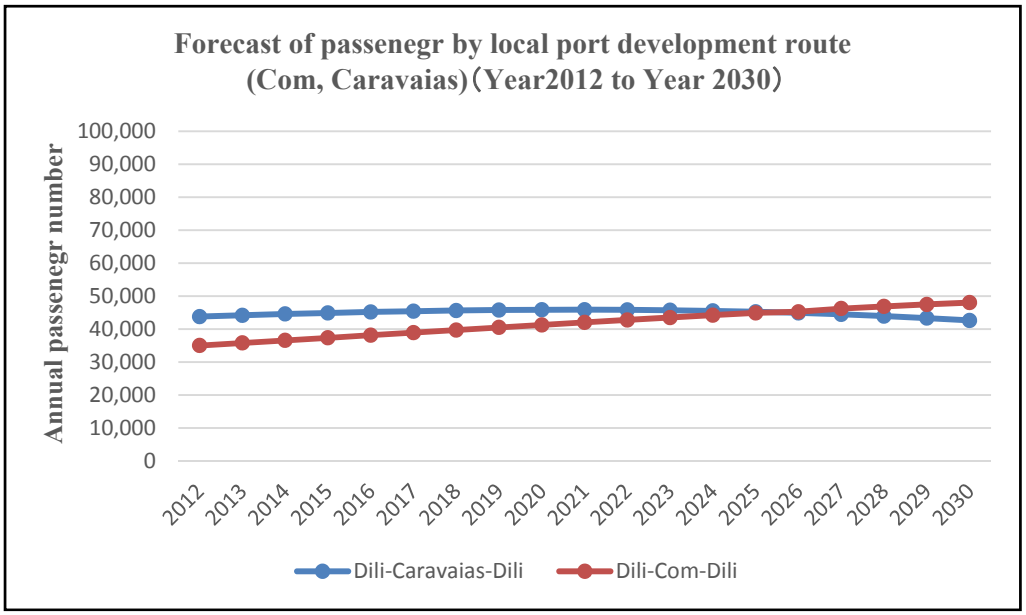
		Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Predictors	Socio-Economic Predictors	Population (annual change)	2.40%	2.30%	2.40%	2.30%	2.30%	2.20%	2.20%	2.20%	2.20%	2.20%	2.20%	2.10%	2.10%	2.10%	2.10%	2.10%	2.10%	2.00%	2.00%
		Real Non-Oil GDP(annual change)	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	9.80%	9.50%	9.30%	9.10%	8.80%	8.60%	8.40%	8.20%	7.90%	7.70%	7.50%
		Real Non-Oil GDP p.c.(annual change)	7.40%	7.50%	7.50%	7.50%	7.50%	7.60%	7.60%	7.60%	7.40%	7.20%	7.00%	6.80%	6.60%	6.40%	6.20%	6.00%	5.70%	5.50%	5.30%
Existing Route	Dili-Atauro-Dili	Ferry Passenger	21,002	21,732	22,493	23,271	24,062	24,894	25,740	26,607	27,491	28,392	29,308	30,239	31,186	32,148	33,124	34,114	35,117	36,133	37,161
		Cargo to Atauro (ton)	6,035	6,639	7,303	8,033	8,836	9,720	10,692	11,761	12,910	14,142	15,458	16,861	18,353	19,934	21,605	23,367	25,218	27,158	29,185
		Cargo to Dili (ton)	23	25	27	30	33	36	40	44	48	53	58	63	68	119	129	140	151	163	175
		Cargo Total (ton)	6,058	6,664	7,330	8,063	8,869	9,756	10,732	11,805	12,958	14,195	15,516	16,924	18,421	20,053	21,734	23,507	25,369	27,321	29,360
	Dili-Oecussi-Dili	Ferry Passenger	52,509	54,334	56,238	58,183	60,211	62,240	64,355	66,524	68,734	70,985	73,275	75,605	77,972	80,377	82,817	85,292	87,800	90,341	92,911
		Cargo to Oecussi (ton)	45,266	49,792	54,771	60,249	66,273	72,901	80,191	88,210	96,827	106,063	115,935	126,459	137,645	149,504	162,039	175,252	189,137	203,686	218,884
		Cargo to Dili (ton)	3,599	3,959	4,355	4,791	5,270	5,797	6,376	7,014	7,699	8,434	9,219	10,055	10,945	15,487	15,786	18,154	19,593	21,100	22,674
		Cargo Total (ton)	48,865	53,751	59,126	65,040	71,543	78,698	86,567	95,224	104,526	114,497	125,154	136,514	148,590	164,991	177,825	193,406	208,730	224,786	241,558
Local Ports Development Route	Dili-Caravaias-Dili	Ferry Passenger	43,800	44,189	44,585	44,893	45,202	45,427	45,629	45,779	45,867	45,888	45,841	45,722	45,528	45,258	44,903	44,465	43,943	43,330	42,625
	Dili-Com-Dili	Ferry Passenger	35,040	35,804	36,590	37,370	38,170	38,937	39,724	40,508	41,280	42,040	42,785	43,515	44,227	44,920	45,244	46,244	46,872	47,474	48,050
		Cargo to Com (ton)	19,012	20,913	23,004	25,304	27,835	30,618	33,680	37,048	40,667	44,547	48,693	53,113	57,811	62,792	68,056	73,606	79,438	85,548	91,931
		Cargo to Dili (ton)	1,832	2,015	2,217	2,439	2,683	2,951	3,246	3,570	3,919	4,293	4,693	5,119	5,572	7,360	7,977	8,628	9,311	10,028	10,776
		Cargo Total (ton)	20,844	22,928	25,221	27,743	30,518	33,569	36,926	40,618	44,586	48,840	53,386	58,232	63,383	70,152	76,033	82,234	88,749	95,576	102,707
Devlopment Potential Route	Dili-Kupang-Dili	Ferry Passenger	4,380	4,532	4,691	4,853	5,022	5,192	5,368	5,549	5,733	5,921	6,112	6,306	6,504	6,705	6,908	7,115	7,324	7,536	7,750
	Oecussi-Kupang-Oecussi	Ferry Passenger	21,004	21,734	22,495	23,273	24,084	24,896	25,742	26,609	27,493	28,394	29,310	30,242	31,189	32,151	32,151	34,117	35,120	36,135	37,164
		Cargo to Oecussi (ton)	22,633	24,896	27,386	30,124	33,137	36,450	40,095	44,105	48,414	53,032	57,968	63,229	68,829	74,752	81,020	87,626	94,568	101,843	109,442
		Cargo to Kupang (ton)	2,520	2,771	3,049	3,353	3,689	4,058	4,463	4,910	5,389	5,904	6,453	7,039	7,661	10,841	11,750	12,708	13,715	14,770	15,872
		Cargo Total (ton)	25,153	27,667	30,435	33,477	36,826	40,508	44,558	49,015	53,803	58,936	64,421	70,268	76,490	85,593	92,770	100,334	108,283	116,613	125,314

Source：JICA survey team based on Additional Study for Maritime Transport Connection along the North Coast of Timor-Leste、Aug. 2013 by HPC



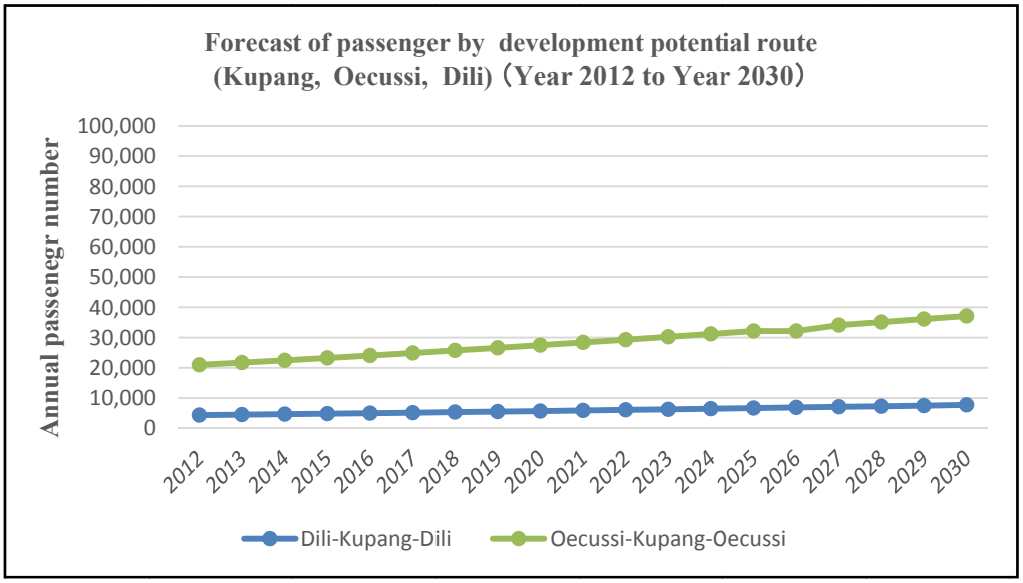
Source: HPC Report 2013, complied by JICA Survey Team

Figure 2-2-4 The transition of passenger demand for ferry by Existing Route (Atauro, Oecussi) from 2012 to 2030



Source: HPC Report 2013, complied by JICA Survey Team

Figure 2-2-5 The transition of passenger demand for ferry by Local Ports Development Route (Caraveras, Com) from2012 to 2030



Source: HPC Report 2013, complied by JICA Survey Team

Figure 2-2-6 The transition of passenger demand for ferry by Development Potential Route (Kupang, Oecussi, Dili) from 2012 to 2030

2-2-1-2-2 Necessary number of ferries based on the future demand of ferry

The estimated results on necessary number of ferries by navigation route are shown in Table 2-2-2 to Table 2-2-4 and Figure 2-2-7 to Figure 2-2-9. The necessary number of ferries has been calculated by dividing demand of the embarkation number of passengers by the annual capacity of embarkation passengers.

(1) Existing Route

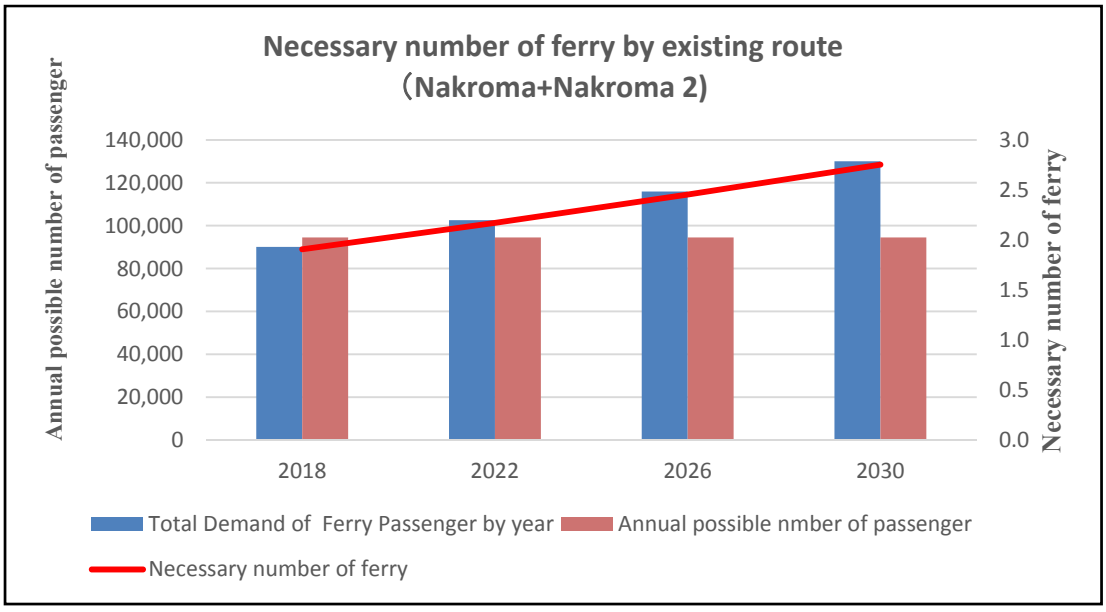
Two navigation routes are operated by Nakroma including the route 1, Dili – Atauro – Dili and the route 2, Dili – Oecussi – Dili. The route 1 is operated with one service a week and the route 2 are with two services a week. Table 2-2-2 and Figure 2-2-7 show the necessary number of ferries based on the prospect of ferry passengers' demand. In 2018 when the Project is completed, it would be possible to satisfy the demand with Nakroma and Nakroma 2. Therefore, two ferries, Nakroma and Nakroma 2 will be necessary for the existing navigation route in 2018. After 2018 it will be necessary more than two ferries to satisfy the demand.

Table 2-2-2 Prospect of necessary number of ferries for the existing route

Year		2012	2013	2014	2015	2016	2017	2018	2022	2026	2030
Dili-Atauro-Dili	Ferry Passenger	21,002	21,732	22,493	23,271	24,062	24,894	25,740	29,308	33,124	37,161
Dili-Oecussi-Dili	Ferry Passenger	52,509	54,334	56,238	58,183	60,211	62,240	64,355	73,275	82,817	92,911
Total Demand of Ferry Passenger by year		**73,511**	**76,066**	**78,731**	**81,454**	**84,273**	**87,134**	**90,095**	**102,583**	**115,941**	**130,072**
Nakroma	Annual navigation number	139	139	139	139	139	139	139	139	139	139
	Authorized number of passenger	300	300	300	300	300	300	300	300	300	300
	Annual possible nmber of passenger	41,700	41,700	41,700	41,700	41,700	41,700	41,700	41,700	41,700	41,700
	Necessary number of ferry	1.8	1.8	1.9	2.0	2.0	2.1	2.2	2.5	2.8	3.1
Nakroma 2	Annual navigation number	139	139	139	139	139	139	139	139	139	139
	Authorized number of passenger	380	380	380	380	380	380	380	380	380	380
	Annual possible nmber of passenger	52,820	52,820	52,820	52,820	52,820	52,820	52,820	52,820	52,820	52,820
	Necessary number of ferry	1.4	1.4	1.5	1.5	1.6	1.6	1.7	1.9	2.2	2.5
Nakroma + Nakroma 2	Annual navigation number	139	139	139	139	139	139	139	139	139	139
	Authorized number of passenger	680	680	680	680	680	680	680	680	680	680
	Annual possible nmber of passenger	94,520	94,520	94,520	94,520	94,520	94,520	94,520	94,520	94,520	94,520
	Necessary number of ferry	1.6	1.6	1.7	1.7	1.8	1.8	1.9	2.2	2.5	2.8

Note: Required number of ferries = Total Demand of Ferry Passenger / Annual Passenger Number

Source: JICA Survey Team



Source: JICA Survey Team

Figure 2-2-7 Necessary number of ferries for Existing Route (Nakroma + Nakroma2)

(2) Local Ports Development Route

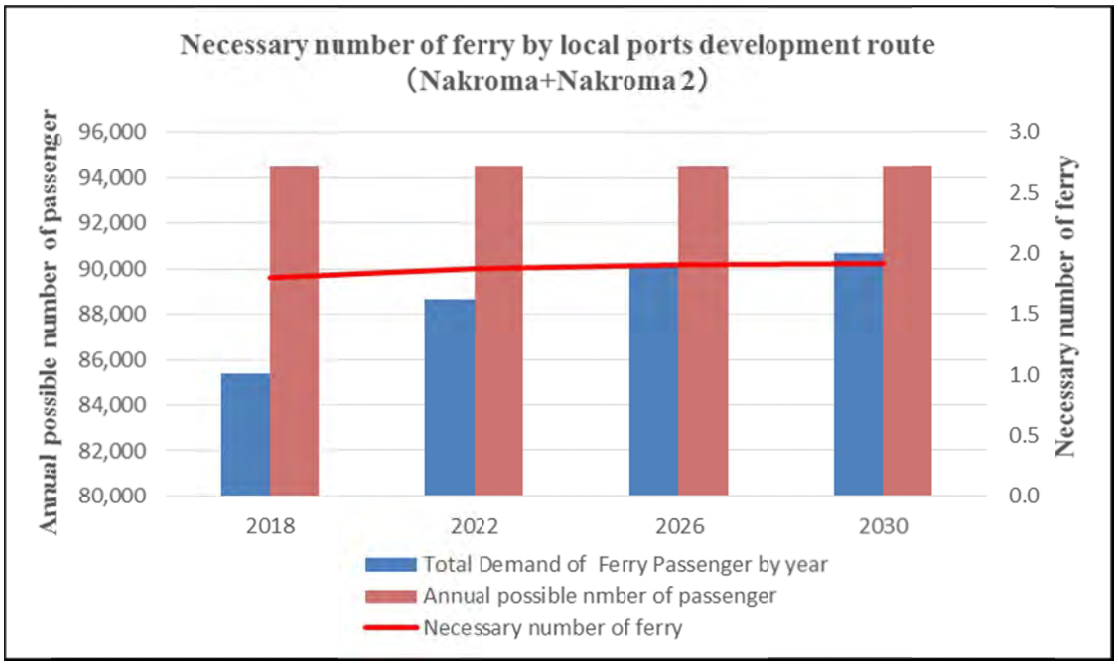
There is steep mountainous area in the central part of Timor-Leste. Therefore, the major economic activities of the country occur in the eastern and western coastal areas. The coastal areas receive the continuous investments such as a road project by ADB, a large scale irrigation project by JICA and power supply development. The government of Timor-Leste has the port development plan in the north-east area of Timor Island to respond increasing demand of passengers and commodity distribution expected in the future. Especially the robust demand of transportation of passengers and commodities Dili – Caraveras and Dili – Com is expected. Table 2-2-3 and Figure 2-2-8 show the prospect of necessary number of ferries by route. The prospect indicates the decrease in the demand of Caraveras route from 2025 because of the effects by the above mentioned road construction. This navigation route also requires two ferries, Nakroma and Nakroma 2 in 2018.

Table 2-2-3 The necessary number of ferries for Local Ports Development Route

Year		2012	2013	2014	2015	2016	2017	2018	2022	2026	2030
Dili-Caravaias-Dili	Ferry Passenger	43,800	44,189	44,585	44,893	45,202	45,427	45,629	45,841	44,903	42,625
Dili-Com-Dili	Ferry Passenger	35,040	35,804	36,590	37,370	38,170	38,937	39,724	42,785	45,244	48,050
Total Demand of Ferry Passenger by year		**78,840**	**79,993**	**81,175**	**82,263**	**83,372**	**84,364**	**85,353**	**88,626**	**90,147**	**90,675**
Nakroma	Annual navigation number	139	139	139	139	139	139	139	139	139	139
	Authorized number of passenger	300	300	300	300	300	300	300	300	300	300
	Annual possible nmber of passenger	41,700	41,700	41,700	41,700	41,700	41,700	41,700	41,700	41,700	41,700
	Necessary number of ferry	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.2	2.2
Nakroma 2	Annual navigation number	139	139	139	139	139	139	139	139	139	139
	Authorized number of passenger	380	380	380	380	380	380	380	380	380	380
	Annual possible nmber of passenger	52,820	52,820	52,820	52,820	52,820	52,820	52,820	52,820	52,820	52,820
	Necessary number of ferry	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.7	1.7	1.7
Nakroma + Nakroma 2	Annual navigation number	139	139	139	139	139	139	139	139	139	139
	Authorized number of passenger	680	680	680	680	680	680	680	680	680	680
	Annual possible nmber of passenger	94,520	94,520	94,520	94,520	94,520	94,520	94,520	94,520	94,520	94,520
	Necessary number of ferry	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.9	1.9	1.9

Note: Required number of ferries = Total Demand of Ferry Passenger / Annual Passenger Number

Source: JICA Survey Team



Source: JICA survey team

Figure 2-2-8 Necessary number of ferries by Local Ports Development Route (Nakroma + Nakroma2)

(3) Development Potential Route

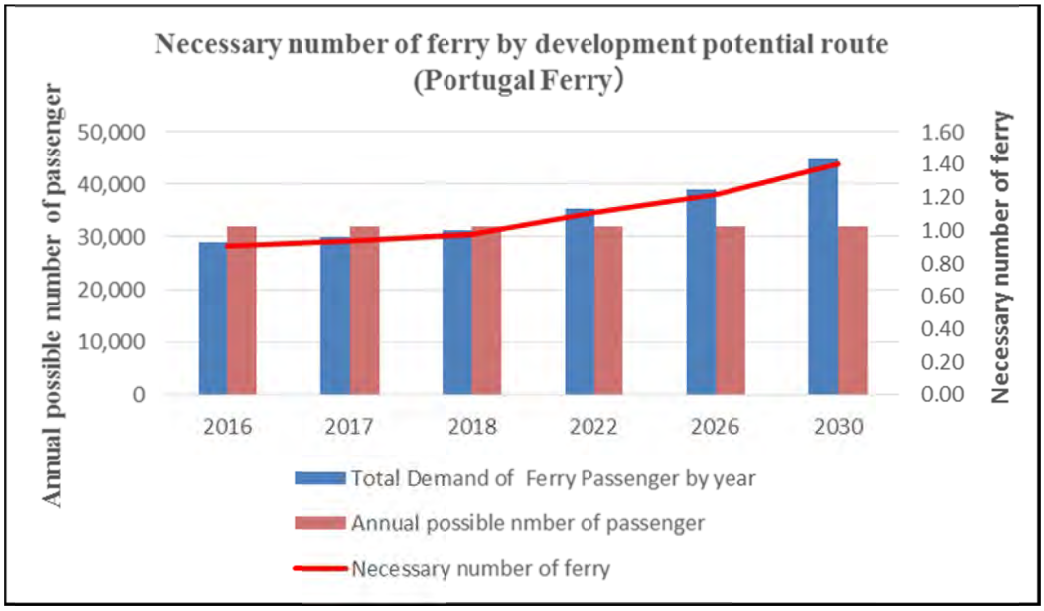
The Kupang Port is located in Indonesian territory in the west of Timor Island and connects the other ports in Indonesia with scheduled navigation routes. There is no navigation route Dili – Kupang currently. If the navigation route from Dili to Kupang is developed, the connection rout from Dili to other ports in Indonesia via Kupang would be a potential major route between the two countries. Table 2-2-4 and Figure 2-2-9 show Prospect of necessary number of ferries by route. The estimated number is one vessel for the year 2018. After that the demand of this route will be over the navigable capacity because the demand of ferry of the route, Oecussi – Kupang – Oecussi will be increased. This is also because of the free trade zone in Oecussi. HPC has taken into account the demand by the free zone development. The government of Timor-Leste has the plan to provide services by the ferry, Portugal, which has the side opening type of Ro/Ro because there is not any bow type opening Ro/Ro facility in Kupang Port.

Table 2-2-4 Prospect of necessary number of ferries by Development Potential Route

Year		2012	2013	2014	2015	2016	2017	2018	2022	2026	2030
Dili-Kupang-Dili	Ferry Passenger	4,380	4,532	4,691	4,853	5,022	5,192	5,368	6,112	6,908	7,750
Oecussi-Kupang-Oecussi	Ferry Passenger	21,004	21,734	22,495	23,273	24,084	24,896	25,742	29,310	32,151	37,164
Total Demand of Ferry Passenger by year		**25,384**	**26,266**	**27,186**	**28,126**	**29,106**	**30,088**	**31,110**	**35,422**	**39,059**	**44,914**
Portugal Ferry Dili - Kupang - Dili	Annual navigation number	23	23	23	23	23	23	23	23	23	23
	Authorized number of passenger	276	276	276	276	276	276	276	276	276	276
	Annual possible nmber of passenger	6,348	6,348	6,348	6,348	6,348	6,348	6,348	6,348	6,348	6,348
	Necessary number of ferry	0.69	0.71	0.74	0.76	0.79	0.82	0.85	0.96	1.09	1.22
Portugal Ferry Oecussi - Kupang - Oecussi	Annual navigation number	93	93	93	93	93	93	93	93	93	93
	Authorized number of passenger	276	276	276	276	276	276	276	276	276	276
	Annual possible nmber of passenger	25,668	25,668	25,668	25,668	25,668	25,668	25,668	25,668	25,668	25,668
	Necessary number of ferry	0.82	0.85	0.88	0.91	0.94	0.97	1.00	1.14	1.25	1.45
Portugal Ferry (Total of two routes)	Annual navigation number	116	116	116	116	116	116	116	116	116	116
	Authorized number of passenger	276	276	276	276	276	276	276	276	276	276
	Annual possible nmber of passenger	32,016	32,016	32,016	32,016	32,016	32,016	32,016	32,016	32,016	32,016
	Necessary number of ferry	0.79	0.82	0.85	0.88	0.91	0.94	0.97	1.11	1.22	1.40

Note: Required number of ferries = Total Demand of Ferry Passenger / Annual Passenger Number

Source: JICA Survey Team



Source: JICA Survey Team

Figure 2-2-9 Necessary number of ferry for Development Potential Route (Ferry Portugal)

2-2-1-3 Prerequisite Conditions for Design of the Project

2-2-1-3-1 Location of Frontend of Platform

The required water depth of the forefront of the jetty is more than 4.5m above low water level based on the dimensions of ferry. At present the Project site appears to the condition of sand deposition. The location of frontend of platform is necessary to consider the wave disturbance due to the steep sea bottom condition and the water depth of non-effluent of sand movement.

2-2-1-3-2 Relation between the direction of alignment of the jetty and the distance of adjoined wharf

The location of the east end of platform should be decided based on the condition which does not disturb maneuvering of the cargo vessel at the adjoined cargo wharf. The arrangement plan of the jetty is prepared based on the location of the east end of platform. The direction of the jetty is decided under the condition of maneuvering of ferry, the distance of the adjoining wharf, the effluence of main channel and the constant wind direction.

2-2-1-3-3 Dividing traffic flow of passengers and vehicles

Ferry is presently launched at the slipway lengthwise and the passengers and vehicles are getting on and off from the Ro/Ro ramp. The passengers are getting on the ferry after loading the vehicles. This process is not efficient. Also, in case of high tide the passengers are obliged to walk in the sea water for embarkation. After the ferry terminal will be relocated, ferry comes alongside of the jetty. The passengers can use the ladder of Ferry and it is possible to divide the traffic flow of passenger and vehicles.

2-2-1-3-4 Design consistent to the passenger terminal building plan

The government of Timor-Leste has the plan to construct the new passenger terminal building at the behind area adjacent to the new ferry terminal of the Project. The design condition of the new ferry terminal building including the height of ground elevation must be prepared by the time of commencement of detailed design of New Ferry Terminal. In case of delay to provide the height of ground elevation of new passenger terminal building, the boundary of the Project will be considered up to as the level adjusting area between the height of platform and the existing ground level.

2-2-1-3-5 Provision of utility facilities

Provision of facilities, such as water supply, power supply, firefighting equipment, illumination and port security and safety equipment was not included in the official request from APORTIL to JICA, however, APOLTIL requested JICA to provide those facilities in this Project during the discussion. Water and power supply to ferries, firefighting equipment, illumination and aid to navigation, and surveillance camera (CCTV camera, etc.) to monitor and keep track of movement of passengers and cargoes on the jetty and platform to maintain the safe operation is designed as the incidental equipment.

2-2-1-3-6 Correspondence of sand deposition

The Project site locates at the end of the reef from the north-west coast to the end of the wharf in Dili Port. The sea bottom condition of the Project site is a very steep slope at near offshore. It is very sensitive sand moving area caused by the small geomorphic change. The Project site has been appeared the phenomena of sand deposition. It is assumed that the reason of sand deposition is caused by the prevention of natural sand moving by the barriers on east and west at the ramp west. Therefore, it is assumed that the sand moving will be changed smoothly and back to the natural equivalent shore line by demolishing the barriers. For keeping the natural equivalent shore line, the permeable type of structure with the pile is better for the jetty and platform. The location of top-end of platform is set in more than the depth of net transport of whole sediments.

2-2-1-4 Design working life

The design working life of the facility must be set appropriately. The design working life shall be assumed to Class 3 design working life of 50 years which is standard for port and harbor facilities, by making the conceptual classification of the design working life defined in ISO 2394 (1998) shown in Table 2-2-5 as the reference.

Table 2-2-5 Concept of Classification of Design Working Life Defined in ISO 2394 (1998)

Class	Expected design working life (year)	Example
1	1-5	Temporary structures
2	25	Replaceable structural elements such as bridge abutment beams and bearings
3	50	Buildings and other public structures, structures other than the below
4	100 or longer	Memorial buildings, special or important structures, largescale bridges

Source：Technical Standards and Commentaries for Port and Harbor Facilities in Japan; 2009

2-2-1-5 Descriptions of inspection results

Since port and harbor facilities are in general exposed to severe natural conditions, lowering of performance over time occurs in many cases caused by deterioration of materials, damage of components, scouring of foundations, sinking, burial, etc. For this reason, the facilities should be maintained and controlled appropriately so as to prevent the status that required performance cannot be fulfilled due to the degraded performance of the facilities.

Maintenance and management of port and harbor facilities represents a series of systems by which damage and deteriorations are efficiently discovered, reasonable assessment is made, and effective countermeasures are taken, such as repair and reinforcement. In accordance with natural conditions, actual situation of facility utilization, design working life, structural characteristics of the facilities, characteristics of materials and easiness, etc., maintenance and management need to be conducted on the basis of relevant adequate standards and planning. Determining the maintenance and management system is importantly made in the light of the situations of respective facilities.

Table 2-2-6 defines the concepts on damage and deterioration by maintenance and management level of port and harbor facilities. Performance verification shall be carried out by targeting maintenance and management Level B on the basis of current maintenance and management capacity of APORTIL, the implementation organization under this Project in Timor-Leste.

Table 2-2-6 Descriptions of Inspection Results

Degree of Deterioration	Conditions of Part or Component
A	Performance of the component has seriously deteriorated.
B	Performance of the component has deteriorated.
C	Performance of the component has not deteriorated, but some deformation is occurring.

Source：Technical Standards and Commentaries for Port and Harbor Facilities in Japan; 2009

2-2-2 Basic Plan

2-2-2-1 Necessary function of the Project

2-2-2-1-1 Contents of the Project

is the list of facilities of the ferry terminal to be constructed by the Project and of the passenger terminal building to be developed by the government of Timor-Leste.

Table 2-2-7 Facilities of the Ferry Terminal and the Passenger Terminal Building

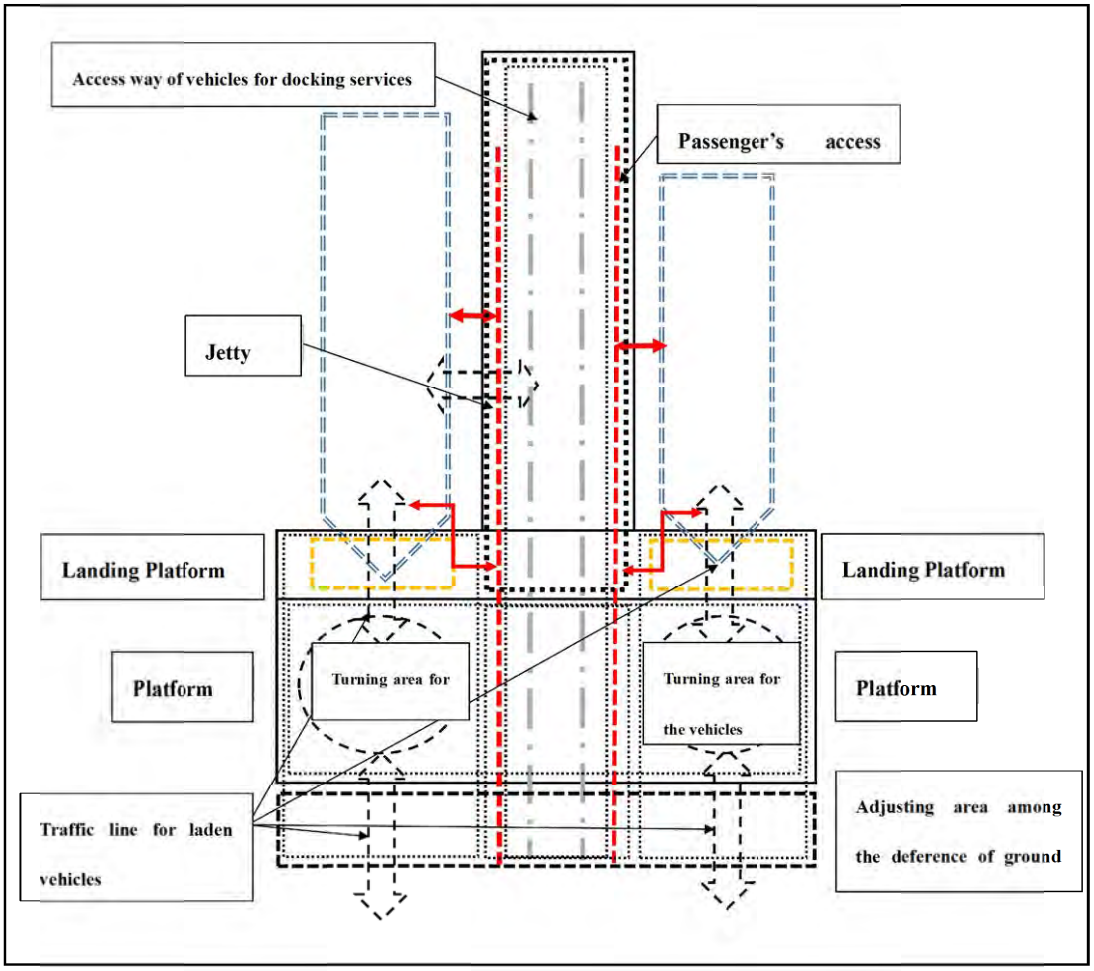
Name of Project	Contents of Facilities and Equipment	Assignation of Project	
		JAPAN	Timor-Leste
1. Ferry Terminal	**Facilities**	●	
	(1) Jetty	●	
	(2) Landing Platform	●	
	(3) Platform	●	
	(4) Access Way	●	
	(5) Coastal Revetment	●	
	Equipment	●	
	(1) Illuminations	●	
	(2) Water Supply	●	
	(3) Fire Hydrants	●	
	(4) Power Supply	●	
	(5) Beacon Light	●	
	(6) Monitoring CCTV Camera	●	
	(7) Trash Pits	●	
	(8) Bollards	●	
	(9) Fenders	●	
2. Passenger Terminal	(1) Terminal Building & Kiosk		●
	(2) Parking Area for vehicles to be loaded and Access Way		●
	(3) Stowage Area for laden cargo		●
	(4) Public bus stop		●
	(5) Passenger Access Way		●
	(6) Parking Lots		●
	(7) Booth for controlling the parking lot		●
	(8) Repair yard for containers to be loaded		●
	(9) Road for discharged vehicles		●
	(10) Illuminations		●
	(11) Monitoring CCTV Camera		●
	(12) Gate		●
	(13) Fence		●
	(14) Landscape and Parks		●

Note: The facilities of the passenger terminal building are listed based on the interviews with APORTIL.

Source: JICA Survey Team

2-2-2-1-2 Functional Layout Planning of the Project

The Project, Ferry Terminal is consist of the Jetty, the Landing Platform, the Platform and the access way. Figure 2-2-10 indicates the functional layout planning of Ferry Terminal in the case of accommodating two ferries at the same time.



Source: JICA Survey Team

Figure 2-2-10 Functional Layout Planning of Ferry Terminal

2-2-2-1-3 Plan of the Project

Ferry Terminal is shown in Figure 2-2-11. The west side of the existing wharf in Dili Port is the planning site. The passenger terminal building will be planned on the land side area of Ferry Terminal.

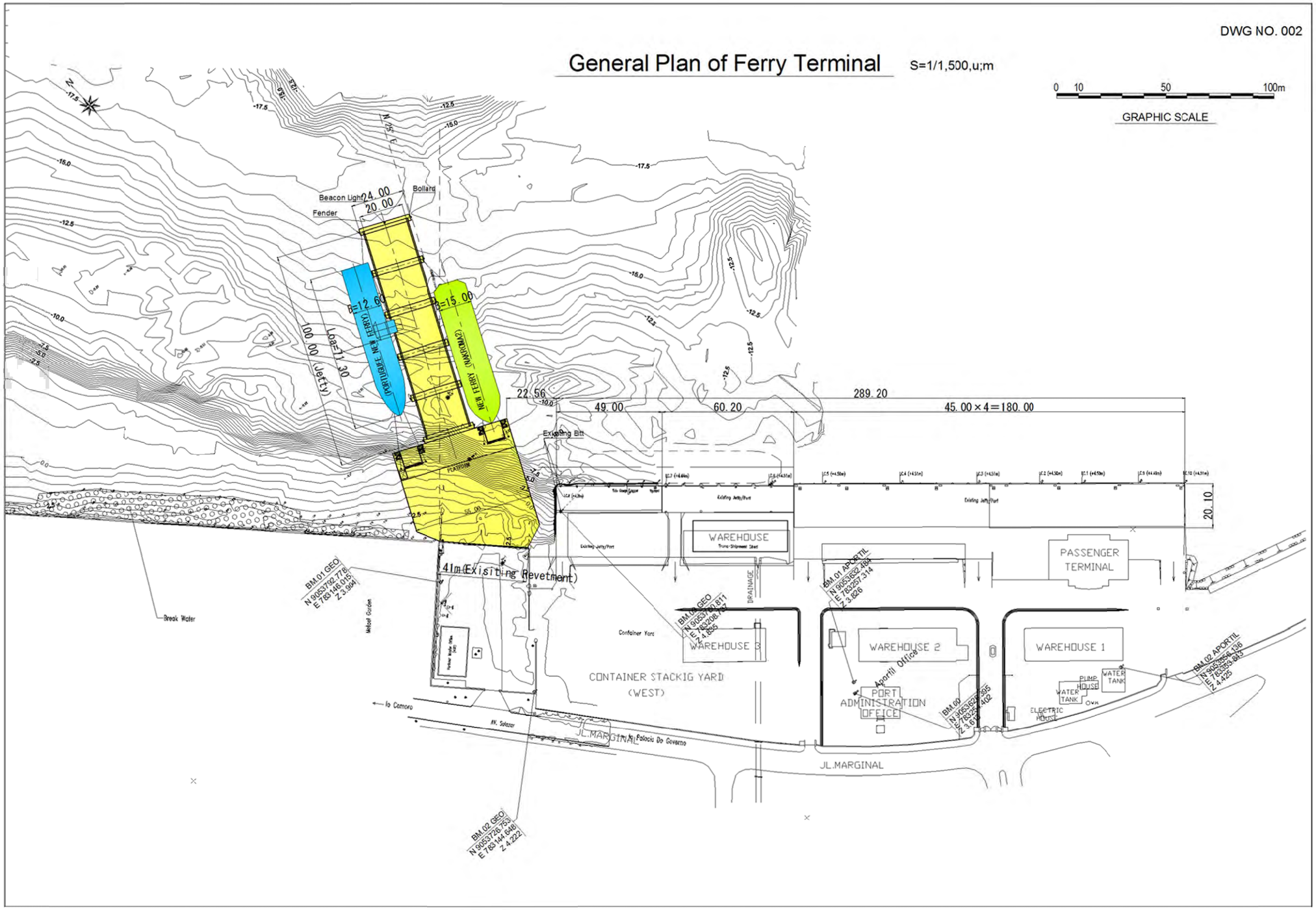


Figure 2-2-11 Plan of Ferry Terminal

2-2-2-2 Design conditions

2-2-2-2-1 Applicable standards

The standards to be applied to the facility design under the Project shall be as follows:

1. Technical Standards and Commentaries for Port and Harbor Facilities in Japan; July 2007; The Ports and Harbors Association of Japan
2. Technical Standards and Commentaries for Port and Harbor Facilities in Japan (partial revision); June, 2014; The Ports and Harbors Association of Japan
3. Specifications for Highway Bridges; March 2012; Japan Road Association
4. Pile Foundation Design Manual; March 2014; Japan Road Association
5. Steel Piles - Design and Construction (2009 Revision); Japan Association of Steel Pipe Piles and Japanese Technical Association for Steel Pipe Piles and Sheet Piles
6. Standard Design Criteria for Ports in Indonesia; January 1984

In the reform of standards in 2007 all the standards that had been specification rules were revised in principle to regulating performance. In addition, port facility performance verification that had been based on the methods to rule safety factors and tolerable stress intensity was revised to clearly define the limitative condition to be verified, to extract destructive modes of the structure that corresponds to the condition, and to introduce trustworthy design method that valuates quantitatively, based on the probability theory, that such destruction as is supposed in its destructive mode will not occur.

2-2-2-2-2 Design wind speed

Regarding design wind speed, maximum wind speed (V) shall be 25 m/s making the wind observation data in the neighborhood of Dili as a reference.

2-2-2-2-3 Design tide level

The tide levels in Dili Port are shown in Table 2-2-8. Design tide levels shall be set those on the dangerous side at conducting verification by utilizing this Table.

Table 2-2-8 Table of Tide Levels in Dili Port

Description	Tide Level
High Water Spring (HWS)	+ 2.8 m
Mean Higher High Water (MHHW)	+ 2.3 m
Mean Lower High Water (MLHW)	+1.8 m
Mean Sea Level (MSL)	+ 1.4 m
Mean Higher Low Water (MHLW)	+1.0 m
Mean Lower Low Water (MLLW)	+0.4 m
Low Water Spring	±0.0 m
Chart Datum (CD)	±0.0 m

Source：Kepanduan Bahari Indonesia Wilayah III (Bahari Indonesia Scout Region III, Page 183),Indonesian Navy 2013

2-2-2-2-4 Design wave

Design wave shall be analyzed by means of the ocean wave factors (50-year return period) shown in Table 2-2-9, of which the results shall be the factors by water depth to be shown in Table 2-2-10.

Table 2-2-9 Deepwater Wave（Return Period is 50 years）

Wave direction	WNW	NW	NNW	N	NNE	NE	ENE
Deepwater height (m)	3.17	1.78	1,81	1.70	0.8	0.9	0.9
significant wave period (s)	9.2	6.3	6.4	6.1	3.8	3.8	3.8

Table 2-2-10 Design Wave Height

M2 Wave direction (°)		Wave height	Wave period	Tidal level (m)	Wave length L_o	Slope (1/x x=)	Water depth h(m)	H_o'(m)	$H_{1/3}$(m)	H_{max}(m)
WNW	324	3.17	9.2	2.30	132.04	10	16.0	0.87	0.80	1.40
							15.0	0.84	0.80	1.40
							12.5	0.80	0.70	1.30
							11.5	0.78	0.70	1.30
							10.0	0.76	0.70	1.30
							9.0	0.76	0.70	1.30
							8.0	0.76	0.70	1.30
							7.0	0.76	0.70	1.30
							6.0	0.76	0.70	1.30
							5.0	0.76	0.80	1.40
							4.0	0.76	0.80	1.40
							3.0	0.76	0.80	1.50
							2.0	0.76	0.80	1.50
							1.0	0.76	0.90	1.70
							0.0	0.76	1.20	2.10
							-1.0	0.76	1.30	1.80
							-2.0	0.76	0.50	0.80
NW	327	1.78	6.3	2.30	61.92	10	16.0	0.70	0.70	1.20
							15.0	0.68	0.60	1.20
							12.5	0.66	0.60	1.10
							11.5	0.64	0.60	1.10
							10.0	0.63	0.60	1.00
							9.0	0.61	0.60	1.00
							8.0	0.61	0.60	1.00
							7.0	0.61	0.60	1.00
							6.0	0.60	0.50	1.00
							5.0	0.60	0.60	1.00
							4.0	0.59	0.50	1.00
							3.0	0.59	0.60	1.00
							2.0	0.58	0.60	1.00
							1.0	0.58	0.60	1.10
							0.0	0.58	0.60	1.20
							-1.0	0.58	0.90	1.50
							-2.0	0.58	0.40	0.60
NNW	330	1.81	6.4	2.30	63.90	10	16.0	0.74	0.70	1.30
							15.0	0.72	0.70	1.20
							12.5	0.70	0.60	1.20
							11.5	0.68	0.60	1.10
							10.0	0.67	0.60	1.10
							9.0	0.67	0.60	1.10
							8.0	0.66	0.60	1.10
							7.0	0.66	0.60	1.10
							6.0	0.65	0.60	1.10
							5.0	0.55	0.50	0.90
							4.0	0.64	0.60	1.10
							3.0	0.64	0.60	1.10
							2.0	0.63	0.60	1.10
							1.0	0.63	0.60	1.20
							0.0	0.62	0.70	1.30
							-1.0	0.62	0.90	1.50
							-2.0	0.62	0.40	0.60
N	360	1.70	6.1	2.30	58.05	10	16.0	1.14	1.10	2.00
							15.0	1.11	1.10	1.90
							12.5	1.08	1.00	1.80
							11.5	1.07	1.00	1.80
							10.0	1.05	1.00	1.70
							9.0	1.05	1.00	1.70
							8.0	1.04	1.00	1.70
							7.0	1.04	0.90	1.70
							6.0	1.03	0.90	1.70
							5.0	1.03	0.90	1.70
							4.0	1.02	0.90	1.70
							3.0	1.02	1.00	1.70
							2.0	1.01	1.00	1.80
							1.0	1.00	1.00	1.90
							0.0	0.99	1.20	2.10
							-1.0	0.99	1.20	1.70
							-2.0	0.99	0.50	0.70

M3 Wave direction (°)		Wave height	Wave period	Tidal level (m)	Wave length L_o	Slope (1/x x=)	Water depth h(m)	H_o'(m)	$H_{1/3}$(m)	H_{max}(m)
NNE	22.5	0.80	3.8	2.30	22.53	10	16.0	0.80	0.80	1.40
							15.0	0.80	0.80	1.40
							12.5	0.79	0.80	1.40
							11.5	0.79	0.80	1.40
							10.0	0.78	0.80	1.40
							9.0	0.78	0.80	1.40
							8.0	0.77	0.80	1.40
							7.0	0.77	0.80	1.40
							6.0	0.76	0.70	1.30
							5.0	0.76	0.70	1.30
							4.0	0.75	0.70	1.30
							3.0	0.75	0.70	1.30
							2.0	0.74	0.70	1.20
							1.0	0.74	0.70	1.20
							0.0	0.73	0.70	1.20
							-1.0	0.73	0.80	1.30
							-2.0	0.73	0.40	0.50
NE	45	0.90	3.8	2.30	22.53	10	16.0	0.86	0.90	1.50
							15.0	0.85	0.80	1.50
							12.5	0.85	0.80	1.50
							11.5	0.84	0.80	1.50
							10.0	0.83	0.80	1.50
							9.0	0.83	0.80	1.50
							8.0	0.83	0.80	1.50
							7.0	0.82	0.80	1.40
							6.0	0.82	0.80	1.40
							5.0	0.82	0.80	1.40
							4.0	0.82	0.80	1.40
							3.0	0.81	0.80	1.40
							2.0	0.81	0.70	1.30
							1.0	0.81	0.70	1.30
							0.0	0.80	0.80	1.40
							-1.0	0.80	0.90	1.40
							-2.0	0.80	0.40	0.50
ENE	67.5	0.90	3.8	2.30	22.53	10	16.0	0.74	0.70	1.30
							15.0	0.73	0.70	1.30
							12.5	0.72	0.70	1.30
							11.5	0.72	0.70	1.30
							10.0	0.71	0.70	1.30
							9.0	0.71	0.70	1.30
							8.0	0.71	0.70	1.30
							7.0	0.71	0.70	1.30
							6.0	0.71	0.70	1.20
							5.0	0.70	0.70	1.20
							4.0	0.70	0.70	1.20
							3.0	0.70	0.60	1.20
							2.0	0.70	0.60	1.20
							1.0	0.70	0.60	1.20
							0.0	0.69	0.70	1.20
							-1.0	0.69	0.80	1.30
							-2.0	0.69	0.40	0.50

Wave directions are clockwise angles from N.

2-2-2-2-5 Required water depth of Frontend of the platform

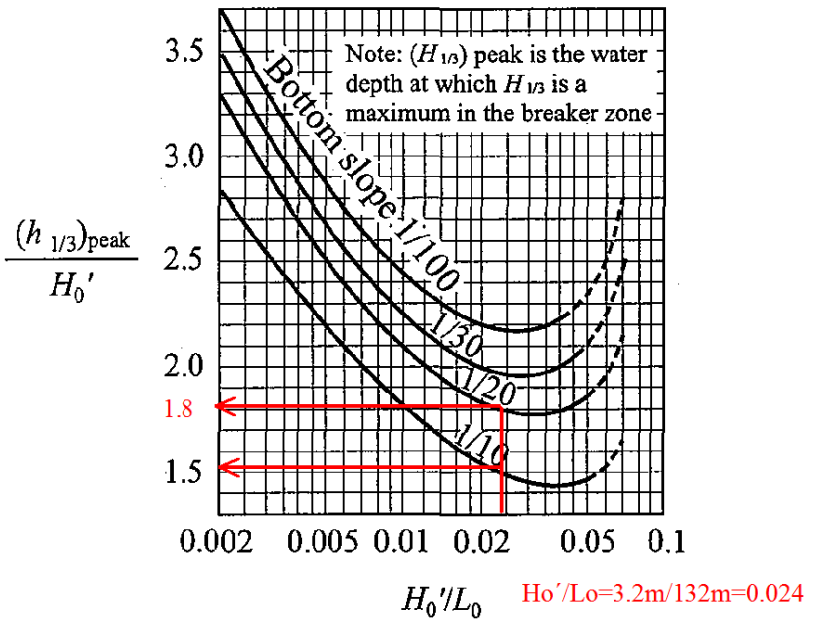
As shown in 2-2-1-3-1, the required water depth of the forefront of the platform is more than 4.5m above low water level based on the dimensions of ferry. At present the Project site appears to the condition of sand deposition. The location of frontend of platform is necessary to consider the wave disturbance due to the steep sea bottom condition and the water depth of non-effluent of sand movement. The required water depth of the forefront of the platform shall be set in the deeper point of 8.5m above low water from the following reviewing.

(1) Breaking wave limit depth and wave height

Breaking wave limit depth shall be calculated from Figure 2-2-12 that has been prepared based on the assumption that the point of maximum significant wave is the initial breaking wave point among the breaking wave zone announced as the breaking wave deformation model of irregular waves against a uniform slope. Furthermore, breaking wave limit height shall be calculated by means of Figure 2-2-13.

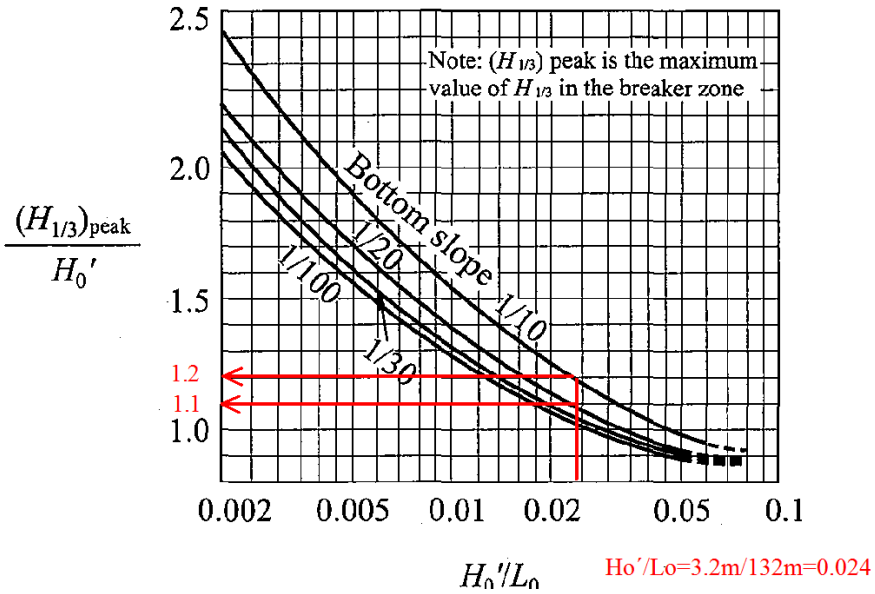
The factors of WNW waves which are the largest shall be used as wave conditions:
H_o' = 3.2 m, T_o = 9.2 s, L_o = 132 m

Then, the breaking wave limit depth will be 1.8 x H_o' = 1.8 x .2 m = 5.7 m - 2.3 m (M.H.W)=-3.4 m, The results of calculating breaking wave limit depth and breaking wave limit wave height are shown in Table 2-2-11.



Source: Seaworthiness Design (Author; Dr. Yoshimi Goda)

Figure 2-2-12 Diagram of Water Depth at which Maximum Value of Significant Wave Height Occurs



Source: Seaworthiness Design (Author: Dr. Yoshimi Goda)

Figure 2-2-13 Diagram of Maximum Value of Significant Wave in Breaking Wave Zone

Table 2-2-11 Results of Calculation of Breaking Wave Limit Depth and Wave Height

	Bottom slope 1/10	Bottom slope 1/20
Breaking Wave Limit Depth (m)	-2.5	-3.4
Breaking Wave Limit Wave Height (m)	3.8 m	3.5 m

Source: JICA Survey Team

The water depth of -2.5 m to -3.4 m is that in the vicinity of the location to install the platform. In the shallower area, deformation by breaking wave (running up waves) needs to be considered. Since there is a possibility that impact breaking waves act upon the superstructure, it shall be responded by the thickness of slab. In addition, as regards the seabed slope in front of the revetment, countermeasures shall be studied taking into account its shape and strength.

(2) Threshold Depth of Surface Layer Sediment Movement

Study shall be made for the threshold (limit) depth of surface layer sediment movement that is determined by the wave conditions and sediment grain diameter (D50 = 0.6 mm or so).

Wave : Wave related factors corresponding to occurrence of high waves

H_o=3.2 m, T = 9.2s, L_o = 132 m

Central grain diameter: 0.6 mm

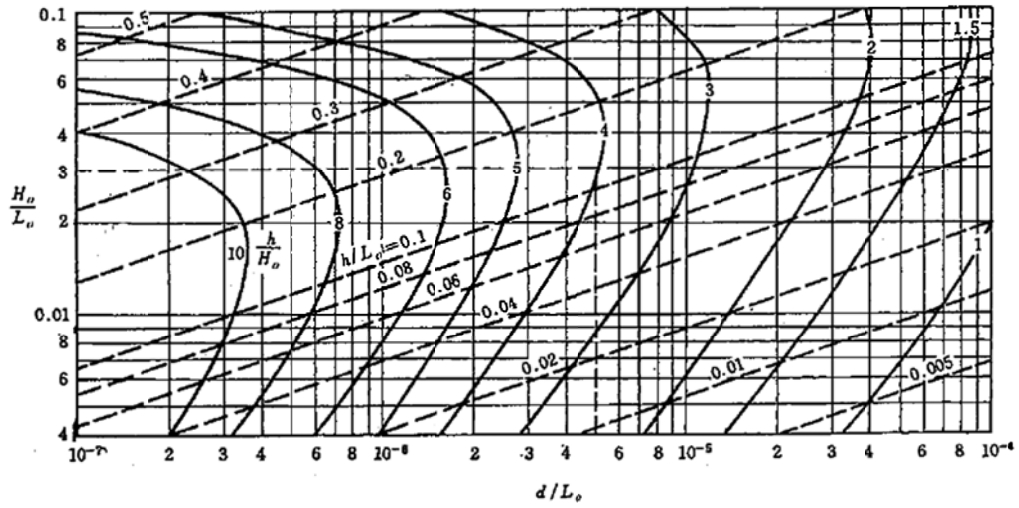
By referring to the calculation diagram for the threshold depth of surface layer sediment movement shown in Figure 2-2-x, the calculations follow below:

$d/L_o = 4.55 \times 10^{-6}$, and $H/L_o = 0.024$

$h/L_o = 0.08$ resulting in h = 10.6 m

Taking into account the equation, M.H.H.W. = +2.3 m, then the threshold depth of surface layer sediment movement = DL-8.3 m.

The seaside face line of the platform shall locate at a point deeper than –8.5 m, there will be little influence of burial.



Source: Technical Standards and Commentaries for Port and Harbor Facilities in Japan, 2009

Figure 2-2-14 Calculation Diagram for Threshold Depth of Surface Layer Sediment Movement

2-2-2-2-6 Sea level rise

Supposing that a sea level rise of 12 to 30 cm will occur in 40 years, its impacts shall be analyzed.

2-2-2-2-7 Topographic and bathymetric conditions

Topographic and bathymetric conditions shall be identified by referring to Figure 1-2-7 (Topographic Map; source: results of local reassignment surveys), Figure 1-2-8 (Bathymetric Map) and Figure 1-2-9 (Longitudinal Section).

2-2-2-2-8 Ground conditions

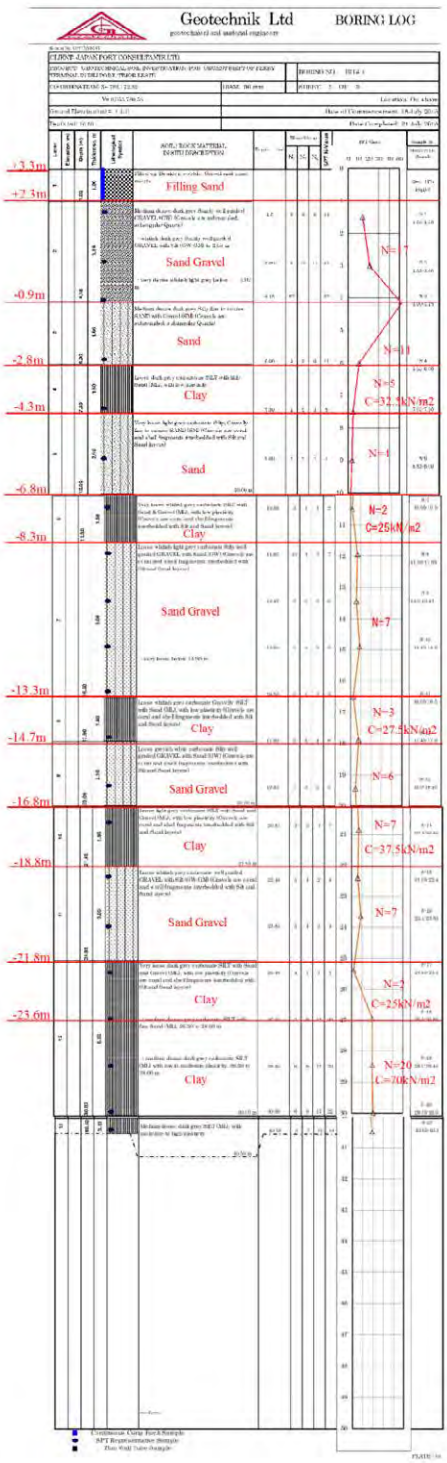
Ground conditions shall be those shown in Figure 2-2-15. The ground conditions specified in Table 2-2-12 below shall be applied to each facility.

Table 2-2-12 Ground Conditions

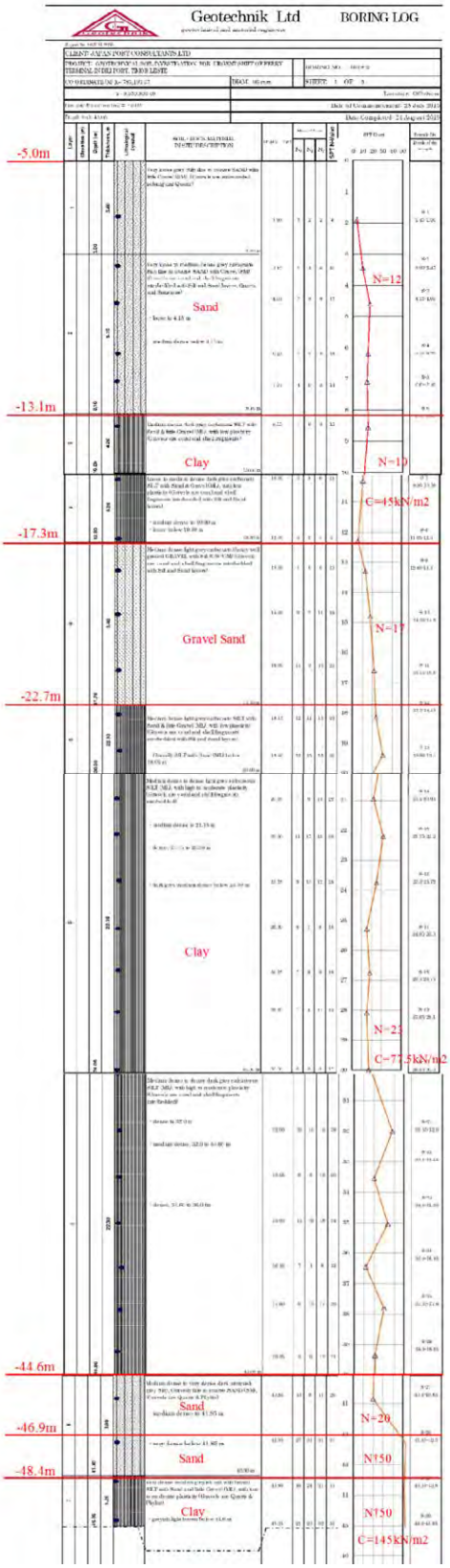
Structure	Borehole Point	Design depth (m) (Existing ground level)	Level to first intersect substrate (m)
Land structure	BH-1	+3.3	-35.0
Platform	BH-2	-5.0	-46.9
Pear	BH-3	-11.2	-33.8
Pear	BH-4	-16.6	-40.4

Source: JICA Survey Team

Note: The design depth in the Table above shows the representing water depth of the ground condition study, which are the ground elevations of the boring points.



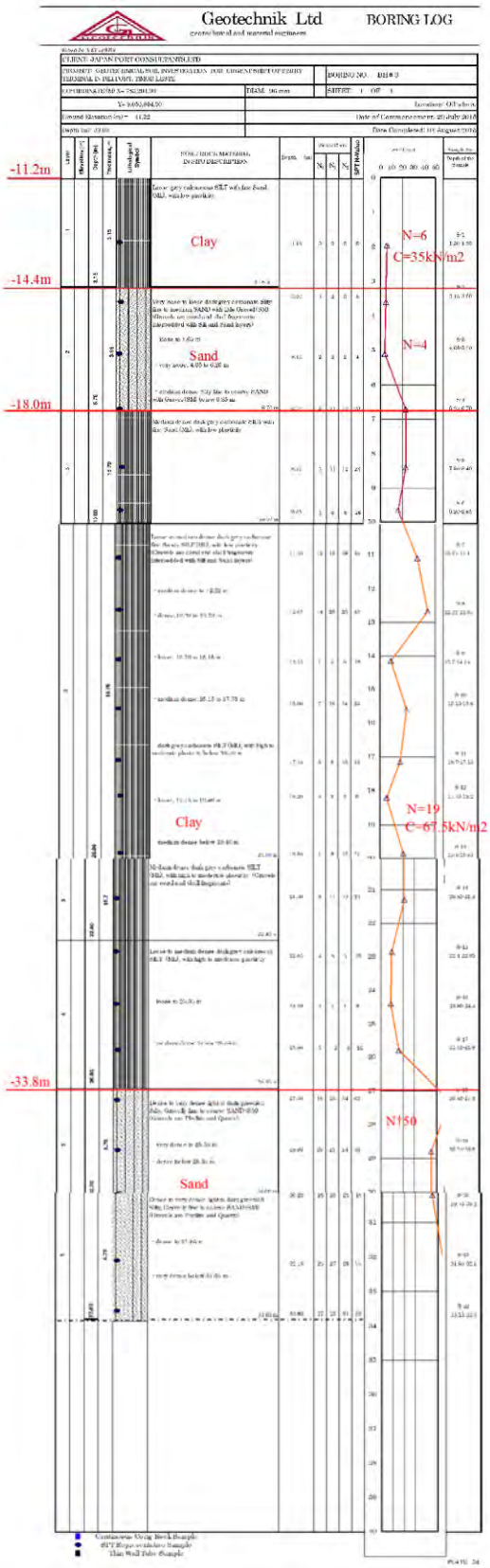
BH-1



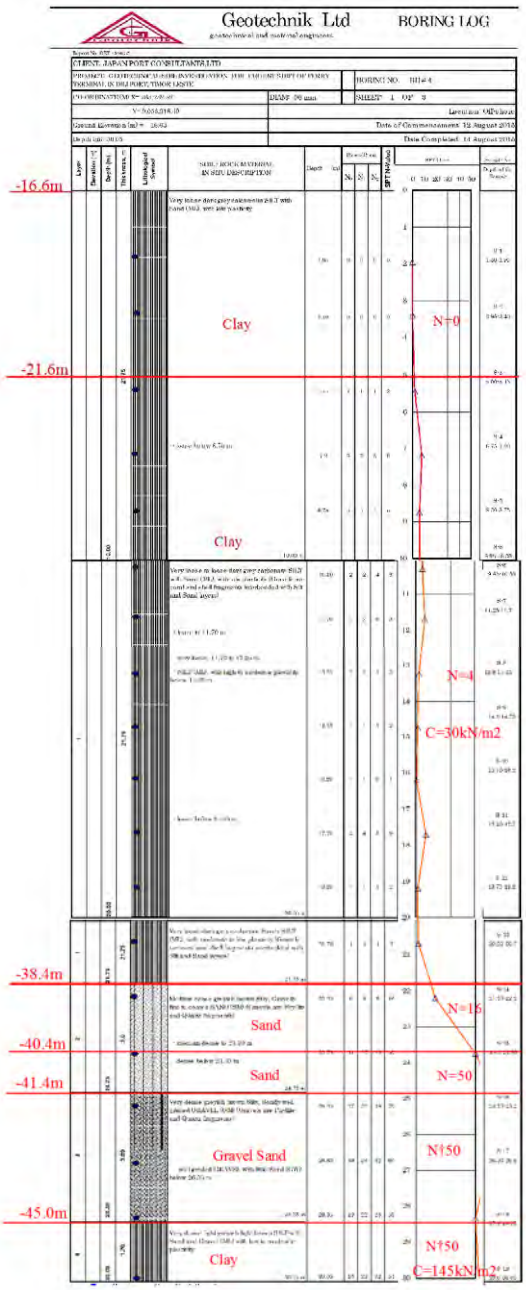
BH-2

Source: JICA Survey Team

Soil Boring Log (1/2)



BH-3



BH-4

Source: JICA Survey Team

Figure 2-2-15 Soil Boring Log (2/2)

2-2-2-2-9 Earthquake motions

The seismic coefficient for verification purpose shall be determined, in accordance with "STANDARD DESIGN CRITERIA FOR PORTS IN INDONESIA, JAN. 1984 DGSC," as follows:

Design horizontal seismic coefficient kh = kr (Seismic coefficient by region) x ki (priority factor)

kr; 0.09, Dili (Zone II, soft soil)

ki; 1.5 (most important structure)

kh = 0.09 x 1.5 = 0.135

The seismic coefficient for verification purpose shall be kh = 0.15

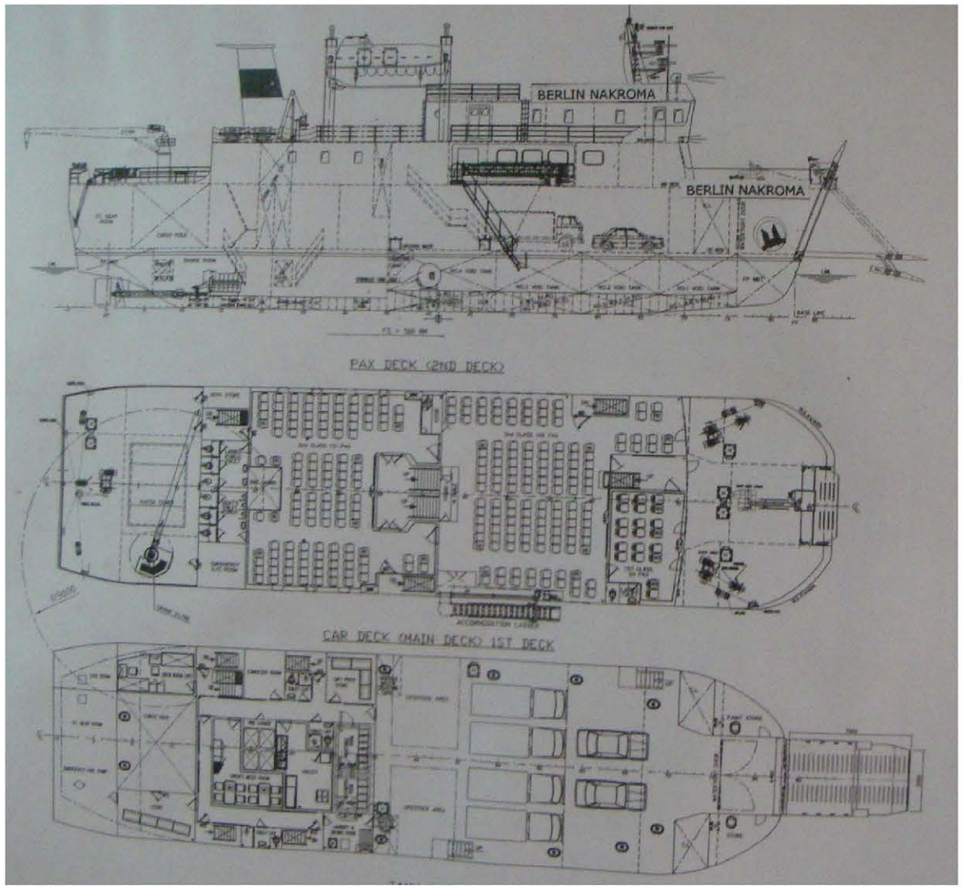
2-2-2-2-10 Motions caused by ships

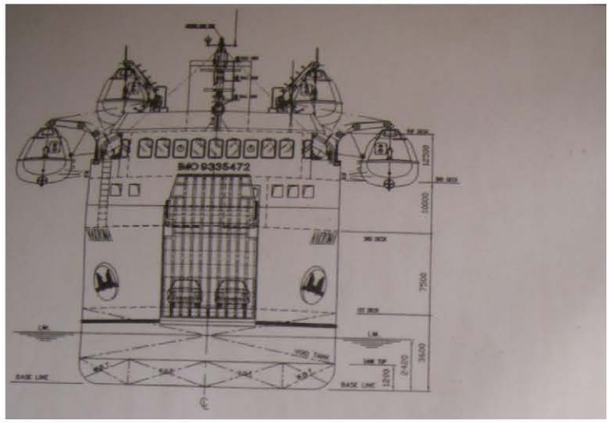
Major parameters related to the design target ferries are shown in Table 2-2-13 and general arrangements by kind of vessel are shown in Figure 2-2-16 to Figure 2-2-19. Maximum length over all and maximum design draught belong to the ferry to be imported from Portugal, while maximum molded breadth is of Nakroma 2. Depending on the target vessel, main deck heights vary to the difference of 2.7 m between the highest and the lowest. In terms of ladder and ship crane positions, Nakroma has both positioned on the starboard, and Nakroma 2 ladder on both sides and crane on starboard.

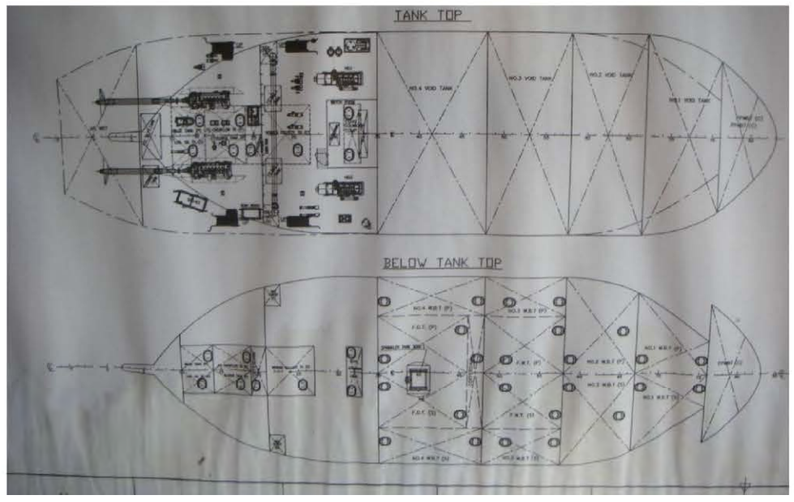
Table 2-2-13 Major Parameters Related to Design Target Ferries

	Principal Dimensions	Nakroma	Nakroma2	Portugal Ferry
Main Data	Deadweight：DWT	287	1,050	
	Gross tonnage：GT	1,134	(1,084)	
	Displacement(t)	925	2,503	2,870
	Length over all：L_{OA}(m)	46.76	67.30	71.30
	Length between perpendiculars：L_{bp} (m)	41.33	61.20	59.34
	Molded breadth：B (m)	12.0	16.00	12.6
	Depth：D (m)		4.70	
	Height of main deck (bulkhead deck) (m)	3.6	4.70	6.30
	Clear width of bow ramp (m)	3.5,4.4	6.00	
	Clear length of bow ramp (m)	7.0	9.4+0.6	
	Height of passenger deck (bulkhead deck) (m)	7.5	4.80	
	Design draught (m)	2.42	3.30	3.70
	Full &Ballast draught (m)		3.30 / 2.08	
	Speed at sea trial (knot)	12	12	15
	Service speed on design draught (knot)		10	
	Clear height below passenger deck (m)	3.5	4.8	
	Lamp position	Bow	Bow	Starboard、Portside
	Ladder position	Starboard	Starboard・Portside	—
	Ship crane position	Starboard	Starboard	—
Passengers	VIP class (persons)	20	30	276
	Economy class (persons)	280	350	
Crew	Captain class		2 cabins	
	Officer/Engineer		2 cabins with 2 beds	21 persons
	Crew (persons)	15	2 cabins with 2 beds	
	Crew and Trainees (人)		2 cabins with 3 beds	
	Lane meter deck (m)		Appx. 190m	
Others	Trucks		3 with 20' container chassis	
	Cars			
	Cars/ General cargo	SUV's/450m^3	SUV's/940t	

Source：Prepared by JICA Survey Team on the basis of materials received from APORTIL

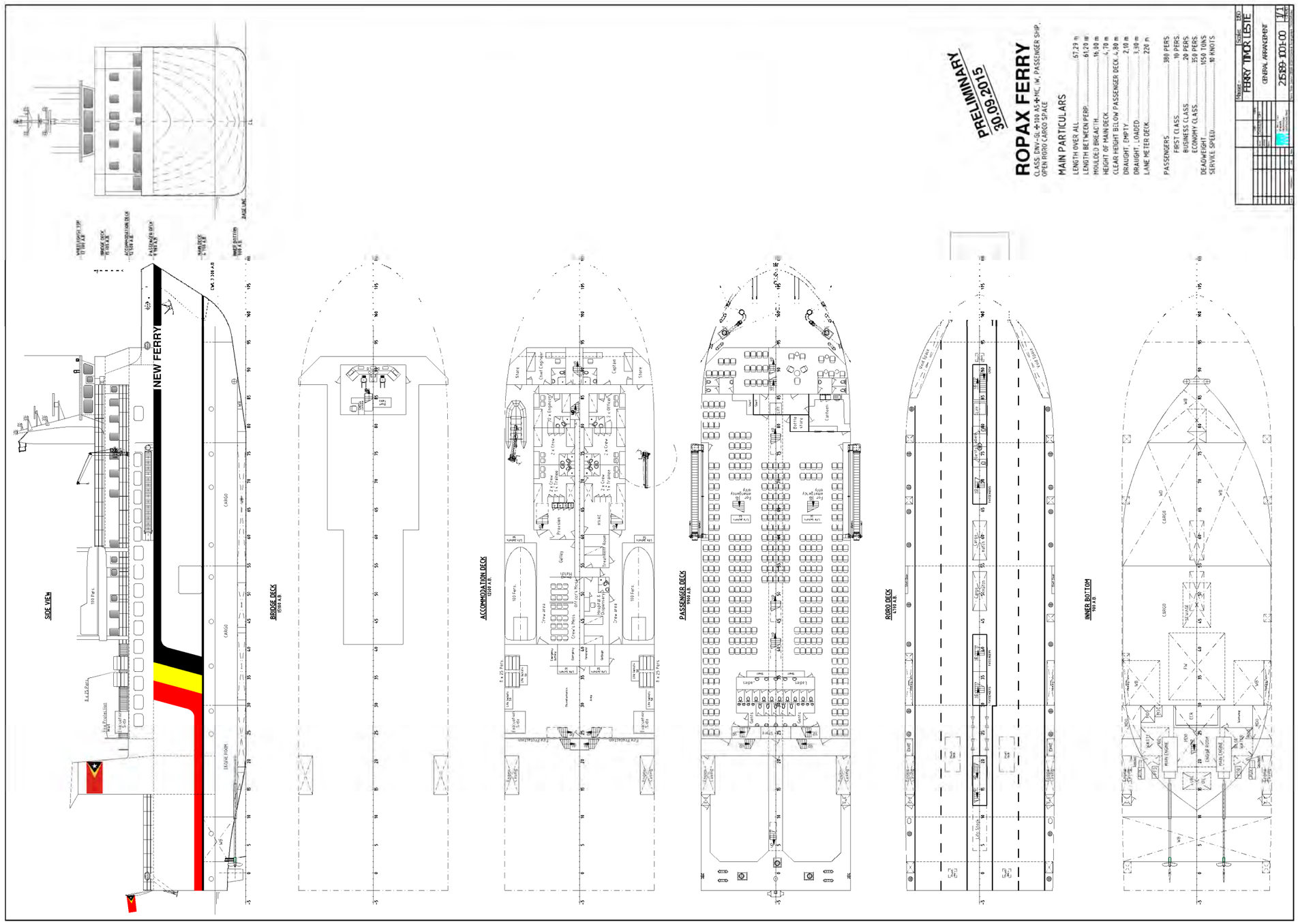






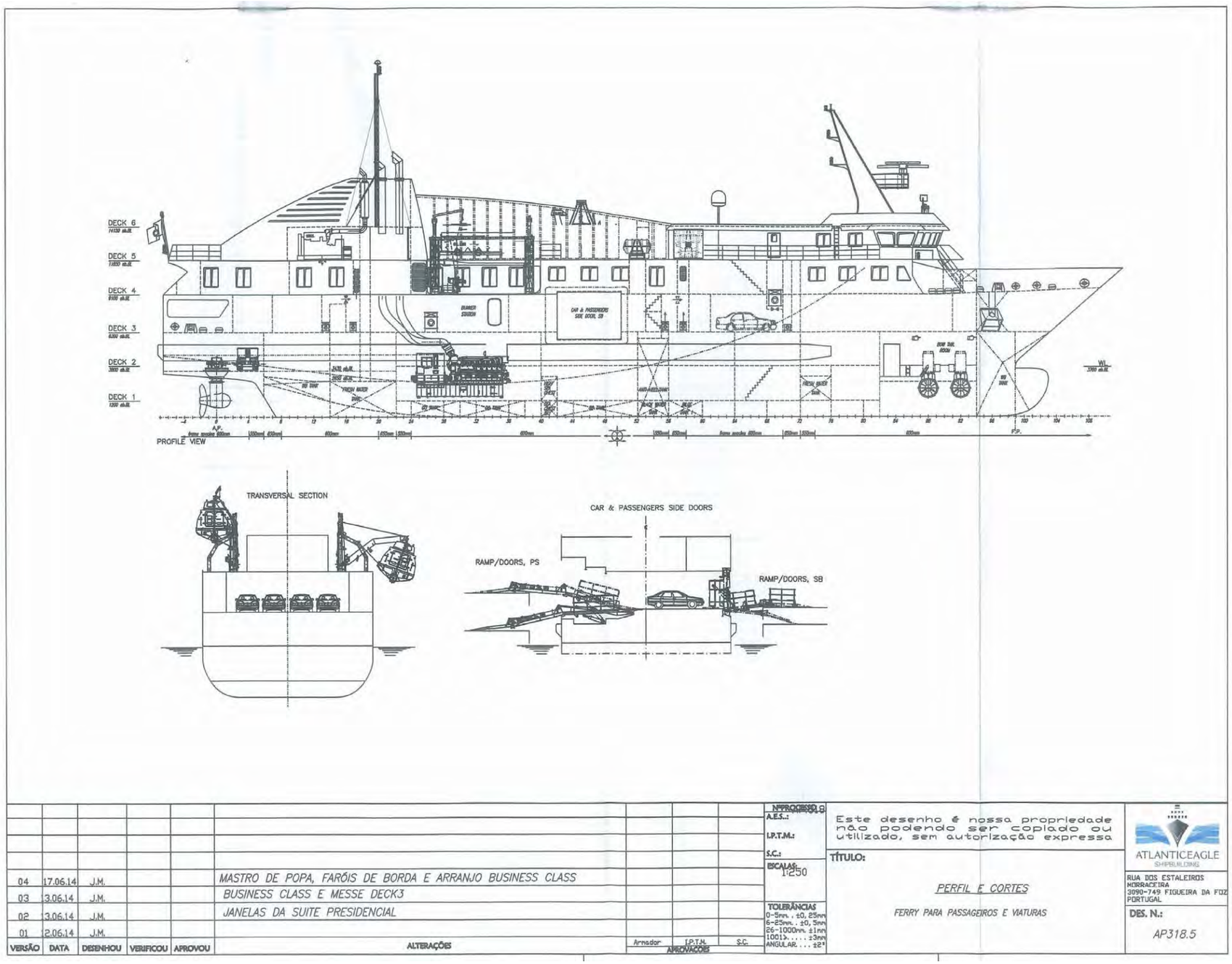
Source: APORTIL

Figure 2-2-16 Nakroma General Arrangement



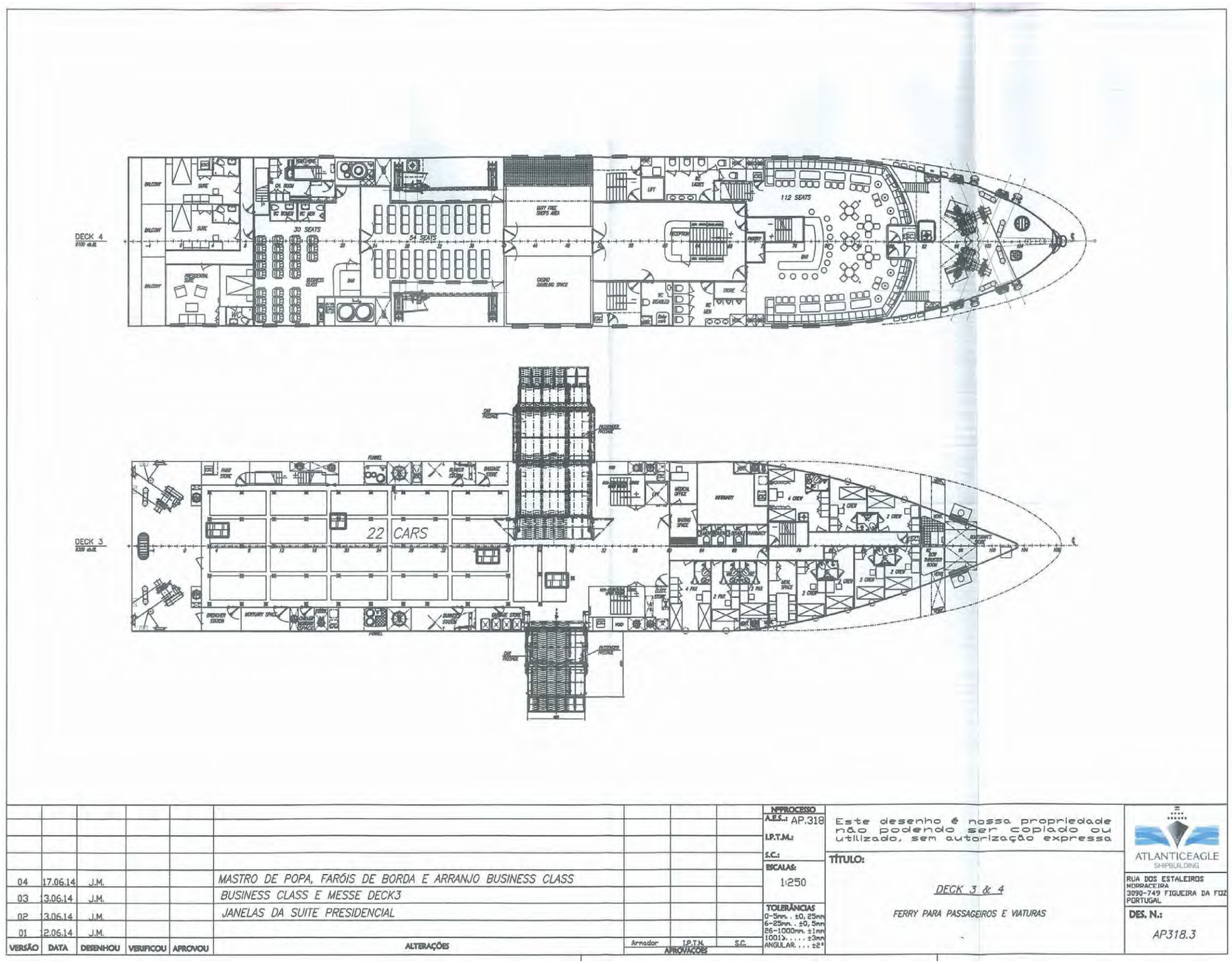
Source: APORTIL

Figure 2-2-17 Nakroma2 General Arrangement



Source: APORTIL

Figure 2-2-18 Portugal Ferry General Arrangement (1/2)



Source: APORTIL

Figure 2-2-19 Portugal Ferry General Arrangement (2/2)

The conditions for docking to a pier required for analyzing the actions by ships shall be, by using the facility design in Oecussi as reference, as follows:

Docking velocity V = 0.35 m/s, docking angle θ = 10 degrees

2-2-2-2-11 Self-weight and Surcharge Load

The characteristic values of unit volume weight used for calculating self-weight shall make use of those shown in Table 2-2-14.

Table 2-2-14 Characteristic Values of Unit Weight of Materials

Material	Characteristic values of unit weight (kN/m^3)
Steel and cast steel	77.0
Reinforced concrete	24.0
Un-reinforced concrete	22.6
Stone (granite)	26.0
Stone (sandstone)	25.0
Sand, gravel, and rubble (dry)	16.0
Sand, gravel, and rubble (wet)	18.0
Sand, gravel, and rubble (saturated)	20.0

Source：Technical Standards and Commentaries for Port and Harbor Facilities in Japan; July 2007

The characteristic values of upper load shall be set taking into consideration the kind of handled cargo, packing style, volume, handling method, loading period, etc. Those in the case of seismic actions in upset condition and accidental condition shall be determined by predicting the existence of live load at the time point when an earthquake assumed under the design conditions will occur in the future. The upper load in the present study shall be, by making the facility design for the ferry pier of Oecussi as reference, as follows:

- Upper live load - Persistent/upset condition 20kN/m^2 - Accidental condition 10kN/m^2

As the characteristic value of live load, maximum load shall assume that of a tractor-trailer for carrying 20-foot containers as shown in Table 2-2-15.

Table 2-2-15 Live Load (Vehicle Load)

Type	Width (m)	Length (m)	Rating (kN)
20ft Tractor-Trailer	3.000	14.800	350

Source : Technical Standards and Commentaries for Port and Harbor Facilities in Japan; July 2007

The characteristic value of side walk live load shall be 5 kN/m^2.

2-2-2-2-12 Materials

(1) Steel

Steel materials used for port facilities should have necessary quality to achieve required performance of the facilities. One example that satisfies this condition is steel materials that comply with to the Japanese Industrial Standards (JIS). Steel materials, among JIS-compliant steel materials, being relatively often used for port facilities are shown in Table 2-2-16.

Table 2-2-16 Quality Standards for Steel Materials (JIS)

Type of steel		Standard	Materials Used
Structural steel	Steel bar	JIS G3191	SS400
	Shaped steel	JIS G3192	SS400, SM400, SM490, SM490Y, SM520, SM570, SMA400, SMA490, SMA570
	Steel Plate and Steel Strips	JIS G 3193	SS400, SM400, SM490, SM490Y, SM520, SM570, SMA400, SMA490
	Flat steel	JIS G 3194	SS400, SM400, SM490, SM490Y, SM520
Steel pile	Steel pipe piles	JIS A 5525	SKK400, SKK490
	Steel H piles	JIS A 5526	SHK400, SHK400M, SHK490M

Source: Technical Standards and Commentaries for Port and Harbor Facilities in Japan; July 2007

(2) Characteristic values of steel materials

The characteristic values of each numeric constant pertaining to steel and cast steel that are required for verifying performance shall be set appropriately considering strength properties. The characteristic values of Young's modulus, shear modulus, Poisson's ratio and Linear expansion coefficient of steel and cast steel shall be referred to those in Table 2-2-17.

Table 2-2-17 Numeric Constants of Steel Materials

Young's modulus *E*	2.0×10^5 N / mm^2
Shear modulus G	7.7×10^4 N / mm^2
Poisson's ratio *V*	0.30
Linear expansion coefficient *a*	12×10^{-6} 1 / °C

Source：Technical Standards and Commentaries for Port and Harbor Facilities in Japan; July 2007

(a) Characteristic values of yielding stress of steel

The characteristic values of yielding stress of steel materials shall be appropriately determined in accordance with the results of relevant experiments.

(b) Characteristic values of yielding stress of steel pile

The characteristic values of yielding stress of steel pile shall be referred to those in Table 2-2-18

according to the kinds of material and stress intensity.

Table 2-2-18 Characteristic Values of Yielding Stress of Steel Pile (JIS) (N/mm^2)

Type of stress \ Steel	SKK400	SKK490
Tensile stress in axial direction (per net cross-sectional area)	235	315
Bending stress (per net cross-sectional area)	235	315
Bending stress (per total cross-sectional area)	235	315
Shearing stress (per total cross-sectional area)	136	182

Source：Technical Standards and Commentaries for Port and Harbor Facilities in Japan; July 2007

2-2-3 Outline Design Drawing

2-2-3-1 Pier

2-2-3-1-1 Specifications of the pier

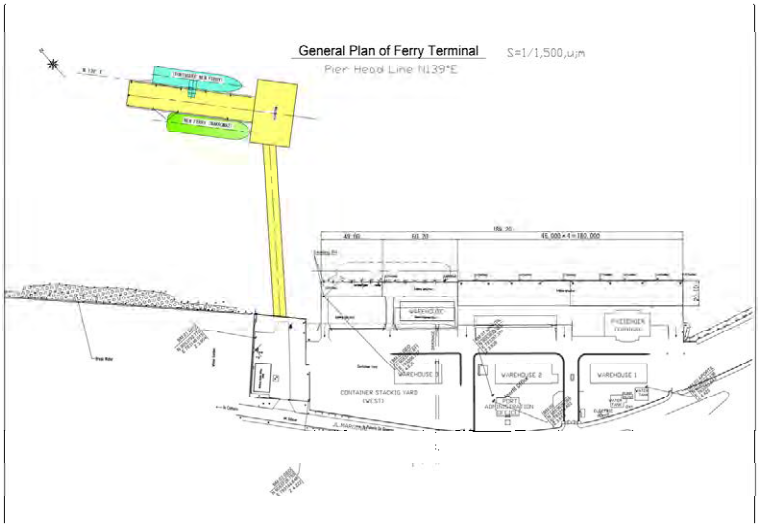
(1) Components of the pier

A pier and a platform that can accommodate target ferries shall be the objects of design. The pier coupled with a platform shall be of a piled permeable structure. The platform is composed of a ferry landing part (Landing platform), a turning platform for vehicles to be loaded, a boarding promenade for passengers, roads for maintenance vehicles, utilities, navigation aid equipment, etc.

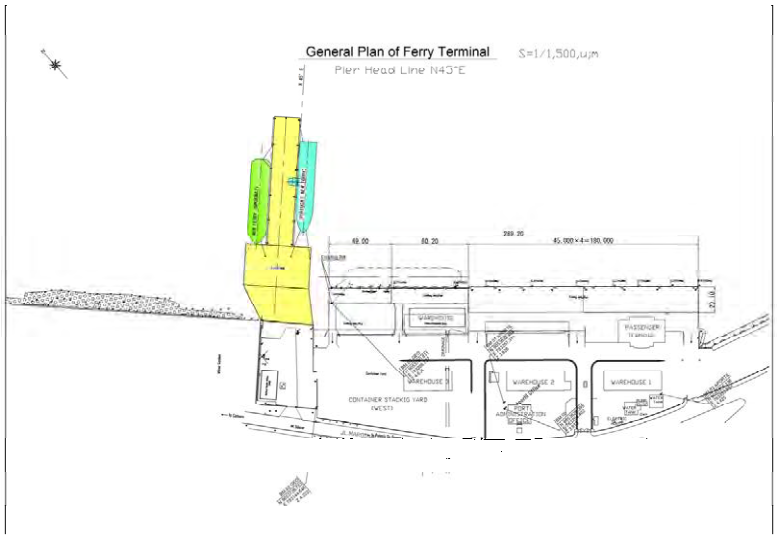
(2) Pier head line

The pier shall have a structure that can accommodate ferries on its both sides so that two ferries may be able to come alongside the pier at the same time. As its determination process in Figure 2-2-20 shows, the pier head line is desirably to be set in the direction of the head line of navigation channel (N. 139o E.); in this case, however, increase in construction costs is expected, since the location to install the platform will have to be relatively offshore. Therefore, the pier head line shall be determined as economically advantageously as possible on condition that it will not affect seabed shape around the construction sea site area, wind direction and maneuvering of cargo ships at / around the existing wharf.

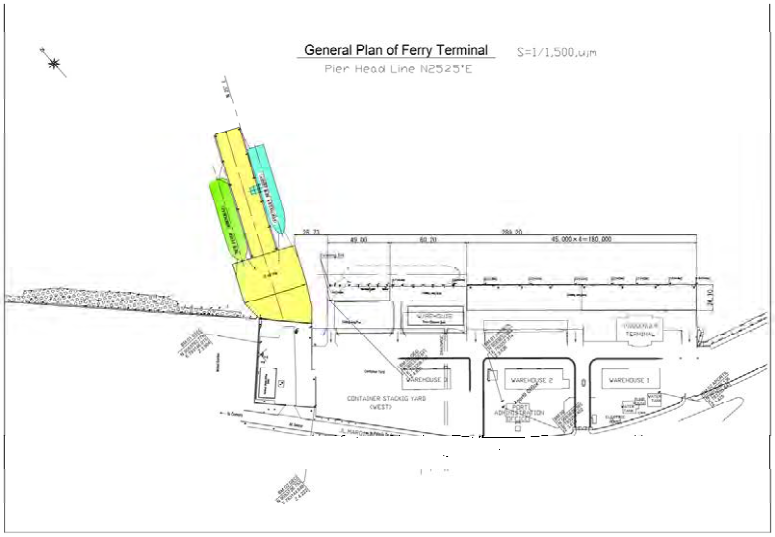
In Dili Port NE wind direction overwhelms others, and hence the pier head line is to be preferably set in the direction of NE in order to ensure mooring safety while receiving wind pressure from the stern that has the smallest exposure area of a ship. In consideration of the safety for berthing and maneuvering ships and influence on e.g. cargo ships at / around the existing wharf, the pier head line was set in the direction of N25^o E.



Pier Head Line in N139^{o} E (Parallel to Navigation Channel H.L.)



Pier Head Line in N45^{o}E (Parallel to Overwhelming Wind from NE)



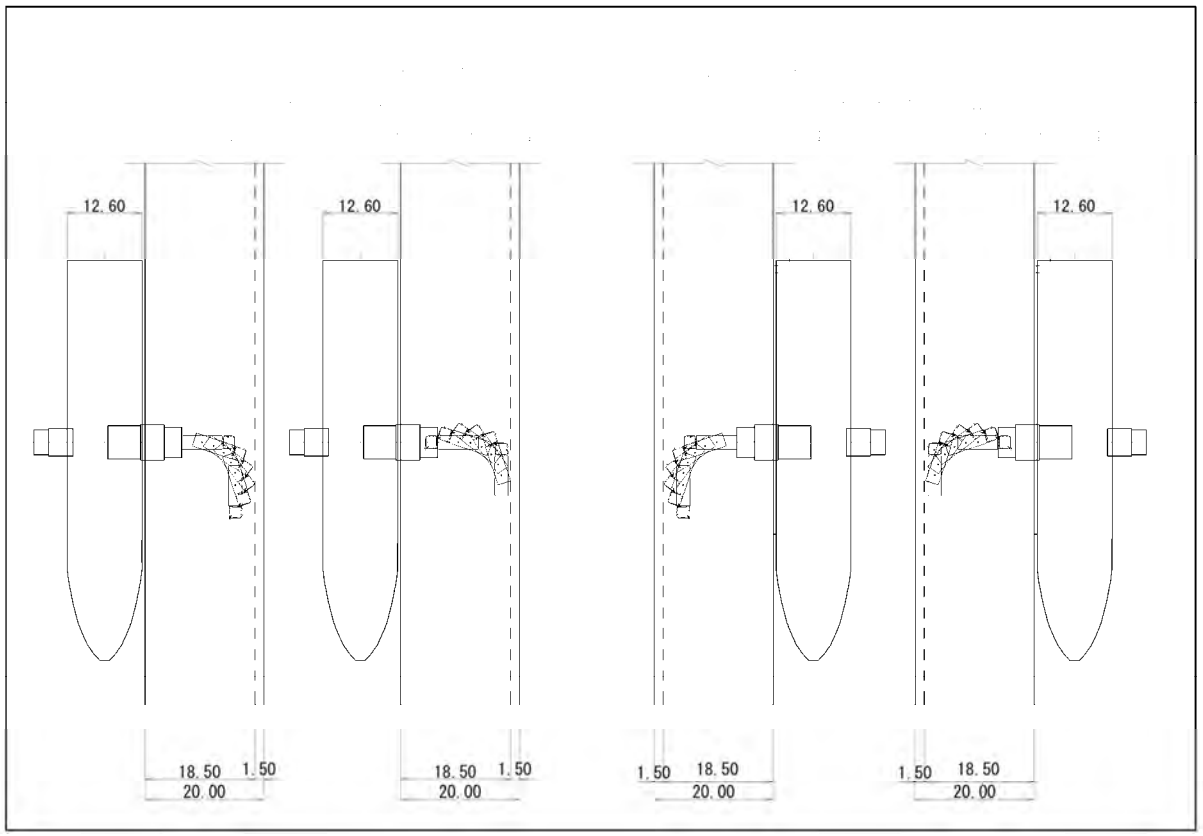
Pier Head Line in N25^{o}E (Adopted Plan)

Source: JICA Survey Team

Figure 2-2-20 Alternative Plans for Pier Face Line

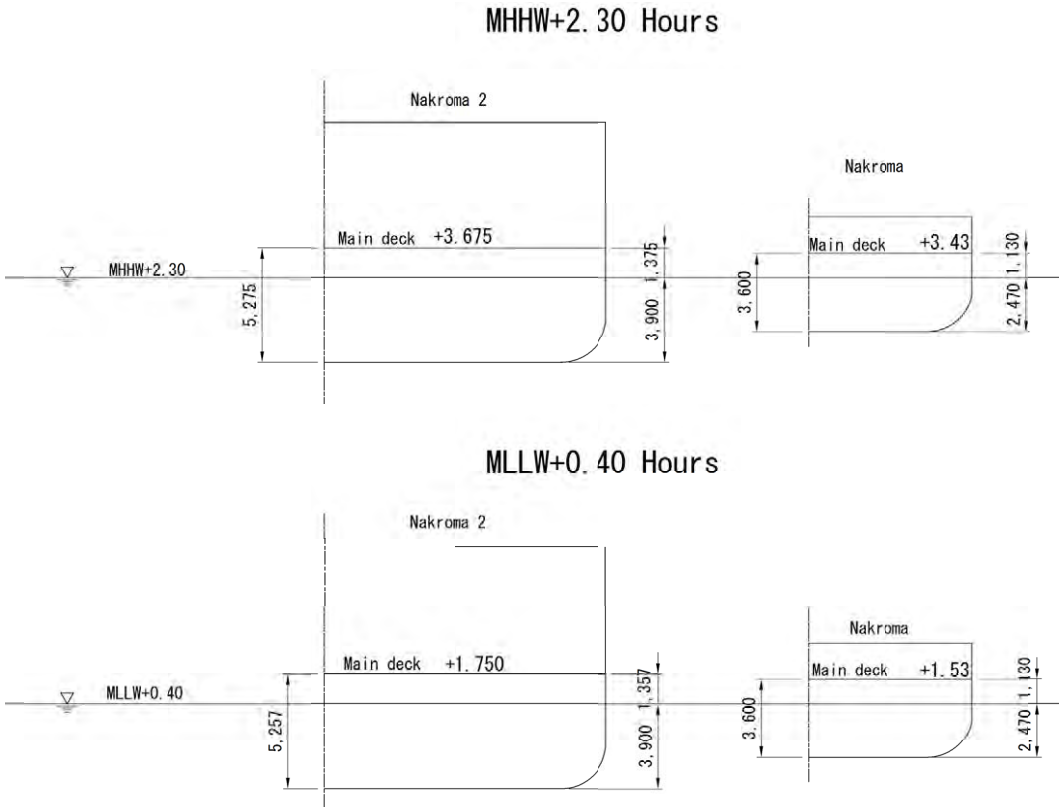
(3) Pier width and structure of landing platform

The pier width needs to be at least 20 m to cover the turning radius of vehicles coming out of the side ramp of the Portuguese ferry, and the width of the promenade (roadway) for both vehicles and passengers. The pier width shall eventually be 24 m taking into account the utility area of 2 m x 2 = 4 m. In addition, the landing platform shall be of a movable ramp structure, in view that there will be a difference of 2.145 m (+3.675 m - 1.53 m) between the main deck heights of Nakroma and Nakroma 2.



Source: JICA Survey Team

Figure 2-2-21 Tracks of Vehicles



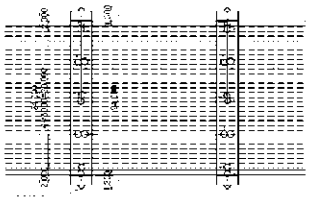
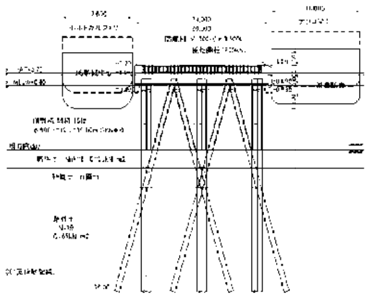
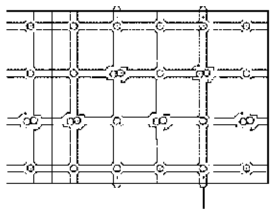
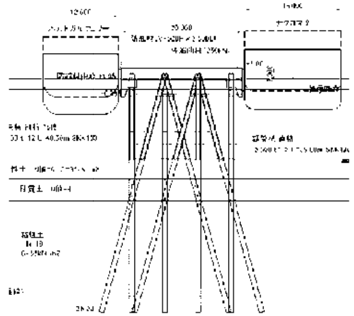
Source: JICA Survey Team

Figure 2-2-22 Changes in Main Deck Height

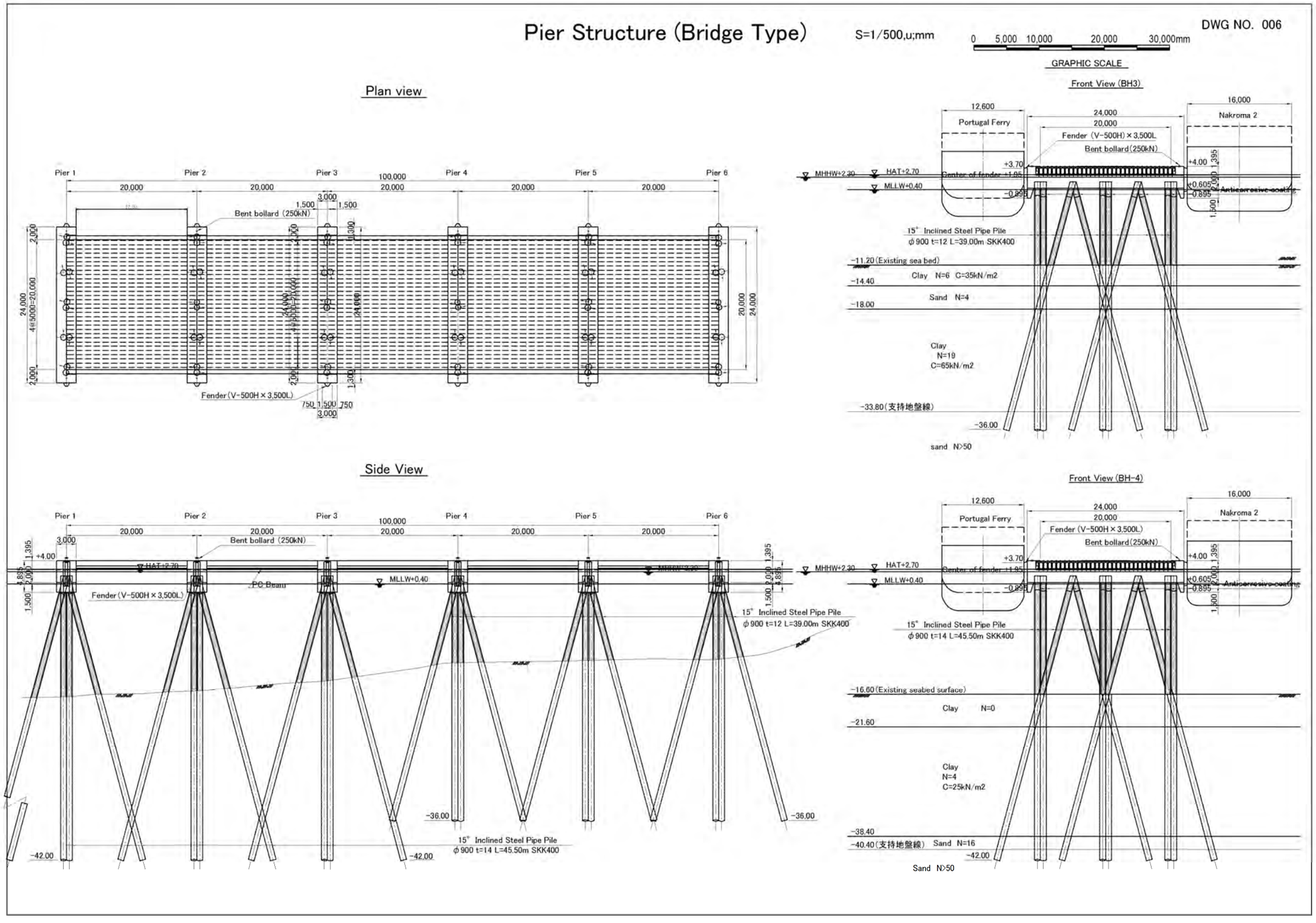
2-2-3-1-2 Type of Structure

The pier structure shall be, following the results of structural comparisons shown in Table 2-2-19, a bridge type pier using steel pipe piles in the substructure and PC girders for the superstructure as shown in Figure 2-2-23.

Table 2-2-19 Comparisons between Alternative Pier Structure Plans

Type of Structure	Bridge Type	Standard Type
Standard cross section	Ground plan  Cross section 	Ground plan  Cross section 
Structure outline	To build a steel pipe pile type bridge pier, and on its top to install PC girders with its unitary length 20 m.	It deals with a normal bridge structure. On the top of the steel pipe pile-driven pier, reinforced concrete beams combined with slabs form the upper structure.
Structural features	There are many construction records as a bridge (pier) both on land and offshore. Structure-wise stable.	Having many construction records, this type offers a stable structure.
Workability	Since the number of driving piles is small, and the superstructure is made just by placing PC girders manufactured in the factory, this type involves less work in the construction site, and offers high workability	Since the number of driving piles is large, and the superstructure is constructed by on-site cast-in concrete, workability is less than the bridge type structure.
Economical features	Small number of driving piles makes this alternative economically advantageous.	Large number of driving piles makes this type less advantageous in terms of economy.
Maintenance	The small number of driving piles made it easier to maintain the structure. In addition, since the quality of the structure depends on the factory-guaranteed PC girders, maintenance is easy.	The large number of driving piles requires more personnel and costs for maintenance.
Conclusion	Best Qualified	Next Best Qualified

Source: JICA Survey Team



Source: JICA Survey Team

Figure 2-2-23 Pier Structure (Bridge Type)

2-2-3-1-3 Required performance of pier

The pier shall aim to contribute to the safe and smooth use of vessels, safe getting on and off of passengers, and safe and smooth handling of cargoes in accordance with the utilization of vessels, and shall satisfy the following required performance:

(1) Usability

Structural components shall not be affected by, and shall ensure stability against, the persistent conditions related to self-weight and earth pressure, and the upset conditions related to ship actions, level one seismic motion, waves and surcharge load.

(2) Serviceability

To enable safe and smooth use of vessels, to allow safe getting on and off of passengers, and to realize safe and smooth cargo handling.

2-2-3-1-4 Performance specifications of the pier

The following describe the performance specifications of the pier.

(1) Usability

(a) Performance specifications for the upset effects

(i) Upset condition related to ship motion effects

① The effects to be considered for the verification of shearing stress of the superstructure, stress in the pile and axial forces against the pile shall comprise: main effects by ships and secondary effects by self-weight and surcharge load.

② Dangerousness in that pile stress intensity can exceed yielding stress shall be verified by using failure probability based on the balance of forces as the indicator.

(ii) Upset condition related to level one seismic motions

① The effects to be considered for the verification of shearing stress of the superstructure, stress in the pile and axial forces against the pile shall comprise: main effects by seismic motions and secondary effects by self-weight and surcharge load.

② Dangerousness in that pile stress intensity can exceed yielding stress shall be verified by using failure probability based on the balance of forces as the indicator.

(iii) Upset condition related to surcharge load

① The upset condition related to surcharge load shall also include the design state in which surcharge load at cargo handling will have effects at the same time as the wind load that woks upon cargo handling equipment and vessels.

② The effects to be considered for the verification of shearing stress of the superstructure, stress in the pile and axial forces against the pile shall comprise: main effects by surcharge load and secondary effects by self-weight and wind.

③ Dangerousness in that pile stress intensity can exceed yielding stress shall be the same as the failure probability in the upset condition related to the ship motion effects.

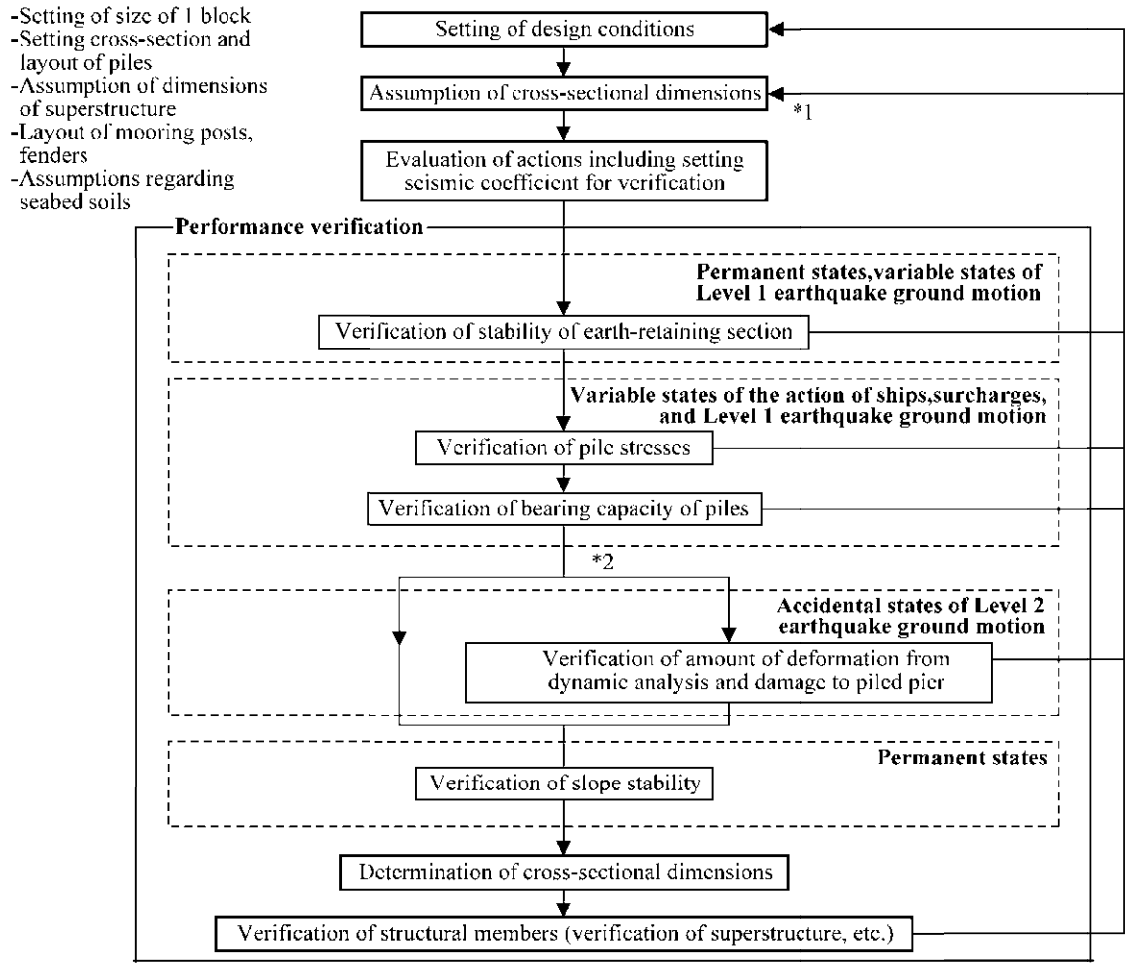
(iv) Upset condition related to waves

① The effects to be considered for the verification of shearing stress of the superstructure, stress in the pile and axial forces against the pile shall comprise: main effects by waves and secondary effects by self-weight.

2-2-3-1-5 Verification of pier performance

(1) Basic procedures of performance verification

Exemplar procedures to verify pier performance are shown in Figure 2-2-24.



*1: Evaluation of the effect of liquefaction and settlement is not shown on the diagram, so it is necessary to separately into consider.
*2: Verification shall be carried out for high earthquake-resistance facilities against the Level 2 earthquake ground motion.

Source: Technical Standards and Commentaries for Port and Harbor Facilities in Japan; July 2007

Figure 2-2-24 Flow of Pier Performance Verification

(2) Results of pier performance verifications

The results of verifications of pier stability are summarized in Table 2-2-20, which ensures the stability of the pier.

Table 2-2-20 Results of Pier Performance Verifications

Effects	Vertical force (kN)	Horizontal force (kN)	
		Parallel to head line	Right angles to head line
At berthing	17,648	818	2,045
At earthquake	13,648	------	2,047
	13,648	2,047	------

Soil conditions	Checking items	At berthing	At earthquake	
			Parallel to head line	Right angles to head line
BH-3	Pile stress	0.826<1.0	0.607<1.0	0.741<1.0
	Pile bearing capacity (kN)	3,347<5,200	2,767<5,200	2,973<5,200
	Displacements	39mm	33mm	40mm
BH-4	Pile stress	0.826<1.0	0.607<1.0	0.758<1.0
	Pile bearing capacity (kN)	3,436<3,841	2,778<3,841	2,973<3,841
	Displacements	39mm	33mm	40mm

Source: JICA Survey Team

2-2-3-2 Platform (including landing platform)

2-2-3-2-1 Platform specification

The platform shall be of a piled permeable structure type. It is composed of a ferry landing part (Landing platform), a turning platform for vehicles to be loaded, a boarding promenade for passengers, roads for maintenance vehicles, utilities, navigation aid equipment, etc. The width of the platform shall be 55 m taking into account the pier width and the ramp width on the ship side. In addition, the landing platform shall be of a movable ramp structure, in view that there will be a difference of an approximately 2.5 m between the main deck heights of target vessels.

2-2-3-2-2 Type of structure

The type of the platform shall be, as shown in Figure 2-2-25, composed of a substructure with steel pipe piles for the section below the landing part and PHC piles for the shallower part of the platform, and a superstructure made of reinforced concrete (RC).

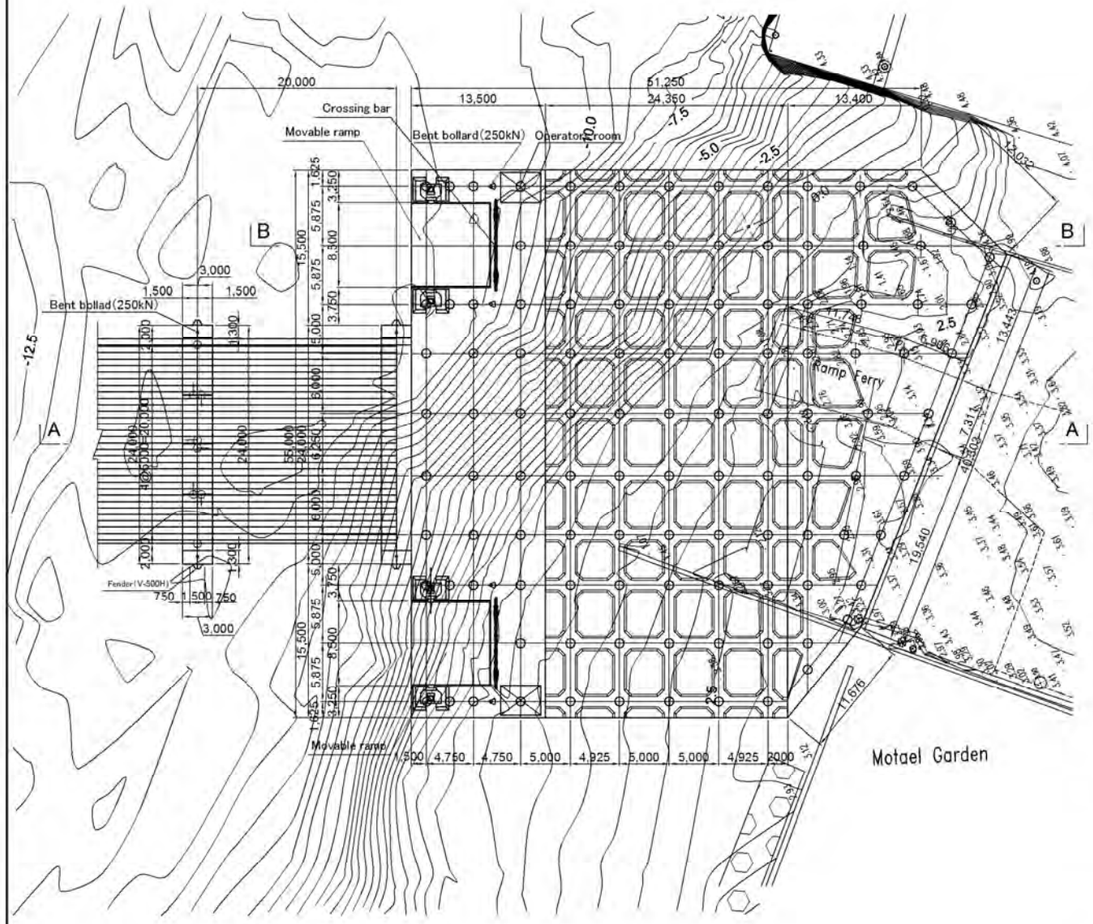
DWG NO. 005

Platform Structural Drawing S=1/500,u;mm

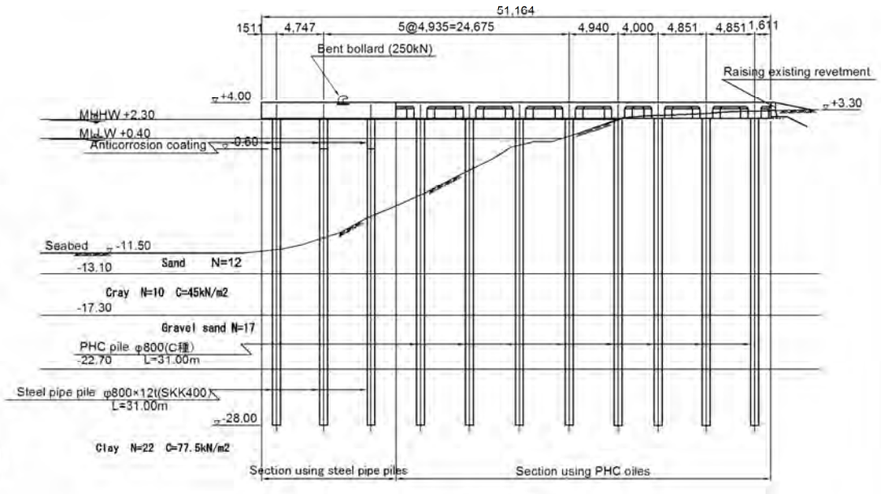
0 5,000 10,000 20,000 30,000mm

GRAPHIC SCALE

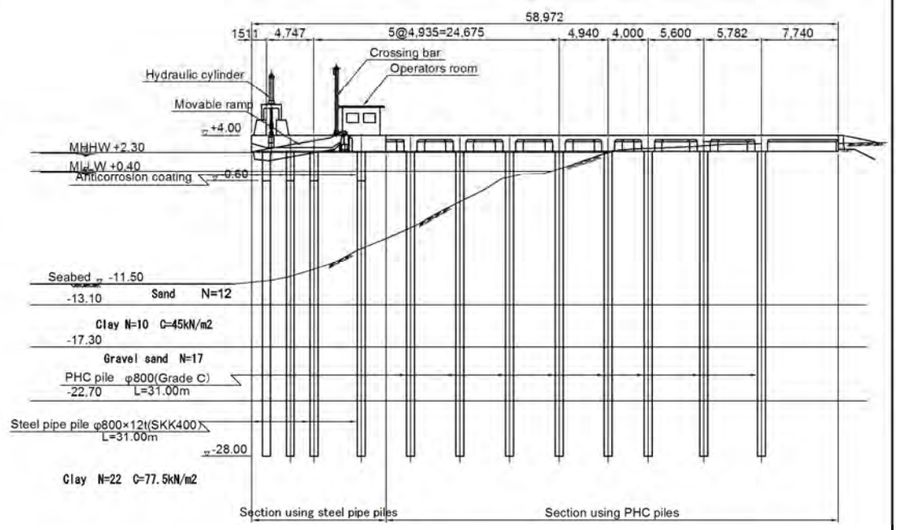
Plan View



A-A Section



B-B Section



Source: JICA Survey Team

Figure 2-2-25 Platform Structural Drawings

2-2-3-2-3 Required performance of platform

(1) Usability

Structural components shall not be affected by, and shall ensure stability against, the persistent conditions related to self-weight and earth pressure, and the upset conditions related to ship actions, level one seismic motion, waves and surcharge load.

(2) Serviceability

To enable safe and smooth use of vessels, to allow safe getting on and off of passengers, and to realize safe and smooth cargo handling.

2-2-3-2-4 Performance specification of platform

Appropriate specification elements shall be established in accordance with the specification and characteristics of vehicles to use the equipment at carrying out verification of performance related parameters, such as width and slope of the platform (landing platform), extension of its horizontal part, radius of curve of the center line of the curved lane, movement width in the vertical direction at the tip of the movable part. The slope of the vehicle getting on/off equipment shall be an appropriate one not larger than the figures provided in Table 2-2-21. If the longitudinal slope steeply changes, then any part of the vehicle, particularly floor surface, may touch the floor of the equipment at getting on and off of vehicles, therefore, careful attention shall be paid to the determination of the longitudinal slope in order not to generate a steep change in the slope.

Table 2-2-21 Width and Slope of Vehicle Getting On/Off Device

Kind of Getting On/Off Equipment	Number of lanes	Width (m)	Slope (%)	
			Fixed part	Movable part
Equipment that exclusively serves vehicles with a width of less than 1.7 m (Small size equipment)	1	3.00	12	17
	2	5.00		
Equipment that exclusively serves vehicles with a width of less than 2.5 m	1	3.75	10	12
	2	6.50		
Equipment that frequently serves large-size container transporting vehicles	1	4.00	-	-
	2	7.00		

Source: Technical Standards and Commentaries for Port and Harbor Facilities in Japan; 2007

2-2-3-2-5 Verification of platform performance

Verification of platform performance shall be carried out taking the following into consideration:

① The direction of effects working on the platform is not always the same, and hence verification shall be conducted, depending on the need, for plural directions.

② In some cases, danger may arise from torsion in the case of pile type structure, and revolution in the case of caisson type structure, and hence careful attention should be paid accordingly.

③ The platform superstructure shall have a height not vulnerable to wave effects, and its crown level be deigned pursuant to the function.

(1) Results of platform performance verifications

The verification results of platform performance and stability are summarized in Table 2-2-22, which ensures the stability of the platform.

Table 2-2-22 Results of Platform Performance Verifications

Effects		Serviceability	Horizontal force (kN)	
			Parallel to head line	Right angles to head line
Steel Pipe Pile Section	At earthquakes	23,018	3,453	3,453
PHC Pile Section	At earthquakes	41,571	6,228	6,228

Design targets	Soil conditions	Checking items	At Earthquake	
			Parallel to head line	Right angles to head line
Steel Pipe Pile Section	BH-2	Pile stress (N/mm^2)	0.811<1.0	0.63<1.0
		Pile bearing capacity (kN)	954<1,150	869<1,150
		Displacements	44mm	45mm
PHC Pile Section		Pile stress (N/mm^2)	σ_c=29.59<40.00	σ_c=29.79<40.00
			σ_t=-2.98>5.00	σ_t=-3.18>5.00
		Pile bearing capacity (kN)	889<1,152	946<1,152
		Displacements	3.6mm	3.5mm

Source: JICA Survey Team

2-2-3-3 Ancillary equipment

2-2-3-3-1 Bollard

(1) Required performance

Ancillary equipment of mooring facilities shall aim to contribute to the safe and smooth use of mooring facilities, and shall satisfy necessary specifications out of the following required performance:

① Usability

Structural components shall not be affected by, and ensure stability against, the persistent conditions related to self-weight and earth pressure, and the upset conditions related to ship action, surcharge load and level one seismic motion.

② Serviceability

To contribute to a safe and smooth use of mooring facilities

(2) Performance specifications

The effects to be considered for the verification of the stability of the components and structure of bollards against the upset condition related to ship actions shall comprise: main effects by the traction force of ship and secondary effects by self-weight. For reference, in the case of bent bollard, the effects should be taken into consideration of traction by mooring ships, and those of ships at coming alongside and leaving the pier.

By way of serviceability, location of installation, intervals and total number of bollards shall be determined appropriately taking into account the type of target vessel and utilization state of the facility.

(3) Verification of performance

The arrangement of bollards and mooring rings shall be based on the following criteria:

① Bent bollards shall be installed close to the water in the berth in order to serve ships being normally moored as well as those coming alongside and leaving the pier.

② The bollards to be used for normal ship mooring or ship operation of coming alongside and leaving the pier shall be installed near the water front line, since mooring ropes extended on the apron can be an obstacle to cargo handling work. Mooring ropes are sometimes pulled upward so that bent bollards are used. The interval of bent bollards and minimum installation number per berth shall follow the figures in Table 2-2-23. Standard values of ship traction force are shown in Table 2-2-24.

Table 2-2-23 Arrangement of Bollards

Gross Tonnage of Target Vessels		Maximum Interval between Bollards（m）	Minimum Installation Number per Berth(pieces)
	< 2,000	10～15	4
2,000 <=	< 5,000	20	6
5,000 <=	< 20,000	25	6
20,000 <=	< 50,000	35	8
50,000 <=	<100,000	45	8

Source: Technical Standards and Commentaries for Port and Harbor Facilities in Japan; 2007

Table 2-2-24 Standard Values of Ship Traction Force

Gross Tonnage of Target Vessels	Traction Force on Straight Bollards	Traction Force on Bent Bollards
200 <= < 500	150	150
500 <= < 1,000	250	250
1,000 <= < 2,000	350	250
2,000 <= < 3,000	350	350
3,000 <= < 5,000	500	350
5,000 <= < 10,000	700	500
10,000 <= < 20,000	1,000	700
20,000 <= < 50,000	1,500	1,000
50,000 <= < 100,000	2,000	1,000

Source: Technical Standards and Commentaries for Port and Harbor Facilities in Japan; 2007

In view that the gross tonnage of the target vessel under this Project is about 1,000 GT, and that a 250 kN bent bollard is considered suitable because of its holding capacity, 12 bent bollards shall be installed on the pier, and two on the landing platform.

2-2-3-3-2 Fenders

(1) Required performance

Required performance factors of collision preventive equipment are as follows:

① To satisfy the requirement to contribute to a safe and smooth use of mooring facilities

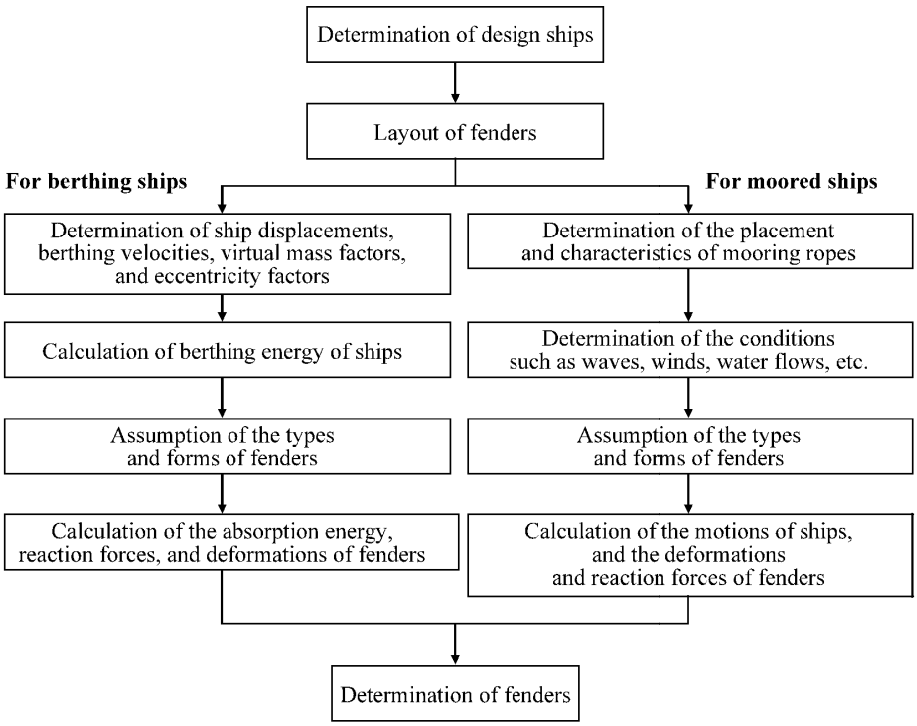
② To maintain the facility in a continuously usable condition without being affected by any possible damage that can be caused by the actions of berthing vessels

(2) Performance specification

Performance specification of collision preventive equipment shall use absorbed energy as the limit value indicator by making as the check item the energy of pushing the anti-collision equipment toward the pier, with respect to the vessels coming alongside the pier, which is an upset condition in terms of design condition.

(3) Verification of performance

When a ship comes alongside the pier, or fluctuates by the effects of waves and/or wind while being moored, force to push the ship toward the pier and friction are generated between the ship and the mooring facility. To prevent damage on the ship body and mooring facility, collision preventive equipment is installed in the mooring facility. The materials used for this equipment are rubber fender and air fender. Exemplar procedures for verifying performance of rubber fender, air fender and pile style fender are shown in Figure 2-2-26.



Source: Technical Standards and Commentaries for Port and Harbor Facilities in Japan; 2007

Figure 2-2-26 Flowchart of Fender Performance Verification

(4) Results of performance verification.

The verification results of fender performance are shown in Table 2-2-25. A total of 12 fenders shall be installed on the side of the pier with an interval of 20 m.

Table 2-2-25 Verification Results of Fender Performance

Target Vessel	Nakroma	Nakroma 2	Portuguese Ferry
Berthing velocity	0.35m/s		
Berthing energy (kN･m)	80.5	136.8	239.1
Required absorbed energy of fender (kN･m)	89.4	152.0	265.7
Fenders used	V-500H×3,500L		
Absorbed energy of fender (kN･m)	300.0		
Counterforce of fender (kN)	1,430		

Source: JICA Survey Team

2-2-3-3-3 Lighting equipment

(1) Required performance

In terms of serviceability of lighting equipment, appropriate intensity of illumination, light sources and others shall be determined in accordance with the scale of facility, form of utilization and working

form of cargo handling, etc.

(2) Performance specification

Standard intensity of illumination is intensity based on a mean and horizontal illumination, and is defined to be the lowest value for allowing a safe and efficient use of the facility. Illumination intensity is regarded to be a target in the design of lighting equipment. Appropriate illumination of lighting equipment shall be determined so as to allow a safe and smooth use of the facility in accordance with the kind of work and form to be effected. Standard illumination intensities for outdoor lighting shall be determined for respective facilities by referring to the values provided in Table 2-2-26.

Table 2-2-26 Standard Illumination of Outdoor Lighting

Facility			Standard Illumination Intensity (lx)
Wharf	Apron	Passengers, vehicles, mooring facilities for pleasure boats, general cargoes, container berths	50
		Sloping walk for pleasure boats, apron where hazardous materials via pipeline are handled	30
		Apron where simple work by means of pipelines, belt conveyors are carried out	20
	Yard	Yard for storing, unloading and transferring of containers and general cargoes	20
	Passage	**Getting on/off platform for passengers and vehicles**	**75**
		Passage for passengers and vehicles	**50**
		Other passageways	20
	Security	All facilities	1 to 5
Roads, Parks	Road	Main roads	20
		Other roads	10
	Parking Areas	For ferries	20
		Others	10
	Parks, Greeneries	Paths inside parks, greeneries	3

Source: Technical Standards and Commentaries for Port and Harbor Facilities in Japan; 2007

As the method for outdoor lighting, using road poles is common. As is generally used, it deals with a lighting method by fixing lighting equipment on poles installed every 8 to 12 m. For lighting large places such as yards and parking areas, many poles are necessary, which may disturb cargo handling work. For this reason, lighting by using poles fits for places not handling cargoes, such as small-scale parking areas and facilities for getting on/off the ferries.

(3) Performance verification

In designing lighting equipment, best suited lighting method, light sources and devices shall be selected, thereby determining the arrangement of lighting equipment in considering of the following points according to the installation site of lighting equipment:

① Standard illumination intensity

② Distribution of illumination intensities

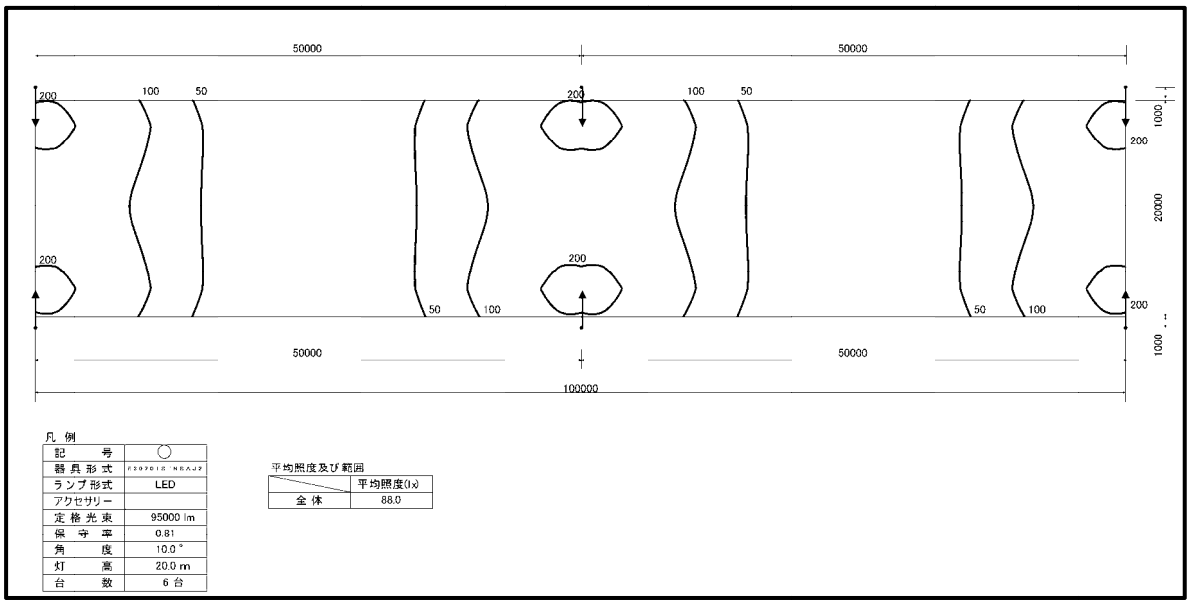
③ Glare

④ Obstacle light and energy-saving

⑤ Light color and color rendering property

(4) Results of performance verifications

Standard illumination shall be 50 lx for passageways for passengers and vehicles, and 75 lx for getting on/off platform for passengers and vehicles. Calculation results of illumination intensities for the pier are shown in Figure 2-2-27. LED shall be used for the lighting devices in view of its durability. Standard illumination density can be satisfied by installing six (6) pieces of lighting equipment on the pier. Four (4) pieces shall be installed at the four corners of the platform.



Source: JICA Survey Team

Figure 2-2-27 Calculation Results of Illumination for the Pier

2-2-3-3-4 Water supplying facility

(1) Required performance

Required performance of a water supplying facility for vessels is to be able to offer safe and smooth serviceability for supplying vessels with clean water.

(2) Performance specification

Performance specifications for a water supplying facility for vessels are listed below:

① To arrange installation places taking into account utilization form by vessels of mooring facility

② To have appropriate water supplying capacity according to the kinds of target vessels

③ To have a structure to prevent water contamination and to keep hydrants clean

(3) Performance verification

The arrangement of hydrants and water supplying capacity shall be determined appropriately

according to the kinds of target vessels. The water intake position of hydrants shall be of a structure that facilitates installation of water intake hoses and prevents water from contamination. The volume of water to be supplied to vessels shall be referred to the values in Table 2-2-27. Since the gross tonnage of the target vessels is more or less 1,000 GT, the specification of the water supplying facility shall be as follows:

① Water supply volume: 80 m^3
② Water supplying time: 5 hours
③ Interval of hydrants: 35 m
④ Number of hydrants: 2 pieces per berth
⑤ Water supplying capacity of one hydrant: 8 m^3/h

Table 2-2-27 Hydrant and Water Supplying Volume

Tonnage of Vessel (Gross tonnage)	Required Water Supply Volume (m^3)	Water Supplying Time (h)	Interval of Hydrants (m)	Number of Hydrants per Berth (pcs)	Water Supplying Capacity per Hydrant (m^3/h)
500	40	5	30	2	4
1,000	80	5	30 to 40	2	8
3,000	250 to 300	5	40 to 50	3 to 4	16
5,000	500	5	40 to 50	4	18
10,000	800	5	40 to 50	4	28

Source: JICA Survey Team

Fire extinguishing facility

Performance specification for the installation and maintenance of fire extinguishing facility shall be as follows:

① Fire-hydrants shall be installed so that the distance from each part of a vessel to the hose connection part may become less than a specified distance.
② Water sources shall be established so that the water supplying volume may be equal to or larger than that obtained from multiplying the number of installed fire-hydrants by a certain volume
③ Fire extinguishing facility shall have a capacity at the tip of respective nozzles to discharge more than the required water pressure or required volume when all the outdoor fire-hydrants are opened at the same time.
④ Cases for keeping the water discharge devices shall not be installed at the places where operation of fire-extinguishing facility becomes extremely impeditive, such as the places that will be used as evacuation passage.
⑤ Fire extinguishing facility shall be equipped with emergency electric power source.

2-2-3-3-5 Navigation aid facility

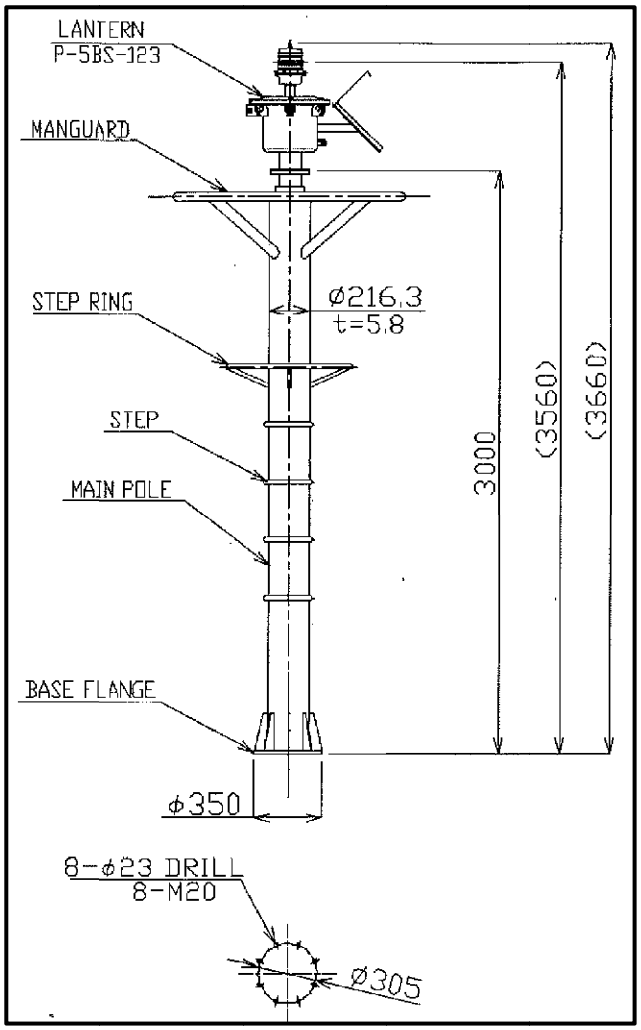
As a navigation aid facility, a beacon light shall be installed at the tip of the pier. A navigation aid

facility constitutes an important signal for ship ship operators, and hence appropriate selection should be made as to, for example, color, lighting pattern, and be installed and controlled according to the purposes. Its specification and structure are shown in Table 2-2-28 and Figure 2-2-28, respectively.

Table 2-2-28 Specification of Light Beacon

Descriptions		P-5BS-123 Type Light Beacon
Main Body	Total length	Approx. 0.7 m
	Level of lighting device	Approx. 0.6 m
	Fully equipped weight	Approx. 30 kg
	Major material	Anti-corrosive aluminum alloy (A5052)
	Paint color	White
	Installation method	Fixed with foundation bolts
Lighting Device	Type	SA-123A type
	Light source	Ultra-high-luminance light emitting diode (LED) - one set
	Lighting pattern	Flashes every 3 seconds (lights 0.5 seconds on and 2.5 seconds off)
	Light color	White
	Effective luminosity	40 cd 28 cd
	Visible distance	3.7 Nautical Miles
	Controller	RL-3S type Non-contact system using CPU, IC and transistors.
	Rated voltage	DC 12 V
	Working voltage	DC 11 V to DC 15 V
Power Source	Input voltage	DC 12 V
	Output voltage	DC 12 V
	Storage Battery	Small-sized lead acid battery set type (Rated capacity: 40 Ah x 1 pce.)

Source: JICA Survey Team



Source: JICA Survey Team

Figure 2-2-28 Light Beacon Structure

2-2-3-3-6 CCTV monitoring camera system

A CCTV monitoring camera system specified below shall be set to keep watch for intruder from the outside

① CCTV camera (Outdoor installed swirl type) x 6 sets
② Monitoring control panel (for Administration Office)
③ Video recording device
④ Communication and control equipment
⑤ Wireless communication system (for transmitting video records)

2-2-3-4 Revetment

2-2-3-4-1 Specification of the revetment

Specification of revetment shall be as shown in Figure 2-2-29 which has been prepared with reference to the parameters of the existing wharf.

2-2-3-4-2 Structural type

The structural type of the revetment shall be a gravity type retaining wall.

2-2-3-4-3 Required performance of the revetment

① Usability: Structural components shall not be affected by, and shall ensure stability against, the persistent conditions related to self-weight and earth pressure, and the upset conditions related to waves and level one seismic motion.

② Serviceability: To be able to protect the hinterland against ocean waves, overtopping waves and flood tide.

2-2-3-4-4 Performance specification of the Revetment

(1) Usability

The following describe performance specification with respect to the upset effects

(a) Upset condition related to Level 1 seismic motion

The effects to be considered in the verification of slipping and falling down of parapets shall comprise: main effects by level 1 seismic motion and secondary effects by self-weight, earth pressure and water pressure.

(b) Upset condition related to waves

The effects to be considered in the verification of slipping and falling down of parapets shall comprise: main effects by waves and secondary effects by self-weight, earth pressure and water pressure.

(2) Serviceability

The allowable overtopping wave volume for the revetment shall be determined appropriately taking into account among others the utilization status of the hinterland. In addition, the revetment shall have a structure that can adequately cope with overtopping waves even after the sinking caused by the effects of level 1 seismic motion. The allowable overtopping wave volume in this case shall take into account the development status of neighboring facilities.

2-2-3-4-5 Verification of revetment performance

A revetment is a structure that should prevent flow out of reclaimed earth, should represent a stable earth retaining work, should be also stable against ocean waves, and should protect the reclaimed hinterland from overtopping waves and flood tide. As possible effects working on the structure, those by earthquake and hydrodynamic pressure generated at earthquake occurrence shall be considered. The following matters shall be taken into account in the verification of revetment performance:

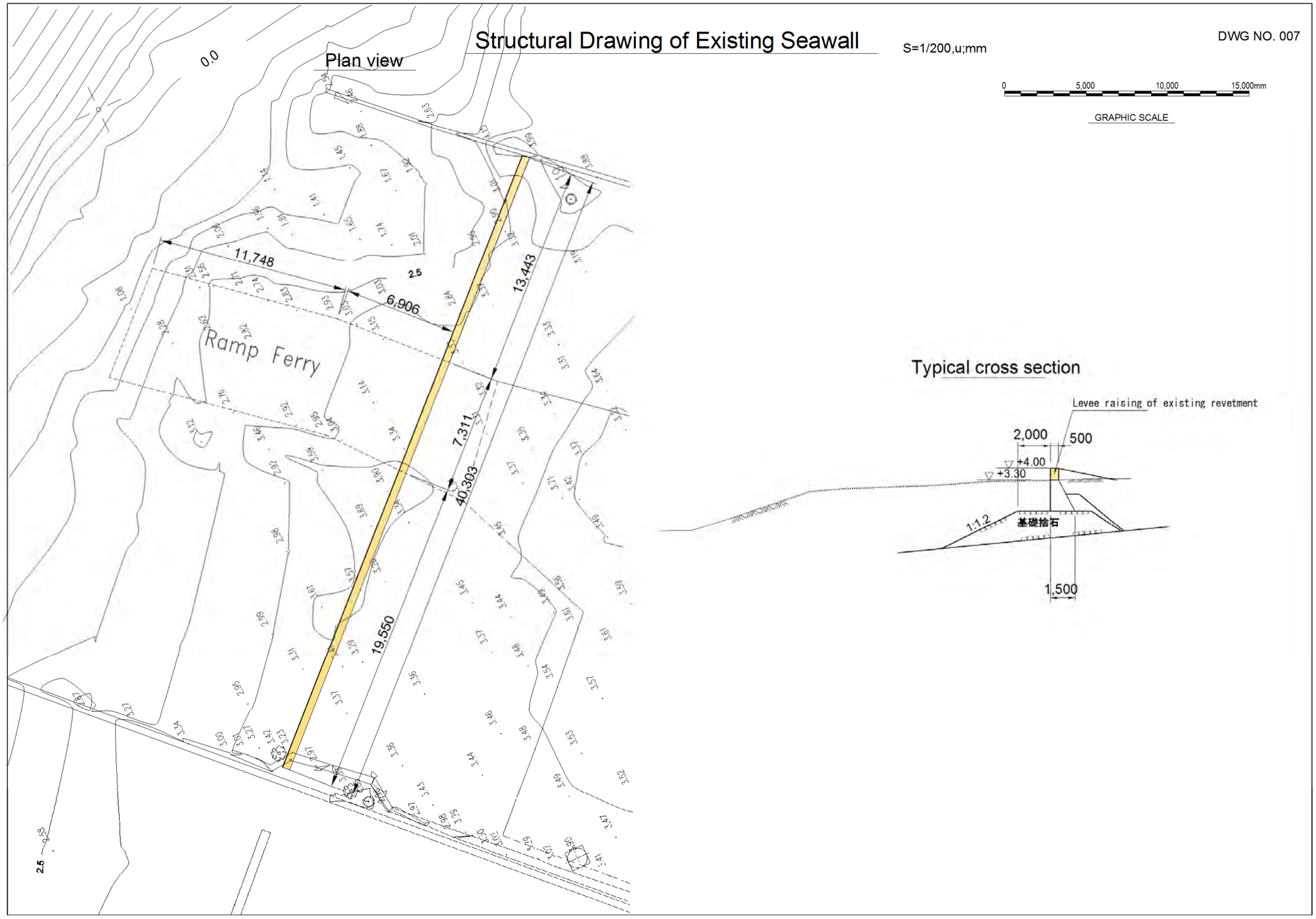
① To have a crown level that can preserve reclaimed land and allow proper use of the same despite ocean waves and high tide.

② To ensure stability against multiple effects, such as waves and earth pressure.

③ To have a structure that impedes flow-out of reclaimed soil.

During the field survey, no flow-out or cave-in of the reclaimed soil behind the revetment of the

projected site was found. Since the existing revetment continues most likely to satisfy even at the present time the required performance, it shall be re-utilized by applying levee raising method.



Source: JICA Survey Team

Figure 2-2-29 Structural Drawing of Existing Revetment

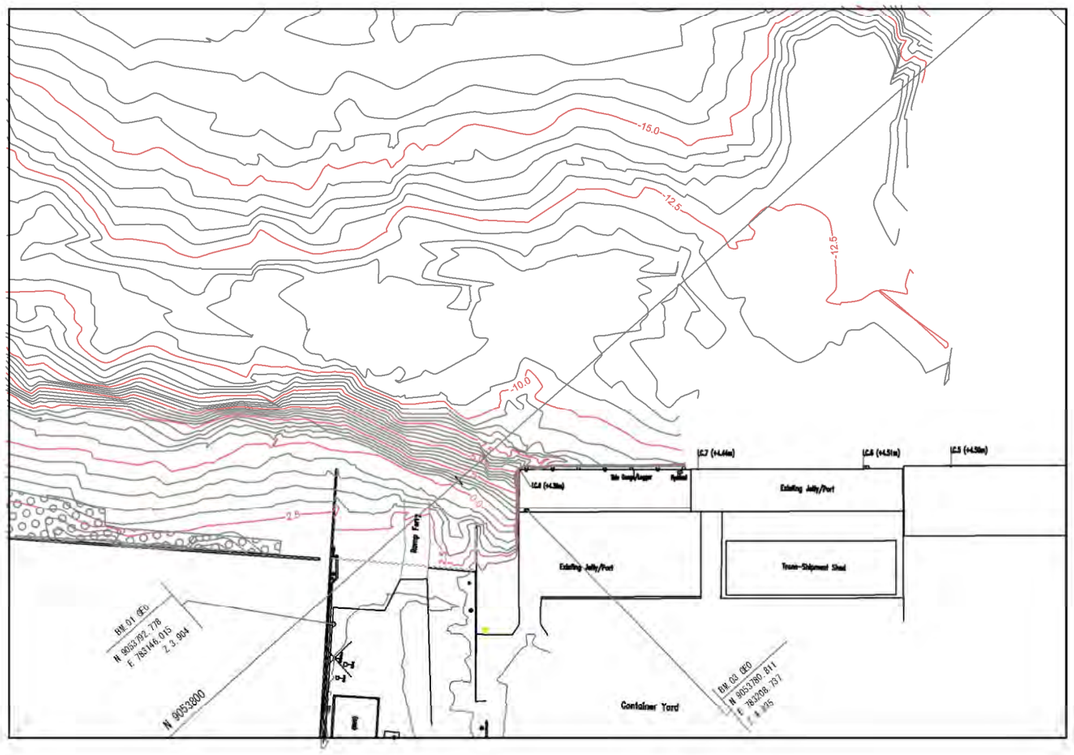
2-2-3-5 Design Drawings

Table 2-2-29 List of Outline Design

Drawing No.	Title of Drawing
001	Location of Dili Port
002	Overall Plan View
003	Bathymetry Map
004	Assumption Drawing of the Ground
005	Structural Drawing of Platform
006	Structural Drawing of Pier
007	Structural Drawing of Revetment
008	Withdrawal Drawing
009	Equipment Arrangement Drawing

Site Location Map

DWG NO. 001



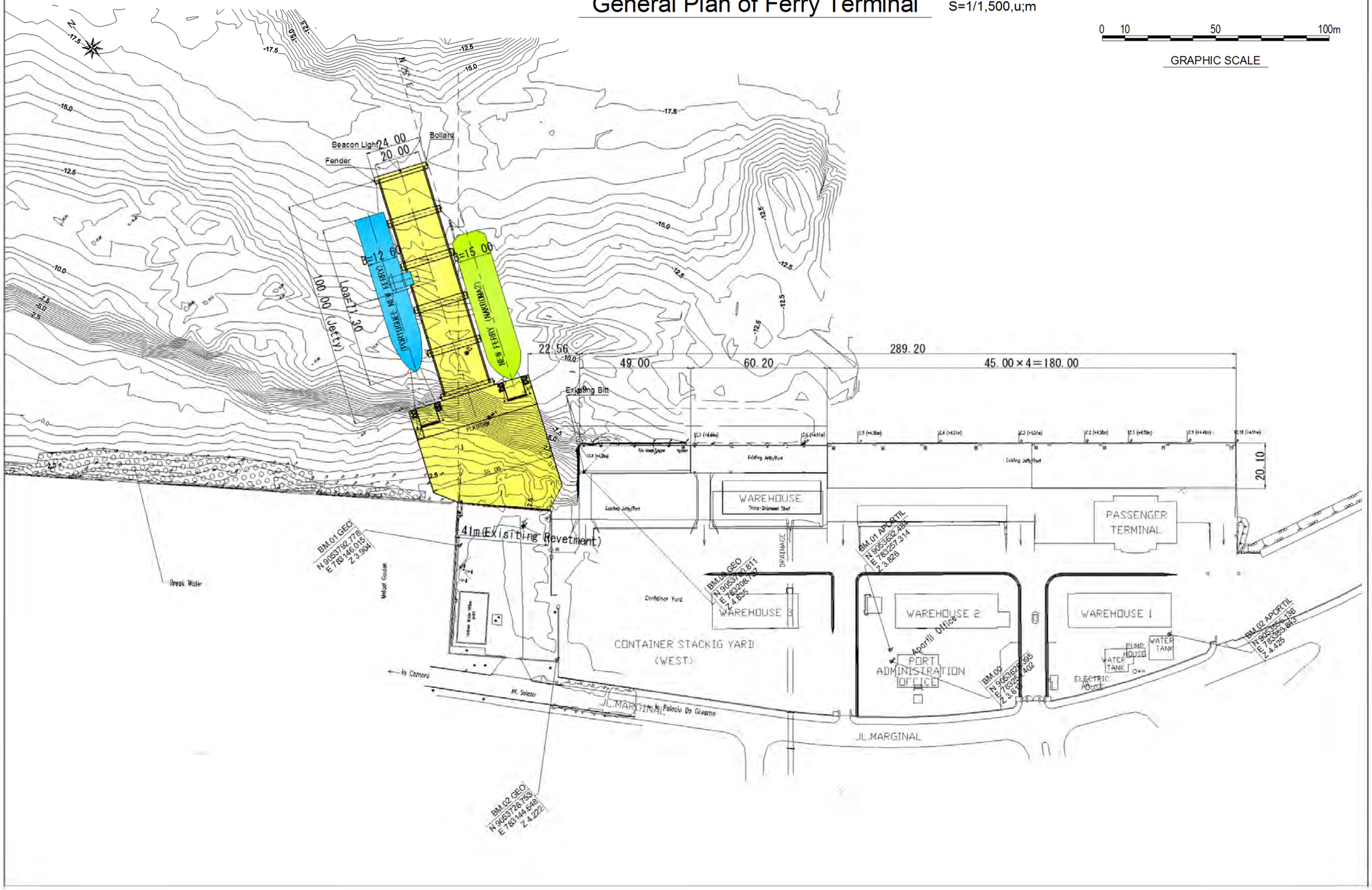
DWG NO. 002

General Plan of Ferry Terminal

S=1/1,500,u;m

0 10 50 100m

GRAPHIC SCALE



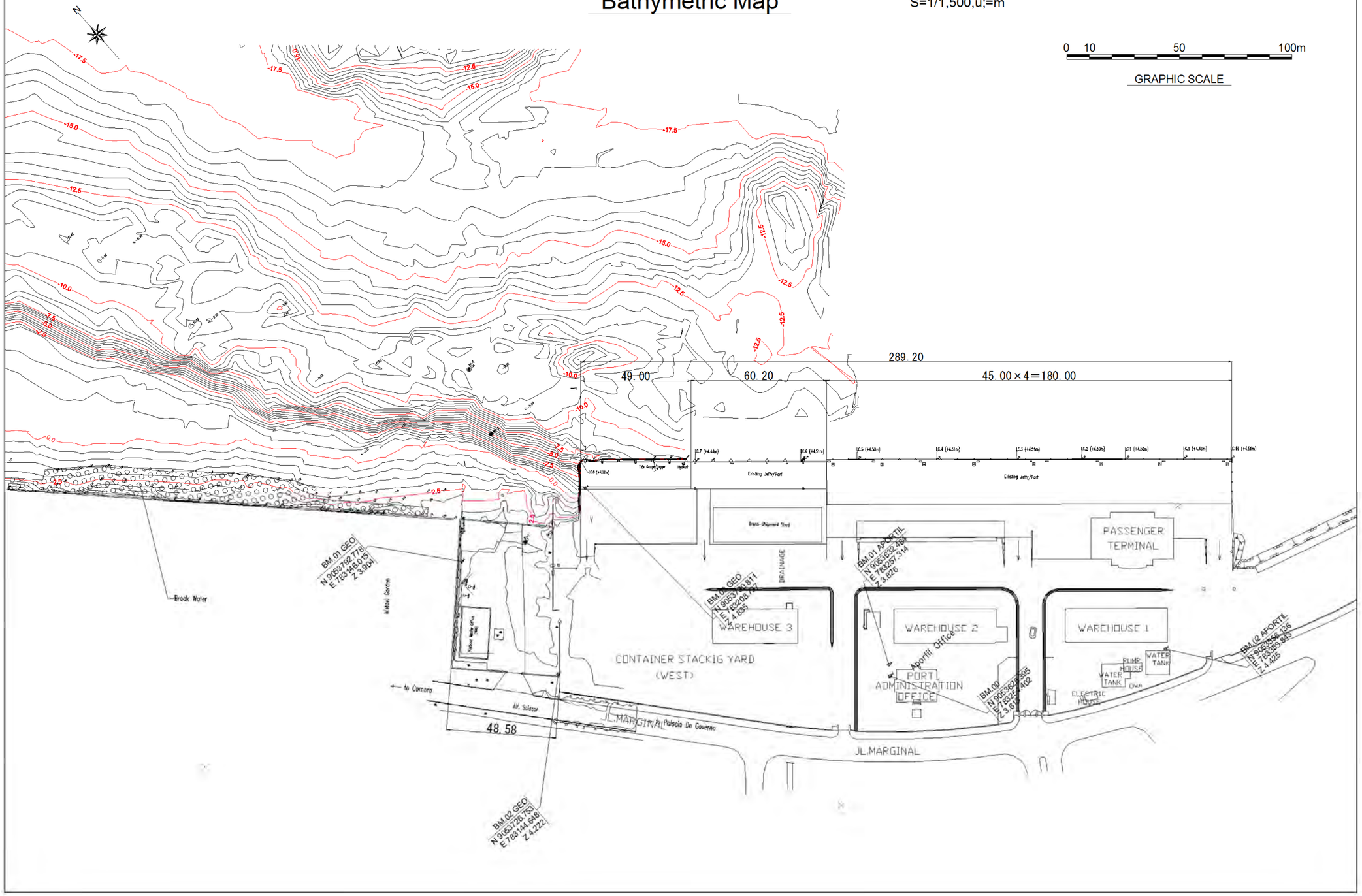
DWG NO. 003

Bathymetric Map

S=1/1,500,u;=m

0 10 50 100m

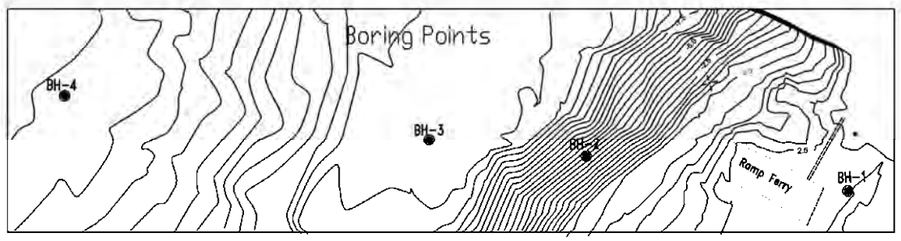
GRAPHIC SCALE

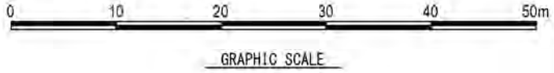


Assumption Drawing of the Ground

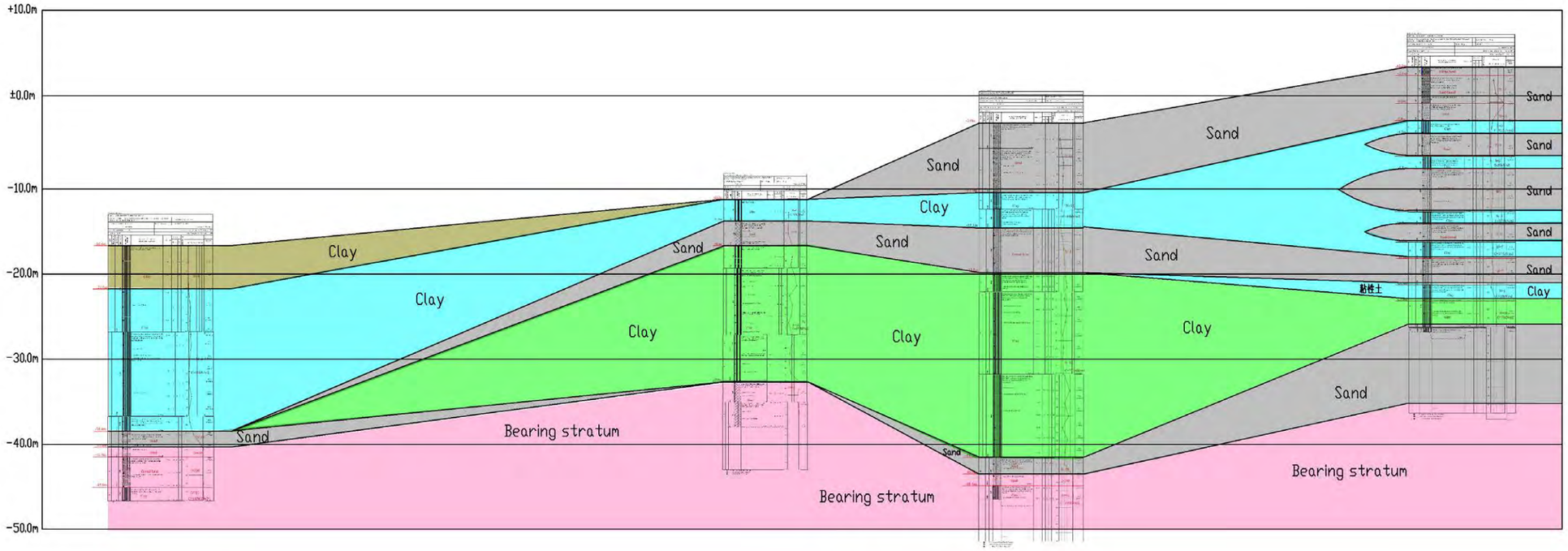
S=1/500, u:m

DWG NO. 004





BH-4 BH-3 BH-2 BH-1

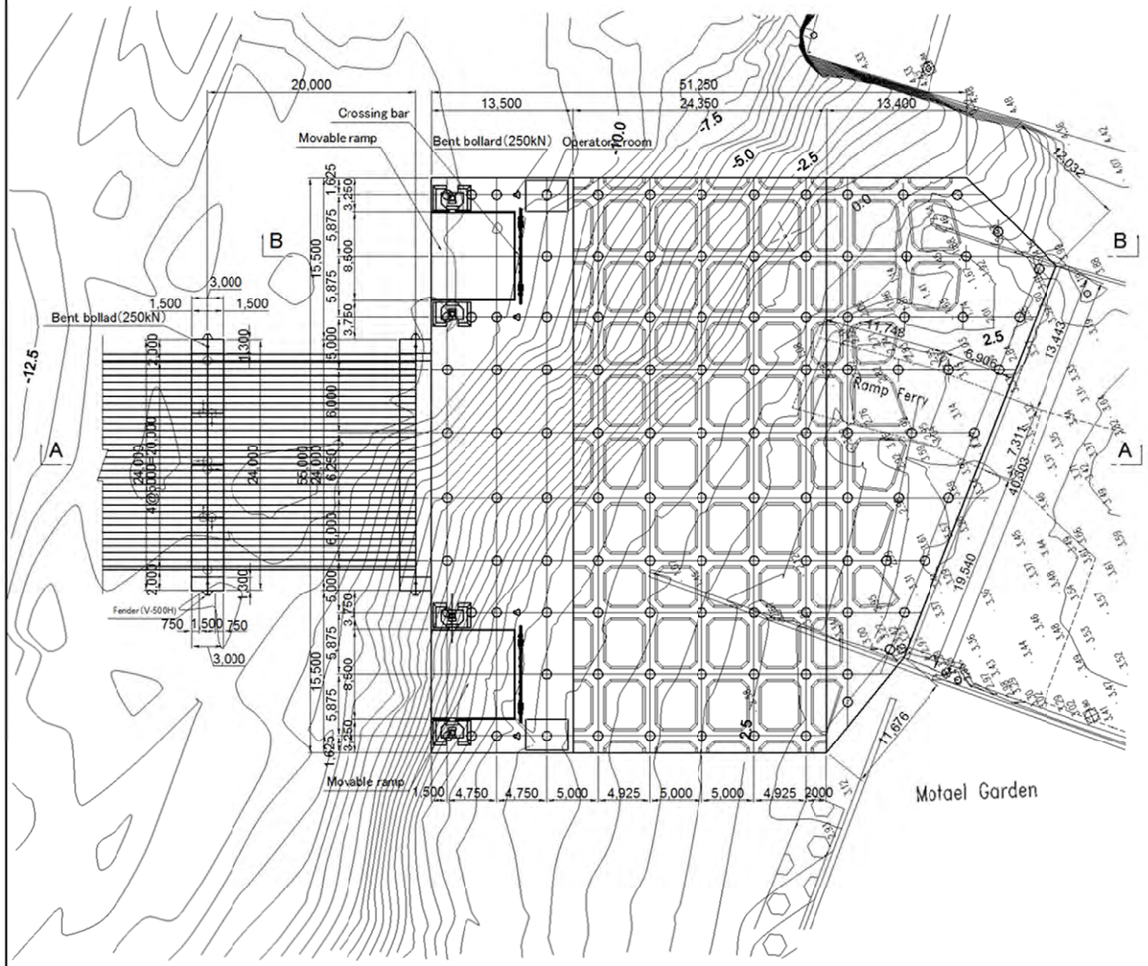


Platform Structural Drawing S=1/500,u;mm

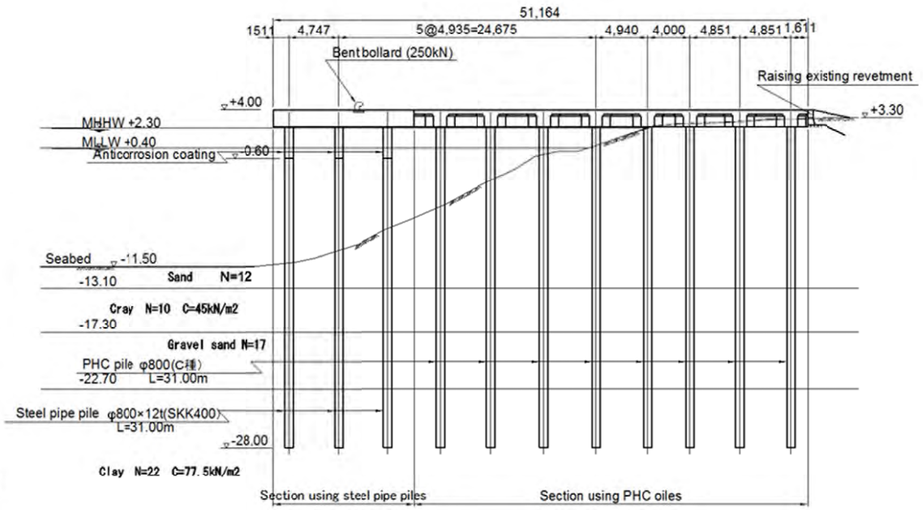
DWG NO. 005

0 5,000 10,000 20,000 30,000mm
GRAPHIC SCALE

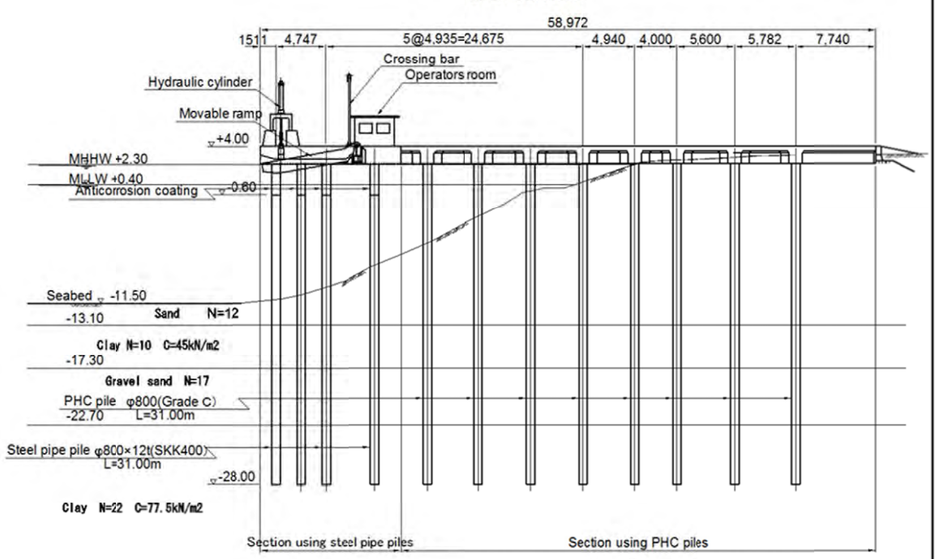
Plan View



A-A Section



B-B Section



Pier Structure (Bridge Type)

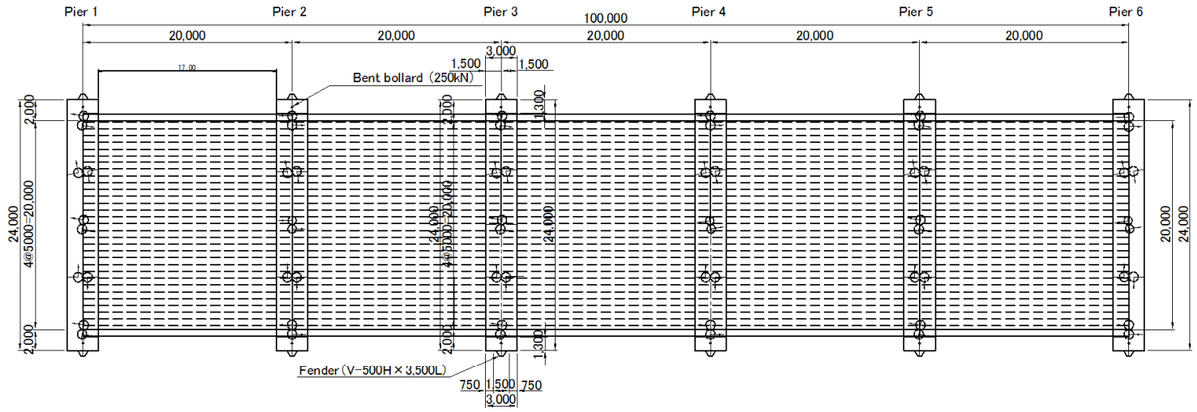
S=1/500,u;mm

DWG NO. 006

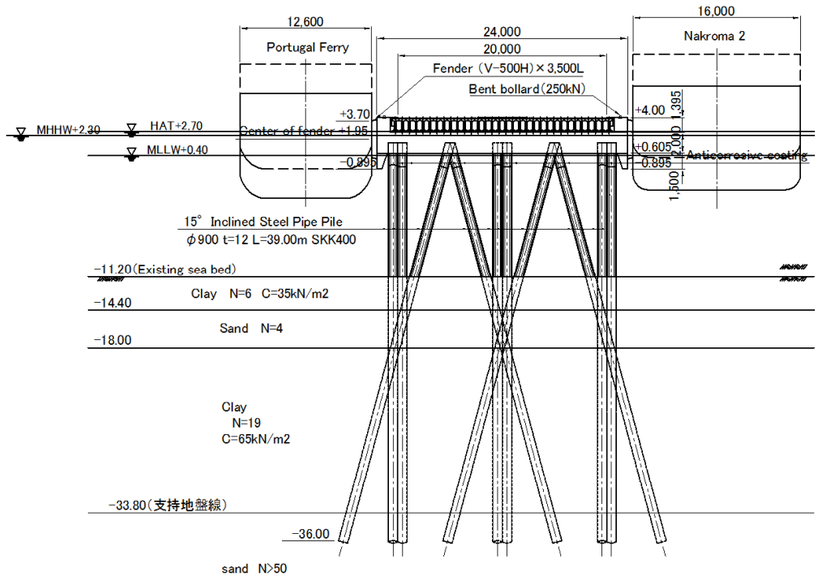
0 5,000 10,000 20,000 30,000mm

GRAPHIC SCALE

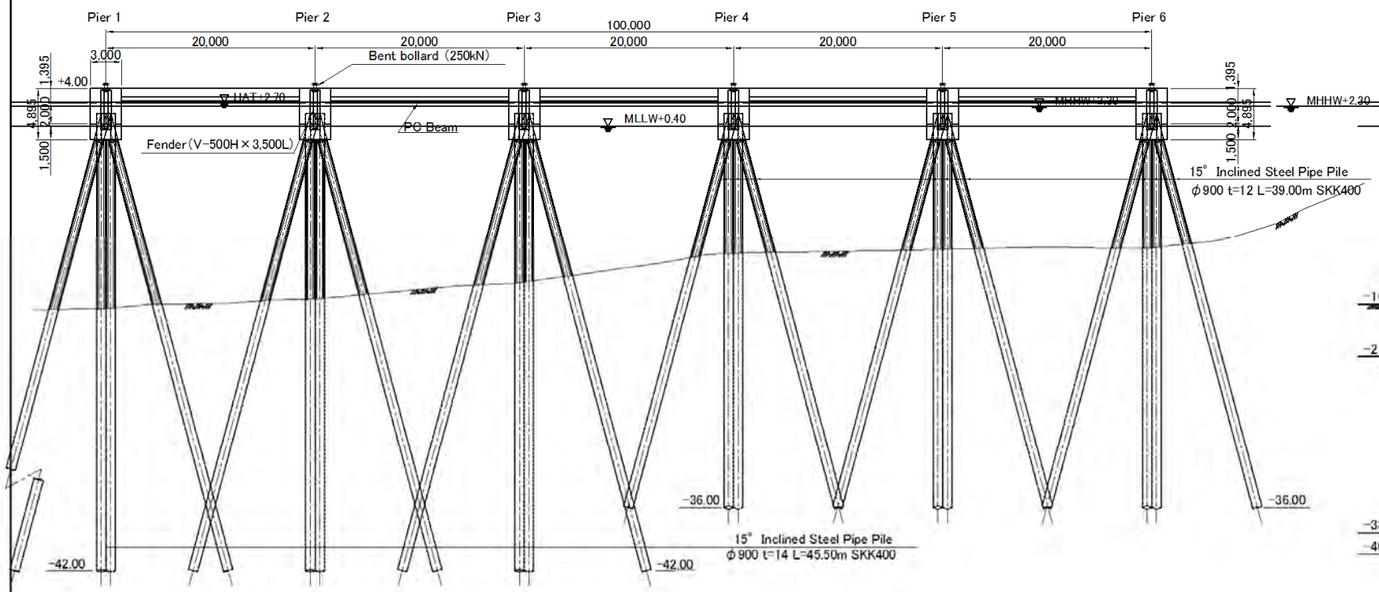
Plan view



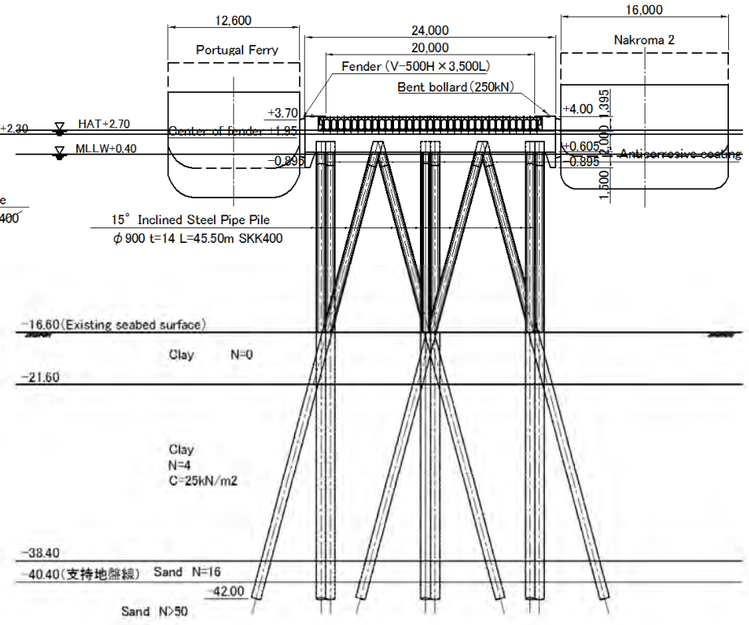
Front View (BH3)



Side View



Front View (BH-4)



Structural Drawing of Existing Revetment

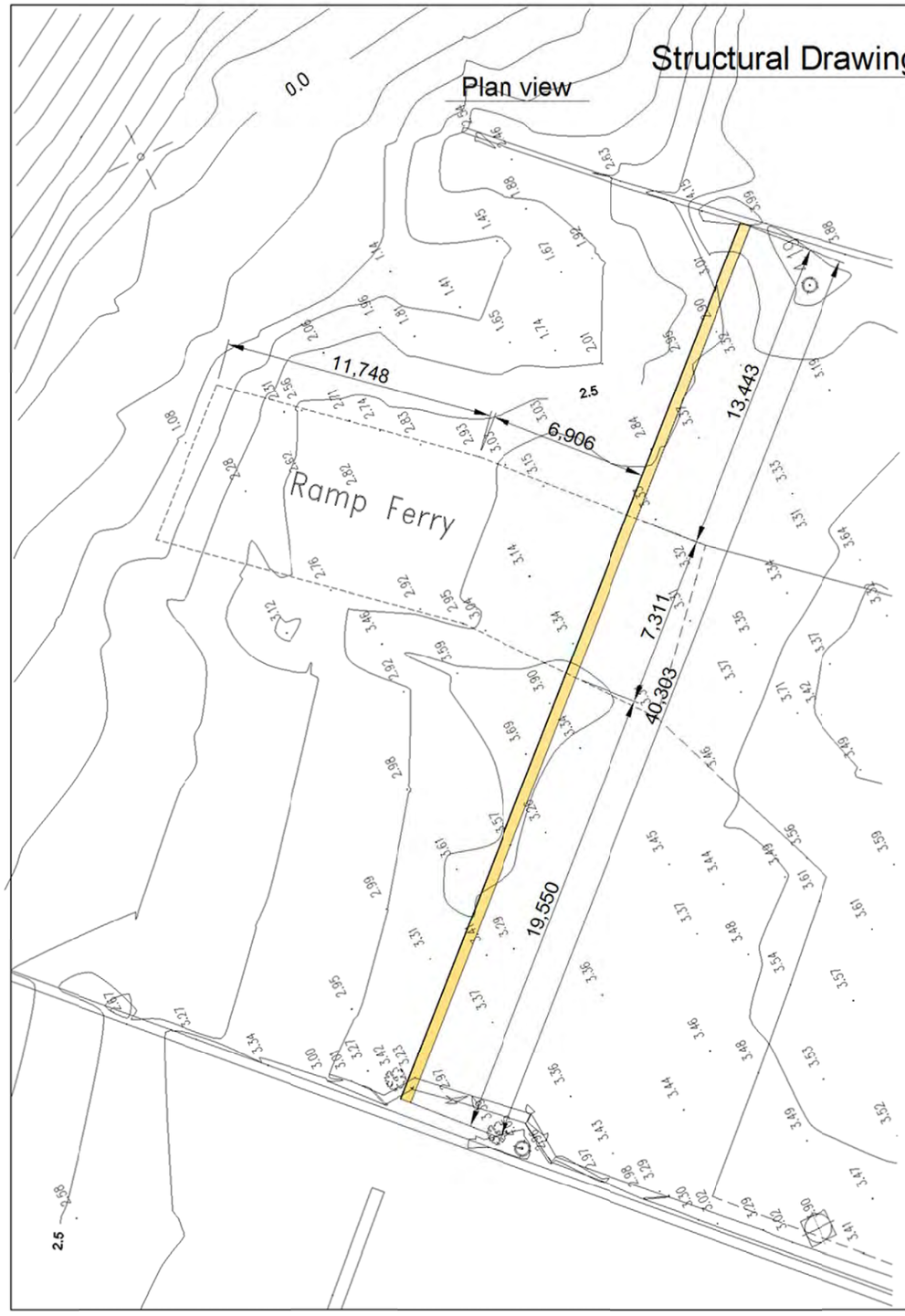
S=1/200,u;mm

DWG NO. 007

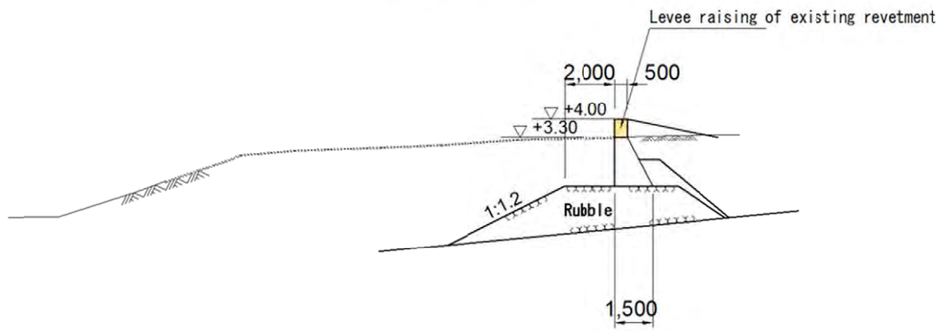
0 5,000 10,000 15,000mm

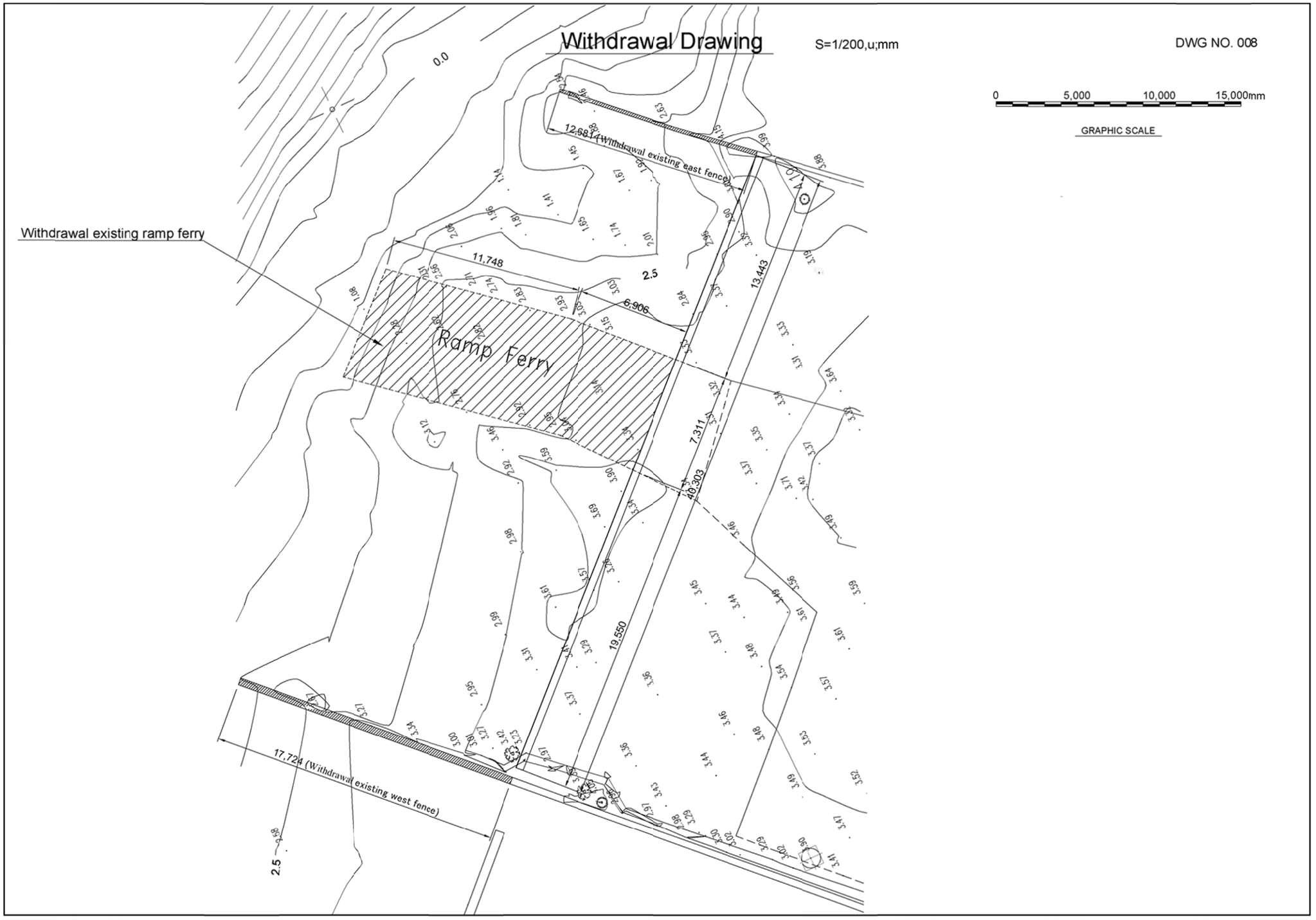
GRAPHIC SCALE

Plan view



Typical cross section




Withdrawal Drawing
S=1/200,u;mm
DWG NO. 008
0
5,000
10,000
15,000mm
GRAPHIC SCALE
Withdrawal existing ramp ferry
Ramp Ferry
12,681 (Withdrawal existing east fence)
11,748
6,906
13,443
7,311
40,303
19,550
17,724 (Withdrawal existing west fence)
2.5
2.5

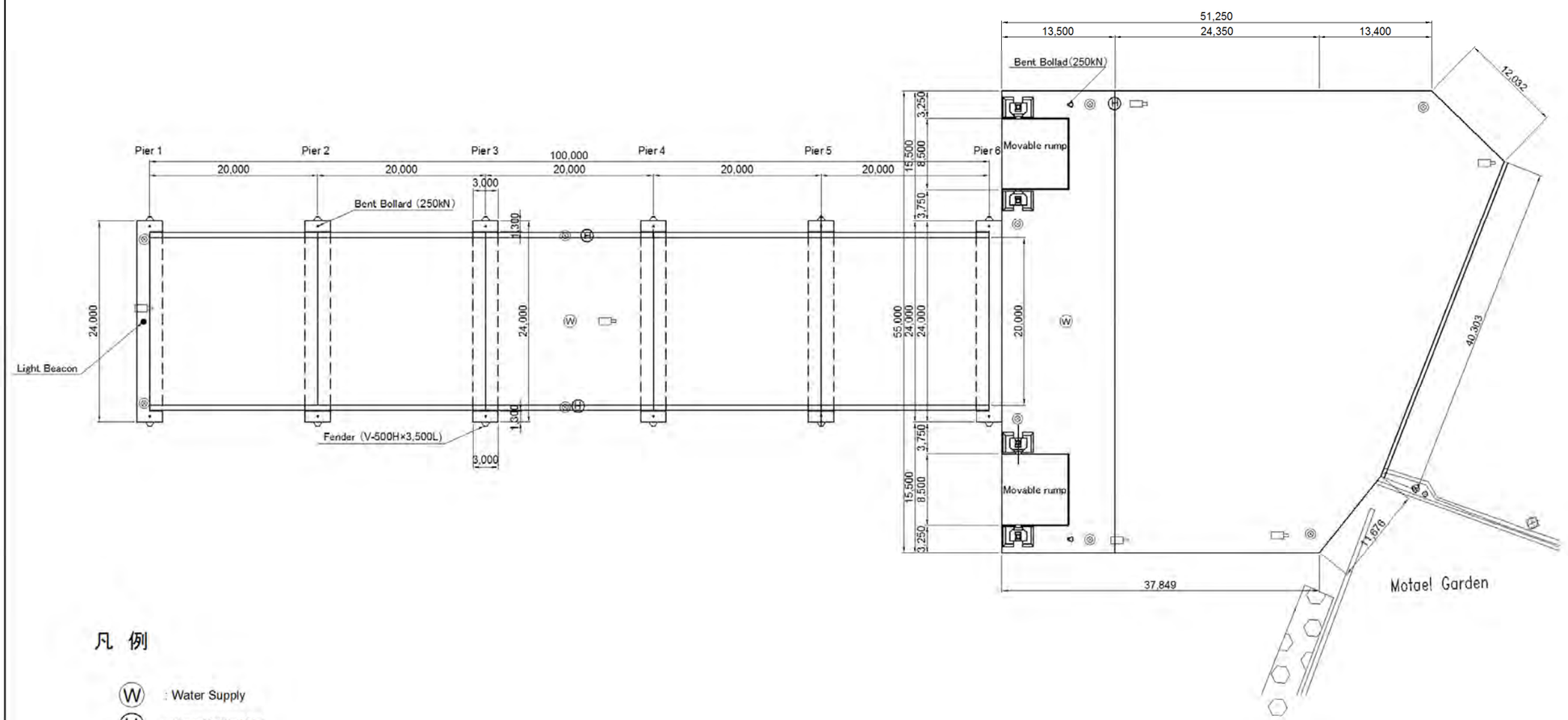
Equipment Arrangement Drawing

S=1/500,u;mm

DWG NO. 009

0 5,000 10,000 20,000 30,000mm

GRAPHIC SCALE



凡 例

Ⓦ : Water Supply

Ⓗ : FIRE HYDRANT

⊗ : Lighting pole

▭ : CCTV monitoring camera

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

The project is implemented under the following basic policy.

① To secure completion of the Project within approved schedule which is essential for Japanese Grant Aid, proper supervision shall be implemented to maintain smooth control of procurement for equipment and material and smooth progress of construction under the implementation schedule.

② For recruitment of workforce, special consideration shall be paid to local customs and regulation and workforce shall be employed from local source as much as possible.

③ For implementation, special effort is necessary to keep contact with local peoples concerned and to harmonize with local communities to avoid occurrence of claims and problems related to the Project.

④ For offshore construction, always collect weather and maritime condition forecast in advance and special attention shall be paid to secure safety

⑤ As construction site is located within Dili Port, close contact with APORTIL shall be maintained to secure safety for Navigation channel and safety of berthing/re-berthing operation by vessels at existing wharf.

2-2-4-2 Implementation Condition

① Construction site is located within Dili Port and it is estimated Maximum wave height will be Approx. 1,2m through rainy and dry season according to past records. Safety First shall be prioritized for offshore construction work and working vessels such as Piling barge, Crane Barge and others shall be sheltered to safe location within port when adverse weather condition encountered.

② Construction material such as stone, rock etc. which will be available in local market shall be utilized as much as possible for the Project. For recruitment of manpower, it should respect opinion of person concerned and local communities to avoid any dispute to society.

③ Famous Church and Independent Memorial Park located nearby the construction site and it will be sensitive environmental circumstance against Noise and Vibration. Therefore, special care shall be taken to minimize such affect during construction period.

④ Timor-Leste locates tropical disease stricken area such as Malaria, Deng fever, etc. Special care and monitoring for health condition and safe sanitary environment shall be taken.

2-2-4-3 Scope of Works

Scope of Works outlined hereinafter for the Project.

(1) Scope of Works provided by Japanese Government

- Detailed Design, Preparation of Tender Documents and Assistant for Tendering
- Provision of Facilities
- Construction of Ferry Jetty, Platform and Movable ramp.
- Installation of Fender, Bollard and Navigation Light.
- Provision of Lighting and Power supply system, Water supply and Fire Hydrant system and Ferry operation safety monitoring system

(2) Scope of Works provided by Recipient Country

- Secure and hand over of the Construction area
- Removal of unnecessary obstacle within Construction area
- Construction of Ferry Passenger Terminal Building
- Provision of Parking Lots
- Construction and Renovation of Boundary Fence and Gate
- Provision of Security System for Ferry Operation
- Bear necessary expenditure for Banking Arrangement and Tax Exemption of the Project

2-2-4-4 Consultant Supervision

After signing of Exchange of Note and Grant Agreement, APORTIL make immediately the Contract for implementation of the Project with Japanese consultant. Japanese consultant shall provide their service for provision of Detailed design, preparation of Tender document, assistance for Tender and Construction supervision and shall be responsible for hand-over of the Project and until end of Defect Liability Period.

Implementation Plan of the Consultant

(1) Detailed Design

The consultant engages Detailed Design work of the Project based on the result of Outline Design. Following works are implemented under Detailed Design.

(a) Review of Outline Design and Detailed Design

(b) Preparation of Tender document

(2) Selection of the Contractor

After completion of Tender document, APORTIL implement selection of the Japanese Contractor by Public Open Tender with assistance by the Consultant.

The Consultant assists APORTIL for following procedure.

(a) Tender Notice

(b) Prequalification

(c) Pre-Tender Meeting

(d) Preparation of Answer to the Contractor's questionnaire

(e) Tender

(f) Evaluation of Tender proposal

(g) Contract

(3) Consultant supervision

The Consultant commences Consultant supervision work after receiving the commencement order issued by APORTIL.

The Consultant implements construction supervision work at site in accordance with the Specification of the Project and given power.

To fulfill the power and obligation under the Contract, the Consultant reports progress of the construction periodically to APORTIL and issue the correspondences such as instruction and/or proposal for improvement of progress, quality, safety and payment to the Contractor.

2-2-4-5 Quality Control Plan

In principle, "General Specification for Port and Harbor" published by Ministry of Land, Infrastructure and Transport, Japan is applicable for Quality Control.

Especially, pay attention for following items listed below table and shall secure the quality defined in the Tender Documents.

Table 2-2-30 Quality Control Items

Work Item		Item	Content
Concrete Mix and Casting	Site	Compressive Strength Test	・ Trial Mix shall be implemented at least 35days before first planned concrete casting. ・ Each 3 specimen shall be provided for 7day and 28 day strength test. When 7 day strength cannot achieve requirement, review mix design and re-Trial Mix require. ・ Sampling of 6 Specimen together with Slump & Temperature measurement shall be conducted every 50m^3 or every casting day (if less than 50m^3) minimum and Specimen shall be tested. ・ For Beam concrete, Sampling require every 20m^3 or every casting day (if less than 20m^3) minimum ・ Temperature of Concrete shall be maintained 5 to 35 ℃ during casting
	Plant	Sieve Analysis Test	・ Sieve Analysis Test shall be conducted for every delivery and Result shall be submitted
		Test for Salt Content	・ Salt Content Test shall be conducted approved interval for monitoring salt content
Reinforcement Bar Fabrication and Assembling		Deliver	・ Confirm Mill sheet, Length, Diameter and Number ・ Confirm appearance to check rust and other obstacle ・ Confirm Stored condition such as sleeper layout and protection sheets
		Fabrication	・ Confirm accuracy with Fabrication Drawing
		Assembling	・ Confirm accuracy of pitch, location of rap and rap length ・ Confirm No rust and dust
Formwork and Timbering Support		Before Assembling	・ Require submission of Design calculation sheet and confirm enough strength, stability and adequate structure ・ Re-confirm no rust and dust for Re-bar
		After Assembling	・ Confirm sufficient cover thickness of Re-bar (7cm for marine, 5cm for land based concrete

Steel Pipe Pile	Deliver	• Confirm Length, Diameter and Number • Confirm appearance to check rust and other obstacle
	Driving	• Driving record shall be prepared for all piles • Rebound record shall be prepared for all piles • Confirm Bearing capacity by using Hiley's Formula

Source: JICA Survey Team

2-2-4-6 Safety Control

The Project site locate just west of existing wharf where is under operation and face to main trunk road of Dili city named as Av. Salazar. Therefore, it is necessary to consider both offshore and on land side when make plan of Safety control.

Construction site locate within Dili Port and being busy always by maneuvering of vessels. Therefore, Safety First and proper monitoring during offshore construction activities is essential. Close contact with APORTIL shall be maintained to collect information such as schedule of vessels calling and kind of operations to secure safety for construction and maneuvering including safety of berthing/re-berthing operation by vessels at existing wharf. Temporary suspension of piling work and crane work will be considered to avoid unexpected accident due to wave created by maneuvering vessels. Special attention to maneuvering vessels shall be paid when working vessel plan to shift. Foe anchoring location of working vessels, prior consultation with APORTIL shall be held and only permitted area being utilized. When adverse weather condition forecast, working vessels shall be sheltered to safety area in advance.

Onshore construction site locate within port premises and limited area. So, keep clean and tidy condition for safety shall be kept. To avoid unexpected traffic accident by in and out traffic from/to Av. Salazar, traffic control staff will be attached. Road (Av. Salazar) is public facilities. So Special attention shall be paid for their conditions and cleaning work shall be taken when it seems to be necessary.

Famous Church and Independent Memorial Park located nearby construction site and it will be sensitive environmental circumstance against Noise and Vibration. Therefore, special care shall be taken to minimize such affect during construction period.

To secure safety control properly during construction period, Tool box meeting shall be held daily and Safety patrol shall be held periodically.

Furthermore, for safety control of labor force, wearing of safety apparatuses, wearing of life jacket and provision of life saving buoy/ring with lines at site are strictly imposed at all times.

To ensure the protection of the health of the personal engaged in the Project, special care and monitoring shall be taken for health conditions of the personal and sanitary condition of the

site because Timor-Leste locates tropical disease stricken area such as Malaria, Deng fever, etc. First Aid facilities such as medicine and necessary goods shall be provided at site.

2-2-4-7 Procurement Plan

2-2-4-7-1 Procurement Plan of Material

In Timor-Leste, except ready mixed concrete, sand, crushed stone and rock material most of construction material are imported and major part are imported from neighbor country, Indonesia. Therefore, procurement of material for the Project also is planned mainly from Indonesia. Such as, plywood, timber and minor construction material are able to procure from local market even if imported one. Construction materials which are not produced in Indonesia such as Rubber Fender, Bollards are procured from Japan.

Source of main construction material is shown in Table 2-2-31 below.

Australia is considered one of possible source but there are no case confirmed after hearing from local societies. Therefore, no plan is adopted.

Table 2-2-31 Procurement source of main material

Source / Material	Locally procured	Procured from 3rd Country	Procured from Japan	Remarks
Ready Mixed Concrete	○			
Cement		○		40kg
Aggregate, Sand, Rock	○			
Reinforcement bar		○		
Plywood	○			
Timber	○			
Steel Pipe Pile, PC pile		○		
Steel material (H-steel, etc)		○		
Fuel	○			Incl O2, As
Marine material			○	Rubber Fender, Bollard
Scarified Anode			○	
Navigation Light			○	

Source: JICA Survey Team

2-2-4-7-2 Procurement Plan of Construction Equipment

For construction equipment, availability of equipment to procure in Timor-Leste is very limited. Especially, marine working vessels are very difficult because very limited marine project were implemented in past. For on-land heavy construction machinery and equipment, the Construction contractor like Indonesian contractor brought from Indonesia and implemented

but most of them are originated from Japan either new or used one. Therefore, common equipment such as crawler crane and backhoe (excavator) are procured from Japan when considered transportation cost, import tax in Indonesia and overhead, etc in Indonesia. Marine working vessels such as Pile driving barge, Barge with crane are available to procure from Jakarta and Surabaya in Indonesia. List of major equipment and source of procurement are shown in Table 2-2-32.

Table 2-2-32 Source of Procurement for Major Equipment

Source / Equipment	Locally procured	Procured from 3rd Country	Procured from Japan	Remarks
Backhoe 0.6m^3			○	Excavation, Demolition
Breaker 600kg class			○	Demolition of slope and RC structure
Crawler crane 40tclass			○	Various use
Pile Driving Barge (H-125 equipped)		○		SPP and PC pile driving
Tug Boat		○		Transportation, Escort of barge
Flat Top Barge		○		Transportation of piles and girder
Concrete Plant	○			Ready mixed concrete locally procure
Agitator truck	○			
Truck crane	○			Spot use
Unic truck 6 t			○	Installation and material handling
Dump truck	○			Transportation of debris and material
Wheel loader	○			Material handling, Pavement
Vibration roller			○	Pavement
Vibration hammer			○	SSP driving
Diesel generator			○	Various use, Power source of the site
Welding machine			○	Various work

Source: JICA Survey Team

2-2-4-8 Operational Guidance Plan

Under the Project, objective Ferry vessels utilized the facilities are plural and movable ramps are planned to provide at landing platform for safe and smooth access with ferry vessels at all tidal range. In addition, CCTV system is provided to monitor and control safe berthing operation and safe passenger and vehicle access operation.

To ensure proper operation and administration of these facilities, it is essential to implement operational guidance and orientation to APORTIL's department and staffs who are operational organization in charge.

Hereinafter, outline of operational guidance and orientation are shown.

(1) Movable Ramp

Movable Ramp consists of following major components.

① Steel made Flame

② Steel made Floor Girder (incl. lifting devices, hinge)

③ Lifting type Hydraulic Cylinder Unit (2 set)

④ Lifting hook for fixing ramp

⑤ Control Unit and Hydraulic hoses

Planned initial Operation guidance and Orientation

① Explanation of each components, capacity and operational range and limit

② Explanation of Hydraulic Unit and Control Unit and guidance of operation method

③ Position of movable ramp for each Ferry vessel with various tidal ranges shall be designed and calculated in advance and guidance of operation.

④ Explanation of Lifting hook and method of handling. Guidance of operation.

⑤ Explanation of Daily and Periodical inspection items and maintenance work. Guidance of actual inspection work and periodical inspection.

Operation and maintenance manual contains above explanation, methodology of operation and maintenance shall be prepared in advance and the Specialist from Movable Ramp manufacturer shall conduct Guidance to APORTIL's department and staffs.

(2) CCTV System

CCTV system is formed by CCTV camera, cable and monitor components. Monitor is installed in the operation room.

Initial operational guidance is planned to explain location and function of each component, guidance for operation method of camera and monitor in the operation room and location for inspection and methods of repair when system has trouble or become out of order. Operation and maintenance manual contains above explanation, methodology of operation and maintenance shall be prepared in advance and Operational Guidance shall be conducted by the specialist who has enough knowledge.

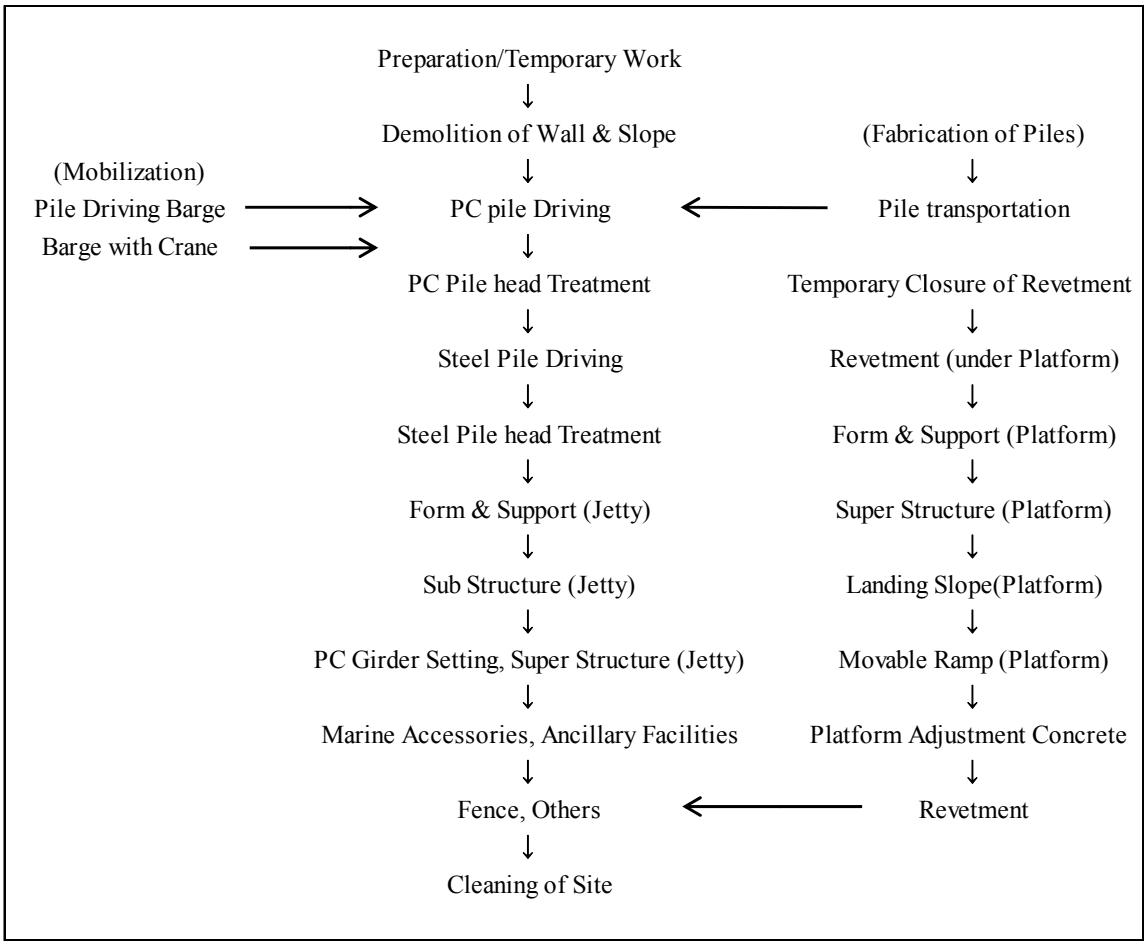
2-2-4-9 Soft Component (Technical Assistance) Plan

There is no plan for Soft Component for the Project.

2-2-4-10 Implementation Schedule Plan

(1) Work Flow for Construction

Main Work Flow is as follows.



Source: JICA Survey Team

Figure 2-2-30 Work Flow

(2) Conditions for Establishment of Implementation Schedule

For Estimation of Construction period which is precondition for Establishment of Implementation Schedule, following Estimation Standards is used.

(a) Cost Estimation Standard for Port & Harbor Civil Works issued 2015 (approved by Ministry of Land, Infrastructure and Transport).

(b) Cost Estimation Standard for Civil Works issued 2014 (approved by Ministry of Land, Infrastructure and Transport).

(c) Depreciation Cost Standard for Vessel, Equipment and Machinery issued 2015 (approved by Ministry of Land, Infrastructure and Transport).

(d) Cost Estimation Standard for Public Building Works issued 2011 (approved by Ministry of Land, Infrastructure and Transport).

When latest edition contain no productivity unit, old edition which contain adequate productivity unit shall be used.

Adjustment of Productivity Unit is calculated in accordance with preparatory Survey-Design-Estimation Manual (Supplementary edition for Civil Work)(Trial edition) issued March 2009 and Revised version issued April 1, 2015 by Office for Design and cost Estimation, Financial Cooperation Implementation Department, JICA.

Area code "Asia" adopts to the Project and following factors are used.

Adjustment factor for Labor Productivity Unit	Skilled labor work	2.5
	Unskilled Labor work	1.5
Adjustment factor for Machinery Productivity Unit	Simple work	0.85
	General work	0.75

Transportation is out of adjustment and Adjustment Factor is 1.00.

Work suspension factor is calculated in accordance with preparatory Survey-Design-Estimation Manual and calculated 1.32 is applied.

2-2-4-11 Implementation Schedule

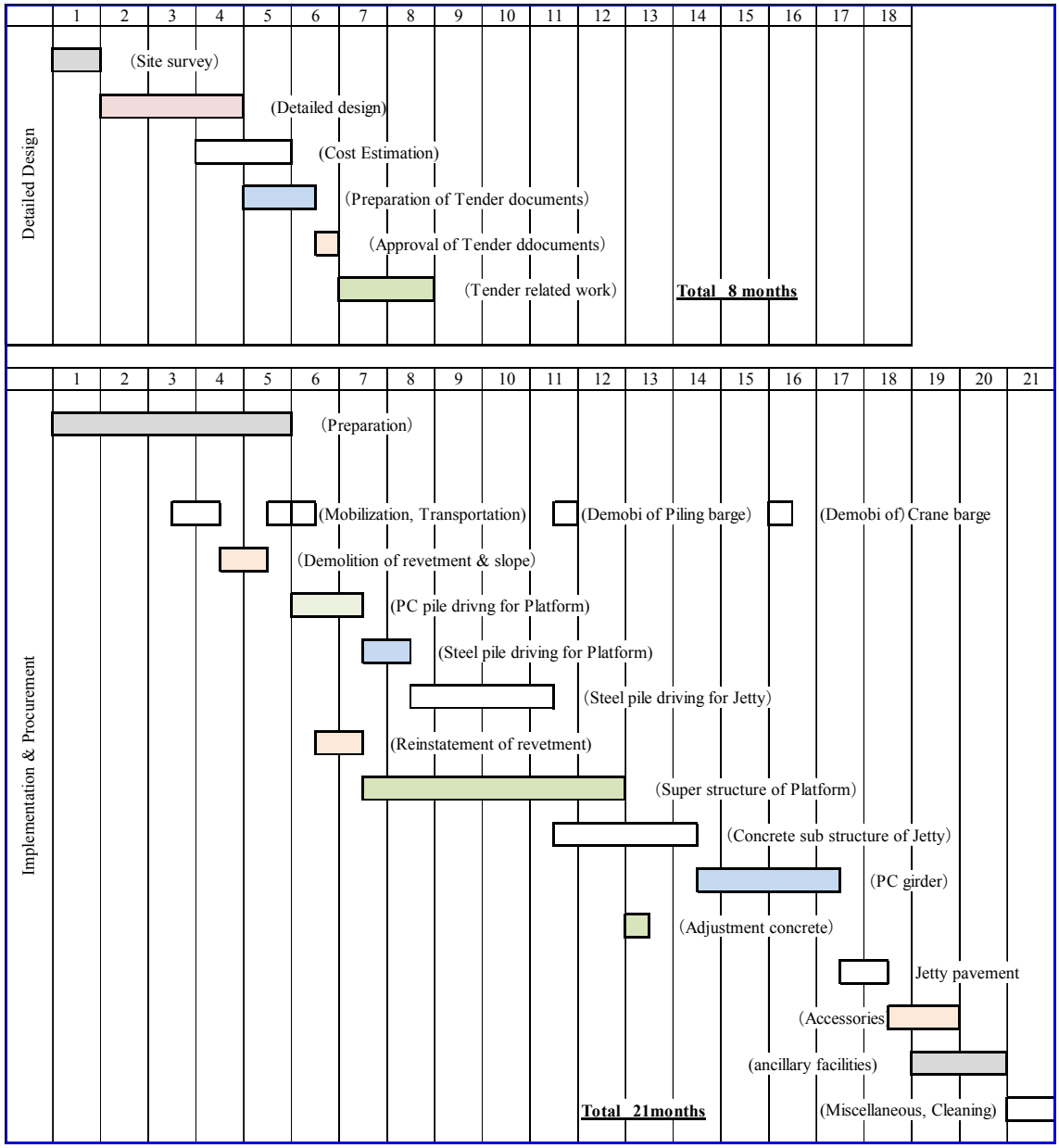
Main scope of the Project are Newly construction of Ferry Jetty, Newly construction of Landing Platform, Provision of adjustment concrete slope, Provision of Water supply & Fire hydrants, provision of Lighting & Power supply and Safety operation monitoring system.

Figure 2-2-31 is presented the Implementation Schedule.

The Project is scheduled 29 months from commencement including detailed design and Tender period to completion of the Project.

Implementation schedule of the Consultant is 8 months from the Contract signing, Preparation of Tender documents, Tender notice and Selection of the Construction Contractor.

Construction at site is planned to complete within 21 months.



Source: JICA Survey Team

Figure 2-2-31 Implementation Schedule

2-3 Obligations of Recipient Country

Table 2-3-1 shows the list of obligations of the government of Timor-Leste.

Table 2-3-1 List of Obligations of the Government of Timor-Leste

1. Before the Tender

NO	Items	Deadline	In charge
1	To approve IEE/EIA	Before the Project approval by Japanese Cabinet	APORTIL
2	To open Bank Account (Banking Arrangement (B/A))	Within 1 month after G/A	MPWCT
3	To secure lands 1）temporary construction yard and stock yard near the Project area 2） borrow pit and disposal site near the Project area	Before notice of the Tender	APORTIL
4	To obtain the planning, zoning, building permit	Before notice of the Tender	APORTIL
5	To clear, level and reclaim the following sites when needed	Before notice of the Tender	APORTIL
6	To determine the plan of passenger terminal building	Before notice of the Tender	APORTIL

2. During the Project Implementation

NO	Items	Deadline	In charge
1	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1） Advising commission of A/P	within 1 month after the signing of the Contract	MOF
	2） Payment commission for A/P	every payment	APORTIL
2	To issue the Working Visa for workers	before commencement of the Project	Ministry of lntema1 Affairs
3	To construct the passenger terminal building	during the Project	APORTIL
4	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country	during the Project	APORTIL
5	To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work	during the Project	AI)ORTIL
6	To bear the cost which is equivalent to the customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the Products and/or the Services, instead of tax exemption system. Such customs duties, internal taxes and other fiscal levies mentioned above include VAT, commercial tax, income tax and corporate tax of Japanese nationals, resident tax, fuel, but not limited, which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract.	during the Project	APORTIL
7	To bear all the expenses, other than those to be borne by the Grand Aid, necessary for the Project implementation	during the Project	APORTIL
8	To submit environmental monitoring report to JICA Timor-Leste Office	during the Project	APORTIL

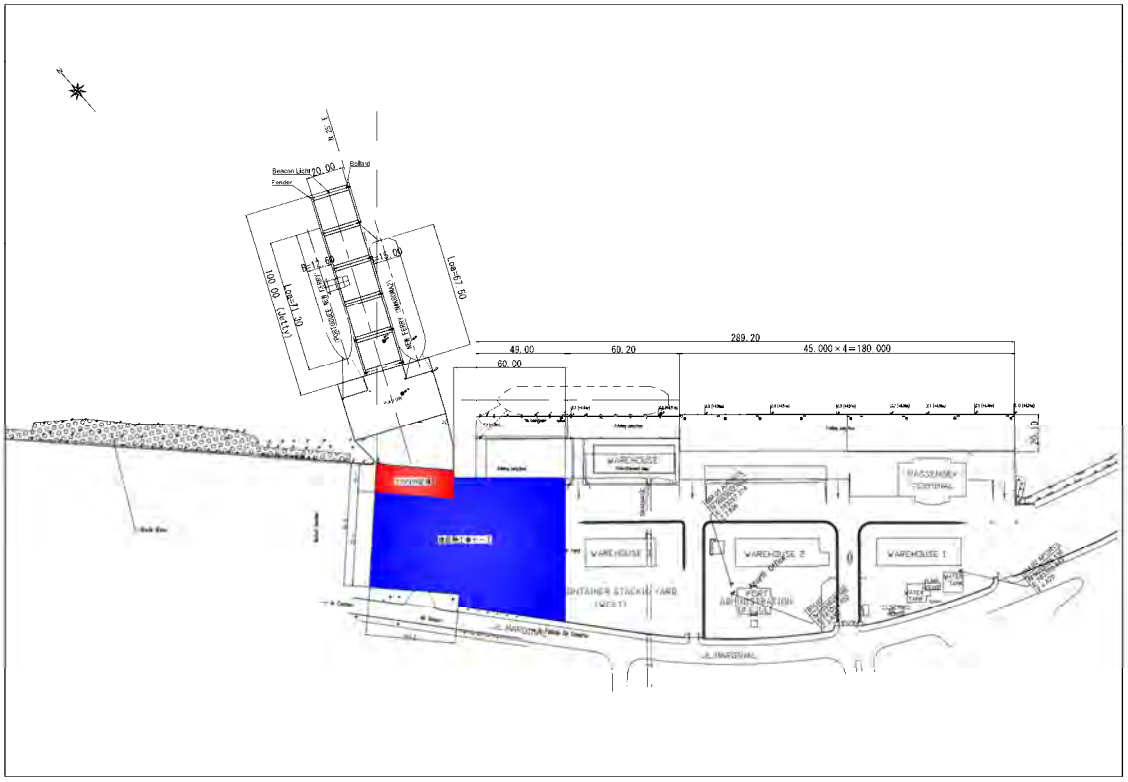
3. After the Project

NO	Items	Deadline	In charge
1	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grand Aid 1） Allocation of maintenance cost 2） Operation and maintenance structure 3） Routine/Periodic inspection	After completion of the construction	APORTIL

Source: JICA Survey Team

(1) Secure the construction yard

APORTIL has the jurisdictional authority of the Project site which locates in Dili Port. It is necessary to use the part of existing 40'container stacking yard as the construction yard which is about 6,500m^2. APORTIL will provide the construction yard before the implementation of the Project. Figure 2-3-1 shows the construction yard which was agreed mutually with APORTIL by the record of discussions with the study team at the field survey.



Source: JICA survey team

Figure 2-3-1 Location of the construction Yard

(2) Demolish of the blockade for the Work in the construction yard

There are the building which is used by GIZ and the office of harbor master and the old concrete blocks and buoys in the construction yard. APORTIL is necessary to demolish or transport the above matters before the start of implementation of the Work. It is also necessary to demolish the west boundary fence for the Work. If it is necessary to accommodate with the other authorities for demolishing the west fence, APORTIL should accommodate with the related authorities for the smoothly demolish the west fence. It is estimated US$19,500 (=6,500m^{2}x $3/m^2) for the demolishing works.

(3) The construction of the passenger terminal building and the related facilities

The government of Timor-Leste has the plan of the passenger terminal building and the related facilities in the behind of the Project site. It is the plan to implement in 2016. The passenger terminal building and related facilities like the parking lot will be implemented by the government of Timor-Lest. APORTIL should consider and need to adjustment to smooth implementation of both works which will be done at the same time.

(4) Import levy for the permanent materials for the work

APORTIL need to bear the cost of duty exemption from tax of the permanent materials for the work.

(5) Assistance for acquire the various approval and obtain the work visa

APORTIL should assist the various approvals related the work and obtain the work visa for Japanese Nationals and the related workers.

(6) The cost of port due and tax in Dili Port

APORTIL should assist the quickly landing and customs clearing for the imported materials and equipment in Dili Port. APORTIL should bear the cost of custom clear and bonded store of those materials and equipment.

(7) The cost of authorized pay for the bank

APORTIL should bear the cost of Banking Arrangement: B/A and Authorized Pay: A/P.

(8) The correspondent action of the environment and social considerations

APORTIL need to take out the permission of the environmental assessment by NDE for the Project and submit the correspondence of the permission to the government of Japan before the approval of Japanese cabinet. APORTIL will submit the report of environmental management plan to NDE and JICA during the works.

(9) The maintenance of the Project

APORTIL is necessary to establish the organization for maintenance of the facilities and make the budget of maintenance work. APORTIL should establish the scheduled method of maintenance works.

2-4 Project Operation Plan

The government of Timor-Leste plans to divide APORTIL into two organizations, APORTIL which is responsible for port operation, and DNTM which is responsible for maritime management for the purpose of strengthening the both aspects. AORTIL will be in charge of

operation of ferries, and management of Ferry Terminal and of Ferry Terminal Building.

2-4-1 Evaluation of Operational Ability of Ferries

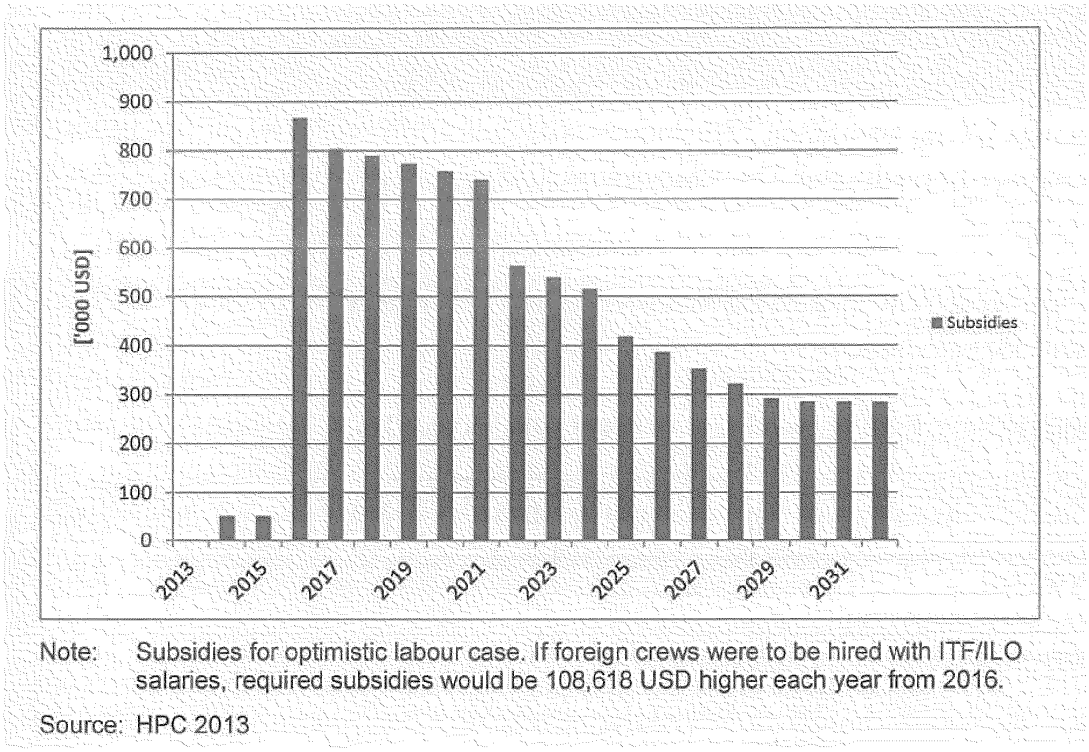
Table 2-4-1 shows the result of cash flow analysis in HPC's report for the two ferries, Nakroma and Nakroma 2, in operation with three navigation routes, Oecussi, Atauro and Com. This result indicates necessity of the government subsidy as indemnify of deficit in the cash flow shown in Figure 2-4-1. This cash flow analysis is based on the low fare of ferry which is established with political considerations. A hike in fare is a simple way to improve the balance in cash flow. However, APORTIL doesn't consider a hike in the fare at this moment

Table 2-4-1 Result of Cash Flow Analysis for the Three Navigation Routes

	2014	2015	2016	2022	2032
Revenues	0	0	1,631	1,939	2,217
Passengers	*0*	*0*	*456*	*522*	*532*
Vehicles	*0*	*0*	*599*	*693*	*709*
Cargo	*0*	*0*	*726*	*949*	*1,201*
Cash Operating Expenses	50	50	2,496	2,501	2,501
Labour Costs	*0*	*0*	*229*	*229*	*229*
Fuel and Lube Oil Costs	*0*	*0*	*1,294*	*1,349*	*1,349*
Maintenance Costs	*0*	*0*	*523*	*473*	*473*
General Costs	*50*	*50*	*450*	*450*	*450*
Operational Cash Flow	**-50**	**-50**	**-865**	**-562**	**-284**
Investment Expenses	2,093	22,232	0	0	-4,108
New Ferry	*0*	*16,301*	*0*	*0*	*0*
Wharf in Dili Harbour	*0*	*3,838*	*0*	*0*	*0*
Consultancy Services	*2,093*	*2,093*	*0*	*0*	*0*
Residual Value	*0*	*0*	*0*	*0*	*-4,108*
Project Cash Flow	**-2,143**	**-22,282**	**-865**	**-562**	**3,824**

Note: Cash flow for optimistic labour case. If foreign crews were to be hired with ITF/ILO salaries, both cash flows would be 108,618 USD lower each year from 2016.

Source: HPC 2013



Note: Subsidies for optimistic labour case. If foreign crews were to be hired with ITF/ILO salaries, required subsidies would be 108,618 USD higher each year from 2016.

Source: HPC 2013

Figure 2-4-1 Transition of Necessary Cost of Government Subsides

Therefore, the ferries can be operated as long as the government subsidies continue. The government of Timor-Leste intends to continue to provide necessary subsidies. The Project requires integrated operation of Ferry Terminal and Ferry Terminal Building. APORTIL has the operational ability for the both facilities and it is concluded that APORTIL is capable as the body of operation and management for the Project. But it is important to review its income sources such as Ferry fares and the charge for owned facilities such as the store shed. It is also necessary for APORTIL to improve efficiency in management of human resources in order to function effectively as the port authority.

2-4-2 Appraisal of APORTIL's ability of corresponding to environmental matter

(1) APORTIL's department in charge of environmental matter

According to Human Resources Manager of APORTIL, a specific department does not exist as the one in charge of the environmental matter in APORTIL, however, Technical Department is in charge of the management and implementation of waste disposal, and the environmental affair in Ferry Nakroma is carried out as follow;

① Oily water is treated through oily water separator which is installed onboard Nakroma and

decomposed to water, oil and sludge. Decomposed water is released into the sea, oil is used as fuel oil and sludge is conveyed to onshore for the authorized contractor to dispose of.

② Garbage generated onboard the ship is deposited in the dust bin onboard and conveyed to onshore dust bin which is installed beside the ferry mooring facility. Then, APORTIL arranges the authorized contractor for transporting the garbage to Tibar Land Fill for incineration.

③ 20 to 25 tons of fuel oil at a time is supplied in approximately every 2 weeks (by 4 to 5 small tank lorries). At this moment, fuel oil is delivered through reinforced vinyl pipe connected to the inlet on the upper deck and engine pump installed on the tank lorry. When the reinforced vinyl pipe is lowered from the upper deck to the tank lorry, the fuel oil remained in the pipe may be spilled out and may contaminate the ground. According to the mechanical engineer who is in charge of Nakroma, fuel supply system will be improved when Nakroma will enter dock.

④ Nakroma is scheduled to enter dock in Surabaya, Indonesia for 2 and a half months from August or September 2015 to conduct the regular maintenance and minor modification. When Nakroma enters dock, alternative ferry from Indonesia will enter service.

(2) Appraisal of APORTIL's ability of corresponding to environmental matter and measures

Garbage generated onboard the ship is deposited in onshore dust bin located beside the mooring facility and APORTIL manages the disposal of the garbage to deliver it to the authorized landfill. Oily water generated from ferry is treated onboard and only sludge is conveyed to onshore for the authorized contractor to dispose of. It is assumed that the demand for environmental measures will be increased due to the commencement of service by new ferries, however, the growth magnitude of environmental impact will be far less than the APORTIL's ability of corresponding to implementing environmental measures. Therefore, it is appraisable that APORTIL has ability of corresponding to implementing environmental measures.

2-4-3 Evaluation of Technical Ability of Safety Operation and Management for Ferry Terminal

The system of berthing and undocking of the ferry at the jetty to be introduced by the Project is the same as the system of the existing cargo wharf. APORTIL has technical ability for berthing and undocking at the jetty. The existing navigation system is enough for navigation management of the ferries. It is necessary to reinforce the management ability of the Ferry Terminal at the jetty and the on the platform such as the gate and ticket control, and the control of the passenger and cargo. GIZ has experiences in the training for the ferry crew and a long term expert of JICA conducts the training of the port safety management. The consecutive

support by the both organizations is crucial to improve the capacity of management and operation.

2-4-4 Evaluation of APORTIL's Ability of Operation and Management of Ferry and Ferry Terminal

It is determined that APORTIL is able to operate more than two ferries and manage Ferry Terminal based on the existing plan on Dili Port from the point of views of finance, technique and safety operation and management of ferries. There are specific needs in technical training for the integrated operation of Ferry Terminal and Ferry Terminal Building.

2-5 Project Cost Estimation

2-5-1 Cost of Timor-Leste side

The estimated cost of Timor-Leste side is US$1.42 hundred million.

1. Land purchased fee	State property
2. Demolish of the blockage	US$19,500
3. Construction of New Ferry Terminal Building	US$1,036,700
4. Import tax for the everlasting construction materials (2.5%)	US$72,500
5. Necessary cost of Banking Fee	US$17,200

2-5-1-1 Estimated Condition

1. Time of estimation	: August, 2015
2. Exchange rate	: 1US$ = J¥123.70
	: 1Rp = J¥0.0105
3. Implementation Term	: Refer to the schedule of Implementation
4. Others	: Estimated based on ODA in Japan

2-5-2 Operation and Maintenance Cost

2-5-2-1 Overall Facilities

In general, periodical visual inspections are fundamental way for Operation and Maintenance Plan. Also, immediate inspection and confirmation of soundness and safe of facilities are necessary for Operation and Maintenance Plan when incidental accident occur due to ship accident, adverse weather conditions, earthquake and tsunami.

Daily visual inspection, monthly inspection and yearly inspection are necessary as periodical inspection as listed in below table and most important activity are observation by

operation office staff during daily ferry operation, such as berthing/re-berthing of Ferry vessels, get on/get off operation of passengers and vehicles, cargo handling when Ferry berth at Jetty.

It is also necessary to conduct emergency repair when defect is found and to evaluate whether large repair work is necessary or not. Where location/position is underwater and difficult to inspect by staffs, inspection by diver is required.

Ferry facility is facilities which require periodical cleaning. Therefore, cleaning workers (approx. US$300/month/pax salary) are employed.

Table 2-5-1 Major Operation and Maintenance Items

Location	Periodical Inspection/Frequency	Estimated Cost (US$)	Remarks
Jetty and Platform	① Daily visual inspection ② Yearly inspection (once a year) including underneath of Jetty by boat	No incidental expense for inspection is considered	Possibility of incidental repair cost of concrete
	③ Confirmation of effectiveness of cathodic protection by potential measurement device (every 3 month)	No incidental expense for inspection is considered	Bookkeeping for measurement record
	④ Underwater inspection by diver (every 3 year)	US$10,000/every 3 year	
Movable Ramp	① Daily visual inspection ② Monthly inspection ③ Periodical inspection (every 2 year). Approx. 6days for 2 ramp2	No incidental expense for monthly inspection is considered US$5,200/every 2 year	Consumable parts and tool for first replacement are supplied with movable ramp
Rubber Fender	① Daily visual inspection ② Monthly inspection	US$25,000/set	Cost for replacement when damage
Bollard	Daily visual inspection and periodically re-paint when necessary	US$100/year	Re-painting
Navigation Aid	Monthly visual inspection. Periodically cleaning of lantern and solar panel	No incidental expense is considered	
Lighting & Power supply	Daily visual inspection. Periodically cleaning of lamp	US$20/lamp	Mercury lamp 250w
Water supply	Daily visual inspection. Periodical	US$100/year	Painting apply

& Hydrant	re-painting Functional check of hydrant per every year		for ground part
CCTV System	Daily visual inspection	US$50/No. US$200/No. US$450/No.	Camera Monitor DC Power source

Source: JICA Survey Team

2-5-2-2 Jetty and Platform

Daily visual inspection by Ferry operation office staff conducts to check whether defect, crack and wearing of concrete and pavement exist or not.

Approx. once a year, yearly inspection by boat to check PC girder, sub structure, corrosion protection and others is conducted and when any defect find, proper repair work implement after evaluate adequate repair method.

(1) Steel pile and Corrosion protection

Effectiveness of cathodic protection against Steel pile shall be confirmed by using potential measurement every 3 month. Measurement data shall be kept as record and monitor range of amperes. When abnormal ampere find, underwater aluminum anode is checked by diver and adequate repair work implement when defect of contact or removal is found. For corrosion protection concrete is conducted once a year by boat to check the defect of FRP cover. In addition, PC pile is also visually inspected. Parts of Steel piles and PC piles positioned underwater are inspected by diver approx. every 3 year.

(2) Super structure and PC girder

Daily visual inspection of Jetty and Platform by Ferry operation office staff conducts to check whether defect, crack and wearing of concrete and pavement exist or not.

Approximately once a year, yearly inspection by boat to check PC girder, sub structure of Jetty and Platform is conducted

2-5-2-3 Hydraulic Movable Ramp

During daily Ferry operation, visual inspection is implemented for Hydraulic Movable Ramp to check leakage of oil and condition of hydraulic system. Once a month, inspection is implemented to check function of hinge and connection, connection of hoses and looseness of operation lever and implement grease-up for hinge and connection part.

When inspection implement 2 years interval, floor girder fixed temporarily by lifting hook and dismantle hydraulic cylinder and all structure and system are inspected. When necessary, oil seal and hydraulic oil will be changed. Also, wearing of bearing of hinge shall be checked.

Spare parts and consumable for 2 years (oil seals, hydraulic oil, coupler, hydraulic hoses,

grease and standard tools) are provided at procurement. Inspection to check damage of floor skid steel is implemented and necessary repair work shall be conducted together with touch up painting of damaged painting.

2 year interval inspection shall be planned not to affect Ferry operation schedule and shall be implemented one by one at most feasible season.

Table 2-5-2 List of Tools and Spare parts

Description	Specification	Quantity	Price(US$)
Standard Tool Kit		1 set	Appox.1,000
Hydraulic hose	With end coupler	4 Nos	Appox.2,000
Oil seal	For cylinder	8 sheet	Appox.200
Coupler	Operation panel, Cylinder	8 Nos	Appox.40
Hydraulic oil	Genius brand	80 l	Appox.400

Source: JICA Survey Team

2-5-2-4 Rubber Fender

Inspection of Rubber Fender implement during berthing and re-berthing of Ferry vessel to check damage. If damage affect function of absorb of berthing energy, replacement will be necessary. Monthly inspection is conducted for fixing part to check looseness of fixing bolts.

2-5-2-5 Bollard

Daily visual inspection is enough because there is low possibility of damage in general. Bollard is made by cast iron and strong enough for wearing but always contact with mooring rope/wire. So, re-painting periodically is preferable considering visual view.

2-5-2-6 Navigation Aids

Daily Inspection is not necessary for Navigation Aids (Beacon light) but to maintain proper function, cleaning of lantern and solar panel is necessary.

2-5-2-7 Lighting and Power supply system

Inspection of lighting facilities is generally conducted during night. Because lamp has their limited life and replacement is required when out of order and electrical cable is required to repair when it damaged. Periodical cleaning of lighting devices are desirable.

2-5-2-8 Water supply system and Fire Hydrant

Daily visual inspection by Ferry operation office staff conducts to check leakage of water, etc. Once a year, Fire hydrant make open and check their function.

2-5-2-9 CCTV system

Daily visual inspection by Ferry operation office staff conducts to check system. When any malfunction appears during operation, monitor will show location and necessary countermeasure shall be taken. Especially, cameras are installed outdoor and daily inspection is essential even if weatherproofed.

2-5-2-10 Operation and Maintenance Cost

As mentioned above, there are various operation and maintenance items including requirement of expense. In some case, incidental investment cost will be required. Possible expense and cost are summarized in Table 2-5-3.

Table 2-5-3 List of Operation and Maintenance Cost

Item	Yearly Maintenance Cost	Periodical Maintenance Cost	Incidental Investment Cost
Overall Facilities	US$3,600		
Jetty, Platform		US10,000/3 year	Concrete repair cost
Movable Ramp		US$5,200/2 year	Repair cost for structural damage
Rubber Fender			US$25,000/set (when damaged)
Bollard	US$100		
Navigation Aids			
Lighting facility			US$70/lamp (change)
Water supply & Hydrant	US$100		
CCTV System			US$50/No. (Camera) US$200/No. (Monitor) US$450/set (DC power source) (all for replace)
Total	US$3,800		

Source: JICA Survey Team

Chapter 3. Project Evaluation

3-1 Preconditions

The preconditions for implementation of the Project are as described below;

1. To secure and provide the Project site,
2. To remove the obstacles for implementing the Project in the Project site,
3. To construct the Passenger Terminal Building to be developed in an integrated manner with the Project,
4. To obtain the environmental permission,
5. To open an account under the name of the government of Timor-Leste in a bank in Japan and to conclude B/A as an agent for which JICA will be able to make payments in Japanese yen to cover the obligations incurred by the government of Timor-Leste or its designated authority under the Verified Contract,
6. To issue the working visa for Japanese nationals whose services may be required in connection with the Project, and
7. To ensure the completion of domestic tax exemption procedures for importing the procured equipment and materials for this Project by the time those equipment and materials will arrive at Timor-Leste.

The preconditions above 1 to 6 except for 3 need to be completed before the start of execution of the Project. The government of Timor-Leste needs to take necessary actions for a Japanese contractor to provide tax exemption regarding 7 above.

3-2 Necessary Inputs by the Recipient Country

Followings are the necessary inputs by the government of Timor-Leste to assure and sustain the effects of the Project.

1. To secure the budget and human resources (engineers) for maintenance of the Ferry Terminal and the Passenger Terminal Building

The maintenance costs of the facilities of the Project will be small according to the Project implementation plan. However, the scheduled checkups and repairs are necessary in order to keep the proper function of the facilities.

2. To keep on disbursement of the subsidies for operational costs of Ferries

The fare of ferry has been kept low. The increase of the number of passengers would have positive impacts on the local economy. Therefore, it is necessary to maintain the low fare until

the people of Timor-Leste will be able to pay proper fare of Ferry to cover the operational cost of ferries.

3. To execute the scheduled environmental monitoring of the Project area

The continuous monitoring of the Project area is important to prevent negative impacts on social and environmental conditions.

3-3 Important Assumptions

Followings are the important assumptions to assure and sustain the effects of the Project.

1. Early development of Navigation Routes to connect the other ports

New navigation routes connecting with the other ports should be developed promptly to stimulate the local economy in aspects of the growth in people's movement and increase in the distribution volume of local products.

2. Execution of the marketing research on passengers of Ferry

The marketing research is required to establish navigation schedule according to the needs to stimulate increase in passengers and cargo transportation.

3. Prompt development for the Potential Routes

It is assumed that tourists and trade will increase by development of potential navigation routes with Kupang to connect with other Indonesian ports. The connection with Kupang Port would stimulate the growth of trade and tourism industry.

4. Keeping the proper operation of Ferry

It is necessary to comply with the authorized capacity of the passengers and of freight for the safety navigation. In this manner the reliability for the ferry transportation would be assured.

5. Proper maintenance of the facilities in the Ferry Terminal

Proper maintenance of the facilities of Ferry Terminal is inevitable for the on-time operation of ferry.

3-4 Project Evaluation

3-1-1 Relevance

The relevance of the project is considered high for the follows reasons;

1. Benefit

The benefits of the Project are expected to make impacts not only on the residents of the north coast but on all the people in Timor-Leste through contribution to the country's economic development.

2. Consistency with Strategic Development Plan: SDP

The development of the port infrastructure is determined in SDP as the essential implementation policy to ensure the growth of national economy. Therefore, the consistency with SDP is high. In addition, Dili Port will function as the traffic nodal point between land and maritime transportations after cargo handling will transfer to the new port in Tibar. After the transfer, Dili Port will play roles as the International Passenger terminal and ferry terminal.

3. Consistency with Japan's Aid Policy

"Making the base of economic activation" is one of the Japan's Aid policies for Timor-Leste. The Project satisfies the demand for Ferry transportation in the northern coast of the country. The Project will also build the base to activate economic relations between the capital region and rural areas as well as relations with the neighbor country, Indonesia.

3-1-2 Effectiveness

(1) Quantitative effects

The Project is based on the plan to respond the future demand of ferry passengers. Table 3-4-1 shows the indicators of quantitative effects of the Project. The berthing hours of ferry and the number of passengers are the two indicators. The reference value is the actual record in 2014 and the target value is the prospect of figures in the 2021, in three years from the Project completion.

Table 3-4-1 Indicators of quantitative effect

Indicators	Actual Record in 2014	Target Value in 2021 【3 years after completion】
Berthing hours of Ferry (hours per day)	3 hours per day	24 hours
Annual number of Passenger	Atauro：21,634 passengers Oecussi：44,036 Passengers	Atauro：28,392 passengers Oecussi70,985 passengers

Source: JICA Survey Team

(2) Qualitative effects

(a) Direct effects

- Improvement of safety for the passenger's embarkation and disembarkation
- Safe berthing of ferry regardless the tide level
- User-friendly terminal with the passenger terminal close by

- The jetty reduces the deflection of the ferry during the approach to the terminal. As a result, flexibility in bunkering work will be highly increased.
- Better transportation services for people because of more flexible navigation schedule and larger transportation volume due to the double berthing jetty
- Contribution to the development of new international Ferry Routes because of the character pf the ferry (Ro/Ro type) to be introduced from Portugal.

(b) In-direct effects

- Contribution to the economic development of the enclave, islands and the northern coast with increased commodity between the rural areas and the capital city
- Conducing the rural economic development as potential transportation measures for tourists which are expected to increase in the future
- Clear demarcation of the role of Dili Port as nodal port for the International tourists and for domestic ferry after transfer of cargo function to the new port in Tibar.

(3) Coordination with other JICA Projects

JICA implemented Grant Aid projects, "The Project for the Rehabilitation of Dili Port in Timor-Leste (2006)" and "The Project for the Urgent Rehabilitation of Oecussi Port (2010) " The port facilities rehabilitated by these two projects will be utilized more effectively if the Ferry Terminal will be improved by the Project. In addition, JICA has dispatched a long-term expert, "Port Facility and Safety Advisor (2012-2015)" and a short-term expert on maintenance of port facilities. These experts currently are on duty. The activities of the experts would contribute to strengthen capacity of APORTIL for proper maintenance of the facilities to be introduced by the Project.

[Appendices]

[List of Appendices]

1. Member List of the Study Team
2. Study Schedule
3. List of Parties Concerned in the Recipient Country
4. Minutes of Discussions

1. Member List

LIST OF TEAM MEMBER:

No.	Name	Job Title	Occupation
1	Mr. KOYANAGI Yoshimoto	Leader	Deputy Director, Transportation and ICT Group Infrastructure and Peacebuilding Dept., JICA
2	Mr. KUDO Takahiro	Planning Management	Deputy Assistant Director, Transportation and ICT Group Infrastructure and Peacebuilding Dept., JICA
3	Mr. MATSUURA Eiichi	Chief Consultant/ Port Planner	Ides Inc.
4	Mr. ASANO Atsushi	Port Facility Planner	Japan Port Consultants, Ltd.
5	Mr. SASE Osamu	Natural Condition surveyor	Japan Port Consultants, Ltd.
6	Mr. YAMADA Tadao	Environmental and Social Considerations Surveyor	Ides Inc.
7	Mr. NISHIMURA Susumu	Construction & Procurement Planner/ Cost Estimation	Japan Port Consultants, Ltd.

2. Study Schedule

	Date in 2015	Day	Site Survey					
			Team Leader/JICA	Chief Consultant/Port Planner	Port Facility Planner	Natural Condition Surveyor	Environmental and Social Conditions Surveyor	Construction & Procurement planner / Cost Estimation
1	Jun. 30	Tue		Arriving at Dili by MI296 (14:20)	Arriving at Dili by MI296 (14:20)			Arriving at Dili by MI296 (14:20)
2	Jul. 1	Wed		Meeting with JICA Discussion with APORTIL	Meeting with JICA Opening quotations from Sub-contractors at JICA Office Discussion with MOTC and APORTIL (Explanation of I/R, questionnaires, etc)			Meeting with JIC Opening quotations from Sub-contractors at JICA Office Discussion with MOTC and APORTIL (Explanation of I/R, questionnaires, etc)
3	Jul. 2	Thu		Explanation of I/R, questionnaires, etc Discussion with APORTIL	Courtesy call to ADB Discussion with APORTIL			Discussion with APORTIL Market research
4	Jul. 3	Fri		Discussion with APORTIL	Discussion with APORTIL			Market research
5	Jul. 4	Sat		Discussion with APORTIL Data review	Discussion with APORTIL Data review			Discussion with APORTIL Data review
6	Jul. 5	Sun	Arriving at Dili by GA7300 (12:20) Internal Meeting	Internal Meeting	Internal Meeting			Internal Meeting
7	Jul. 6	Mon	Meeting with JICA, EOJ Discussion with APORTIL on M/D Hearing survey and discussion with IFC	Meeting with JICA, EOJ Discussion with APORTIL on M/D Hearing survey and discussion with IFA	Discussion with APORTIL on M/D			Interviewing construction contractors
8	Jul. 7	Tue	Discussion with GIZ about Maritime project Discussion with APORTIL on M/D	Discussion with GIZ about Maritime project Discussion with APORTIL on M/D	Discussion with GIZ about Maritime project Discussion with APORTIL on M/D	Arriving at Dili by MI296 (14:20)	Arriving at Dili by MI296 (14:20)	Discussion with GIZ about Maritime project Discussion with APORTIL on M/D
9	Jul. 8	Wed	Discussion with APORTIL on M/D	Discussion with APORTIL on M/D	Discussion with APORTIL on M/D Opening quotations from Sub-contractors at JICA Office Signature of the contract with sub contractors	Meeting with JICA Opening quotations from Sub-contractors at JICA Office Signature of the contract with sub contractors	Meeting with JICA Discussion with APORTIL on M/D Opening quotations from Sub-contractors at JICA Office Signature of the contract with sub contractors	Opening quotations from Sub-contractors at JICA Office Signature of the contract with sub contractors
10	Jul. 9	Thu	Discussion with Ministry of Foreign Affairs and Cooperation Site survey for New Port in Tibar and Dry Port	Discussion with Ministry of Foreign Affairs and Cooperation Site survey for New Port in Tibar and Dry Port	Consideration of the hearing survey items for the Ferry Boat passenger Site survey for New Port in Tibar and Dry Port	Discussion with sub-contractor	Discussion for the hearing survey schedule with the environmental department Discussion with sub-contractor Site survey for New Port in Tibar and Dry Port	Hearing survey for the custom and tax exemption for the project Site survey for New Port in Tibar and Dry Port
11	Jul. 10	Fri	Report to JICA, EOJ	Report to JICA, EOJ	Discussion for the schedule of Package 1 with the sub contractor	Discussion for the schedule of Package 1 with the sub contractor Preparation for the applying form for the marine survey	Discussion with Sub-Contractor for the environmental survey items and schedule	Interviewing local shipping agents and marketing survey for the construction materials
12	Jul. 11	Sat	Delay for departure due to explosion of volcano	Internal Meeting Data review	Internal Meeting and data review	Internal Meeting and data review	Internal Meeting and data review	Internal Meeting and data review Sending the survey form for the materials purchased by third countries
13	Jul. 12	Sun	Departing from Dili by GA7310 (13:20)	Data review	Data review	Data review	Data review	Data review
14	Jul. 13	Mon		Discussion with MOTC for the dimension of ferries and planning preconditions	Discussion with MOTC for the dimension of ferries and planning preconditions	Discussion with APORTIL (obtaining natural conditions data)	Discussion with Min. of Commerce, Industry and Environment,MCIE (obtaining legal documents and data on environment)	Discussion with Custom Office
15	Jul. 14	Tue		Alignment of the survey schedule with the sub contractors Consideration of the planning preconditions	Alignment of the survey schedule with the sub contractors Consideration of the planning preconditions	Alignment of the survey schedule with the sub contractors Consideration of the planning preconditions	Collecting environmental data	Distributing questionnaires to local construction contractors
16	Jul. 15	Wed		Discussion with vice minister for the items of MD and the request for implementing the signature with MD	Discussion with vice minister for the items of MD and the request for implementing the signature with MD	Collecting natural condition data and supervising sub-contractor	Site survey	Construction materials procurement survey
17	Jul. 16	Thu		Discussion with APORTIL for the out line design and the requested matters	Discussion with APORTIL for the out line design and the requested matters	Collecting natural condition data and supervising sub-contractor	Checking status of environmental survey and discussing with subcontractor	Interviewing Japanese Consulting company
18	Jul. 17	Fri		Examine of the allotment plan of the outline design for the project	Examine of the allotment plan of the outline design for the project	Collecting natural condition data and supervising sub-contractor	Collecting environmental data	Examine the construction executing plan
19	Jul. 18	Sat		Internal Meeting and data review Site survey for the local ports in the eastern coast	Internal Meeting and data review	Internal Meeting and data review	Internal Meeting and data review	Internal Meeting and data review
20	Jul. 19	Sun		Data review	Data review	Data review	Data review	Data review
21	Jul. 20	Mon		Discussion with APORTIL (reporting survey status and finding issues)	Discussion with APORTIL (reporting survey status and finding issues) Hearing survey for the passengers of Nakroma	Discussion with APORTIL (reporting survey status and finding issues)	Discussion with APORTIL (reporting survey status and finding issues)	Discussion with APORTIL (reporting survey status and finding issues)
22	Jul. 21	Tue		Preparing draft Site Survey Report Implementing supplementary survey	Preparing draft Site Survey Report Implementing supplementary survey	Applying the extend of visa Collecting natural condition data and supervising sub-contractor	Discussion with APORTIL (management and operation system on environmental aspects, etc.)	Collecting answers for questionnaires from construction contractors Interviewing Japanese Consulting company
23	Jul. 22	Wed		Preparing draft Site Survey Report Implementing supplementary survey	Preparing draft Site Survey Report Implementing supplementary survey	Collecting natural condition data and supervising sub-contractor	Checking status of environmental survey and discussing with subcontractor	Construction execution planning
24	Jul. 23	Thu		Preparing draft Site Survey Report Implementing supplementary survey	Preparing draft Site Survey Report Implementing supplementary survey	Collecting natural condition data and supervising sub-contractor	Collecting environmental data	Cost estimation
25	Jul. 24	Fri		Discussion with APORTIL	Discussion with APORTIL	Collecting natural condition data and supervising sub-contractor	Collecting environmental data	Discussion with APORTIL
26	Jul. 25	Sat		Internal Meeting and data review	Internal Meeting and data review	Internal Meeting and data review	Internal Meeting and data review	Internal Meeting and data review
27	Jul. 26	Sun		Data review	Data review	Data review	Data review	Data review
28	Jul. 27	Mon		Reporting JICA, EOJ	Reporting JICA, EOJ	Discussion with APORTIL (reporting survey status and finding issues)	Discussion with APORTIL (reporting survey status and finding issues)	Reporting JICA, EOJ
29	Jul. 28	Tue		Departing from Dili by MI295 (15:25)	Departing from Dili by MI295 (15:25)	Preparing draft Site Survey Report Implementing supplementary survey	Preparing draft Site Survey Report Implementing supplementary survey	Departing from Dili by MI295 (15:25)
30	Jul. 29	Wed				Preparing draft Site Survey Report Implementing supplementary survey	Preparing draft Site Survey Report Implementing supplementary survey	
31	Jul. 30	Thu				Collecting natural condition data and supervising sub-contractor	Preparing draft Site Survey Report Implementing supplementary survey	
32	Jul. 31	Fri				Discussion with APORTIL	Discussion with APORTIL	
33	Aug. 1	Sat				Internal Meeting and data review	Internal Meeting and data review	
34	Aug. 2	Sun				Data review	Data review	
35	Aug. 3	Mon				Report JICA	Report to JICA	
36	Aug. 4	Tue				Preparing draft Site Survey Report Implementing supplementary survey	Departing from Dili by MI1295 (15:25)	
37	Aug. 5	Wed				Preparing draft Site Survey Report Implementing supplementary survey		
38	Aug. 6	Thu				Collecting natural condition data and supervising sub-contractor		
39	Aug. 7	Fri				Collecting natural condition data and supervising sub-contractor		
40	Aug. 8	Sat				Data review		
41	Aug. 9	Sun				Data review		
42	Aug. 10	Mon				Collecting natural condition data and supervising sub-contractor		
43	Aug. 11	Tue				Collecting natural condition data and supervising sub-contractor		
44	Aug. 12	Wed				Report to JICA		
45	Aug. 13	Thu				Departing from Dili by MI295 (15:25)		

3. List of Parties Concerned in the Recipient Country

Organization	Name	Position
Ministry of Foreign Affairs and Cooperation	Mr. Nuno Moniz Alves	Director
	Mr. Ines Da Costa Moreira	Desk Officer for Asia and Middle-East
	Mr. Cristiana Gloria	Assistant Administration
Ministry of Finance	Mr. Elson Martinho da Costa	External Assistance Coordination Officer
	Ms. Miranda Santo	ditto
	Mr. Hideaki Maruyama	Advisor
Ministry of Public Works, Transport and Communications	Mr. Inacio Moreira	Vice Minister II
	Mr. Constantino Ferreira Soares	Advisor for Vice Minister
	Mr. Rui Mannel Neto Fragh	Advisor for Vice Minister
	Mr. Teotonio de Assis	Advisor for Vice Minister
Ministry of Commerce, Industry and Environment National Directorate for Environment (NDE) , State Secretariat for Environment	Mr. Antonio Lelo Taci	Director of NDE
	Mr. Francisco Poto	Chief of EIA Department
APORTIL /DNTM	Mr. Constantino Ferreira Soares	President
	Mr. Lino Barreto	Director of DNTM
	Mr. Gabriel Hilario Fernandes	Engineer
	Mr. Jonas F. Alves Do Rego	Operational Security
	Mr. Joes M. Marques	Harbor Master/APORTIL & DNTM
	Mr. Helder da Silva	Technical officer/APORTIL & DNTM
	Ms. Adelina Andrade	Finance /APORTIL
	Mr. Moises de Araiyo	APORTIL
	Mr. Joao de F. Fernandes	DNTM

	Mr. Alberto F Percira	DNTM
	Mr. Hiroyuki Onishi	Advisor/JICA
Custom Department Office	Ms. Rosa de Silva	Head of Commercial Compliance
Meteorological Office	Mr. Eqidio da Costa Butares	Advisor
GIZ	Mr. Rodrigo Garcia-Bernal	Principal Advisor
	Ms. Nadezuda Nikolous	Junior Advisor
IFC	Ms. Milissa Day	Resident Representative, Timor Leste

4. Minutes of Discussions

MINUTES OF DISCUSSIONS
ON THE PREPARATORY SURVEY
FOR THE PROJECT FOR URGENT SHIFT OF FERRY TERMINAL IN DILI PORT
IN THE DEMOCRATIC REPUBLIC OF TIMOR-LESTE

In response to a request from the Government of Democratic Republic of Timor-Leste (hereinafter referred to as "Timor-Leste"), the Government of Japan decided to conduct a Preparatory Survey on "The Project for Urgent Shift of Ferry Terminal in Dili Port" (hereinafter referred to as "the Project"). In accordance with this decision, Japan International Cooperation Agency (hereinafter referred to as "JICA") decided to commence the survey.

JICA sent the Preparatory Survey Team for the Field Survey (hereinafter referred to as "the Team"), which is headed by Mr. Yoshimoto KOYANAGI, Deputy Director, Transportation and ICT Group, Infrastructure and Peacebuilding Department, JICA, and is scheduled to stay in the country from June 30th to August 4th, 2015.

The Team held discussions with the officials concerned of the Timor-Leste side, and conducted a field survey at the Project site.

In the course of discussions and field survey, the both sides confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare a Draft Report of the Preparatory Survey.

Dili, August 25, 2015

小柳 桂泉

Mr. Yoshimoto Koyanagi
Leader
Preparatory Survey Team
Japan International Cooperation Agency

Inácio Freitas Moreira
Vice Ministro das OPC

Ministry of Public Works, Transport and Communications
The Democratic Republic of Timor-Leste

(Witnessed by)

Carlos de Jesus Oliveira
Head of DPMU

Ministry of Finance
The Democratic Republic of Timor-Leste

ATTACHMENT

1. Objective of the Project

The objective of the Project is to achieve a safer port operation by construction of new ferry jetty and necessary facilities, thereby contributing to better environment to port users.

2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Urgent Shift of Ferry Terminal in Dili Port".

3. Project Site

Both sides confirmed that site of the Project is in Dili Port which is shown in Annex-1.

4. Line Ministry and Executing Agency

Both sides confirmed the line ministry and executing agency as follows:

4-1. The line ministry is Ministry of Public Works, Transport and Communications (MPWTC), which would be the agency to supervise the executing agency.

4-2. The executing agency is Adminstração dos Portos de Timor-Leste (APORTIL). The executing agency shall coordinate with all the relevant agencies to ensure smooth implementation of the Project and ensure that the Undertakings are taken by relevant agencies properly and on time.

4-3. The organization chart is shown in Annex-2.

5. Item requested by the Government of Timor-Leste

5-1. As a result of discussions, with the Team, both sides confirmed that the items requested by the Government of Timor-Leste are as follows:

- Jetty to accommodate two(2) ferries at the same time and landing platform
- Facilities such as water supply, power supply, fire hydrant, lighting system, and safety control system, etc.

5-2. The Team explained to the Timor-Leste side that the ferry to be procured by the Germany in future will be given the higher priority in the process of the examination of the design for new jetty.

5-3. The Timor-Leste side requested to the Team that the countermeasure for sedimentation would be considered for the design of the above mentioned jetty and facilities.

5-4. JICA will assess the appropriateness of the above requested items through the survey and will report findings to the Government of Japan. The final components of the Project

would be decided by the Government of Japan.

6. Japan's Grant Aid Scheme

6-1. The Timor-Leste side understood the Japan's Grant Aid Scheme and its procedures as described in Annex-3, Annex-4 and Annex-5, and necessary measures to be taken by the Government of Timor-Leste.

6-2. The Timor-Leste side agreed to take the necessary measures, as described in Annex-6, for smooth implementation of the Project, as a condition for the Japan's Grant Aid to be implemented. The detailed contents of the Annex-6 will be worked out during the survey and shall be agreed no later than by the Explanation of the Draft Preparatory Survey Report.

The contents of Annex-6 will be used to determine the following:

(1) The scope of the Project.

(2) The timing of the Project implementation.

(3) Timing and possibility of budget allocation

Contents of Annex-6 will be updated as the Preparatory Survey progresses, and will finally be the Attachment to the Grant Agreement.

7. Schedule of the Study

7-1. The Team will proceed with further field survey in Timor-Leste until August 4th, 2015.

7-2. JICA will prepare the draft Preparatory Survey Report and dispatch a mission to Timor-Leste in order to explain its contents around January, 2016.

7-3. If the contents of the draft Preparatory Survey Report is accepted in principle and the Undertakings are fully agreed by the Government of Timor-Leste side, JICA will complete the final report and send it to Timor-Leste around May, 2016.

7-4. The above schedule is tentative and subject to change.

8. Environmental and Social Considerations

8-1. The Timor-Leste side confirmed to give due environmental and social considerations during implementation of the Project, and after completion of the Project, in accordance with the JICA Guidelines for Environment and Social Considerations (April, 2010).

8-2. The Timor-Leste side agreed to conduct the necessary procedures concerning the environmental assessment (including stakeholder meetings, Initial Environmental Examination (IEE) etc.) and submit required environmental report of the Project to the Ministry of Commerce, Industry and Environment. The period required from the request of approval till the obtainment of approval will be further examined, and the Timor-Leste side agreed to obtain the approval from Ministry of Commerce, Industry and Environment and submit it to JICA Timor-Leste Office preferably before the Cabinet

approval of the Project by the Government of Japan which is scheduled around April, 2016.

9. Disclosure of Information

Both sides confirmed that the study results excluding the Project cost will be disclosed to the public after the completion of the Survey. All the study results including the Project cost will be disclosed to the public after all the verification of contracts for the Project are concluded by JICA.

10. Other Relevant Issues

10-1. The Timor-Leste side explained to the Team that Tibar New Port development project is in progress exclusively for cargo handling and that Dili Port will be utilized as a passenger port even after completion of the Tibar Port project.

10-2. The Timor-Leste side explained to the Team their plan for procurement of new ferries of which the ferries from Portugal and Germany will be deployed in a few years. The detailed information on timing of deployment and operation plan by new ferries, etc., will be informed by the Timor-Leste side to the Team by July 27th, 2015.

10-3. The Timor-Leste side agreed that they will construct the passenger terminal building by their own expense by the completion of the project. The both sides will continue technical discussion during the Team's stay till July 27th, 2015, on layout plan of passenger terminal building which is alignment with the construction plan of new jetty and platform. The necessary condition for the outline design work for the new jetty and platform such as passengers' flow, access road route to the platform, shall be agreed during the Team's stay.

10-4. The Timor-Leste side assured that they will secure the necessary budget and personnel for operation and maintenance of the facilities to be provided by the Project.

10-5. The Timor-Leste side agreed to secure the temporary construction yards and the dumping site around the Project site.

10-6. If the dredging work is required to secure the necessary water depth, the Timor-Leste side shall secure the dumping area for the dredged soil which accords to the environmental condition and requirement.

10-7. The Timor-Leste side agreed that the implementing agency (APORTIL) shall bear the cost, which is equivalent to the customs duties, internal taxes and other fiscal levies which may be imposed in Timor-Leste, instead of tax exemption system.

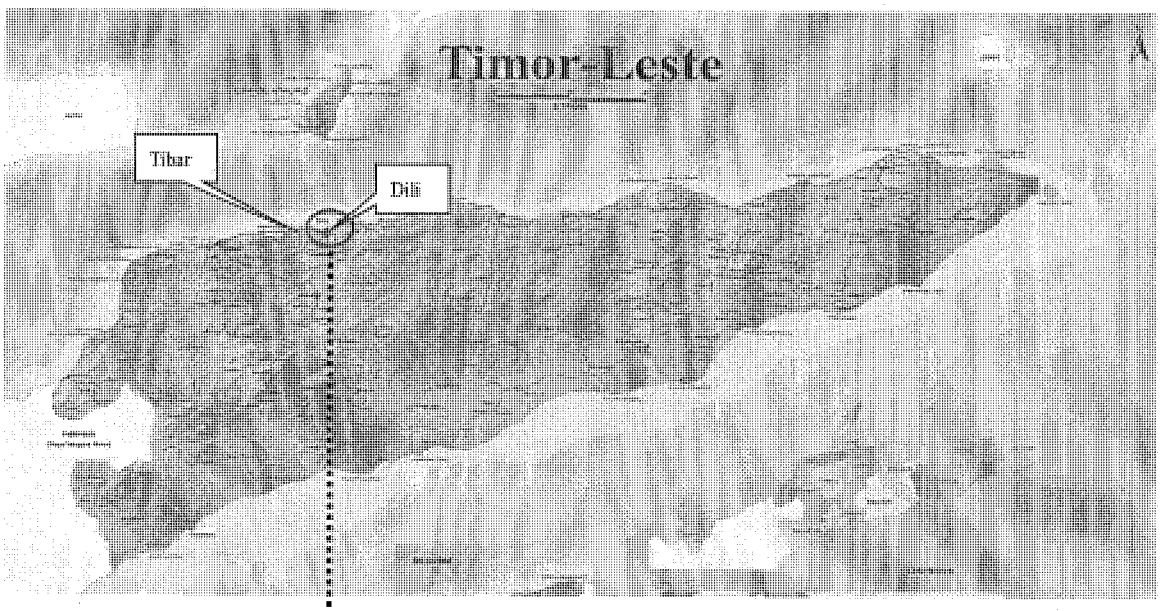
10-8. The both sides agreed to the issuance of the Working Visa for all workers who will be engaged in the project, and agreed that the Timor-Leste side shall take necessary actions to support for the smooth issuance of Working Visa and that the Japanese side shall follow the required procedure in a timely manner.

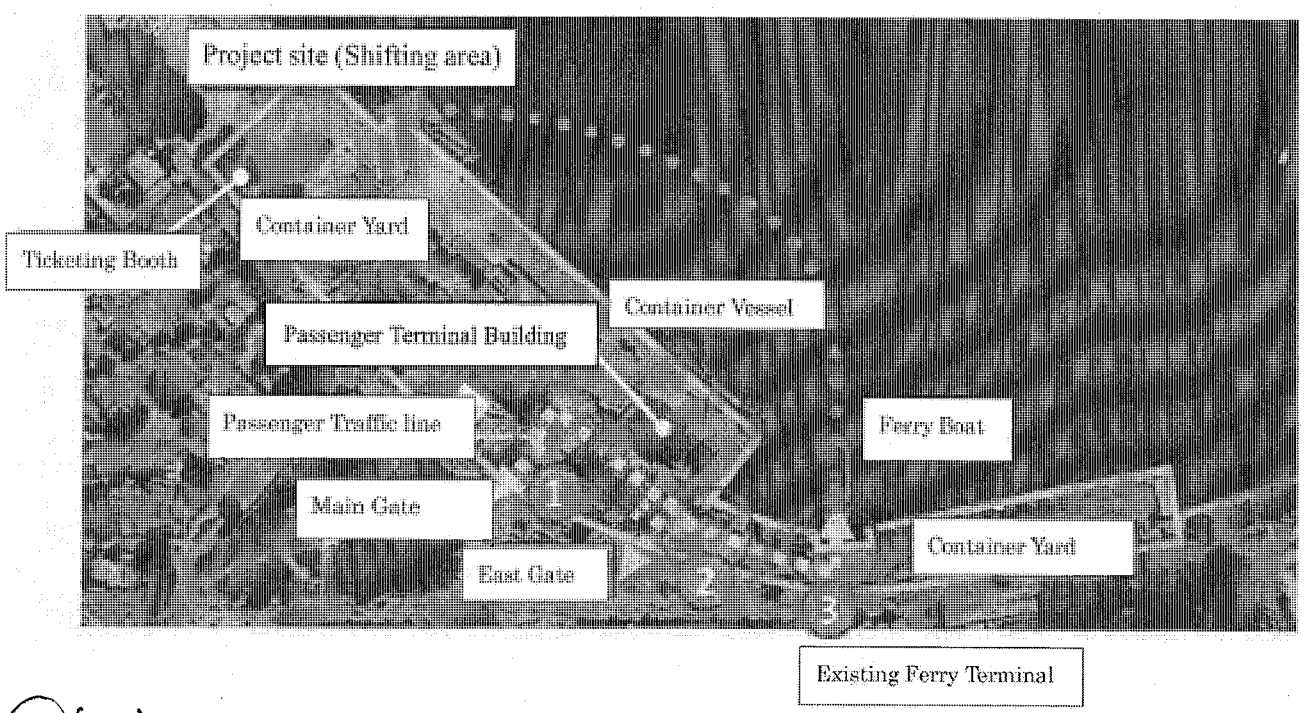
10-9. During implementation and after completion of the Project, the progress and issues will be monitored by using Project Monitoring Report. The format of Project Monitoring Report is attached as Annex-7.

Annex-1	Project Site
Annex-2	Organization Chart
Annex-3	Japan's Grant Aid
Annex-4	Flow Chart of Japan's Grant Aid
Annex-5	Financial Flow of Japan's Grant Aid
Annex-6	Major Undertakings to be taken by Each Government
Annex-7	Project Monitoring Report

Annex-1

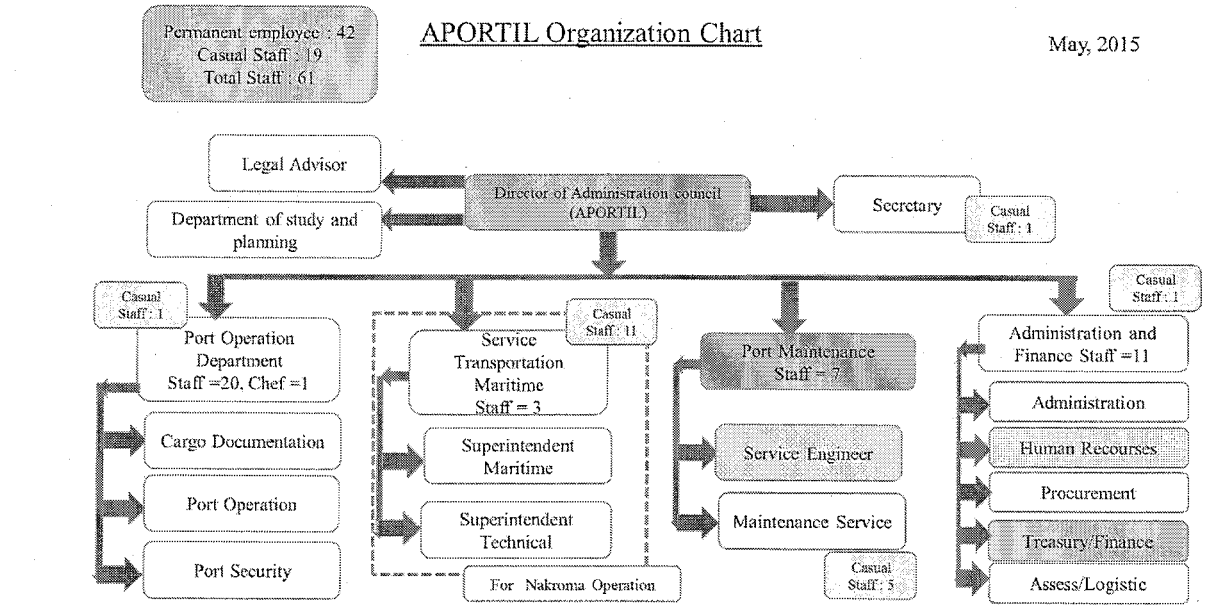
Project Site





Annex-2

Organization Chart



JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures :

- ·Preparatory Survey
  - The Survey conducted by JICA
- ·Appraisal &Approval
  - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- ·Authority for Determining Implementation
  - The Notes exchanged between the GOJ and a recipient country
- ·Grant Agreement (hereinafter referred to as "the G/A")
  - Agreement concluded between JICA and a recipient country
- ·Implementation
  - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be

guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants
For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey
JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A
After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants
In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country
Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"
The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country
In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"
The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to

assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"
The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

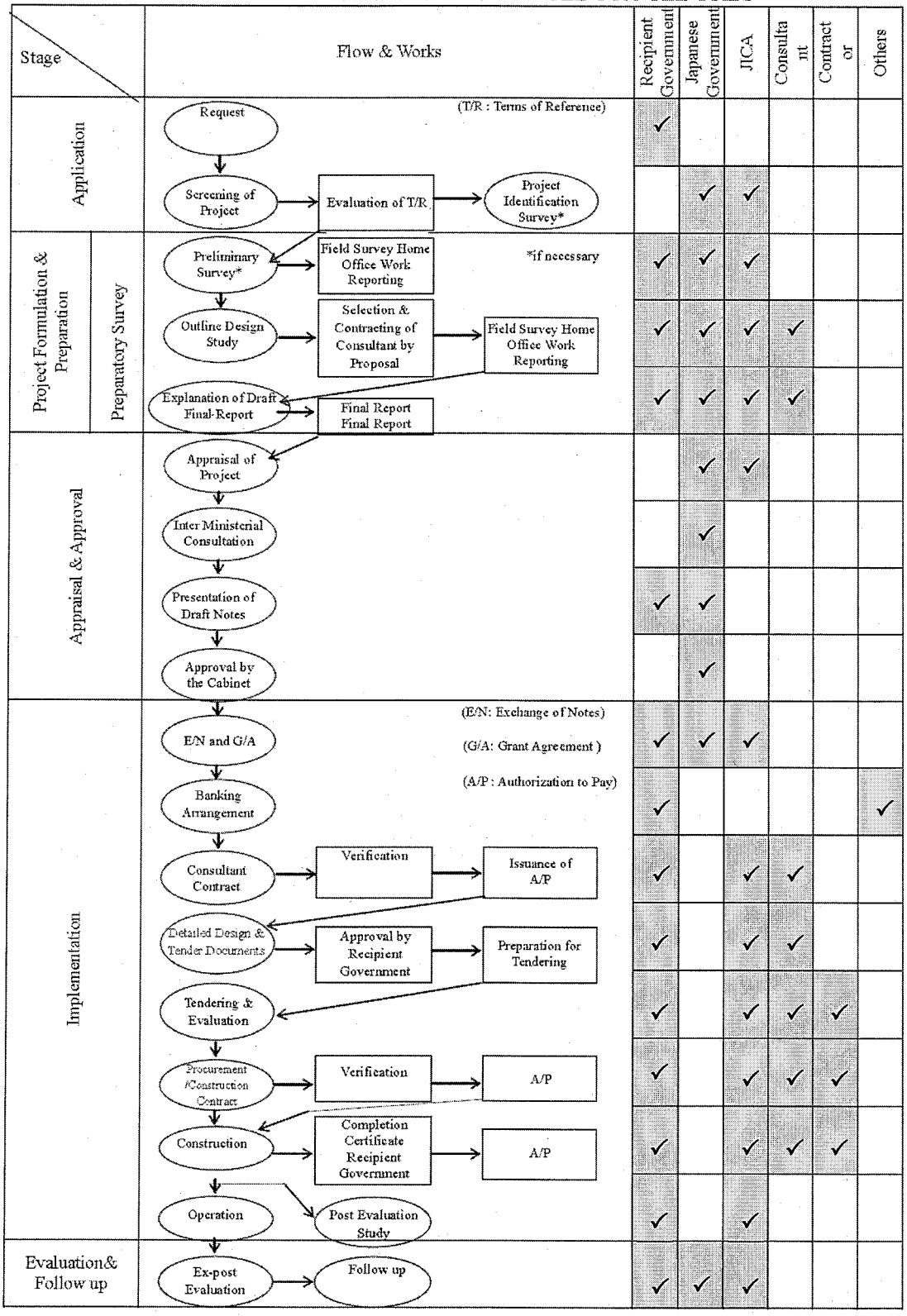
b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

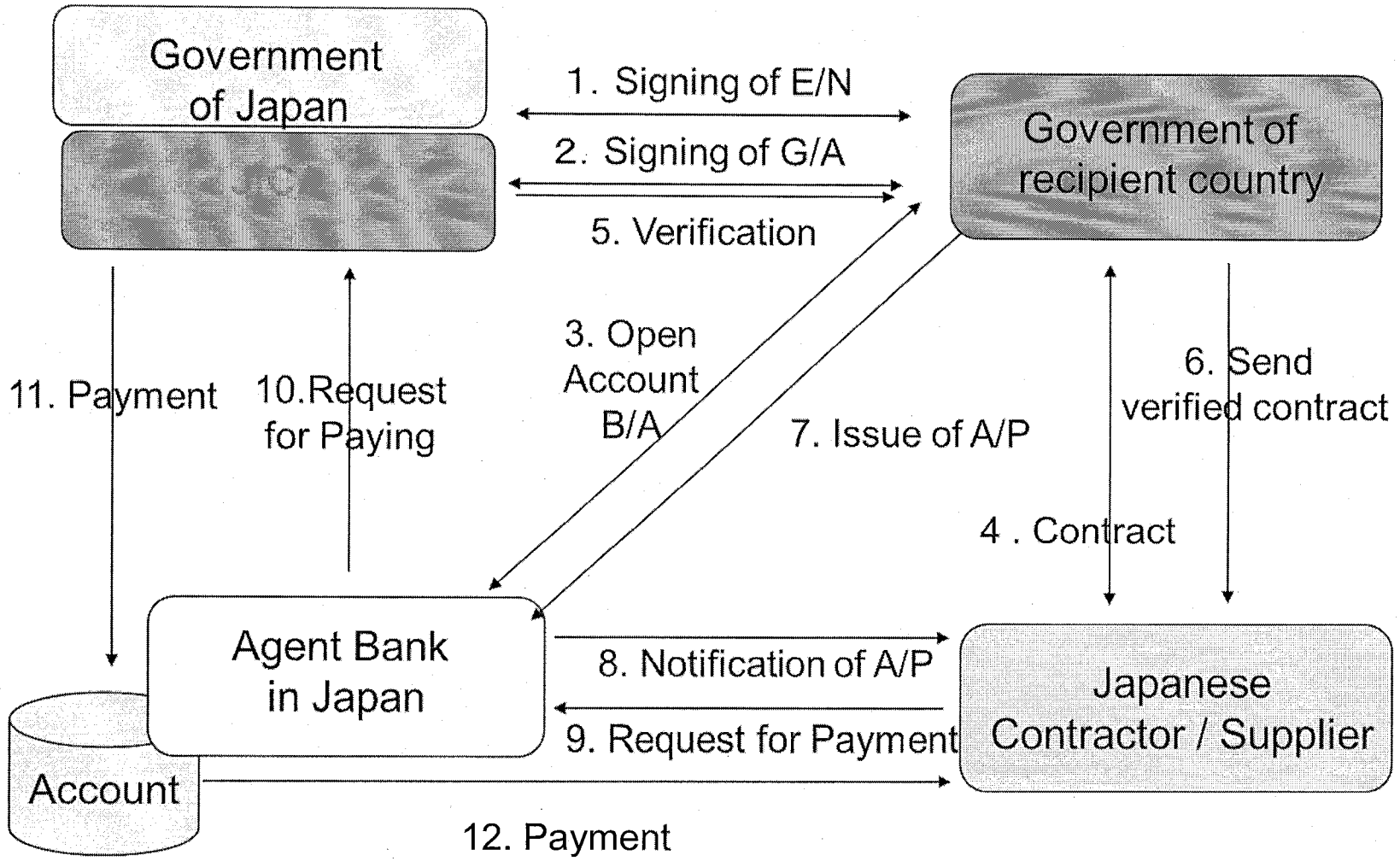
(10) Social and Environmental Considerations
A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

Annex-4

FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



Financial Flow of Grant Aid



Major Undertakings to be taken by Each Government

Major Undertakings to be taken by Recipient Government

1. Before the Tender

NO	Items	Deadline	In charge	Ref.
1	To approve IEE/EIA	before the Project approval by Japanese Cabinet	APORTIL	
2	To open Bank Account (Banking Arrangement (B/A))	within 1 month after G/A	MPWTC	
3	To secure lands 1) temporary construction yard and stock yard near the Project area 2) borrow pit and disposal site near the Project area	before notice of the tender document	APORTIL	
4	To obtain the planning, zoning, building permit	before notice of the tender document	APORTIL	
5	To clear, level and reclaim the following sites when needed	before notice of the tender document	APORTIL	

2. During the Project Implementation

NO	Items	Deadline	In charge	Ref.
1	To bear the following commissions to a bank of Japan for the banking services based upon the B/A			
	1) Advising commission of A/P	within 1 month after the singing of the contract	MOF	
	2) Payment commission for A/P	every payment	APORTIL	
2	To issue the Working Visa for workers	before commencement of the Project	Ministry of Internal Affairs	
3	To construct the passenger terminal building	during the Project	APORTIL	
4	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country	during the Project	APORTIL	
5	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work	during the Project	APORTIL	
6	To bear the cost which is equivalent to the customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the Products and/or the Services, instead of tax exemption system. Such customs duties, internal taxes and other fiscal levies mentioned above include VAT, commercial tax, income tax and corporate tax of Japanese nationals, resident tax, fuel tax, but not limited, which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract	during the Project	APORTIL	
7	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the Project implementation	during the Project	APORTIL	
8	To submit environmental monitoring report to JICA Timor-Leste Office	during the Project	APORTIL	

3. After the Project

NO	Items	Deadline	In charge	Ref.
1	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine/Periodic inspection	After completion of the construction	APORTIL	

Major Undertakings to be covered by the Grant Aid

No	Items	Deadline	Cost Estimated (Million Japanese Yen)*	
1	To construct ferry terminal jetty and necessary facilities (or To procure equipment)			
	- Improvement of ferry terminal jetty			
	- Improvement of necessary facilities			
	1) To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		XX.XX	
	a) Marine(Air) transportation of the products from Japan to the recipient country			
	b) Internal transportation from the port of disembarkation to the project site			
	2) To construct access roads			
	a) Within the site			
2	To implement detailed design, tender support and construction supervision (Consultant)		YY.YY	
3	Contingencies		ww.ww	
	Total		ZZ.ZZ	

(Sample)

Project Monitoring Report

on

Project Name

Grant Agreement No. XXXXXXX

Organization Information

Authority (Signer of the G/A)	_____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Executing Agency	_____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Line Ministry	_____ Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____

Outline of Grant Agreement:

Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____
Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:

1: Project Description

1-1 Project Objective

1-2 Necessity and Priority of the Project

- Consistency with development policy, sector plan, national/regional development plans and demand of target group and the recipient country.

1-3 Effectiveness and the indicators

- Effectiveness by the project

2: Project Implementation

2-1 Project Scope

Table 2-1-1a: Comparison of Original and Actual Location

Location	**Original:** *(M/D)* **Attachment(s):Map**	**Actual:** *(P/Rand PCR)* **Attachment(s):Map**

Table 2-1-1b: Comparison of Original and Actual Scope

Items	Original	Actual
(M/D)	*(M/D)*	*(P/R and PCR)*

2-1-2 Reason(s) for the modification if there have been any.

(P/R and PCR)

2-2 Implementation Schedule

2-2-1 Implementation Schedule

Table 2-2-1: Comparison of Original and Actual Schedule

Items	Original		Actual
	DOD	G/A	
[M/D] Project Completion Date*	*(M/D)*		*(P/R,PCR)* As of (Date of Revision) Please state not only the most updated schedule but also other past revisions chronologically.

*Project Completion was defined as _____ at the time of G/A.

2-2-2 Reasons for any changes of the schedule, and their effects on the project.

(P/R and PCR)

2-3 Undertakings by each Government

2-3-1 Major Undertakings

See Attachment 2.

2-3-2 Activities

See Attachment 3.

2-4 Project Cost

2-4-1 Project Cost

Table 2-3-1 Comparison of Original and Actual Cost by the Government of Japan
(Confidential until the Tender)

Items			Cost (Million Yen)	
	Original	Actual	Original	Actual
Construction Facilities (or Equipment)				
Consulting Services	- Detailed design -Procurement Management -Construction Supervision			

Total		

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

Table 2-3-2 Comparison of Original and Actual Cost by the Government of XX

Items			Cost (Million USD)	
	Original	Actual	Original	Actual
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = (local currency)

2-4-2 Reason(s) for the wide gap between the original and actual, if there have been any, the remedies you have taken, and their results.

(P/R, PCR)

2-5 Organizations for Implementation

2-5-1 Executing Agency:

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original: *(M/D)*
Actual, if changed: *(P/R and PCR)*

2-6 Environmental and Social Impacts

Report based on the agreed environmental checklist and monitoring form (See Attachment 4)

3: Operation and Maintenance (O&M)

3-1 O&M and Management

- Organization chart of O&M
- Operational and maintenance system (structure and the number ,qualification and skill of staff or other conditions necessary to maintain the outputs and benefits of the project soundly, such as manuals, facilities and equipment for maintenance, and spare part stocks etc)

Original: *(M/D)*
Actual: *(PCR)*

3-2 O&M Cost and Budget

- The actual annual O&M cost for the duration of the project up to today, as well as the annual O&M budget.

Original: *(M/D)*

4: Precautions (Risk Management)

- Risks and issues, if any, which may affect the project implementation, outcome, sustainability and planned countermeasures to be adapted are below.

Original Issues and Countermeasure(s): *(M/D)*	
Potential Project Risks	Assessment
1.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action during the Implementation:

	Contingency Plan (if applicable):
2.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action during the Implementation:
	Contingency Plan (if applicable):
3.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action during the Implementation:
	Contingency Plan (if applicable):
Actual issues and Countermeasure(s)	
(P/R and PCR)	

5: Evaluation

5-1 Overall evaluation

Please describe your evaluation on the overall outcome of the project.

(PCR)

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

(PCR)

Attachment

1. Project Location Map
2. Undertakings to be taken by each Government
3. Monthly Report
4. Monitoring report on environmental and social considerations

MINUTES OF DISCUSSIONS
ON THE PREPARATORY SURVEY FOR THE PROJECT FOR
URGENT SHIFT OF FERRY TERMINAL IN DILI PORT
(EXPLANATION ON DRAFT PREPARATORY SURVEY REPORT)

On the basis of the discussions and field survey in the Democratic Republic of Timor-Leste (hereinafter referred to as "Timor-Leste") in July, 2015, and the subsequent technical examination of the results in Japan, the Japan International Cooperation Agency (hereinafter referred to as "JICA") prepared a draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") on the Project for urgent shift of ferry terminal in Dili Port (hereinafter referred to as "the Project").

In order to explain the Draft Report and to consult with the concerned officials of the Government of Timor-Leste on its contents, JICA sent to Timor-Leste the Preparatory Survey Team for the explanation of the Draft Report (hereinafter referred to as "the Team"), headed by Mr. Yoshimoto KOYANAGI, Deputy Director, Transportation and ICT Group, Infrastructure and Peacebuilding Department, JICA, from January 26 to 30, 2016.

As a result of the discussions, both sides confirmed the main items described in the attached sheets.

Dili, January 29th, 2016

Mr. Yoshimoto Koyanagi
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Mr. Constantino Ferreira Soares
Presidente
Adminstração dos Portos de Timor-Leste
The Democratic Republic of Timor-Leste

(Witnessed by)

Mr. Cancio de Jesus Oliveira
Director
Development Partnership Management Unit
Ministry of Finance
The Democratic Republic of Timor-Leste

ATTACHEMENT

1. Objective of the project

   The objective of the Project is to achieve a safer port operation by construction of new ferry jetty and necessary facilities, thereby contributing to better environment to port users.

2. Project Site

   Both sides confirmed that site of the Project is in Dili Port which is shown in Annex-1.

3. Line Agency and Executing Agency

   Both sides confirmed the line agency and executing agency as follows:

3-1. The line ministry is Ministry of Public Works, Transport and Communications (MPWTC), which would be the agency to supervise the executing agency.

3-2. The executing agency is Adminstração dos Portos de Timor-Leste (APORTIL). The executing agency shall coordinate with all the relevant agencies to ensure smooth implementation of the Project and ensure that the Undertakings are taken by relevant agencies properly and on time. The Timor-Leste side explained to the Team that APORTIL has been reorgamized as a financially independent entity responsible for operation and maintenance of port facilities from January 2016, and is an authorized agency for implementation of the Project including budgetary authority.

3-3. The organization chart is shown in Annex-2.

4. Contents of the Draft Report

   After the explanation of the contents of the Draft Report by the Team, the Timor-Leste side agreed in principle to its contents.

5. Cost Estimation

   Both sides confirmed that the Project cost estimation described in Annex-3 is provisional and would be examined further by the Government of Japan for its final approval.

6. Confidentiality of the Cost Estimation and Specifications

Both sides confirmed that the Project cost estimation and technical specifications in the Draft Report should never be duplicated or disclosed to any third parties until all the contracts of the Project are concluded.

7. Japan's Grant Aid Scheme

The Timor-Leste side understood the Japan's Grant Aid Scheme and its procedures as described in Annex-4, Annex-5 and Annex-6, and necessary measures to be taken by the Government of Timor-Leste.

8. Project Implementation Schedule

The Team explained to the Timor-Leste side that the expected implementation schedule is as attached in Annex-7.

9. Expected outcomes and Indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Timor-Leste side has responsibility to monitor the progress of the indicators and achieve the target in year 2021.

[Quantitative Effect]

Indices	Basis (at 2014)	Target (at 2021, three years after completion of the Project)
Berthing hours of Ferry (hours per day)	3 hours per day	24 hours
Annual number of Passenger	Atauro : 21,634 passengers Oecussi : 44,036 passengers	Atauro : 28,392 passengers Oecussi : 70,985 passengers

[Qualitative Effect]

(1) Direct effects

- Improvement of safety for the passenger's embarkation and disembarkation
- Safe berthing of ferry regardless the tide level
- User-friendly terminal with the passenger terminal close by
- The jetty reduces the deflection of the ferry during the approach to the terminal. As a result, flexibility in bunkering work will be highly increased.
- Better transportation services for people because of more flexible navigation schedule and larger transportation volume due to the double berthing jetty
- Contribution to the development of new international Ferry Routes because of the character of the ferry (Ro/Ro type) to be introduced from Portugal.

(2) In-direct effects

- Contribution to the economic development of the enclave, islands and the northern coast with increased commodity between the rural areas and the capital city
- Conducing the rural economic development as potential transportation measures for tourists which are expected to increase in the future
- Clear demarcation of the role of Dili Port as nodal port for the International tourists and for domestic ferry after transfer of cargo function to the new port in Tibar.

10. Undertakings Taken by Both Sides

Both sides confirmed undertakings described in Annex-8. The Timor-Leste side assured to take the necessary measures and coordination including allocation of the necessary budget which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage. Contents of Annex-8 will be updated as the Detailed Design progresses, and will finally be the Attachment to the Grant Agreement.

11. Monitoring during the Implementation

The Project will be monitored every six months during the project period by the executing agency using the Project Monitoring Report (PMR) described in Annex-9.

12. Ex-Post Evaluation

JICA will conduct ex-post evaluation three (3) years after the project completion with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, Sustainability) of the Project. Result of the evaluation will be publicized. The Timor-Leste side is required to provide necessary support for them.

13. Schedule of the Study

JICA will complete the Final Report of the Preparatory Survey in accordance with the confirmed items and send it to the Timor-Leste side around May, 2016.

14. Environmental and Social Considerations

14-1 General Issues

14-1-1 Environmental Guidelines and Environmental Category

The Team explained that "JICA Guidelines for Environmental and Social Considerations (April 2010)" (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as B because the Project is not located in a sensitive area, nor has it sensitive characteristics, nor falls it into sensitive sectors under the Guidelines, and its potential adverse impacts on the environment are not likely to be significant.

14-1-2 Environmental Checklist

The environmental and social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as Annex-10. Both sides confirmed that in case of major modification of the content of the Environmental Checklist, The Timor-Leste side shall submit the modified version to JICA in a timely manner.

14-2 Environmental Issues

14-2-1 Initial Environmental Examination (IEE)

The Timor-Leste side agreed to conduct the necessary procedures concerning the environmental assessment (including stakeholder meetings, Initial Environmental Examination (IEE) etc.) and submit required environmental report of the Project to the Ministry of Commerce, Industry and Environment, and the Timor-Leste side agreed to obtain the approval of the necessary environment document from Ministry of Commerce, Industry and Environment and submit it to JICA Timor-Leste Office preferably before the Cabinet approval of the Project by the Government of Japan which is scheduled around April, 2016.

14-2-2 Environmental Monitoring Plan

The Timor-Leste side agreed that monitoring for environmental and social considerations will be conducted by the responsibility of APORTIL in accordance with the Environmental Monitoring Plan described in the Draft Report. The results of monitoring will be provided to JICA Timor-Leste Office by filling in the Environmental Monitoring Form attached as Annex-11, during construction phase and after completion of the Project.

14-3 Information Disclosure of Monitoring Results

Both sides confirmed that the Timor-Leste side will disclose results of environmental and social monitoring to local stakeholders in their office and/or through their website.

The Timor-Leste side agreed that JICA will disclose results of environmental and

social monitoring submitted by the Timor-Leste side as the monitoring forms attach as Annex-11 on its website.

15. Other Relevant Issues

15-1. Operation and Maintenance of the Facilities

The team explained the importance of operation and maintenance of the facilities constructed by the Project considering that proper asset management impacts greatly on life-span of the facilities and its maintenance cost. The Timor-Leste side shall secure enough staff and budgets necessary for appropriate operation and maintenance of the facilities. The annual operation and maintenance costs are estimated and shown in Annex 12.

15-2. Safety Measures

To avoid accidents on site during the implementation of the Project, the Timor-Leste side agreed to cause the consultant and the contractor to enforce safety measures such as setting safety assurance to the site, providing information for security control to public, and deploying adequate security personnel, based on "The Guidance for the Management of Safety for Construction Works in Japanese ODA Projects" which has been published on JICA's URL below.

http://www.jica.go.jp/activities/schemes/oda_safety/ku57pq00001nz4eu-att/guidance_en.pdf

15-3. Misconduct

If JICA receives information related to suspected corrupt or fraudulent practices in the implementation of the Project, APORTIL and relevant organizations will provide JICA with such information as JICA may reasonably request, including information related to any concerned official of the government and/or public organizations of Timor-Leste.

APORTIL and relevant organizations will not, unfairly or unfavorably treat the person and/or company which provided the information related to suspected corrupt or fraudulent practices in the implementation of the Project.

15-4. Disclosure of Information

Both sides confirmed that the study results excluding the Project cost will be disclosed to the public after completion of the Preparatory Survey. All the study results including the project cost will be disclosed to the public after all the contracts for the Project are concluded.

15-5. Operation of Dili Port

The Timor-Leste side explained to the Team that they don't have any plan of

concession contract on the operation of Dili Port to any private company from other country and that Dili port will be operated by the Government of Timor-Lest (APORTIL).

15-6. Temporary Construction Yard, Borrow Pit and Disposal Site

The Timor-Leste side agreed to secure the temporary construction yard, borrow pit and disposal site near the Project site before tender notice of the Project and also agreed to demolish the blockage in the construction yard before commencement of the construction work with the coordination/adjustment with contractor(s).

15-7. Passenger Terminal

The Timor-Leste side explained to the Team about construction plan of passenger terminal and also explained that the passenger terminal will be completed by the end of the Project.

15-8. Progress of New Ferries

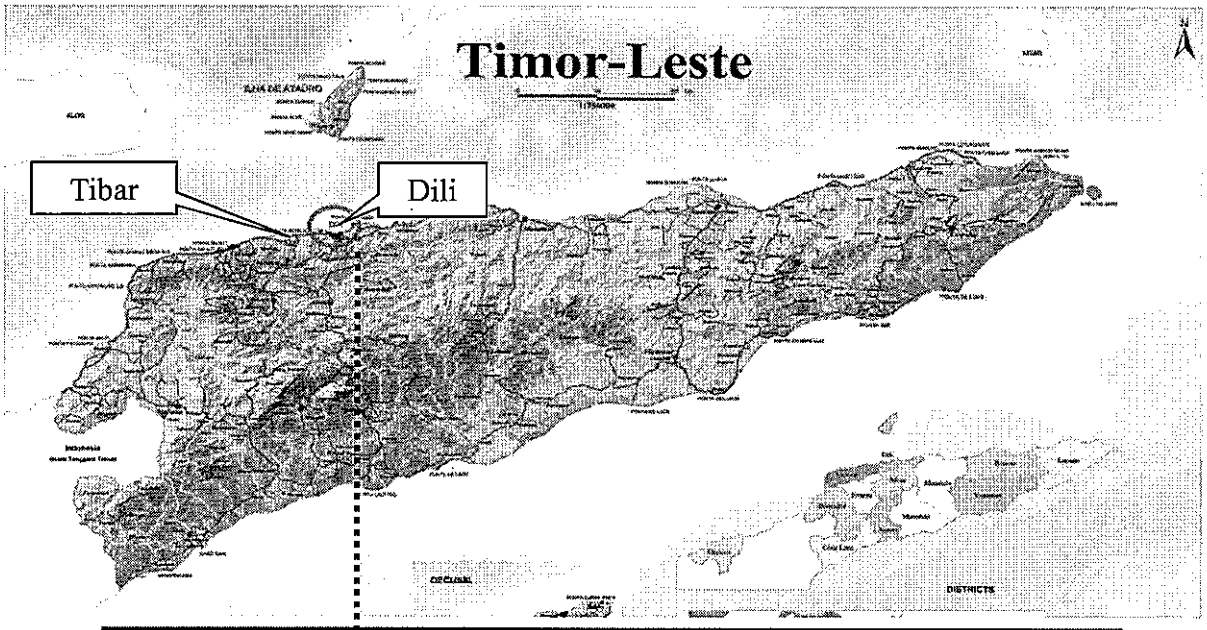
The Timor-Leste side explained to the Team about the progress of procurement of new ferries of which the ferry from Portugal and Germany will be deployed around the end of 2016 and mid-term of 2017 respectively.

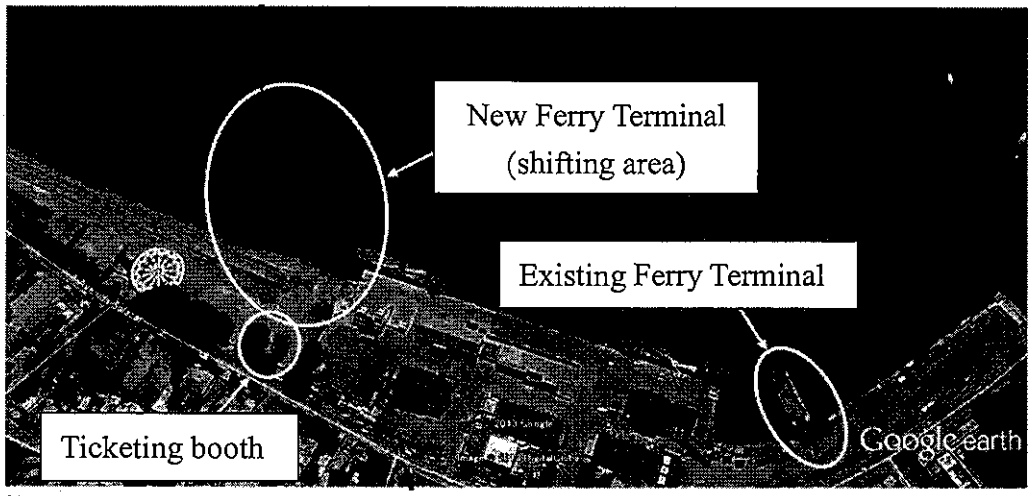
15-9. Working Visa

Both sides agreed the necessary procedure for the issuance of Working Visa for all workers who will be engaged in the project, and agreed that both sides shall follow the required procedure and take necessary actions in a timely manner respectively.

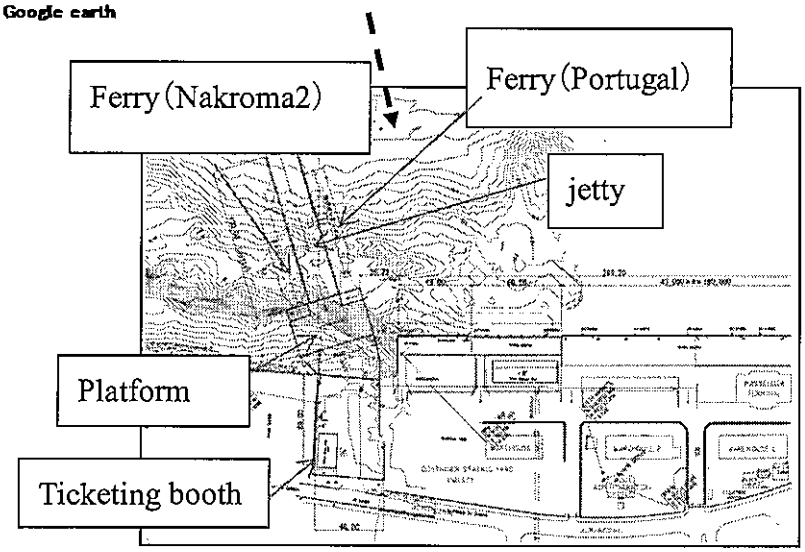
Annex-1 Project site
Annex-2 Organization Chart
Annex-3 Project Cost Estimation
Annex-4 Japan's Grant Aid
Annex-5 Flow Chart of Japan's Grant Aid
Annex-6 Financial Flow of Japan's Grant Aid
Annex-7 Project Implementation Schedule
Annex-8 Major Undertakings to be taken by Each Government
Annex-9 Project Monitoring Report (PMR)
Annex-10 Environmental Checklist
Annex-11 Environmental Monitoring Form
Annex-12 Operation and Maintenance Cost

Project Sites





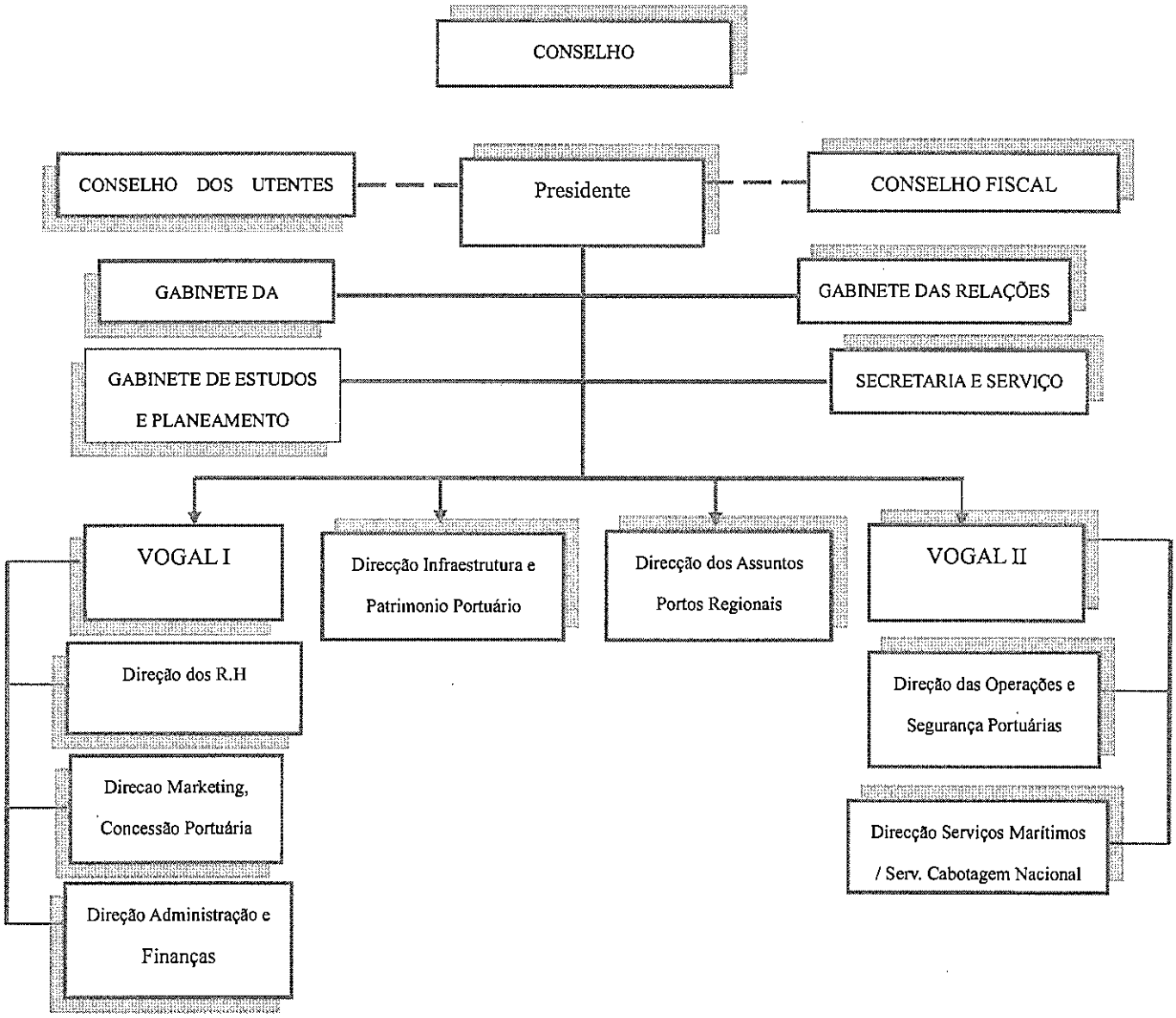
出典：Google earth



Layout plan

Annex-2

Organization Chart



Project Cost Estimation

This page is closed due to the confidentiality.

JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through following procedures:

- ·Preparatory Survey
  - The Survey conducted by JICA
- ·Appraisal &Approval
  - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- ·Authority for Determining Implementation
  - The Notes exchanged between the GOJ and a recipient country
- ·Grant Agreement (hereinafter referred to as "the G/A")
  - Agreement concluded between JICA and a recipient country
- ·Implementation
  - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be

guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants
For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey
JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A
After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants
In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country
Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"
The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country
In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"
The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to

assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"
The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

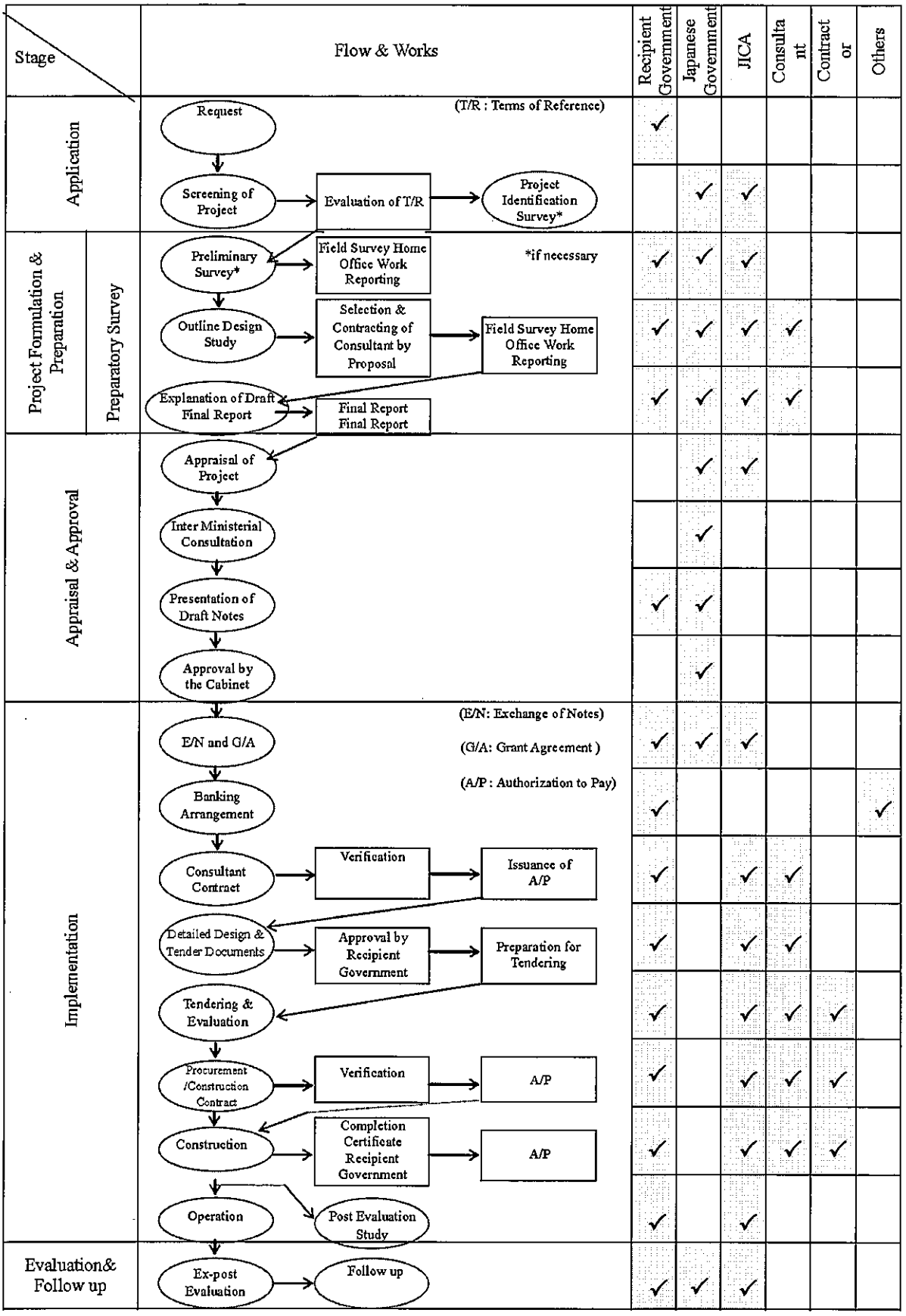
a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

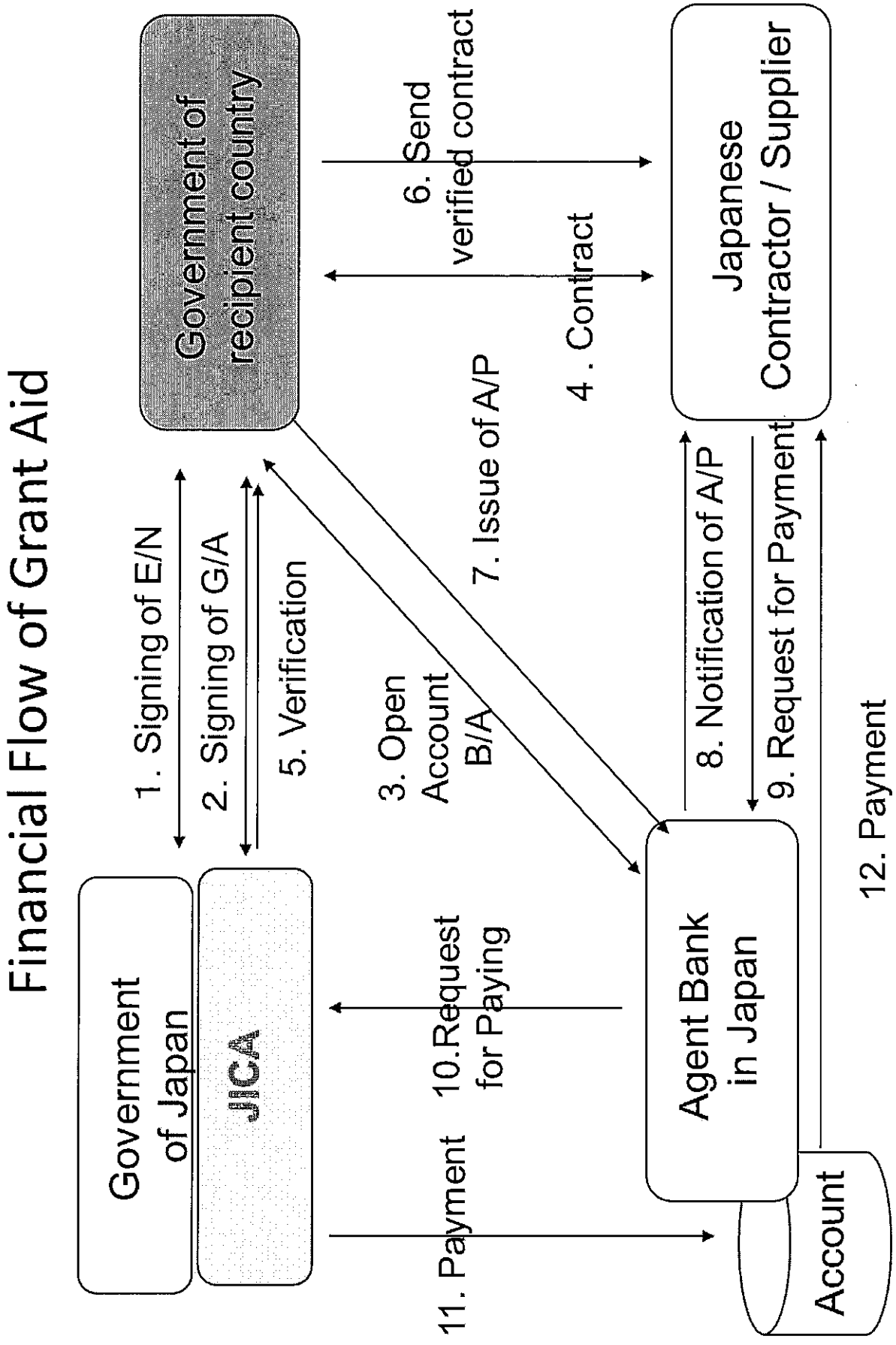
b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

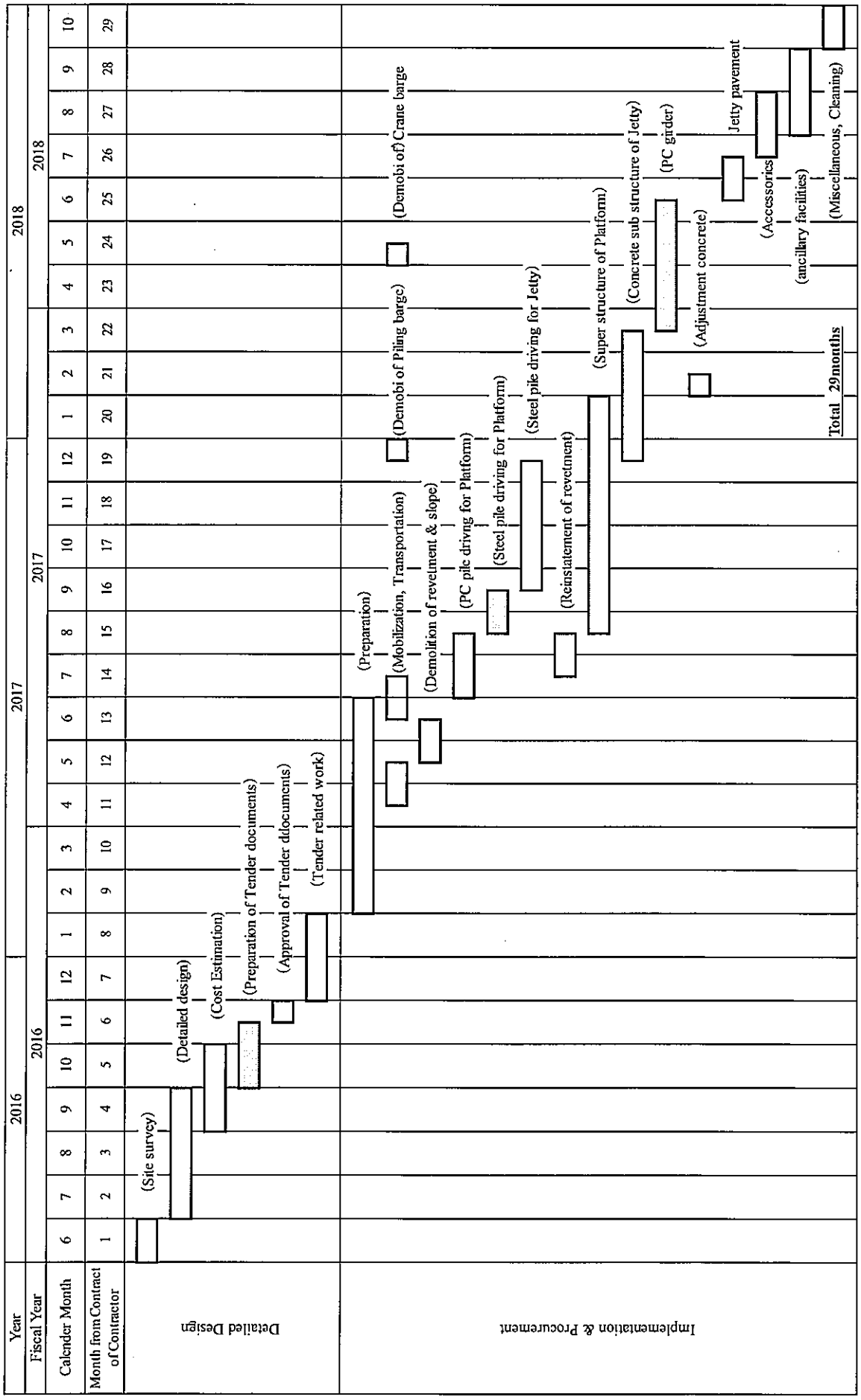
(10) Social and Environmental Considerations
A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

FLOW CHART OF JAPAN'S GRANT AID PROCEDURES




Financial Flow of Grant Aid
Government of recipient country
Japanese Contractor / Supplier
Government of Japan
JICA
Agent Bank in Japan
Account
1. Signing of E/N
2. Signing of G/A
3. Open Account B/A
4 . Contract
5. Verification
6. Send verified contract
7. Issue of A/P
8. Notification of A/P
9. Request for Payment
10.Request for Paying
11. Payment
12. Payment

Project Implementation Schedule



Annex-8

Major Undertakings to be taken by Each Government

Major Undertakings to be taken by Recipient Government

1. Before the Tender

NO	Items	Deadline	In charge	Cost Estimated (USD)	Ref.
1	To obtain the approval of IEE	before the Project approval by Japanese Cabinet	APORTIL		
2	To open Bank Account (Banking Arrangement (B/A))	within 1 month after G/A	MPWTC		
3	To secure lands 1) temporary construction yard and stock yard near the Project area 2) borrow pit and disposal site near the Project area	within 1 month after G/A	APORTIL		
4	To obtain the planning, zoning, building permit	before tender notice	APORTIL		
5	To clear, level and reclaim the following sites when needed	before tender notice	APORTIL		
6	To determine the plan of passenger terminal building	before tender notice	APORTIL		

2. During the Project Implementation

NO	Items	Deadline	In charge	Cost Estimated (USD)	Ref.
1	To bear the following commissions to a bank of Japan for the banking services based upon the B/A				
	1) Advising commission of A/P	within 1 month after the singing of the contract	MOF	17,200	
	2) Payment commission for A/P	every payment	APORTIL		
2	To issue the Working Visa for workers	before commencement of the Project	Ministry of Internal Affairs		
3	To construct the passenger terminal building	during the Project	APORTIL	1,036,700*1	
4	To demolish the blockage in the construction yard	before commencement of the construction work	APORTIL	19,500	
5	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country	during the Project	APORTIL		
6	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work	during the Project	APORTIL		
7	To bear the cost which is equivalent to the customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the Products and/or the Services, instead of tax exemption system. Such customs duties, internal taxes and other fiscal levies mentioned above include VAT, commercial tax, income tax and corporate tax of Japanese nationals, resident tax, fuel tax, but not limited, which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract	during the Project	APORTIL	72,500	
8	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the Project implementation	during the Project	APORTIL		
9	To submit environmental monitoring report to JICA Timor-Leste Office	during the Project	APORTIL		

*1/ Cost of construction of passenger terminal is subject to change based on the design and BoQ (Bill of Quantity).

3. After the Project

NO	Items	Deadline	In charge	Cost Estimated (USD)	Ref.
1	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine/Periodic inspection	after completion of the construction	APORTIL	Refer to Annex-12	
2	To submit environmental monitoring report to JICA Timor-Leste Office	after completion of the construction	APORTIL		

Major Undertakings to be covered by the Grant Aid

No	Items	Deadline	Cost Estimated (Million Japanese Yen)	Ref.
1	To construct ferry terminal jetty and necessary facilities (or To procure equipment)	Before end of contract	1,999	
	- Improvement of ferry terminal jetty			
	- Improvement of necessary facilities			
	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country			
	a) Marine(Air) transportation of the products from Japan to the recipient country			
	b) Internal transportation from the port of disembarkation to the project site			
2	To implement detailed design, tender support and construction supervision (Consultant)	Before end of contract	132	

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX
20XX, Month

Organization Information

Authority (Signer of the G/A)	Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Executing Agency	Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Line Agency	Person in Charge _____ (Division) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____

Outline of Grant Agreement:

Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____
Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:

1: Project Description

1-1 Project Objective

1-2 Necessity and Priority of the Project

- Consistency with development policy, sector plan, national/regional development plans and demand of target group and the recipient country.

1-3 Effectiveness and the indicators

- Effectiveness by the project

Quantitative Effect (Operation and Effect indicators)		
Indicators	Original (Yr)	Target (Yr)
Qualitative Effect		

2: Project Implementation

2-1 Project Scope

Table 2-1-1a: Comparison of Original and Actual Location

Location	**Original:** *(M/D)* **Attachment(s):Map**	**Actual:** *(PMR)* **Attachment(s):Map**

Table 2-1-1b: Comparison of Original and Actual Scope

Items	Original	Actual
(M/D)	*(M/D)*	*(PMR)* Please state not only the most updated schedule but also other past revisions chronologically. All change of design shall be recorded regardless of its degree.

2-1-2 Reason(s) for the modification if there have been any.

(PMR)

2-2 Implementation Schedule

2-2-1 Implementation Schedule

Table 2-2-1: Comparison of Original and Actual Schedule

Items	Original		Actual
	DOD	G/A	
[M/D] 'Soft component' shall be stated in the column of 'Items'. Project Completion Date*	*(M/D)*		*(PMR)* As of (Date of Revision) Please state not only the most updated schedule but also other past revisions chronologically.

*Project Completion was defined as _____ at the time of G/A.

2-2-2 Reasons for any changes of the schedule, and their effects on the project.

2-3 Undertakings by each Government

2-3-1 Major Undertakings

See Attachment 2.

2-3-2 Activities

See Attachment 3.

2-4 Project Cost

2-4-1 Project Cost

Table 2-4-1a Comparison of Original and Actual Cost by the Government of Japan
(Confidential until the Tender)

Items			Cost (Million Yen)	
	Original	Actual	Original	Actual
Construction Facilities (or Equipment)	'Soft component' shall be included in 'Items'.			Please state not only the most updated schedule but also other past revisions chronologically.
Consulting Services	- Detailed design -Procurement Management -Construction Supervision			
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

Table 2-4-1b Comparison of Original and Actual Cost
by the Government of Sri Lanka

Items			Cost (Million USD)	
	Original	Actual	Original	Actual
				Please state not only the most updated schedule but also other past revisions chronologically.
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = (local currency)

2-4-2 Reason(s) for the wide gap between the original and actual, if there have been any, the remedies you have taken, and their results.

(PMR)

2-5 Organizations for Implementation

2-5-1 Executing Agency:

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original: *(M/D)*
Actual, if changed: *(PMR)*

2-6 Environmental and Social Impacts

- The results of environmental monitoring as attached in Attachment 5 in accordance with Schedule 4 of the Grant Agreement.
- The results of social monitoring as attached in Attachment 5 in accordance with Schedule 4 of the Grant Agreement.
- Information on the disclosed results of environmental and social monitoring to local stakeholders, whenever applicable.

3: Operation and Maintenance (O&M)

3-1 O&M and Management

- Organization chart of O&M
- Operational and maintenance system (structure and the number ,qualification and skill of staff or other conditions necessary to maintain the outputs and benefits of the project soundly, such as manuals, facilities and equipment for maintenance, and spare part stocks etc)

Original: *(M/D)*
Actual: *(PMR)*

3-2 O&M Cost and Budget

- The actual annual O&M cost for the duration of the project up to today, as well as the annual O&M budget.

Original: *(M/D)*

4: Precautions (Risk Management)

- Risks and issues, if any, which may affect the project implementation, outcome, sustainability and planned countermeasures to be adapted are below.

Original Issues and Countermeasure(s): *(M/D)*	
Potential Project Risks	Assessment
1.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action during the Implementation:
	Contingency Plan (if applicable):
2.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:

	Mitigation Measures:
	Action during the Implementation:
	Contingency Plan (if applicable):
3.	Probability: H/M/L
(Description of Risk)	Impact: H/M/L
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action during the Implementation:
	Contingency Plan (if applicable):
Actual issues and Countermeasure(s)	
(PMR)	

5: Evaluation at Project Completion and Monitoring Plan

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan for the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Attachment

1. Project Location Map
2. Undertakings to be taken by each Government
3. Monthly Report
4. Environmental Monitoring Form / Social Monitoring Form
5. Monitoring sheet on price of specified materials
6. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
   (Final Report Only)

Environmental Checklist : 10. Ports and Harbors

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1. Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	(a) It is assumed that APORTIL will prepare EIS (Category A Project) or SEIS (Category B Project) by end of April 2016. (b) APORTIL will proceed and Environmental License will be issued by the end of June 2016. (c) EIS/SEIS meets the requirements of NDE, therefore, any collateral condition may not be required. (d) Permit for construction works will be prepared by APORTIL and obtained by the commencement of the construction work.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) N (b) N	(a) It is assumed that this project will be classified as Category B Project, therefore, the public consultation to be held at the stage of SEIS and EMP is not mandatory. APORTIL will discuss with NDE on the Public Consultation to be held or not. After NDE will review the SEIS and EMP, then NDE may require to hold the public consultation. (b) Comments and opinion collected at Public Consultation will be replied by APORTIL and those comments will be taken into account, if necessary.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental	(a) Y	(a) Review of alternative plans including environmental and social considerations matter has already carried out.

Environmental Checklist : 10. Ports and Harbors

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		considerations?		
2. Pollution Control	(1) Air Quality	(a) Do air pollutants, such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust emitted from ships, vehicles and project equipment comply with the country's emission standards? Are any mitigating measures taken?	(a) Y	(a) Field survey was conducted prior to the commencement of construction work, all items clear the criteria. During construction and operation, number of vessels and vehicles will be increased, however, the impact to air quality is minimal. During construction, water splay and tire cleaning facility will be provided and inspection and maintenance of engines for vessels and vehicles will be conducted for the improvement of exhausted gas quality.
	(2) Water Quality	(a) Do effluents from the project facilities comply with the country's effluent and environmental standards? (b) Do effluents from the ships and other project equipment comply with the country's effluent and environmental standards? (c) Does the project prepare any measures to prevent leakages of oils and toxicants? (d) Does the project cause any alterations in coastal lines and disappearance/appearance of surface water to change water temperature or	(a) Y (b) Y (c) Y (d) N	(a) Related facility (passenger terminal building) will be constructed and sewerage facility and rainwater drainage which meet the environmental quality standard will be provided. Present water quality clear the standard of Indonesia because local environmental quality standard has not been issued yet. (b) Timor-Leste does not have own quality standard for discharge water and water quality, however, MARPOL (Annex IV), Marine Pollution Prevention Act 2008 and other international agreements are applied. (c) Fuel supply to working vessels and construction machine will be conducted in accordance with the requirements of working procedural manual and project contractor must prepare the action plan for oil spill. (d) Reclamation is not necessary, and the jetty and platform

Environmental Checklist : 10. Ports and Harbors

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		quality by decrease of water exchange or changes in flow regimes? (e) Does the project prepare any measures to prevent polluting surface, sea or underground water by the penetration from reclaimed lands?	(e) N	is supported by steel pipe piles and concrete piles, therefore, seawater exchange will not occur. (e) Reclamation is not necessary.
	(3) Wastes	(a) Are wastes generated from the ships and other project facilities properly treated and disposed of in accordance with the country's regulations? (b) Is offshore dumping of dredged soil properly disposed in accordance with the country's regulations? (c) Does the project prepare any measures to avoid dumping or discharge toxicants?	(a) Y (b) Y (c) Y	(a) Wastes are collected by APORTIL and disposed of at public landfill. (b) In case dredging work is necessary, pollution prevention membrane must be installed to prevent spreading muddy water. Dredged material must be dumped at authorized offshore dumping area. (c) It is not planned that any hazardous substance is used. In case hazardous substance is used in this project, project contractor must prepare the procedural manual for handling hazardous substance and the operation must be carried out according to the procedural manual.
	(4) Noise and Vibration	(a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards?	(a) Y	(a) Level of noise and vibration clear the Indonesian criteria because Timor-Lest does not have local criteria. Japanese criteria is used for forecasting the level of noise and vibration during piling work.
	(5) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the	(a) N	(a) Groundwater is not pumped up.

Environmental Checklist : 10. Ports and Harbors

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		extraction of groundwater will cause subsidence?		
	(6) Odor	(a) Are there any odor sources? Are adequate odor control measures taken?	(a) Y	(a) In case dredging work is necessary, dredged material may generate bad smell. If the bad smell is tremendous, some measure to neutralize ammonia is taken.
	(7) Sediment	(a) Are adequate measures taken to prevent contamination of sediments by discharges or dumping of hazardous materials from the ships and related facilities?	(a) Y	(a) MARPOL (Annex IV), Marine Pollution Prevention Act 2008 and Waste Management Act 2010 are applied, therefore, vessels and related facilities do not dispose/dump pollutant to the seawater.
3. Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) Protected area does not exist around the proposed project area.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?	(a) N	(a) There are not primary forest, tropical natural forest, important habitat of coral, mangrove, wetland, tidal wetland, etc. around the project site, however, coral which is classified as Near Threatened (NT) is found at the area about 1,000 meters to north from the project site, and countermeasures to prevent giving impact due to construction work on the coral above must be provided.
		(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?	(b) N	(b) There is not any important habitat for precious species around project site.
		(c) If significant ecological impacts are	(c) Y	(c) There is no concern to give impact on ecological system, however, visual observation must be conducted to find any

Environmental Checklist : 10. Ports and Harbors

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?	(d) Y	spreading of muddy water. When working vessel will be imported from foreign country, ship bottom cleaning prior to the mobilization and verification upon arrival must be carried out to prevent adventive to come in.
		(d) Is there a possibility that the project will adversely affect aquatic organisms? Are adequate measures taken to reduce negative impacts on aquatic organisms?	(e) N	(d) Ditto above
		(e) Is there a possibility that the project will adversely affect vegetation or wildlife of coastal zones? If any negative impacts are anticipated, are adequate measures taken to reduce the impacts on vegetation and wildlife?		(e) No impact will be given to coastal vegetation and wild animals.
	(3) Hydrology	(a) Do the project facilities affect adversely flow regimes, waves, tides, currents of rivers and etc. if the project facilities are constructed on/by the seas?	(a) N	(a) Jetty and platform are supported by steel pipe piles and concrete piles, therefore, ferry mooring facility does not give negative impact on flow condition, wave and tidal current.
	(4) Topography and Geology	(a) Does the project require any large scale changes of topographic/geographic features or cause disappearance of the natural seashore?	(a) N	(a) Change of topography and geology and cease of natural seashore will not occur.
4. Social	(1) Resettlement	(a) Is involuntary resettlement caused by project	(a) N	(a) to (j) No land acquisition nor involuntary resettlement

Environmental Checklist : 10. Ports and Harbors

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
Environment		implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?		occur because the project area is under the control of APORTIL.
		(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?	(b) N	
		(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?	(c) N	
		(d) Are the compensations going to be paid prior to the resettlement?	(d) N	
		(e) Are the compensation policies prepared in document?	(e) N	
		(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?	(f) N	
		(g) Are agreements with the affected people obtained prior to resettlement?	(g) N	
		(h) Is the organizational framework established to properly implement resettlement? Are the	(h) N	

Environmental Checklist : 10. Ports and Harbors

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(j) N	
	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?	(a) Y	(a) During construction work, vehicles for construction work may impact the traffic of surrounding area, however, the number of vehicle is not many and level of impact is minor. Work schedule is informed on ahead to the surrounded residents.
		(b) Is there a possibility that changes in water uses (including fisheries and recreational uses) in the surrounding areas due to project will adversely affect the livelihoods of inhabitants?	(b) N	(b) There is no impact on the usage of water area.
		(c) Is there a possibility that port and harbor facilities will adversely affect the existing water traffic and road traffic in the surrounding areas?	(c) Y	(c) Same as (a)
		(d) Is there a possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are considerations given to public health, if necessary?	(d) N	(d) Any population inflow is not expected due to this project.

Environmental Checklist : 10. Ports and Harbors

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) There is no legacy nor historical places around the project site.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) The area for this project is within the existing port area, therefore, it is assumed that the project has no negative impact on the landscape.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N (b) N	(a) and (b) The ethnic minority and indigenous people does not exist around the project area and the fishery rights does also not exist because the project area locates within the existing port area.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?	(a) Y	(a) Local regulations are observed.
		(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?	(b) Y	(b) Safety measures, such as wearing life jackets (when working on the sea) and installing life float, safety fence and caution sign are planned.
		(c) Are intangible measures being planned and	(c) Y	(c) It is planned to provide the safety and health training to

Environmental Checklist : 10. Ports and Harbors

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(d) Y	workers, including the safety and health of workers and respecting the local society. (d) Employment of local people must be prioritized and workers must be educated for respecting local culture.
5. Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) N (c) N	(a) Construction volume must be minimized. Monitoring must be carried out for dust, noise, vibration, exhaust gas, muddy water, etc. by instrument measurement and visual observation daily, and impact to the surrounding area must be verified. (b) It is not assumed that any work generating pollution is implemented, however, monitoring to verify the generation of pollution can minimize the negative impact on natural environment. The construction work has minimal impact on natural environment. Natural environment other than pollution has no negative impact. (c) Increase of number of vehicles during the construction work is low, however, interview to the surrounding residents must be carried our periodically in order to

Environmental Checklist : 10. Ports and Harbors

Category	Environmental Item	Main Check Items	Yes: Y No : N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
				understand the situation and make the negative impact minimal.
	Note on Using Environmental Checklist	(a) Where necessary, impacts on groundwater hydrology (groundwater level drawdown and salinization) that may be caused by alteration of topography, such as land reclamation and canal excavation should be considered, and impacts, such as land subsidence that may be caused by groundwater uses should be considered. If significant impacts are anticipated, adequate mitigation measures should be taken. (b) If necessary, the impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N (b) N	(a) It is not assumed that the project has impact on groundwater system (lowering of water level and salination) and ground settlement due to usage of groundwater. (b) The project lies at northern side and central part of the island of Timor-Leste, it is not assumed that the impact caused by the project has cross-border impact.

MONITORING FORM (Before and during construction work)

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item	Monitoring Results during Report Period
Responses/Actions to Comments and Guidance from Government Authorities	
Number and contents of comments made by stakeholders	
Number and contents of responses made by project proponent	

2. Mitigation Measures

Air Quality, Ecological System

Schedule	Condition of air quality, dust, ecological system, etc. by visual observation	Judgement, countermeasure
1st day		
2nd day		
3rd day		
:		

In case any unusual situation of air quality is identified during visual observation, the following quality survey is implemented.

- Air Quality (Emission Gas / Ambient Air Quality)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
SO_2	$\mu g/Nm^3$	max.365/24hours	max.900/hour	N.A.	Indonesia	
NO_2	$\mu g/Nm^3$	max.150/24hours	max.400/hour	N.A.	Indonesia	
CO	$\mu g/Nm^3$	max.10,000 /24hours	max.30,000 /hour	N.A.	Indonesia	
O_3	$\mu g/Nm^3$	-	max.235/hour	N.A.	Indonesia	

Dust (TSP)	μg/Nm^3	max.230/24hours	-	N.A.	Indonesia	
HC	μg/Nm^3	max.160/3hours		N.A.	Indonesia	
Pb	μg/Nm^3	max.2/24hours	-	N.A.	Indonesia	

Water Quality (by Visual Observation)

Schedule	Rain fall	Condition of water pollution	Condition of rain fall and drainage	Judgement, countermeasure
1st day	yes/no			
2nd day	yes/no			
3rd day	yes/no			
.				

In case any unusual situation of water quality is identified during visual observation, the following quality survey is implemented.

Water Quality

Schedule	Item	Unit	Sample -1	Sample -2	Sample -3	Sample -4	Sample -5	*Criteria	Adjudication
1st day	Turbidity	NTU						Max. 5	
	pH	-						7-8.5	
(Date)	Total nitrogen	mg/L						0.1	
	Total phosphate	mg/L						0.015	
	COD	mg/L						-	
	Oil & grease	mg/L						-	
	Total suspended solids	mg/L						Max. 20	
3rd day	Turbidity	NTU						Max. 5	
	pH	-						7-8.5	
(Date)	Total nitrogen	mg/L						0.1	
	Total phosphate	mg/L						0.015	
	COD	mg/L						-	
	Oil & grease	mg/L						-	
	Total suspended solids	mg/L						Max. 20	
5th day	Turbidity	NTU						Max. 5	
	pH	-						7-8.5	
(Date)	Total nitrogen	mg/L						0.1	
	Total phosphate	mg/L						0.015	
	COD	mg/L						-	
	Oil & grease	mg/L						-	
	Total	mg/L						Max. 20	

Schedule	Item	Unit	Sample -1	Sample -2	Sample -3	Sample -4	Sample -5	*Criteria	Adjudica-tion
	suspended solids								
7th day (Date)	Turbidity	NTU						Max. 5	
	pH	-						7-8.5	
	Total nitrogen	mg/L						0.1	
	Total phosphate	mg/L						0.015	
	COD	mg/L						-	
	Oil & grease	mg/L						-	
	Total suspended solids	mg/L						Max. 20	

*:Indonesian criteria are applied because Timor-Leste's criteria have not been issued.

Waste (within construction area)

Schedule	Contents	Quantity (m^3)	Disposal method
1st day			
2nd day			
3rd day			
. .			

Soil pollution

Schedule	Description of work	Yes/No of soil pollution	Mitigation method
1st day			
2nd day			
. .			

Noise / Vibration

Item (unit)	Measured value (average)	Measured value (max)	Local standard	International standard referred	Frequency (during piling work)	Method	Measuring point
Noise level (dB)			NA	80 (7AM-7PM)	10 min. Twice/day	Noise level meter	Border of lot
Vibration level (dB)			NA	70 (7AM-7PM)		Vibration meter	Border of lot

Note : Japanese standard of Ministry of Land, Infrastructure, Transport and Tourism is

referred as International standard for noise and vibration.

Odor

Schedule	Description of work	Yes/No of odor	Mitigation method
1st day			
2nd day			
. .			

3. Natural Environment

- Ecosystem

Monitoring Item	Monitoring Results during Report Period
Negative effects/Actions to Valuable species	To be carried out together with Air Quality visual observation

4. Social Environment

Monitoring item	Item	Method	Frequency	Condition during reporting period
Resettlement	Not Applicable			
Livelihood	Traffic jam, noise, vibration	Visual observation and hearing	Once/week	
Working environment	Implementation status of management of safety and health	Verification of monthly	Once/month	
Accident	Implementation status of management of safety and health	Verification of monthly accident report	Once/month	

MONITORING FORM (During operation)

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item	Monitoring Results during Report Period
Responses/Actions to Comments and Guidance from Government Authorities	
Number and contents of comments made by stakeholders	
Number and contents of responses made by project proponent	

2. Social environment

Monitoring item	Item	Method	Frequency	Condition during reporting period
Accident	Implementation status of management of safety and health, Safe traffic line of passengers	Verification of monthly accident report	Once/month	

Operation and Maintenance Cost

Item	Yearly Maintenance Cost	Periodical Maintenance Cost	Incidental Investment Cost
Overall Facilities	US$3,600		
Jetty, Platform		US10,000/3 year	Concrete repair cost
Movable Ramp		US$5,200/2 year	Repair cost for structural damage
Rubber Fender			US$25,000/set (when damaged)
Bollard	US$100		
Navigation Aids			
Lighting facility			US$70/lamp (change)
Water supply & Hydrant	US$100		
CCTV System			US$50/No. (Camera) US$200/No. (Monitor) US$450/set (DC power source) (all for replace)
TOTAL	**US$3,800**		