No.

BASIC DESIGN STUDY REPORT

ON

THE PROJECT FOR REHABILITATION OF DILI PORT

OF

THE DEMOCRATIC REPUBLIC OF TIMOR LESTE

NOVEMBER 2005

JAPAN INTERNATIONAL COOPERATION AGENCY

GM
JR
05-187

PREFACE

In response to a request from the Government of the Democratic Republic of Timor Leste, the Government of Japan decided to conduct a basic design study on the Project for Rehabilitation of Dili Port and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to East Timor a study team from March 1 to March 28,2005.

The team held discussions with the officials concerned of the Government of East Timor, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to East Timor in order to discuss a draft basic design, and as this result, the present report was finalizes.

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

I wish to express my sincere appreciation to the officials concerned of the Government of the Democratic Republic of Timor Leste for their close cooperation extended to the teams.

November 2005

Seiji Kojima
Vice President
Japan International Cooperation Agency

November 2005

Letter of Transmittal

We are pleased to submit to you the basic design report on The Project for Rehabilitation of Dili Port in the Democratic Republic of Timor Leste.

This study was conducted by International Development System Inc., under a contract to JICA, during the period from February 23, 2005 to November 30, 2005. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of East Timor and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

Finally, we hope this report will contribute to further promotion of the project.

Very truly yours,

Fujio Saigusa
Project Manager
Basic design study team on
the Project for Rehabilitation of Dili Port
in the Democratic Republic of Timor Leste
International Development System Inc.

LOCATION MAP

Country Profile

Land Area : 14,000 sq. Km

Population : 930,000 (2004)

Language : Tetum、Portuguese

Currency : US Dollar

G D P : US343 million (2002)

GDP per capita : US$491 (2002)

Actual GDP increase rate : 5 %（2002）

Perspective View

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Abbreviations

Abbreviation	Full Spelling
ADB	Asian Development Bank
AusAID	Australian Agency for International Development
B/A	Banking Arrangement
B/D	Basic Design
BL No.	Block No.
CFET	Consolidated Funds for East Timor
D/D	Detail Design
DoE	Directorate for Environment's
DWT	Dead Weight Tonnage
DST	Department of Sea Transportation
E/N	Exchange of Notes
EIA	Environmental Impact Assessment
EIRP	Emergency Infrastructure Rehabilitation
EMP	Environmental Management Plan
EPU	Environmental Protection Unit
ETPA	East Timor Public Administration
F/S	Feasibility Study
GRT	Gross Tonnage
ICB	Interlocking Concrete Block
IEE	Initial Environmental Examination
JICA	Japan International Cooperation Agency
MDE	Ministry of Development and Environment
MTCPW	Ministry of Transport, Communications and Public Works
NDP	National Development Plan
NGO	Non-Governmental Organization
PC	Pre-stressed Concrete
RC	Reinforced Concrete
SEA	Strategic Environmental Assessment
SIP	Sector Investment Program
TFET	Trust Fund for East Timor
UN	United Nations
UNDP	United Nations Development Programmed
UNICEF	United Nations International Children's Fund
UNMISET	United Nations Mission of Support in East Timor
UNOPS	United Nations Office for Project Services
UNTAET	United Nations Transitional Administration in East Timor

Summary

70% of the infrastructure was destroyed and damaged in East Timor, for the confusion and the interruption of the maintenance, following the direct election where the autonomy of East Timor, proposed by Indonesia Government, was put to the vote in August 1999.
After that, the economy recovered to some extent while the nation-building aiming at the future independence under the regime of United Nations Transitional Administration in East Timor (UNTAET). However after independence, the economic condition was getting worse again due to decreasing of number of persons charged in aid operations of foreign countries and organizations.

The government has established a "National Development Plan of 5 years (2002-2007);NDP". The government is implementing the policy that the priority subjects shall be education, health, improvement of agricultural productivity, efficient administration of the government and the maintenance of infrastructure, in accordance with NDP and "Sector Investment Program; SIP", aiming at the economic development for alleviation of poverty.

MTC has been positively aiding private organizations and implementing improvement of the infrastructures, in the sector of transportation, in accordance with NDP and with SIP.

Building of an efficient port is vital for stable lives of people due to East Timor is depending on importation of 85 % of their daily consumption. It would guarantee the national income of exportation of various agricultural products too.

East Timor has seven ports including fishing ports. Dili Port, has three wharves for 2000 GRT class vessels, is the only international port in this country. Only two wharves are under operation for international vessels and cargos, excluding one wharf with structural defects that is used only for small boats at the present time.

The Indonesian Government started construction work of Dili Port in 1994 and completed work 1999. Few years after completion some parts of concrete slabs and beams of the wharves were damaged due to construction defects. Although the wharves are under operation avoiding the seriously damaged parts at present, the present cargo volume is about to exceed the capacity of the port. If the damaged wharves are left without any measures to repair, the function of Dili Port as an international port would be lost in near future, and the national economy and lives of people would be affected seriously.

Under these circumstances, the Government of East Timor made a request for Grant Aid for the project of rehabilitation of Dili Port (the Project) including repair to the damaged concrete slabs and beams to the Government of Japan.

Based on the request for Grant Aid from the Government of East Timor, a field survey of the preparatory study was implemented by JICA in August 2004. Many deteriorated parts, including falling covering concrete, exposing and severance of re-bars, were found in the wharves by the field survey. The damage of the wharves was foreseen to be getting worse in future.

Additional parts, with serious damages to be repaired, were found out of the range of the request from the Government of East Timor too.

The preparatory study concluded that the repairing of the surface of the concrete slabs and beams are not enough due to the serious defect in the wharf structure and therefore the superstructure of the wharf has to be demolished completely and re-built.

The seriousness of the damages to the wharves is recognized by the Government of East Timor with the conclusion of the preparatory study. The Government examined the components of the Project in detail and made an additional request for Grant Aid for the Project.

The field survey for basic design study was carried out by JICA from 28th February to 30th March 2005. The components of the request were confirmed through the discussion with the concerned persons of the Government of East Timor. Condition of the damaged wharves, causes of the damage, natural conditions around the Port and the present usage of the Port were surveyed

With the result of the field survey, basic design was implemented, the range of the Grant Aid for the Project was determined and construction method was planned in Japan. After that an investigation committee was delegated to East Timor from 3rd to 14th September 2005, components of the basic design and the role of the Government of East Timor were confirmed.

The investigation committee was delegated again with detailed design study report from 19th to 30th November 2005. The result of detailed design was discussed, confirmed and agreed with the concerned persons of the Government with drawings and documents.

The range of the Grant Aid for the Project was determined so that safe berthing and smooth loading and unloading would be enabled in consideration of the future sum of cargos to be handled in Dili Port.

The basic design was implemented based on “Technical Standards and Commentaries for Port and Harbour Facilities in Japan”, the method of the rehabilitation of wharves was determined through the examination of possibility of usage of existing foundation PC piles and through the consideration of reducing the cost. The structural type was determined from the economical and

efficient viewpoint, based on the result of the field survey of damaged wharves. The components and scale of the project is given in the following table.

Table- 1 Components and scale of the Project

Item of Rehabilitation	Structural Character	Description	Scale
Wharf (BL 1, 2)	Wharf with foundation of pre-stressed concrete piles	Demolition and re-building of superstructure	Area of Rehabilitation : 1,800m^2 Length : 90m Width : 20m Design depth : 7m
Wharf (BL 3, 4)	Wharf with foundation of pre-stressed concrete piles	Demolition and re-building of superstructure	Area of Rehabilitation : 1,080m^2 Length : 90m Width : 12m Design depth : 7m
Access to the wharf (BL 7)	Reclamation with concrete retaining wall	Demolition of superstructure Retaining wall, reclamation and concrete pavement	Area of Rehabilitation : 216m^2 Length : 14.4m Width : 15m
Enlargement of wharf (BL 9)	Wharf with foundation of pre-stressed concrete piles	Demolition of transit shed Enlargement of wharf in width (BL3,4)	Area of Rehabilitation : 720m^2 Length : 90m Width : 8m

The estimated cost of the Project is approximately ¥908 millions (Japanese Yen) including ¥900 millions of the Grant Aid of Japan and ¥ 8 millions of the obligation of the Government of East Timor. The scheduled construction time is 29 months following 3months of preparation work (PQ, Tender and Contract).

After the completion of the Project, Dili Port would be maintained by the port authority (APORTIL) under MTC. Although most engineers went back to Indonesia after the disturbance, the skills of staff in the port authority has been improved with the training of the specialists delegated by aid organizations, so that continuous maintenance of the port is enabled with 32 regular staff.

The maintenance of Dili Port was recognized possible because the contents would not change after the rehabilitation of existing wharves.

Following effects would be expected by the implementation of this Project. The transportation condition would be improved and about 930,000 people of total population (of 2004) would be benefited by the Project of the rehabilitation of the only international port in this country.

A. Direct Impact

- The safety of arriving vessels would be improved in berthing, de-berthing, and in loading and unloading work.
- Time of vessels standing by would be shortened because two berth rehabilitated by the Project would reduce time of loading and unloading of cargo.

B. Indirect Impact

- Reduction of transportation cost would activate the national economy and promote the foundation for various enterprises. The exportation of local products mainly agricultural products would be promoted.
- The chance of employment would be increased by the construction work and by the operation of the Port.
- The cost for maintenance in future would be reduced for the Government of East Timor by the Project of the rehabilitation of the port.

The Dili port is a vital factor for social and economical functions in this country, Therefore an urgent implementation of the project was required. However the government of East Timor lacks the financial and technical background to initialize such a project, therefore requirement of grant aid is the only solution to this problem.

In the implementation of the Project, prompt and smooth practice of the obligation of the Government of East Timor shall be required. The effect of the Project would be manifested and get continuous with the reasonable maintenance work of rehabilitated wharves.

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ON

THE PROJECT FOR REHABILITATION OF DILI PORT

IN

TIMOR-LESTE

CONTENTS

CHAPTER 1

BACKGROUND OF THE PROJECT

Chapter 1 Background of the Project

East Timor occupies the eastern part of the Timor Island sharing the land area of 14,000 km^2, the population of some 930,000 persons (as of 2004) and the GDP of 490 US$ per capita. Dili Port is located at the capital of East Timor and the Port handles 95 % of the total export and import cargo. The Port is also the gateway of maritime transportation between the capital and Oecusi, enclosed territory in West Timor. Therefore, the Port is one of the most important infrastructures supporting the socio-economic activities in East Timor.

The Port was constructed between 1994 and 1999 by Indonesian Government. However, in September 2002, some parts of concrete slab of the wharf in the Port were damaged accidentally. Although the damaged parts were repaired temporarily, some areas of the wharf were not used and the port operation has been limited consequently. It was found that the portland cement concrete made wharves are partially in a destructive condition according to the visual site inspection conducted by the Government of East Timor.
Under these circumstances, the Government of East Timor made a request for Grant Aid for the project of rehabilitation of Dili Port (the Project) to the Government of Japan.

CHAPTER 2

CONTENTS OF THE PROJECT

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

The government established “National Development Plan of 5 years (2002-2007) ;NDP”. The government is implementing the policy that the prior subjects shall be education, health, improvement of agricultural productivity, efficient administration of the government and the maintenance of infrastructure.
East Timor has seven ports including fishing ports and MTC is operating and maintaining these ports as the Port Authority.

East Timor is depending on importation in 85 % of daily consumption and Dili Port is only international port in this country.
However, in September 2002, some parts of concrete slab of the wharf in the Port were damaged incidentally. Although the damaged parts were repaired temporarily, some areas of the wharf are not in use and the port operations are limited consequently. It was found that the concrete made wharves are partially in the destructive condition according to the visual site inspection conducted by the Government of East Timor.

Under these circumstances, the Government of East Timor made a request for Grant Aid for the project of rehabilitation of Dili Port (the Project) including repair of the damaged concrete slabs and beams to the Government of Japan in January 2003.

Based on the request for Grant Aid from the Government of East Timor, a field survey of the preparatory study was implemented by JICA in August 2004. The preparatory study concluded that the superstructure of the wharf has to be demolished and re-built completely not only repairing the surface of the concrete slabs and beams because of the serious defect of the wharf structure.
The field survey of basic design study was implemented by JICA from 1st to 28th March, 2005 and the study concluded that the superstructure has to be re-built completely too. Besides the study designed that the concrete foundation piles shall be driven newly not using existing piles from economic standpoint.

The purpose of the project is to restore the functions of Dili Port as the international port and to keep safe and efficient operation of port by implementing the rehabilitation of the damaged wharf.

Based on the request of the Government of East Timor and based on the result of basic design study, following items are chosen as components of the Project (Refer to Fig.2-1.1)

Rehabilitation of the wharf (BL 1, 2)
Rehabilitation of the wharf (BL3,4)
Rehabilitation of the access to the wharf (BL7)
Enlargement of wharf BL3,4 in width (BL9)

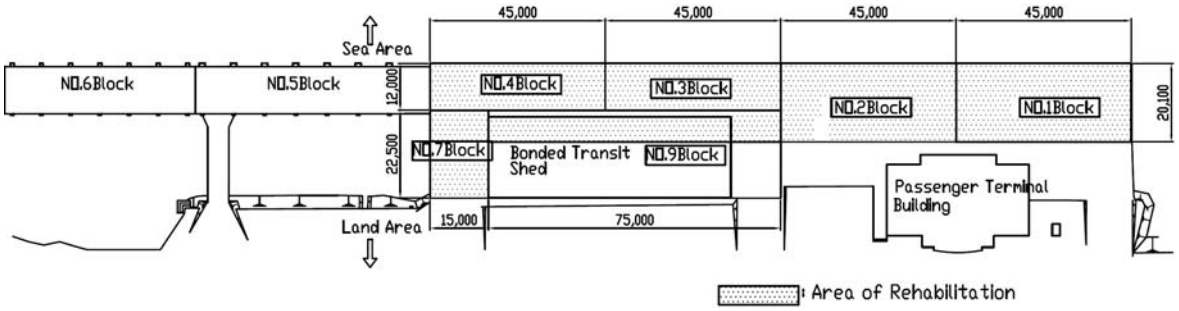


Fig.-2-1.1 Component of the Project

Based on the results of field surveys conducted, design concept for the planned wharf is established as shown below.

- The wharf will be designed with design seismic coefficient, kh = 0.15, that is the assumed value for the existing wharf.
- Surcharge on the wharf will be that on the general wharf in accordance with the Technical Standards and Commentaries for Port and Harbour Facilities in Japan.
- Field survey of superstructures results show that superstructures of Block Nos. 1 to 4 and Block No. 7 are heavily damaged. The superstructures should be demolished, with due consideration to the present unusable conditions for accommodation of ships and cargo handling operations.
- The concrete foundation piles shall be driven newly not using existing piles from economic standpoint.
- Structural comparative study was done in three structural types consisting of pile foundation type, gravity type and steel sheet pile type. Based on the result of the study, pile foundation type was chosen from economic, environmental standpoint. The study also judged that the pile foundation type is the most stable from the standpoint of method of construction and that the type fits conditions and characteristics of the site.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

2-2-1-1 Basic Policy

The basic elements of this project outlined below cover:

(1) Object scope (Facilities)
(2) Selected site (Section)
(3) Scale of cooperation

(1) Object scope (Facilities)

- Demolition and re-building of superstructure of wharf. (BL 1, 2, 3, 4, 7 & 9)
- Driving of foundation PC piles of wharf. (BL 1, 2, 3 &4)
- Reclamation and pavement of the access by using concrete retaining wall. (BL7)
- Enlargement of wharf in width. (BL 9)

(2) . Selected site

Eastern part 180m in length of the wharf of Dili Port. (Whole length of the wharf is 289.2m)

(3) . Scale of cooperation

The components and scale of the project is in the following table. The scheduled construction time is 29 months following 3months of preparation work (PQ, Tender and Contract).

Table- 2-2-1.1 Components and scale of the Project

Item of Rehabilitation	Structural Character	Description	Scale
Wharf (BL 1, 2)	Wharf with foundation of pre-stressed concrete piles	Demolition and re-building of superstructure	Area of Rehabilitation 1,800m^2 Length 90m, Width 20m, Design depth 7m
Wharf (BL 3, 4)	Wharf with foundation of pre-stressed concrete piles	Demolition and re-building of superstructure	Area of Rehabilitation 1,080m^2 Length 90m, Width 12m, Design depth 7m
Access to the wharf (BL 7)	Reclamation with concrete retaining wall	Demolition of superstructure Retaining wall, reclamation and concrete pavement	Area of Rehabilitation 216m^2 Length 14.4m, Width 15m
Enlargement of wharf in width (BL 9)	Wharf with foundation of pre-stressed concrete piles	Demolition of transit shed Enlargement of wharf in width(BL 3,4)	Area of Rehabilitation 720m^2 Length 90m, Width 8m

2-2-1-2 Policy for Physical Conditions

Dili Port is located almost at the center of the northern coastal area of Timor Island. Mountainous area stretches to the interior land area.

The weather condition of the Timor Island is affected by the monsoon. It is categorized that East Timor has two seasons; one is dry season and the other is rainy season. Dry season continues from June to November, and rainy season from December to May respectively. Dry season is brought by the south-east trade wind coming from the Australia Continent. On the other hand, rainy season is generated by the north-west monsoon from the South China Sea.

The temperature in Dili is between 22°C Min. and 33°C Max. throughout the year, and stable comparatively. The highest temperature has been recorded before rainy season, while the lowest temperature has been recorded between June and August.

The yearly rainfall in Dili City is 1,200 mm in the year 1989, and 85% of the rainfall concentrate usually in the rainy season.

The gateway port in East Timor, Dili is located at 8°33' south latitude, and 125°34'east longitude.

(1) Weather

Wind direction and wind velocity recorded at Dili Airport between January 2003 and December 2004 (unavailable for November 2004) are shown in the **Table 2-2-1.2 (1) Wind Direction and Wind Velocity (Total Number). Table 2-2-1.2 (2) Wind Direction and Wind Velocity (More than 10m/s)** (Observation time: 9:00, 15:00, and 18:00)

North-East wind direction was most frequently observed. However, as for the wind more than 10m/s, North-West, West wind directions were most frequently occurred. It is estimated that the maximum wind velocity is 25m/sec at Dili Port.

Table 2-2-1.2 (1) Wind Direction and Wind Velocity (Total Number)

Wind Direction	Frequency (%)	Average (m/s)	Max. Velocity (m/s)
Calm	32.0%	0.00	0.00
NE	24.5%	3.8	10.3
E	1.9%	4.0	10.3
SE	0.9%	2.7	9.2
S	0.5%	2.5	7.8
SW	0.4%	3.2	7.8
W	12.4%	4.2	13.9
NW	15.2%	3.5	12.8
N	12.1%	3.3	12.8

Dili Airport Observatory

Table 2-2-1.2 (2) Wind Direction and Wind Velocity (More than 10m/s)

Wind Direction	Frequency (%)	Average (m/s)	Max. Velocity (m/s)
NE	14.3%	10.3	10.3
E	9.5%	10.3	10.3
SE	0.0%	—	—
S	0.0%	—	—
SW	0.0%	—	—
W	38.1%	11.3	13.9
NW	28.6%	11.8	12.8
N	9.5%	12.1	12.8

Dili Airport Observatory

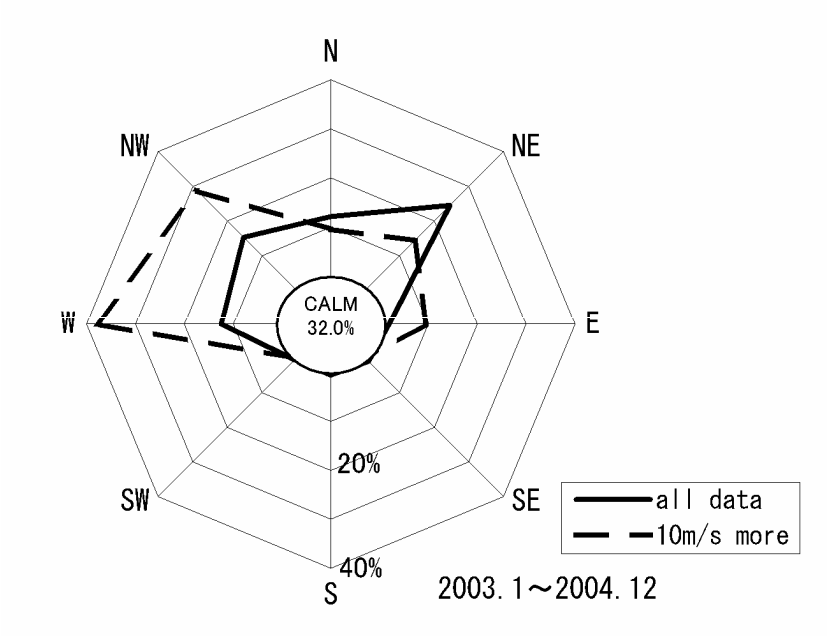


Fig. 2-2-1.1Windrose

（2） Wave

Maximum wave heights by direction in front of the wharf are shown in the following table. The maximum wave heights are approximately 1.0 m only throughout the year.

Table 2-2-1.3 Planned Wave Heights

Season	Month	Wind Direction	Wave Height (High)	Wave Height (low)	Wave Period
Dry	Apr.-Oct.	NE	1.0m	0.5m	5sec
Rainy	Nov.-Mar.	NW	1.0m	0.5m	5sec

（3）Tide

Tidal ranges at Dili Port are shown below:

H.H.W.L (Extraordinary high water level)	:	+2.70m
H.W.L (High water level)	:	+2.30m
M.W.L (Mean water level)	:	+1.30m
L.W.L.(Low water level)	:	+0.30m
DL（Lowest water level）	:	0.00m

Above figures are referred to “Seafarer Tides 2003” by Commonwealth, Australia 2002 and Indonesia Tidal 2003.

（4）Sounding Map

Fig. 2-2-1.2 shows the sounding map of Dili Port. This map is the latest one measured by United Peacekeeping Force in September 1999. The Port maintains around -7m water depth in front of the Port. Coral reef develops well 500 m offshore. Both sides of the reef are used by vessels as the water channel. The natural breakwater made by the coral reef protects the coastal area including the Port from the wave attacks effectively.

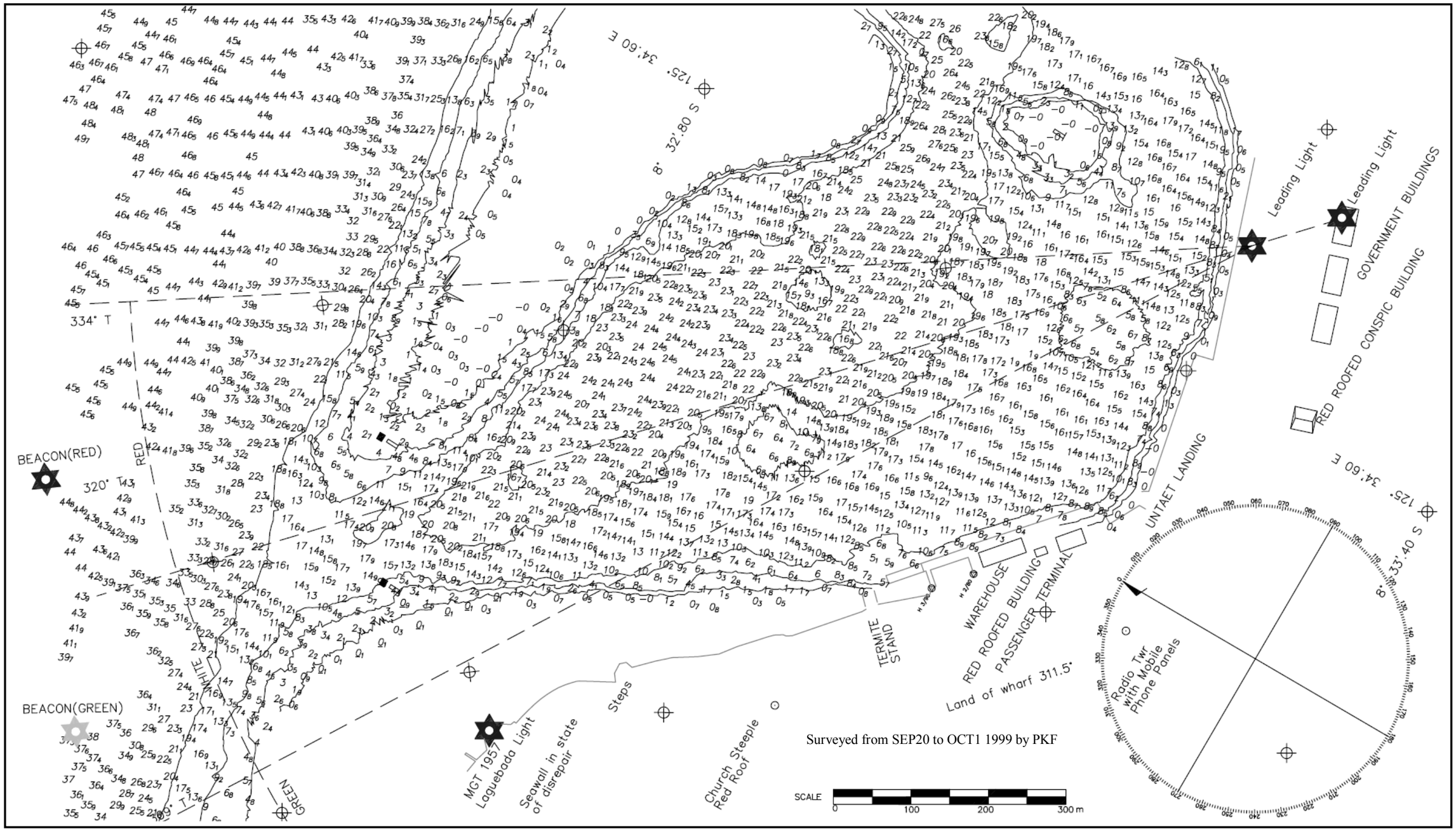


Fig. 2-2-1.2 Sounding Map of Dili Port

（5）Sub-soil Condition

According to the sub-soil survey carried out by the JICA Study Team, sub-soil condition at the site is shown as below.

Table 2-2-1.4 Sub-Soil Condition

Depth 0m（Seabed）	Material	N-Value	Density
4m～8m	Marine Deposit Silt&Sand	N=5～7	Soft
21m～26m	Sand（Median） With Silt	N=7～40	Loose～Dense
26m～	Sand&Fine Gravel (Partially Cemented)	N>25 （$\overline{N}$＝35）	Dense～Hard

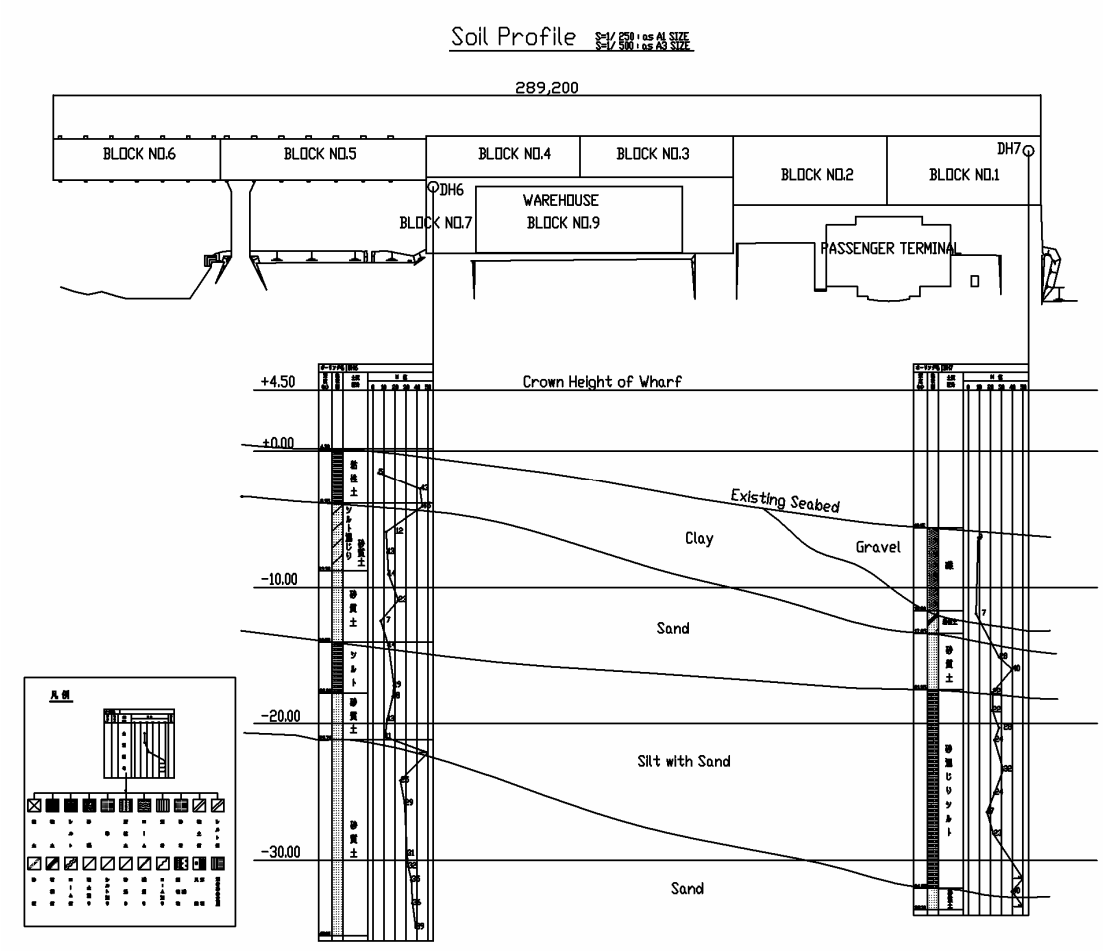


Fig. 2-2-1.3 Soil Profile

（6）Earthquake

The latest earthquake which provably affected the East Timor is an earthquake recorded in 1995/5/15. This earthquake has the magnitude 6-7 with the epicenter 78 km west of Dili City (8°36' south latitude, and 126°16'east longitude), and 47 km depth.

Taking into consideration of the information regarding the earthquakes concerned, seismic coefficients are decided as follows.

Design seismic coefficient　kh＝kr（regional coefficient）×ki（coefficient of importance）

kr（regional coefficient）；0.09、

ki（coefficient of importance）；1.5、

Therefore;　kh＝0.09×1.5=0.135→0.15

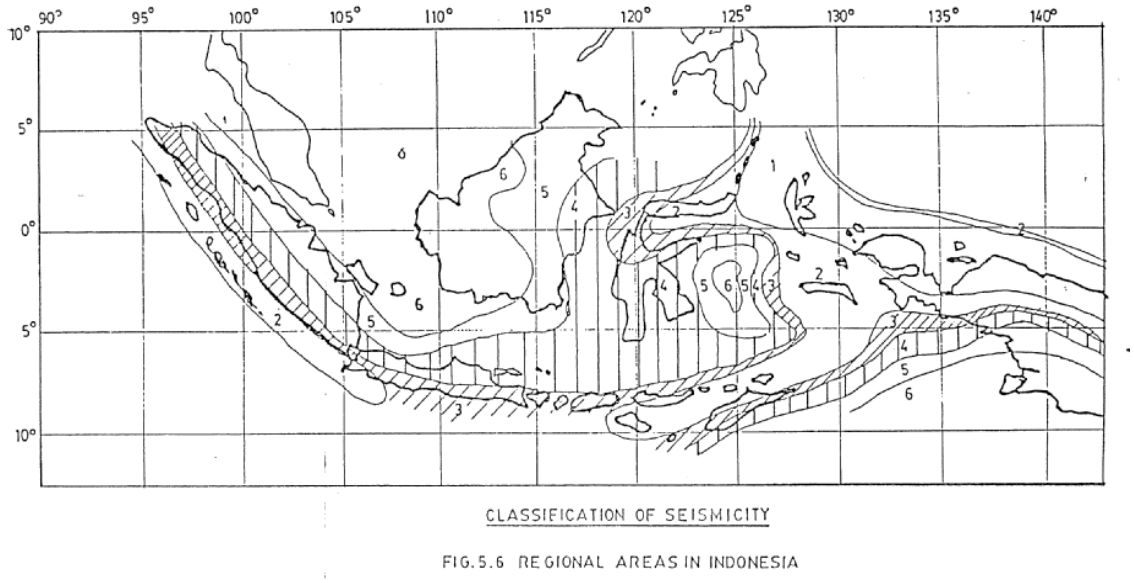


Fig. 2-2-1.4Classification of Seismicity

2-2-1-3 Policy for Socioeconomic Condition

The drop of GDP to US$336 million in 2003 from US$343 in 2002 followed by the rise to US$339 in 2004 from in 2003, corresponds the drop of GDP to 412US$ per capita in 2003 from US$491 per capita in 2002 followed by the drop to 354US$ per capita in 2004 from in 2003. (refer to Table-2-2-1.5)

Table 2-2-1.5 Economic Data of East Timor

Fiscal Year	2002	2003	2004
GDP (US$ Million)	343	336	339
GDP per capita (US$)	491	412	354
Rate of actual economic growth on GDP (%)	-6.7	-6.2	1.8
Structure of industries in GDP (%)			
Agricultural Industry	25.9	25.4	n.a.
Industry	18.8	17.5	n.a.
Service Industry	55.3	57.1	n.a.
Rate of economic growth of industry (%)			
Agricultural Industry	3.4	-2.3	n.a.
Industry	26.4	9.5	n.a.
Service Industry	n.a.	n.a.	n.a.

Where: n.a. not applicable

Agriculture is the most basic industry and the most important factor for economic promotion in East Timor. However, production of coffee, only agricultural product of East Timor, is easily affected by weather condition and by the fluctuation of the international market. Development of other various farm products is now required for promoting the exportation of this country.

The sum of exportation is US$6 million (coffee exportation is about 50% of it) and the importation is prevailing with the sum of US$239million in 2002.

2-2-1-4 Policy for Construction Condition and Procurement Condition

I In Timor-Leste, enough common equipment are existing except for big machines such as pile driving machine, crane with capacity over 30t or equipment for marine construction work.

Accordingly, equipment for the major marine construction work must be imported from the neighboring countries. In this matter an extra expense which is required for transportation and cruise costs will become a big burden.

On this account, the construction scheme has been considered to apply the common use of equipment which is available in Timor –Leste as much as possible.

On the other hand, it is indispensable that in the project enough experienced local personnel such as engineers, technicians, and mechanics are available for the marine construction that has knowledge of marine conditions and a natural condition well. However, this does not exist in Timor-Leste, therefore these personnel must be imported.

It is one of the characteristics of construction work in this country that all material except for soil and stone is imported from abroad. So, most construction materials would be procured from abroad directly or through import agencies for this Project.

2-2-1-5 Policy for Application of Local Contractors

The concept of implementation of technology transfer to Timor-Leste utilizes of local Consultant and Contractors.

The contents of technology transfer are safety control, quality control and schedule control of the work in consideration of the environment.

The levels of consultant and construction in Timor-Leste are as follows.

(1) Consultant Firms in Timor-Leste

The country is still very young, therefore only the following three consultant firms will be able to participate to the project.

- Dili International Consulting Pty Ltd
- Kakatua Matebian Pty. Ltd
- Horizonte Consultant Pty

For the construction supervision phase, the selected consultant firm among these will be able to participate to the Project. It leads to upbringing of consultant by the project.

In the urgent rehabilitation project, it was a method of individual participation in a project. However, these trained persons found employment outside of Timor-Leste after having learned technology. Accordingly, the project will take a method of participation of consultant firm for the future of Timor-Leste.

(2) Construction Firms in Timor-Leste

After August 30, 1999, most of grant construction works by donors was carried out by foreign construction firms by their own management in Timor-Leste.

It is due to unavailability of qualified personnel and/or construction firms in Timor-Leste.

On the other hand, for local measures the subcontract work of the Japan Aid Projects of road and irrigation has been done by the Timorese.

In regard to the Japan Aid Port Project, it had been done by Japanese Marine Contractors (year of 2001), due to 1) construction time was limited, 2) experienced marine contractors did not exist in Timor-Leste.

There are many Timorese contractors.

The number of Timorese contractors are interested in participating as a subcontractor for the Rehabilitation of Dili Port Project. The nominated firms by MTCPW are shown as Table 2-2-1.6 as follows.

Table 2-2-1.6 Nominated Firms by MTCPW

No.	Name of Firm	Name of Representative	Tel. Number
1	CARYA TIMOR LESTE PTY.LTD.	WONG PAK TEE	7242266
2	PEAKHIL	GREGORIO A.D.S.	7241634
3	WP LORONG MATAN	SALVADOR DELLORO	7246507
4	ESTELITO ALLER	HILME C.	7236808
5	LUZ CLARITA. CO	ALEIXO DA SILVA GAMA	7261008
6	EMPAT SAUDARA	TOME YAP	7233880
7	CINCO IRMAOS PTY.LTD.	SUGENG	7272060
8	CV. CAHYA MENTARI	JACINTO S.M.	7235372
9	JJ MCDONALD & SONS	BERNADETH FLORIS	7255891
10	SOMEDINA	DAMIEN SOM	7272000
11	LARIGUTO CORP.	ANO GUSMAO	7238555
12	MB THAI TRADING	JOAO MD XIMENES	7324257
13	SEREIA DO MAR. CO.	JOSE F. DOS SANTOS	7240388
14	TIMOR LESTEINDE CO.	JOSE S. GORUS	7245252
15	TRIO CONSTRUCTION	HENRIQUE CORTE	7233876
16	BURAS TIMOR	HENRIQUE REAL	7242557
17	ENSUL	Zito Dos SANTOS	723-2656

2-2-1-6 Policy for Operation & Maintenance by Implementation Organization

(1) Implementation Organization of Recipient Country

The agency in charge of overseeing the Project is the Port Authority under the Ministry of Transportation and Communication (MTC). After the completion of the Project, the Port Authority will be responsible for the operation, management and maintenance of Dili Port under supervision of MTC.

Three sections, Administration, Maintenance of Facilities & Equipment and Operation, are arranged under the Port Authority. (Refer to Fig-2-2.1.5)

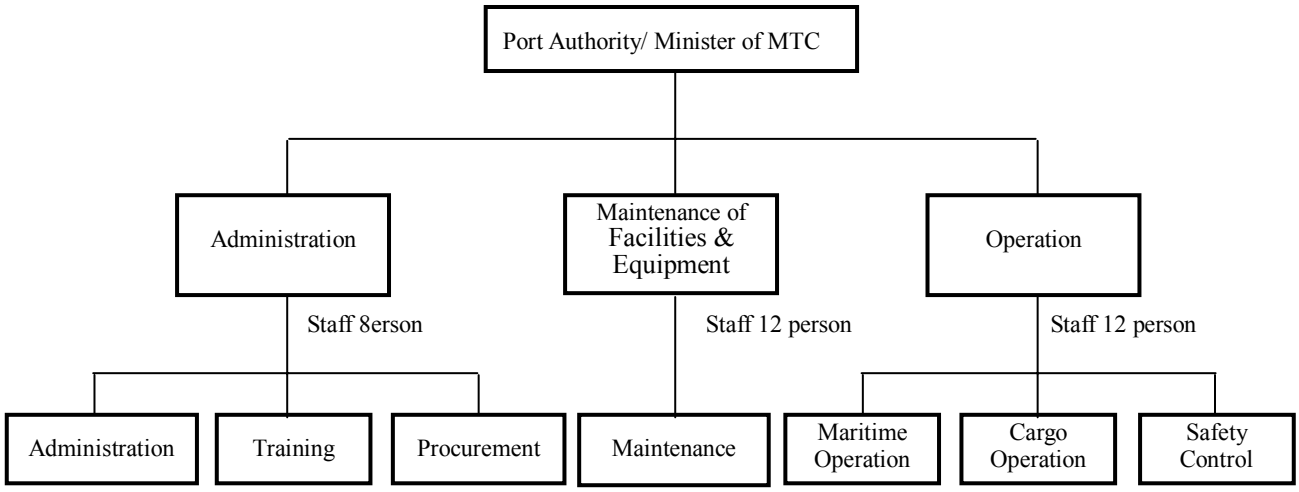


Fig-2-2.1.5 Organization of Port Authority

(2) Budget of Recipient Country

Expecting revenue of Port Sector from 2003/04 to 2007/08 is as shown in Table 2-2-1.7. Expecting expenditure of Port Sector is as showing in Table2-2-1.8.

Table 2-2-1.7 Expecting revenue of Port Section

Unit: US$1,000

Fiscal year	**2003/4**	**2004/05**	**2005/06**	**2006/07**	**2007/08**
Expecting Revenue	900	900	900	900	900

Table 2-2-1.8 Expecting Expenditure of Port Section

(Unit: thousand $)

	2004/05	2005/06	2006/2007	2007/08	Total
Salaries and Wages	100	100	100	100	400
Goods & Services	339	287	287	287	1,200
Minor Capital	119	90	90	90	389
Capital & Development	370	100	100	100	670
Proposed Budget	928	577	577	577	2,659
UN Assessed	60	0	0	0	60
Bilateral-Multilateral	0	0	0	0	0
Total Combined Sources	988	577	577	577	2719

2-2-1-7 Policy for Improvement Grade for Facilities

(1) Existing Condition of Dili Port Facility

Dili was formerly a coastal port but it is now the main and only international port of entry to East Timor. Dili port is located at Lat. 08°33' S, Long. 125°31' E. Built on the foreshore close to the center of town, the port is constrained in depth of port land behind the quayside by the main road.

The layout of buildings and cargo sheds are more suited to its previous function of a coastal wharf handling mainly general cargo rather than for international container shipping. Work by the UNPKF, and then under the EIRP and bilateral aid has been aimed at repairs and adoption of the Port to handling increased volumes of container cargo. The rehabilitation of the east and west container yard, and the demolition of warehouses correspond to above concept. The layout plan of Dili Port is shown in **Fig. 2-2-1.7**.

Illustrated facility layout plan is as shown in **Fig. 2-2-1.6,** list of facility is as shown in **Table 2-2-1.9** and in **Table 2-2-1.10.**

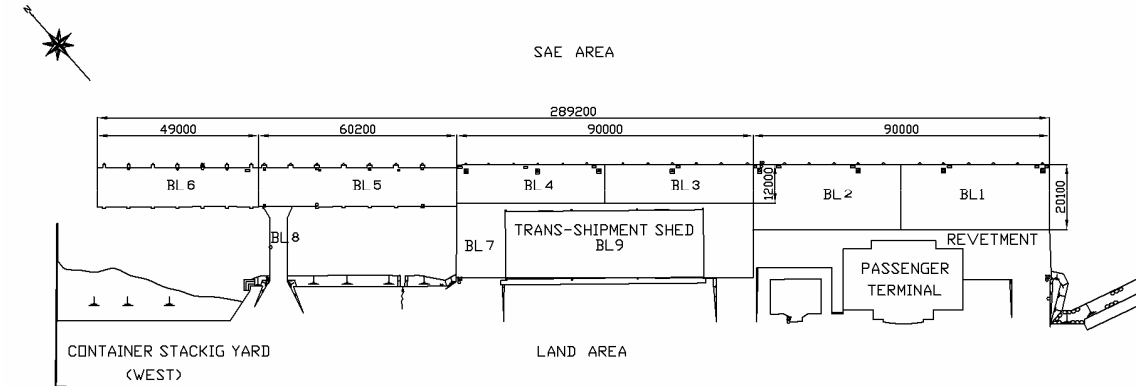


Fig. 2-2-1.6 Illustrated Facility Layout Plan

Table 2-2-1.9 List of Mooring Facility

BL No.		Length (m)	Width (m)	Location	Reference
Wharf 289.2m	1	45.0	20.1	In front of Passenger Terminal	Construction in 1993, by Indonesia
	2	45.0	20.1	In front of Passenger Terminal	Construction in 1993, by Indonesia
	3	45.0	12.0	In front of Transit Shed	
	4	45.0	12.0	In front of Transit Shed	
	5	60.2	12.1	Western End	Construction in 1997, by Indonesia
	6	49.0	12.1	Western End	Construction in 1997, by Indonesia Improvement in 2002, by ADB
7		90.0	22.5	Access Road to BL4, 5	
8		22.5	6.1	Access Road to BL5, 6	Construction in 1997, by Indonesia

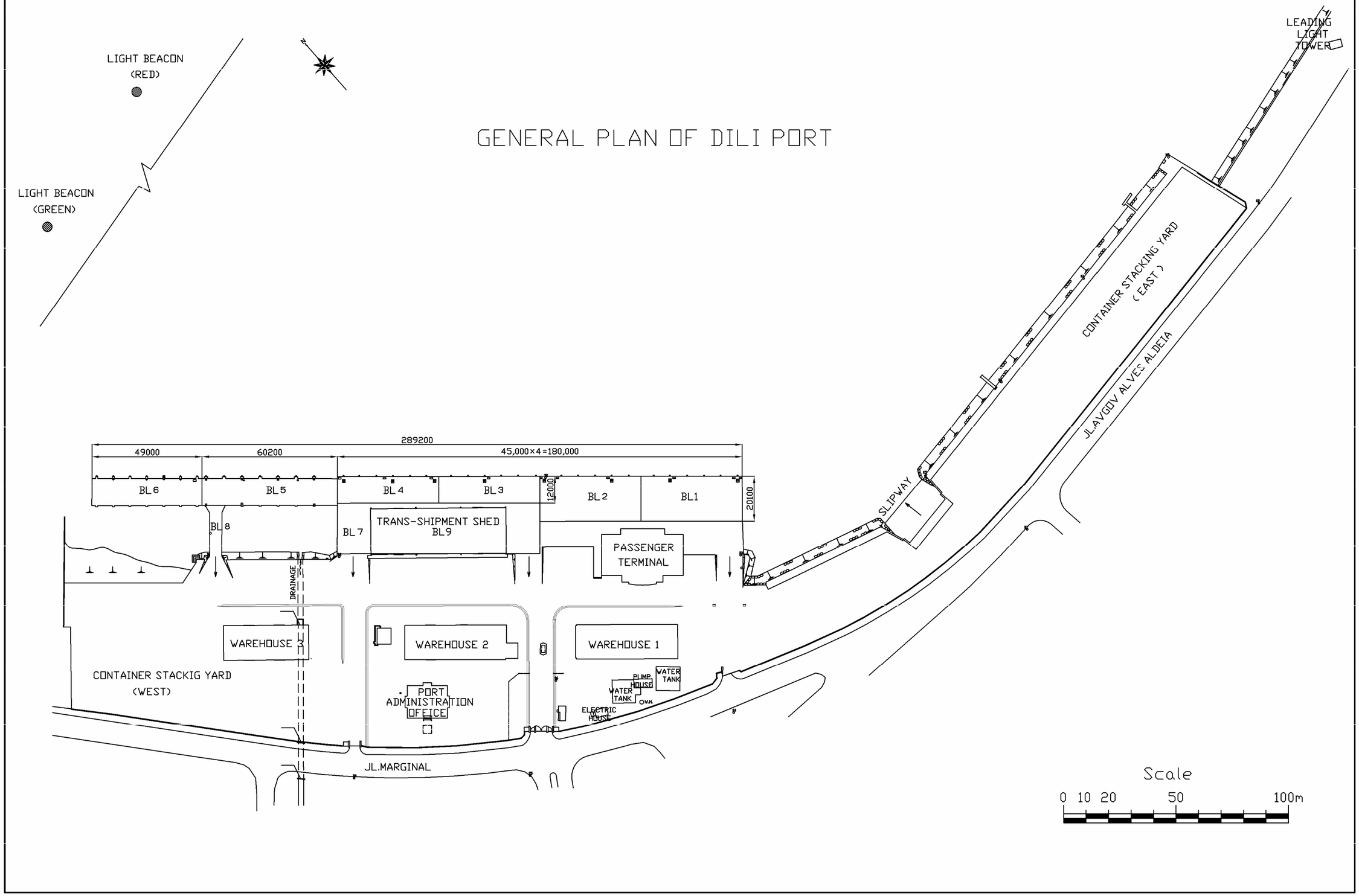


Fig. 2-2-1.7 Layout Plan of Dili Port

Table 2-2-1.10 List of Other Facility

Facility	Length (m)	Width (m)	Location	Reference
Revetment	120	12	West Container Yard	
Transit Shed	60	20	BL7	Steel Framework
Passenger Terminal	35	20	BL1、2	Three Floor

Each facility is summarized below.

1) Access Channel

Although the Port is facing the open sea, it has a natural harbor characteristic with well sheltered coral reef around 500 m offshore. The reef appears above sea level during the low tide. Two gaps of the reef are used as access channels. The western channel which is used as the main approach to Dili Port is deeper and wider than the eastern one, having the navigation aids restored to a high standard under Japanese grant aid. (main channel: length 800m, water depth -8.0～-10.0m, width 120m) It is said that coral reef is scattered within the eastern channel, so that this channel is available only for the ships accustomed to the surroundings.

2) Wharf

The wharf face is 290m long and 12m wide (excluding the front of passenger terminal) and can accommodate three small or two larger vessels (5,000DWT class) at one time, with draft up to 7.2m.
The structural type is an open-type wharf with concrete piles. Pre-cast reinforced concrete piles with diameter 600mm are used as supporting piles. It looks sound from the outward appearance. However, many cracks, fallen concrete fragment, and exposed steel bars etc. can be observed under the slab. Considering these it could be judged that the structures, especially slabs are in dangerous situation. The field survey results indicate the urgent necessity of the rehabilitation of the wharf.

3) Buildings

Passenger terminal is not used currently excluding a room which is occupied as an office of the Port Authority. A new terminal for the ferry boat will be constructed at the western end of the Port. There are some buildings to be used as offices.

4) Storage

Covered storage consist of a transit shed (BL9) and three warehouses. BL9 is immediately behind the wharf BL3 and BL4, with dimension of 56m x 21m. Three warehouses are with dimensions of: two at 20m x 40m and one at 15.3m x 37m. Storage are all with concrete floors. BL9 is used as bonded transit shed and reservation area for custom Equally.
Container storage is totally 15,575 m^2 made up of 9,000 m^2 in the Eastern Yard (225 x 40m), 4,590 m^2 in the Western Yard and hardstand, and with a further 3,000m^2 available through a western extension.

(2) Deteriorated Condition of the Dili Port Wharf

Site inspection to judge the deterioration of the wharf structure were conducted for upper decks and for pile foundations. The surveys were based on the visual inspection, Schmidt hammer test and elastic wave surveys. The compressive strength was confirmed by Schmidt hammer test, and the embedded pile lengths were measured by elastic wave surveys.

1) Site Inspection

- Visual Observation

○ Method

There are no fixed manuals to judge the deterioration of the structure. So, the "Manual on Maintenance and Repair of Port Facility in Japan" issued by THE PORT AND HARBOUR RESEARCH INSTITUTE in July 1999 is used to evaluate the deterioration. **Table 2-2-1.11** represents the "Degradation Criteria", and **Fig. 2-2-1.8** shows the illustrated "Rate of Rusty Area"

Table 2-2-1.11Degradation Criteria

Category	A		B		C	
Criteria		I	II	III	IV	V
Corrosion of Steel Bar	None 0.03%	Spotted Rust Stain 0.30%	Some Rust Stain 1%	Much Rust Stain 10%	Degradation 16%	Much Degradation 50%
Crack	None	Spotted Crack	Some Crack	Much Crack	Much Crack With few mm Width	Some Collapsed Crack
Loss/Fall of Concrete Reinforcement	None	None	Some Loss/Fall	Loss/Fall Partially	Loss/fall Sporadically	Much Loss/Fall
Judgment*	No Need to Observation In Details		Observation in Details		Repair Works/Reinforcement	

* Judgment is as follows:
A: No need to observation in details
B: Observation in details is necessary
C: Repair/Reinforcement is necessary
** Referred to the following figures.
***Reference: Manual on Maintenance and Repair of Port Facility in Japan

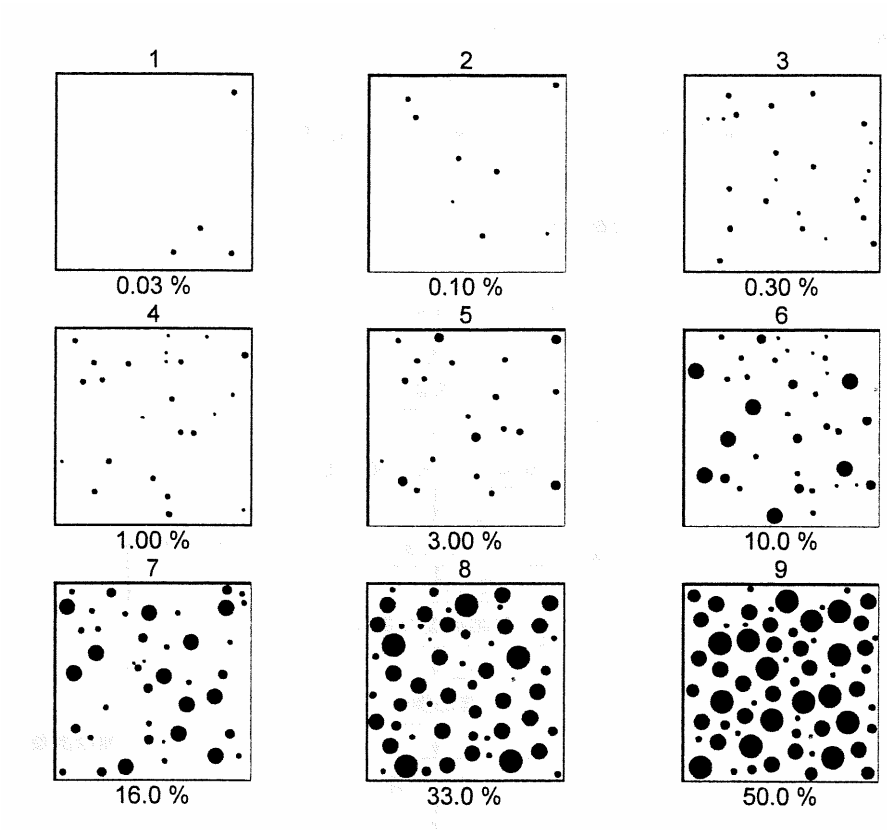


Fig. 2-2-1.8 Rate of Rusty Area（ASTM-D610）

The deteriorated concrete material is defined as follows.

The degradation criteria is more than V.

Much degradation caused by rust, and loss/fall of concrete are observed.

Exposure, break and significant corrosion of steel-bars are observed, so that deteriorated material volume is more than 30% of the total.

If the deterioration condition is in progress at some blocks, the blocks should be dissolved and rehabilitated. In that case, local repairing to be taken could be the temporary countermeasures, not permanent one

○ **Result**

Superstructure

The result of inspection for wharf superstructure is as shown in **Table 2-2-1.12, Fig.**

Table 2-2-1.12 Deterioration Rate on Facility Component

BL No.	Compo-nent	Q'ty piece	Deteriorated (piece)		Deteriorated (rate)		Urgency
			Sep. 2004	Mar. 2005	Sep. 2004	Mar. 2005	
1	Beam	78	19	19	24%	24%	⑥
2	Beam	78	30	35	38%	45%	④
3	Beam	36	14	15	39%	42%	③
	Slab	22	2	8	9%	36%	
4	Beam	36	24	28	67%	78%	①
	Slab	22	6	7	27%	32%	
5	Beam	73	2	2	3%	3%	⑧
6	Beam	63	4	6	6%	10%	⑦
7	Beam	30	17	24	57%	80%	②
	Slab	22	6	7	27%	32%	
8	Beam	10	0	0	0%	0%	⑨
9	Beam	37	—	14	—	38%	⑤
	Slab	43	—	5	—	12%	

Where：There are no deteriorated components under the slabs of BL1、2、5、6、8.

Deterioration is in progress between Sep. 2004 and Mar. 2005.

Slab conditions are as follows according to the visual observation.

Table 2-2-1.13 Condition of Slabs

BL No,	Condition	Ref.
1	Cracks are found along the both sides of slabs.	Rehabilitation. is needed
2	Steel bars are exposed due to the concrete covering.	ditto
3	Steel bars are exposed at the center of the slabs.	ditto
4	Ditto	ditto
5	Some rainfalls are expected during the concrete setting.	
6	None	
7	Some damages caused by cargo handling equipment are found.	
8	None	
9	Not clear	

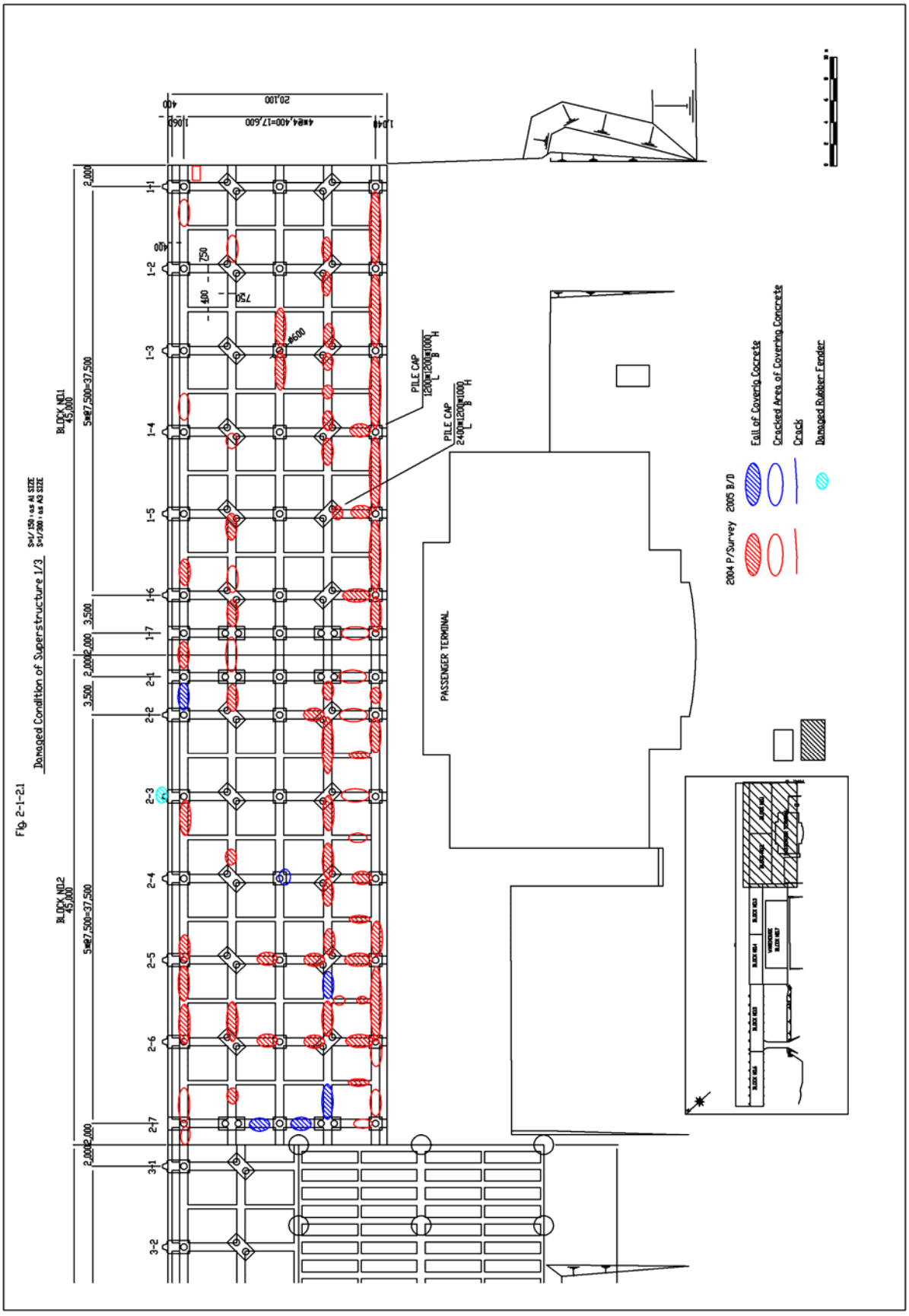


Fig. 2-2-1.9 Damaged Condition of Superstructure (1)

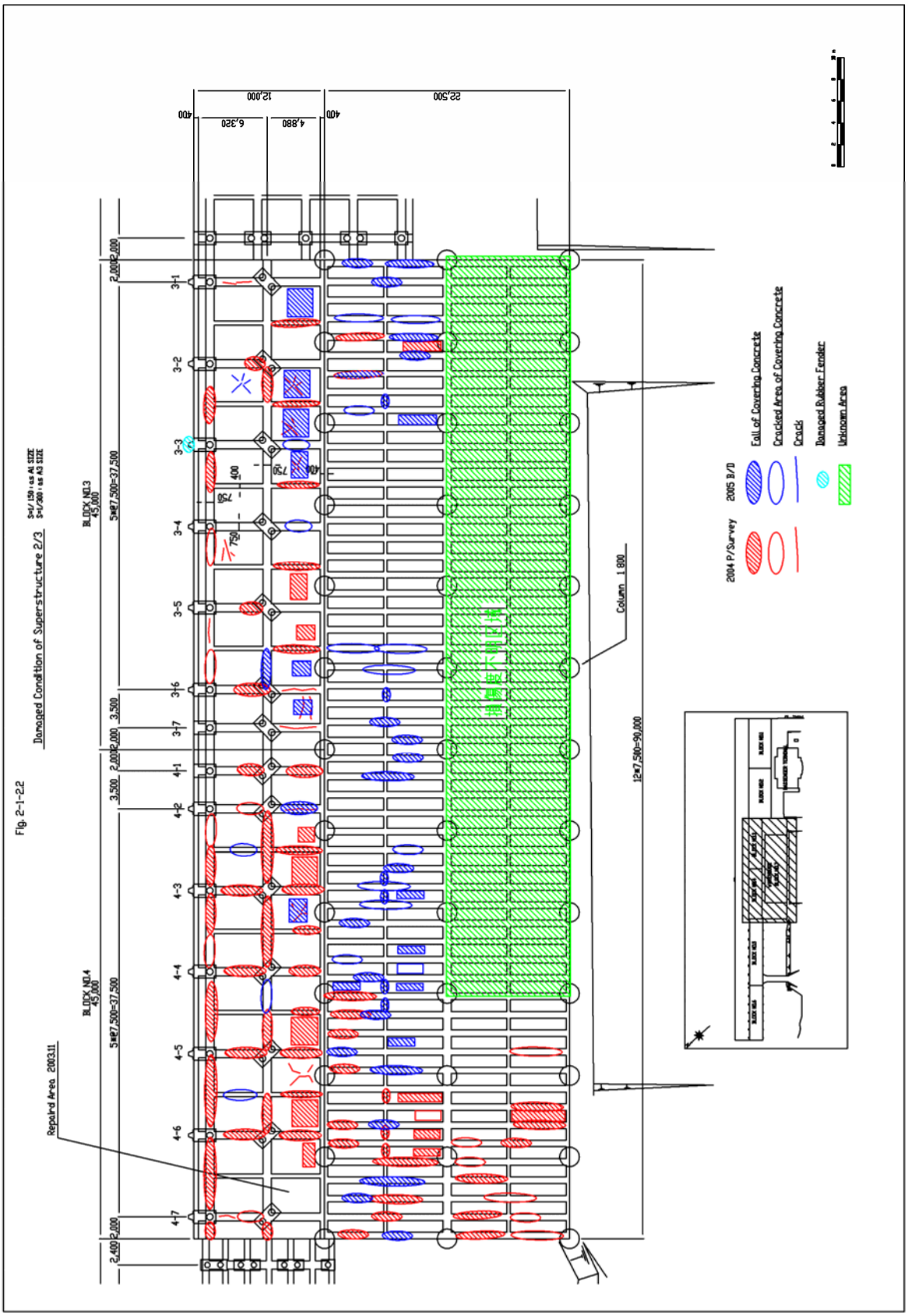


Fig. 2-2-1.10 Damaged Condition of Superstructure (2)

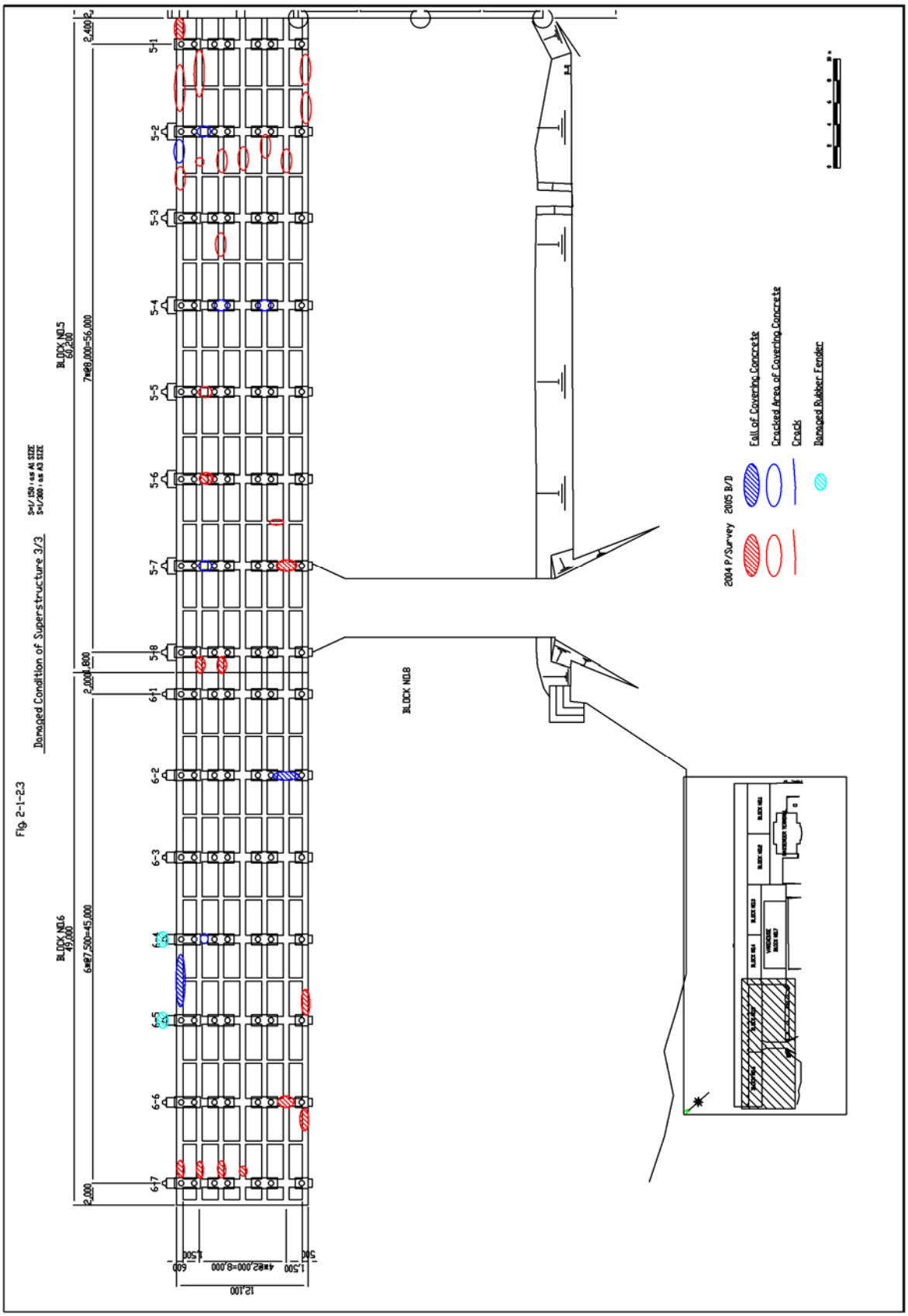


Fig. 2-2-1.11 Damaged Condition of Superstructure (3)

Pile Foundation of Wharf

Visual observations of piles under-water were done by driver. As a result, loss/fall of concrete covering was not found, so that it is judged that there are no problems on the PC pile materials.

- Non-destructive Test

○ Result of Schmidt hammer test

Concrete compressive strengths of BL1～4, BL7 and BL9 were tested by Schdmit hammer test as a non-destructive test. As a result, 26～35N/mm^2 for upper deck structure and 63～70N/mm^2 for PC piles were confirmed respectively showing a sufficient strength.

○Results of Elastic Wave Surveys

It is found from the results of elastic wave surveys conducted in Dili Port that PC piles remarkable reflection is observed around the pile length of 10 m and reflection data is recoded around the pile length of 22 m. Supposing that one (1) pile is 12 m long, at least two (2) piles are provided. However, third pile is not confirmed on all piles surveyed. Visual observations conducted show that the piles are in good conditions, free from any crack or damage.

(3) Policy of Improvement

Japan's grant aid project components and the obligation of East Timor are planned as follows.

Japan's Grant Aid:

- Rehabilitation of Wharf (BL1, BL2)
- Rehabilitation of Wharf (BL3, BL4)
- Rehabilitation of Access Road (BL7)
- Expansion of Apron (BL9)

1) Rehabilitation of Wharf (BL1, BL2):
At present, only one wharf available in Dili Port.
The wharf has dimensions of 90m length, 20m width, and –7m water depth.
The wharf provides 1 berth for average ship size (2,000GRT), handling container cargo and general cargo.
The deterioration of the wharf is severe and in progress. (Average deterioration rate is 35%). It is estimated that the wharf be out of order in the near future without any rehabilitation works.

2) Rehabilitation of Wharf (BL3, BL4):
The usage of the wharf is prohibited due to the deterioration.
The wharf has dimensions of 90m length, 12m width, and –7m water depth.
The wharf provides 1 berth for average ship size (2,000GRT), handling general cargo. However, apron width is only 12m, so that cargo handling activities and traffic are confused resulting in low productivity.
The deterioration of the wharf is severe and in progress. (Average deterioration rate is 50%)

3) Rehabilitation of Access Road (BL7):
Block 7 is the access road connecting the wharves with the hinterland area.

The road structure is the open-type with concrete piles having dimensions of 14.4m length and 15m width.

The deterioration of the wharf is severe and in progress. (Average deterioration rate is 24%) As a result, traffic by heavy machines are restricted.

4) Expansion of Apron (BL9):

This component is to widen the apron of Block 3 and 4 by using the area of the bonded transit shed. (Block 9) The transit shed (21m x 56m) is built within the area of Block 9, so that the transit shed have to be demolished in order to rehabilitate the Block 3 and 4. The area left behind the demolition is used for the widening of Block 3 and 4.

Another idea is to use all the area left behind after demolition as a yard. However, this idea is too premature considering the present cargo handling volume and the existing container yard.

The deterioration of Block 9 is severe and in progress. (Average deterioration rate is 24%)

Obligation of East Timor:

- Demolition of Transit Shed (Block 9)

1) Demolition of Transit Shed (Block 9):

Demolition of bonded transit shed is concluded as follows:

Cargo handling volume by packaging style in Dili Port is estimated as shown in the **Table 2-2-1.14**. In these cargo, only break-bulk cargo is possible to pass through the bonded transit shed. It is estimated only 4,000ton per year. There are some alternatives for relocation of the bonded transit shed and no hence no hindrance to demolishing of existing shed.

Table 2-2-1.14 Cargo Handling Volume by Packaging Type–Dili Port 2004

Cargo Handling Volume	100%	63,000 ton
Container Cargo	60%	37,800 ton
Non-Container Cargo	40%	25,200 ton
Break-bulk Cargo	16%	4,032 ton
Sacked Cargo	84%	21,168 ton

Demolition of bonded transit shed should be done by the Government of East Timor at their own expense.

2-2-1-8 Policy of Method of Construction, Procurement, and Construction Period

Refer to "**2-2-1-4 Policy for Construction Condition and Procurement Condition**", "**2-2-1-5 Policy for Application of Local Contractors**" and "**2-2-4-7 Implementation Schedule**".

2-2-2 Basic Plan

2-2-2-1 Total Plan

Components of the project are as shown in Table 2-2-2.1.

Table2-2-2.1 Components of direct cost of the Project

Item	Description (Quantity, dimension and specification)	
Demolish of existing wharf	4,041 m^2	Temporary removal of existing fenders, bollards and water supply valves. Demolish of existing concrete slabs and beams. Demolish of existing foundation of pre-stressed concrete piles.
Driving of pre-stressed concrete piles	339 nos.	Temporary Jetty for pile driving. Pre-stressed piles Diameter 600mm Length 24,000mm
Rehabilitation of wharf superstructure	3,618m^2	Re-building of wharf superstructure of reinforced concrete. Resetting of water supply valves, fenders and bollards. Setting of water supply pipes.
Retaining wall	119.9m	Concrete gravity type wall
Concrete pavement	357.8m^2	Thickness of concrete layer: 45cm

2-2-2-2 Facility Design

(1) Policy of facility design

Based on the results of site surveys conducted, design concept for the planned wharf is established as shown below.

- Scope of the wharf design covers Block Nos. 1 to No. 4, Block No. 7 and Block No. 9. Warehouse on Block No. 9 should be demolished to secure the smooth cargo handling operations in front of the warehouse and the smooth execution of wharf improvement works. However, the improvement works for Block No. 9 should be minimized.
- Superstructures: Site survey results show that superstructures of Block Nos. 1 to 4 and Block No. 7 are heavily damaged. These superstructures should be demolished, with due consideration to the present unusable conditions for accommodation of ships and cargo handling operations.
- Substructures : Judging from the elastic wave survey results, the existing PC foundation piles of Block Nos. 1 to 4 are in a good condition and still usable. Elevation of the pile tips is assumed to be – 20 m., based on the elastic wave survey results.
- The wharf will be designed with design seismic coefficient, kh = 0.15, that is the assumed value for the

existing wharf.

- Surcharge on the wharf will be that on the general wharf in accordance with the Technical Standards and Commentaries for Port and Harbour Facilities in Japan.
- Structure of the existing wharf is divided into two (2) structural types judging from the wharf apron and foundation pile arrangements. Structural comparative study will be done for Block Nos. 1 and 2, and the wharf design for Block No. 3 and 4 will be made by applying the structural type selected.
- Structural comparison will be made for three (3) alternative structural types, open type, gravity type and steel sheet pile type that are applicable to the planned wharf. For rehabilitation of the existing open type wharf, study will be made on two (2) alternative cases, the wharf with existing foundation piles, and the wharf with new foundation piles.

(2) Rehabilitation Layout Plan

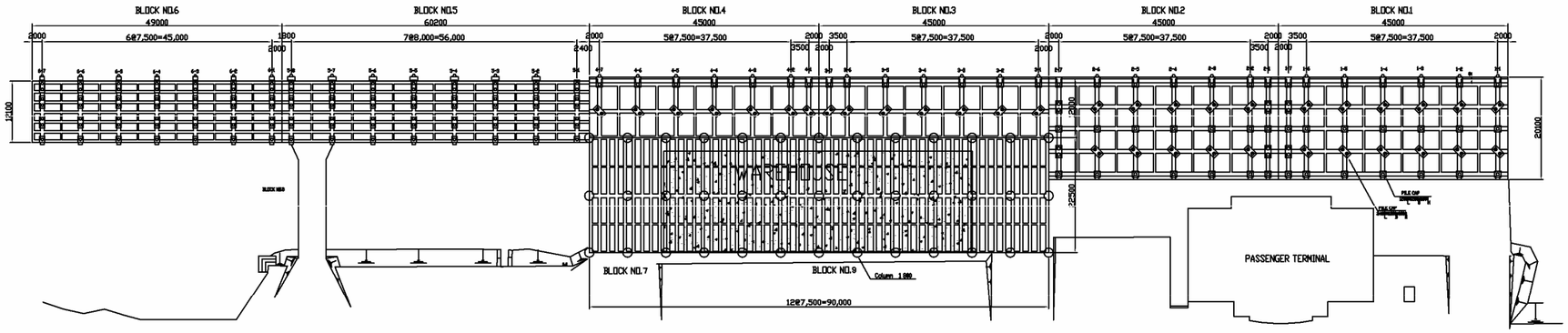
Wharf improvement plan was so determined as to ensure more efficient and smoother cargo handling operations without any change in the existing wharf shape and alignment in principle. Shown in **Fig. 2-2-2.1** is the wharf layout plan worked out, based on the Design Concept described above.

Wharf Section to be Rehabilitated :

Open Type Wharf Section	:Block Nos. 1 to 4 with overall length of 180 m
Approach Section	:Block No. 7 with width of 15 m
Transit Shed Section	:Block No. 9 with span (seaside) of 11.25 m

GENERAL PLAN

(EXISTING LAYOUT)



REHABILITATION PLAN

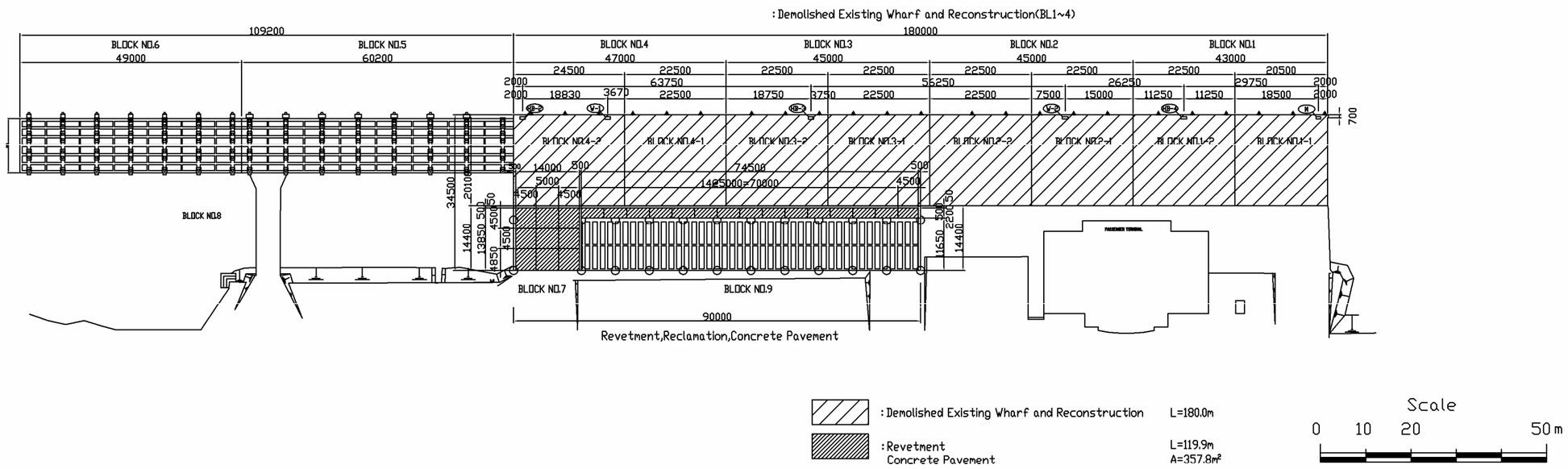


Fig. 2-2-2.1 Rehabilitation Layout plan

(3) Design Standards

The applied design Standards are listed below.

「Technical Standards and Commentaries for Port and Harbour Facilities in Japan」

The Overseas Coastal Area Development Institute of Japan.

・「STANDARD DESIGN CRITERIA FOR PORTS IN INDONESIA」 1984 DGSC

and related Japanese Industrial Standard.

(4) Wharf Characteristics

1) Target Vessel

5,000DWT （Cargo ship）

Length overall(m) L＝109m

Molded breadth(m) B＝16.8m

Full load draft(m) d＝6.5m

2) Water depth of wharf

Same as existing wharf.

－7.0m

3) Crown height

Same as existing wharf.

＋4.5m

4) Apron width

The apron width of wharf will be determined in accordance with Table 2-5-3-2.2 and BL1 & 2 of existing wharf.

As cargo handling operations are currently impeded at the existing wharf apron of BL 3 & 4 for small apron width of 12 m., wide space is provided for safe cargo handling operations at the wharf aprons.

Apron width : 20m

Table 2-2-2.2 Standard Apron Width

(Technical Standards and Commentaries of Port and Harbour Facilities in Japan)

(1) Currently the values listed in **Table T- 20.2.1** are being used as the standard apron width for ordinary wharves.

Table T- 20.2.1 Standard Apron Width

Water depth of berth (m)	Apron width (m)
Less than 4.5	10
4.5 or more and less than 7.5	15
7.5 or more	20

(2) For general cargo wharves, provision of the space for cranes, temporary stacking space, cargo handling space, and access road should normally be considered. It is desirable to have an apron width of 15 to 20 m when there is sheds behind the wharf and forklift trucks are used, and an apron width of 10 to 15 m when the back of the wharf faces a road or open storage yards where trucks are to enter the apron for direct loading to and unloading from ships.

5) Surcharge(Static load)

Ordinary condition $20kN/m^2$

During an earthquake $10kN/m^2$

6) Berthing force

Reaction force of rubber fender R＝550 kN(V-500H×2000L;R3)

Energy absorption E＝94.6 kN･m(Deflection 45%)

7) Mooring force

Mooring force acting on a bollard

P＝350 kN

8) Live load

Consider the cargo handling equipments and vehicle loads as shown below.

Truck(T－25)

Tractor chassis (40ft container)

Reach stacker(lifting capacity 45t)

(5) Results of Comparative Study

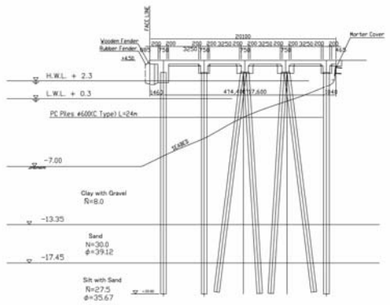
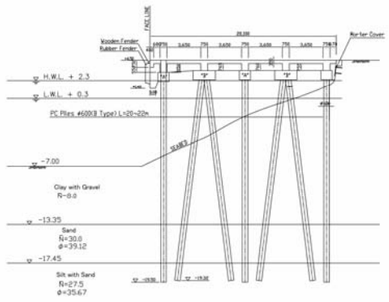
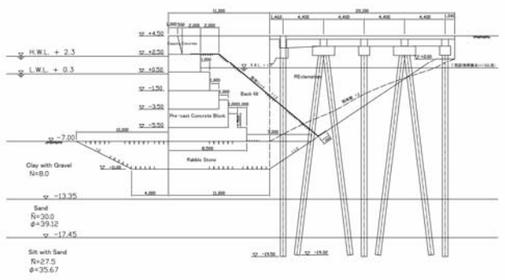
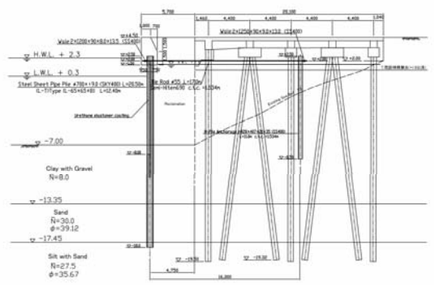
Alternative structural types considered which are applicable for rehabilitation of the existing open type wharf in Dili Port include Open Type by rehabilitation of the existing wharf, Gravity Type with concrete blocks, and Quay Type with steel sheet piles. With respect to the open type by rehabilitation of the existing wharf, two (2) cases are studied; open type with the use of existing piles, and open type with replacement of all the piles with new ones.

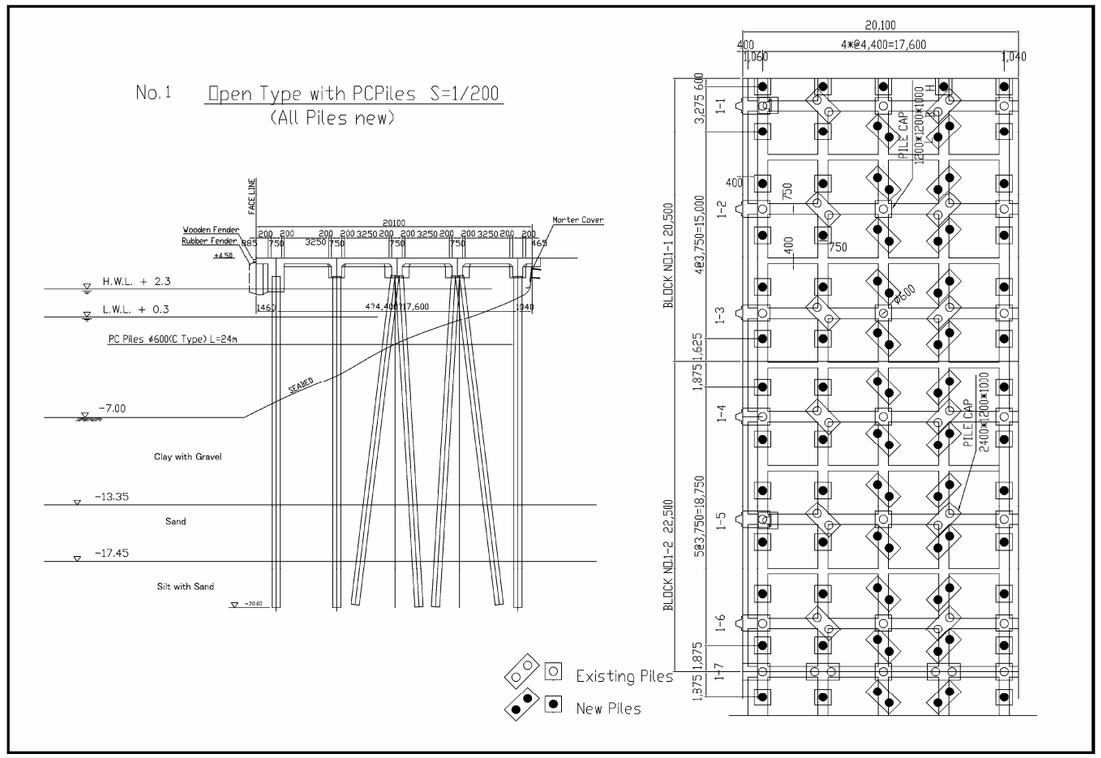
Comparative study is made on the following alternatives of three (3) structural types with four (4) cases to select the optimum structural type for the wharf：

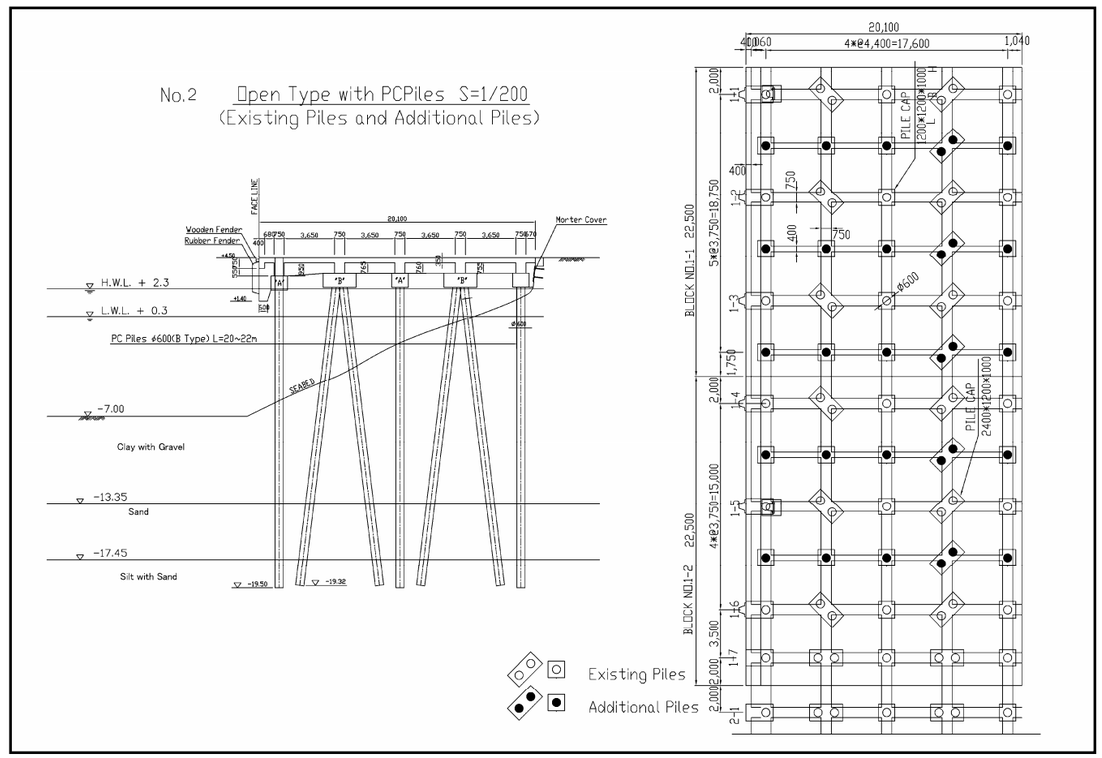
1. Open Type with new PC piles with two (2) cases;
2. Gravity Type with concrete blocks with one (1) case; and
3. Quay Type with steel sheet piles with one (1) case.

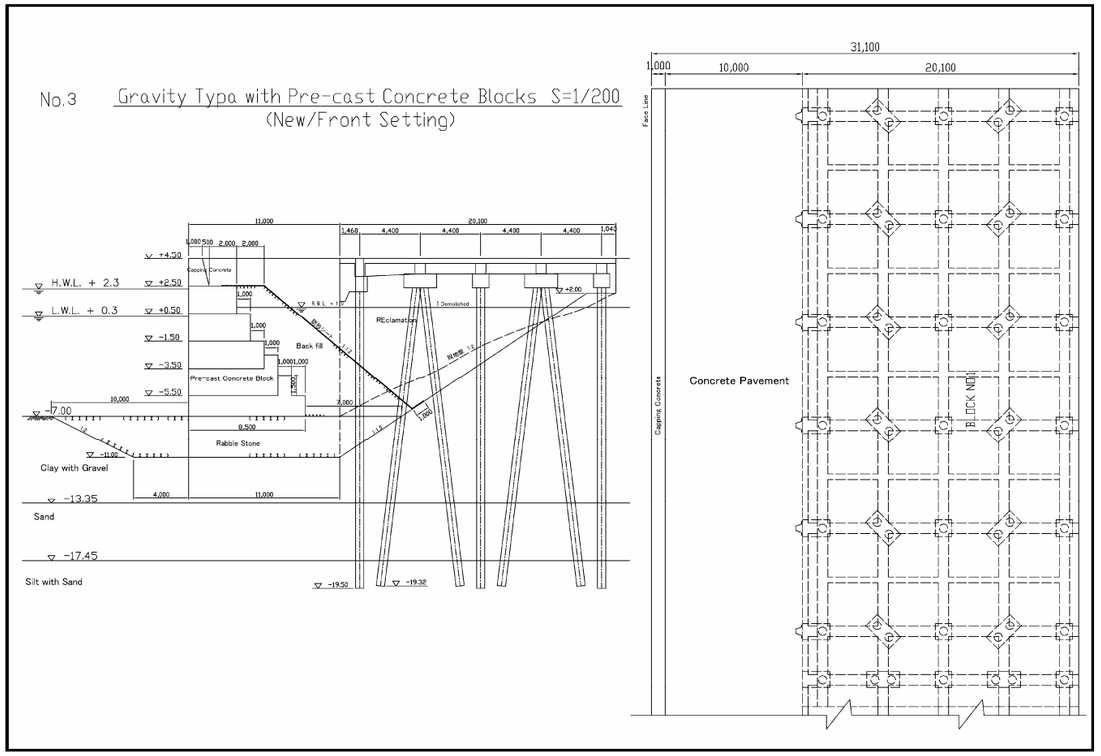
As a result of comparative study on the respective alternatives from the viewpoint of structural stability, ease of construction works, construction cost and environmental impact, Open type with new PC piles is selected as the optimum alternative for rehabilitation of the wharf in Dili Port. Shown in **Table 2-2-2.3** are the findings from the comparative study of all alternatives.

Table 2-2-2.3 Comparative Table of Rehabilitation Works

	Type１． Open Type with PC Piles (All piles new)	Type２． Open Type with PC Piles (Existing piles and additional piles)	Type３． Gravity Type with Pre-cast Concrete Blocks (New/Front Setting)	Type４． Quay Type with Steel Sheet Pipe Piles (New/Front Setting)
Typical Section				
Results of Stability Study	Mmax Case(by M-N Interaction Curve) Bearing Capacity Ordinary Conditions — 675.2kN＜1316.8kN Extraordinary Conditions M=223.0kN･m、N=350.9kN 894.3kN＜2194.6kN Berthing C. M=177.8kN･m、N=427.4kN 766.4kN＜2194.6kN	Mmax Case(by M-N Interaction Curve) Bearing Capacity Ordinary Conditions — 687.4kN＜1316.8kN Extraordinary Conditions M=216.0kN･m、N=256.4kN 1168kN＜2194.6kN Berthing C. M=164.2kN･m、N=460.4kN 934.1kN＜2194.6kN	Sliding Overturning Bearing Capacity for Eccentric and Inclined Loads Ordinary Conditions Fs=2.71＞1.2 4.05＞1.2 Fs=1.78＞1.2 Extraordinary Conditions Fs=1.03＞1.0 1.51＞1.1 Fs=1.01＞1.0 Circular Slip Fs＝1.43＞1.3(Ordinary Condition)	Ordinary Conditions Extraordinary Conditions Stress of Steel Sheet Pile 160.6N/mm^2＜180 247.1N/mm^2＜270 Stress of Tie Rod 174N/mm^2＜176 239N/mm^2＜264 Stress of Anchorage Pile 119.4N/mm^2＜140 172.2N/mm^2＜210
Construction Practicability	The works by this type are mainly consisting of foundation piling and superstructure concreting, which will be executed block by block. Therefore, there will be no disturbance to the normal Port Operation on other blocks. North west part of the West Stacking Yard can be used for temporary storage of construction materials. Manufacturing yard for PC piles will not be required at the site, since they are proposed to be imported from neighboring countries.	The works by this type are mainly consisting of foundation piling and superstructure concreting, which will be executed block by block separately. Therefore, there will be no disturbance to normal Port Operation on other blocks. However, due to re-use of the existing piles, removal/demolishing works of existing structures and facilities will be rather heavier, wider and more complicated. North west part of the West Stacking Yard can be used for temporary storage of construction materials. Manufacturing yard for PC piles will not be required at the site, since they are proposed to be imported from neighboring countries.	Larger scope of structures and works will be required, i.e. foundation excavation for pre-cast concrete block structures, soil improvement for sea bed by substitution, increment of stone mound thickness, etc. Working area will be limited in view of cooperation with the Port Operation, so that it will be difficult to provide sufficient space to accommodate heavy equipment and barges for construction. The church yard located west of the Port can be used for temporary storage of the concrete blocks. However, provision of transportation, heavy and loading/unloading equipment for those materials will require high costs. Those factors are indicating less construction practicability.	Working area will be limited in view of cooperation with the Port Operation, so that it will be difficult to provide sufficient space to accommodate heavy equipment and barges for construction. Dili Port Godown has empty space at this moment and is available to store expensive construction materials, such as steel sheet piles.
Duration of Construction	This type requires driving piles among/between the existing piles. Therefore, it shows rather longer duration of time for completion if compared with normal works of this type, but it proves the shortest requirement of time, if compared with other types which are taken into this study.	This type of works requires longer duration of time, if compared with the case of Type 1, due to removal/demolishing and re-treatment of heads of the existing piles for re-use.	In case the works are to be executed continuously and without any interruption and disturbance, this type will be completed faster. However, in case the work should be done separately block by block in consideration and cooperation of the Port Operation, the method of this type is considered as non-efficient and takes longer duration of time.	Same as in Type 3.
Environmental Effects	The method to remove/demolish the existing structures is all the same in even construction of other types studied in this report. However, during pile driving and superstructure concreting works of this type, it requires rather smaller scale of environmental protection of filter cloth, if compared with the other types.	Same as in Type 1.	Sea water contamination may happen at the time of works for sea bed excavation, soil improvement, stone mounding and reclamation. This will require mobilization of wide ranged environmental protection of filter cloth, maintenance of monitoring of environmental effects, and provision of other devices for this purpose. Further to the above, other negative effects can be considered, i.e. big noise to be occurred at the concrete block manufacturing factory and traffic volume increment/disturbance to be caused by transportation of blocks, other environmental negative effects by the factory.	Since it is impossible to construct the whole works at one time, it is necessary to mobilize wide ranged environmental protection of filter cloth to avoid sea contamination, to maintain monitoring environmental effects, and to provide other devices for this purpose, during stone mounding and reclamation works.
Effects on Port Operation	The bad effects upon the Port Operation during the works of this type are considered less, due to execution of separated block by block works, as mentioned above.	Same as in Type 1.	As mentioned above, heavy equipment such as truck cranes and back-hoes to be employed for placing concrete blocks will limit and disturb the Port Operation. This new wharf will be constructed in front of the existing Wharf. Therefore, it will also limit mooring space for commercial vessels and make them difficult to approach to the wharf.	Heavy equipment, such as pile driving equipment, cranes, back-hoes, etc. will move around on and occupy the existing wharf for the works. This will limit and disturb the Port Operation. In case pile driving will be executed by barge, mooring of commercial vessels to the wharf will be secured as usual by providing two(2) security/pilot boats to lead them approaching to or leaving from. This new wharf will be constructed in front of the existing wharf. That means, it will limit mooring space for commercial vessels.
Maintenance after Completion/Hand-Over	Easy/simple.	Easy/simple.	Easy, but it is necessary to monitor and manage settlement of reclaimed part.	It is necessary to maintain and manage anti-corrosive protection of steel sheet piles, as well as to monitor and manage settlement of reclaimed part.
Cost (Type 1 denotes Cost Index 1)	1.0	1.3	1.6	1.4
Overall Evaluation	**Excellent**	**Good**	**Good**	**Good**







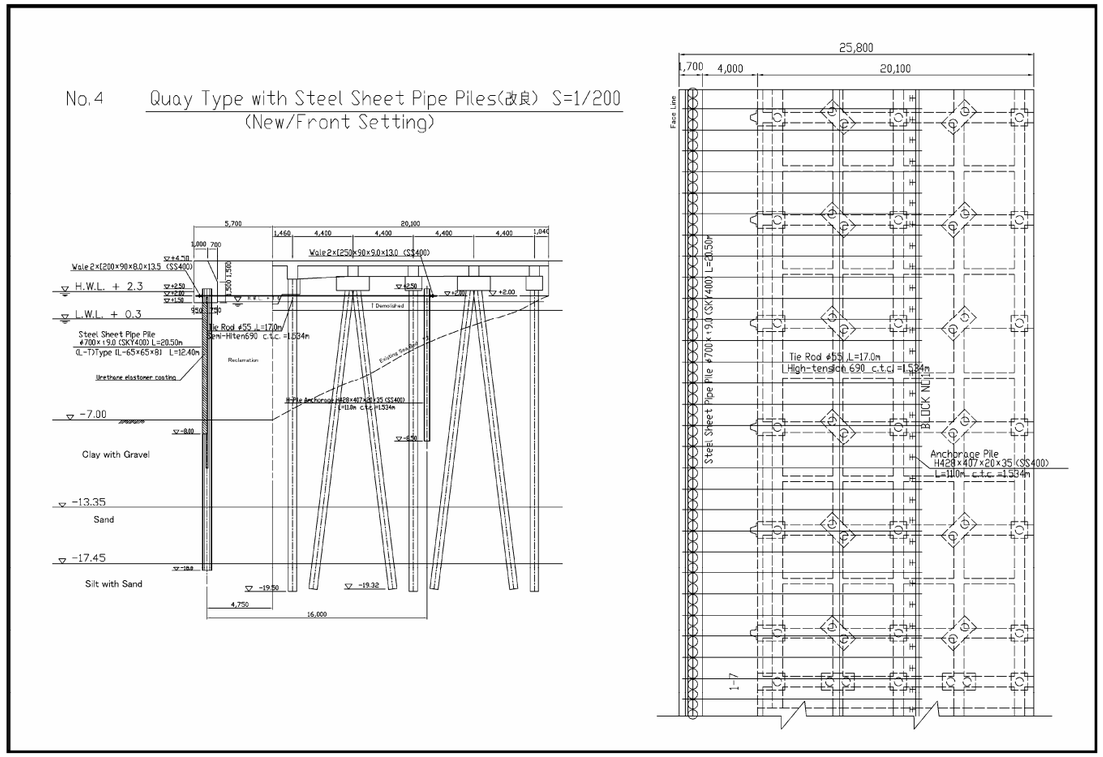


Fig. 2-2-2.2 Cross Section of Comparative Type

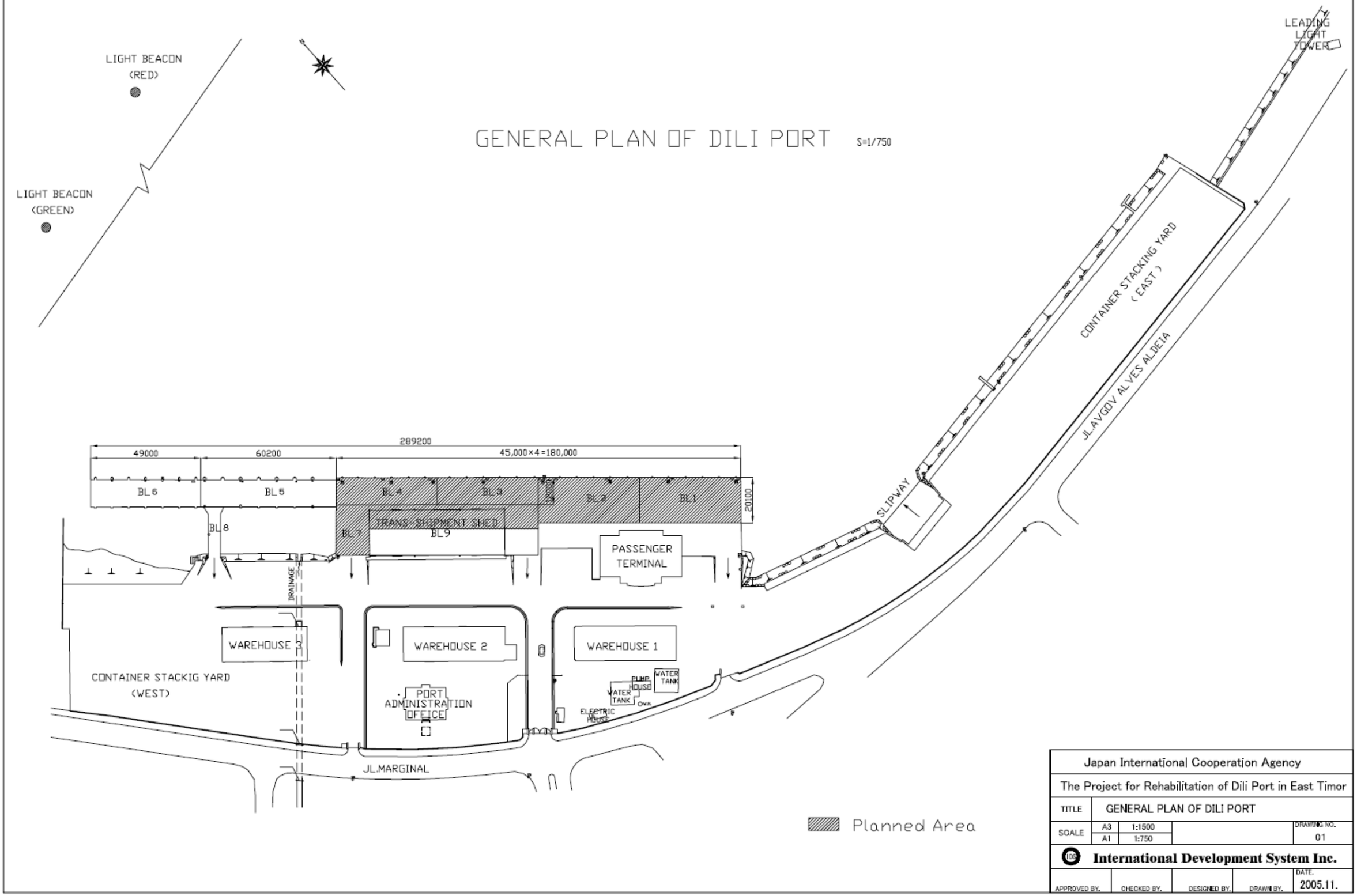
2-2-3 Basic Design Drawing

Basic Design Drawings are shown below.

Drawing List

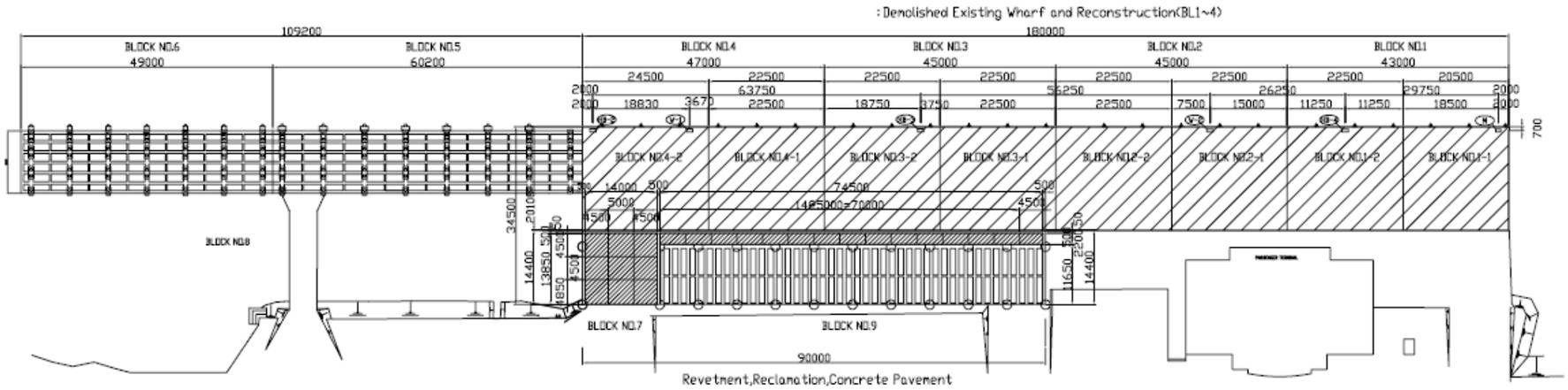
No,	Drawing name	Scale
1	LAYOUT PLAN OF DILL PORT	1/750
2	Plan for Rehabilitation of Dili Port	1/500
3	Rehabilitation of Supersutructure	1/250
4	Supersutructure of Wharf, Front view	1/250
5	Typical cross-section	1/100
6	Layout of PC Piles	1/250
7	Earth retaining and pavement plan	1/200, 1/100

GENERAL PLAN OF DILI PORT S=1/750



Japan International Cooperation Agency					
The Project for Rehabilitation of Dili Port in East Timor					
TITLE	GENERAL PLAN OF DILI PORT				
SCALE	A3	1:1500		DRAWING NO.	
	A1	1:750		01	
International Development System Inc.					
APPROVED BY.	CHECKED BY.	DESIGNED BY.	DRAWN BY.	DATE. 2005.11.	

Plan for Rehabilitation of Dili Port S=1/500

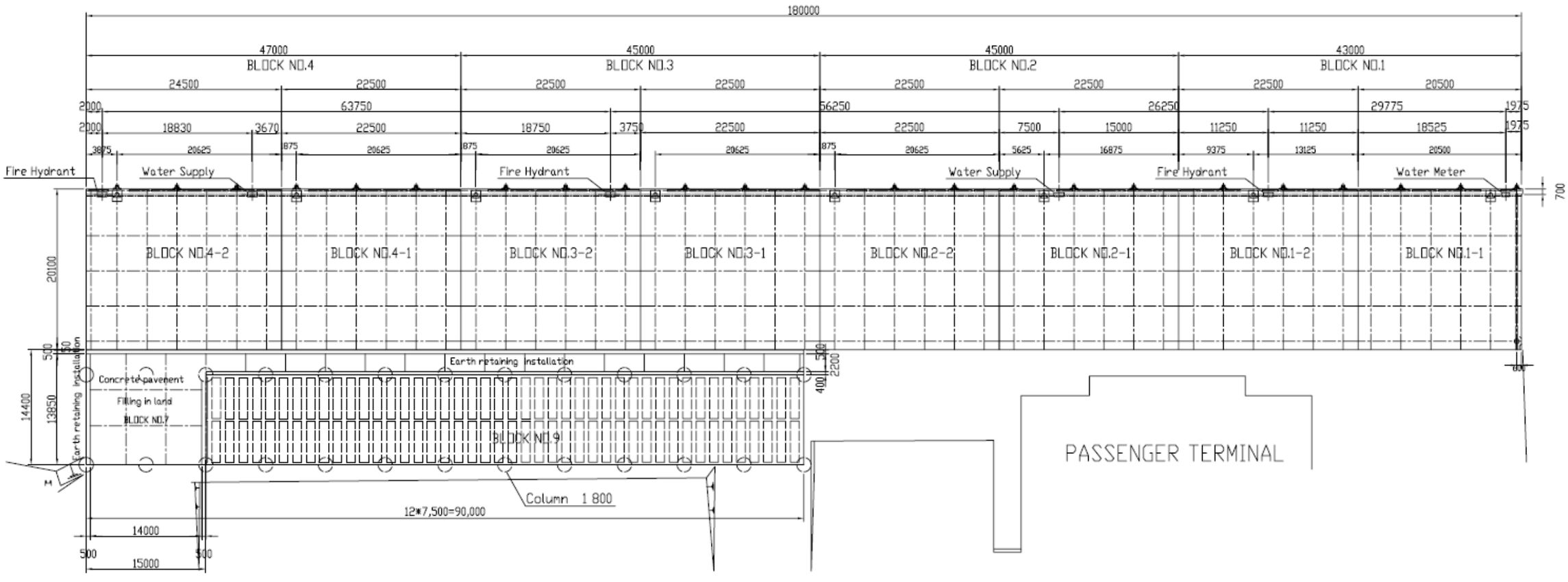


: Demolished Existing Wharf and Reconstruction L=180.0m

: Revetment L=119.9m
Concrete Pavement A=357.8m²

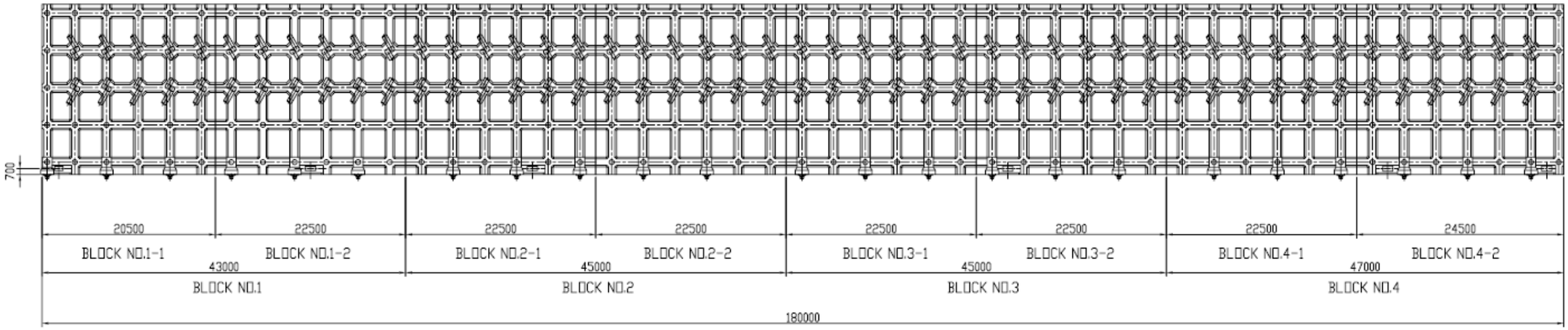
Japan International Cooperation Agency					
The Project for Rehabilitation of Dili Port in East Timor					
TITLE	Plan for Rehabilitation of Dili Port				
SCALE	A3 1:1000 / A1 1:500				DRAWING NO. 02
International Development System Inc.					
APPROVED BY.	CHECKED BY.	DESIGNED BY.	DRAWN BY.	DATE. 2005.11.	

Rehabilitation Plan of Superstructures of Wharf

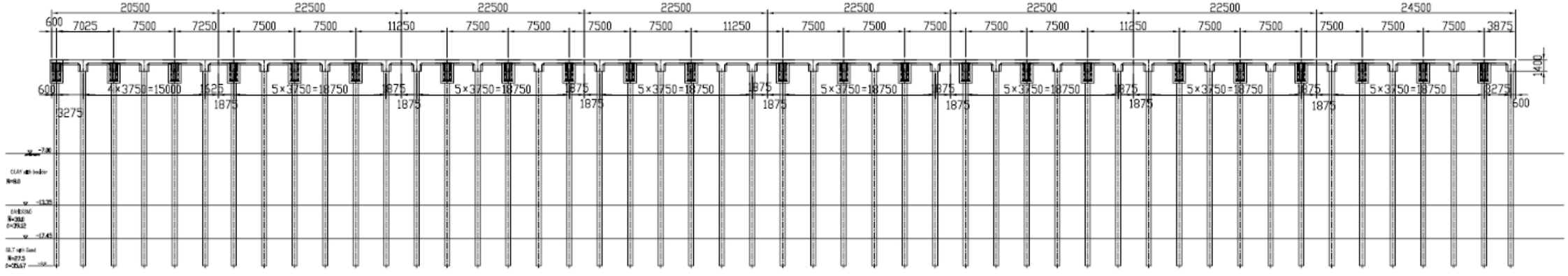


Japan International Cooperation Agency					
The Project for Rehabilitation of Dili Port in East Timor					
TITLE	Rehabilitation Plan of Superstructures of Wharf				
SCALE	A3	1:500		DRAWING NO.	03
	A1	1:250			
International Development System Inc.					
APPROVED BY.	CHECKED BY.	DESIGNED BY.	DRAWN BY.	DATE.	2005.11.

Superstructures of Wharf

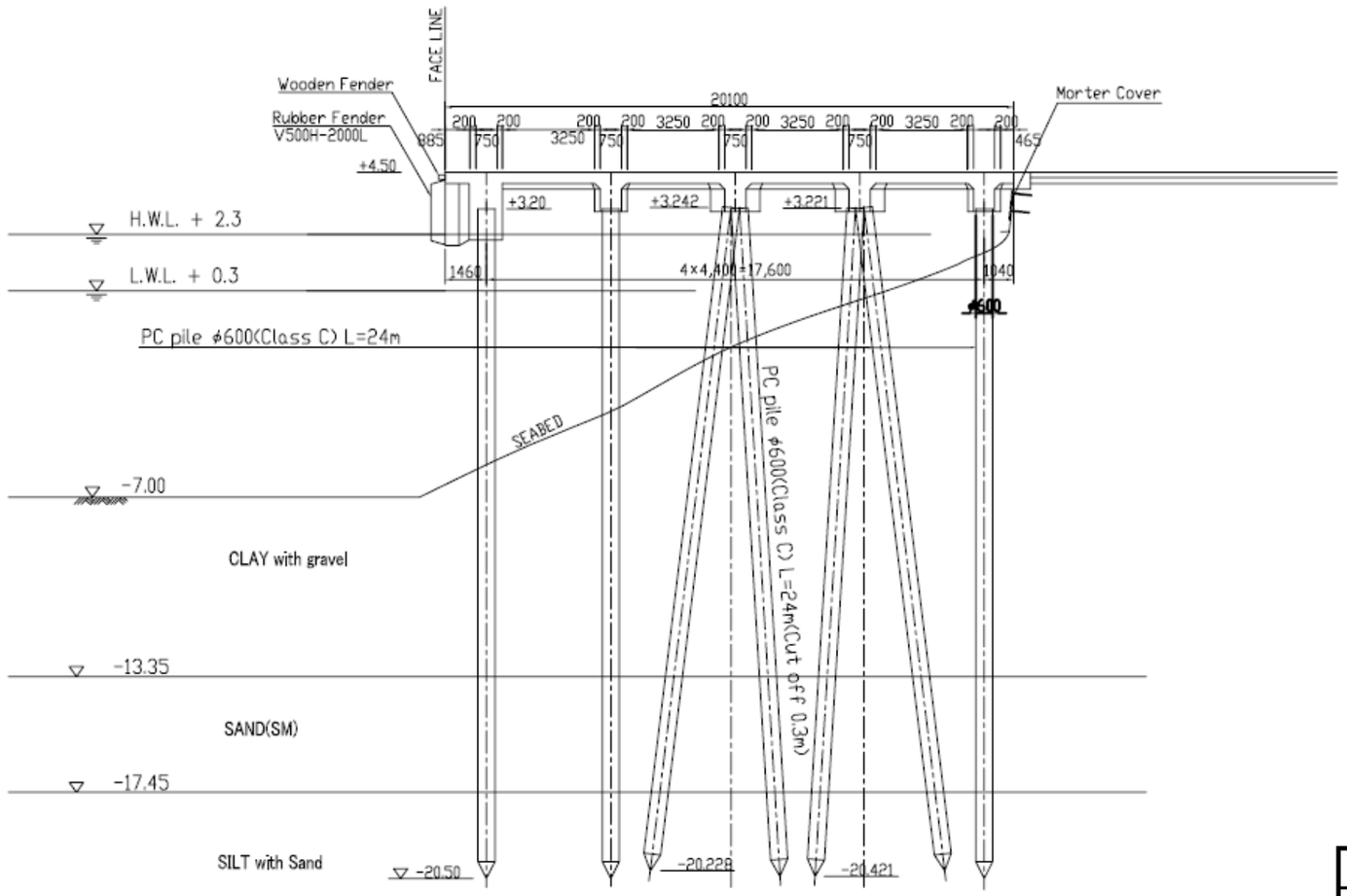


Front view



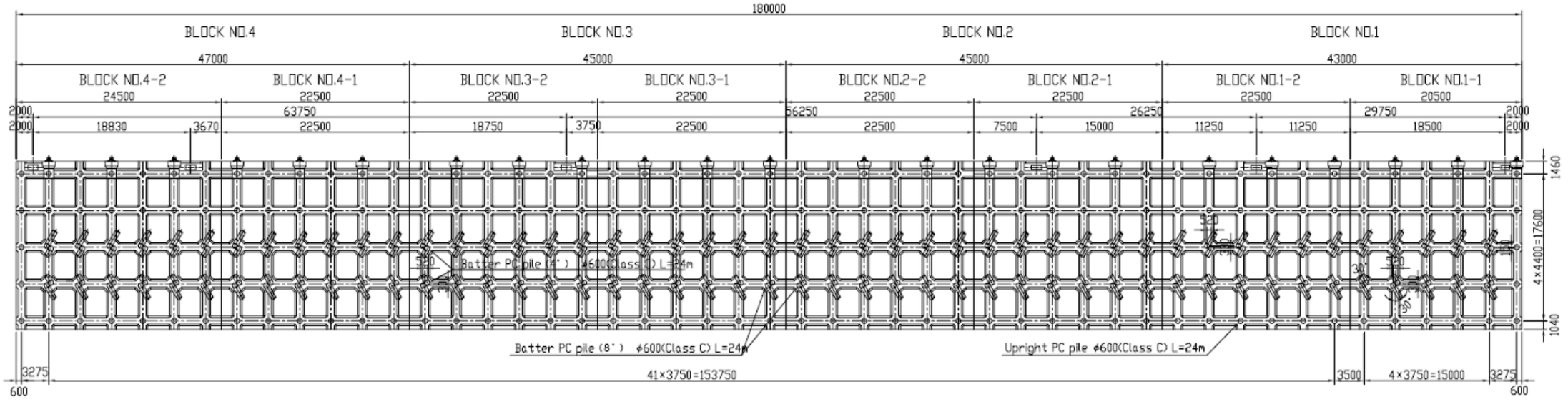
Japan International Cooperation Agency					
The Project for Rehabilitation of Dili Port in East Timor					
TITLE	Superstructures of Wharf, Front view				
SCALE	A3	1:500		DRAWING NO.	04
	A1	1:250			
International Development System Inc.					
APPROVED BY.	CHECKED BY.	DESIGNED BY.	DRAWN BY.	DATE.	2005.11.

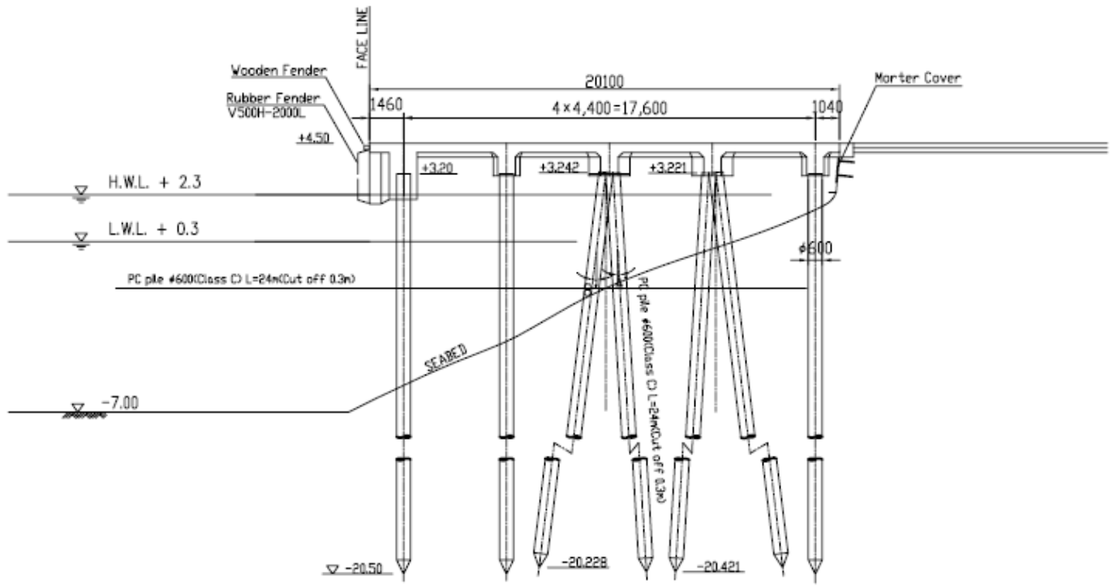
Typical cross-section S=1/200



Japan International Cooperation Agency					
The Project for Rehabilitation of Dilī Port in East Timor					
TITLE	Typical cross-section				
SCALE	A3 1:200 A1 1:100				DRAWING NO. 05
International Development System Inc.					
APPROVED BY.	CHECKED BY.	DESIGNED BY.	DRAWN BY.	DATE. 2005.11.	

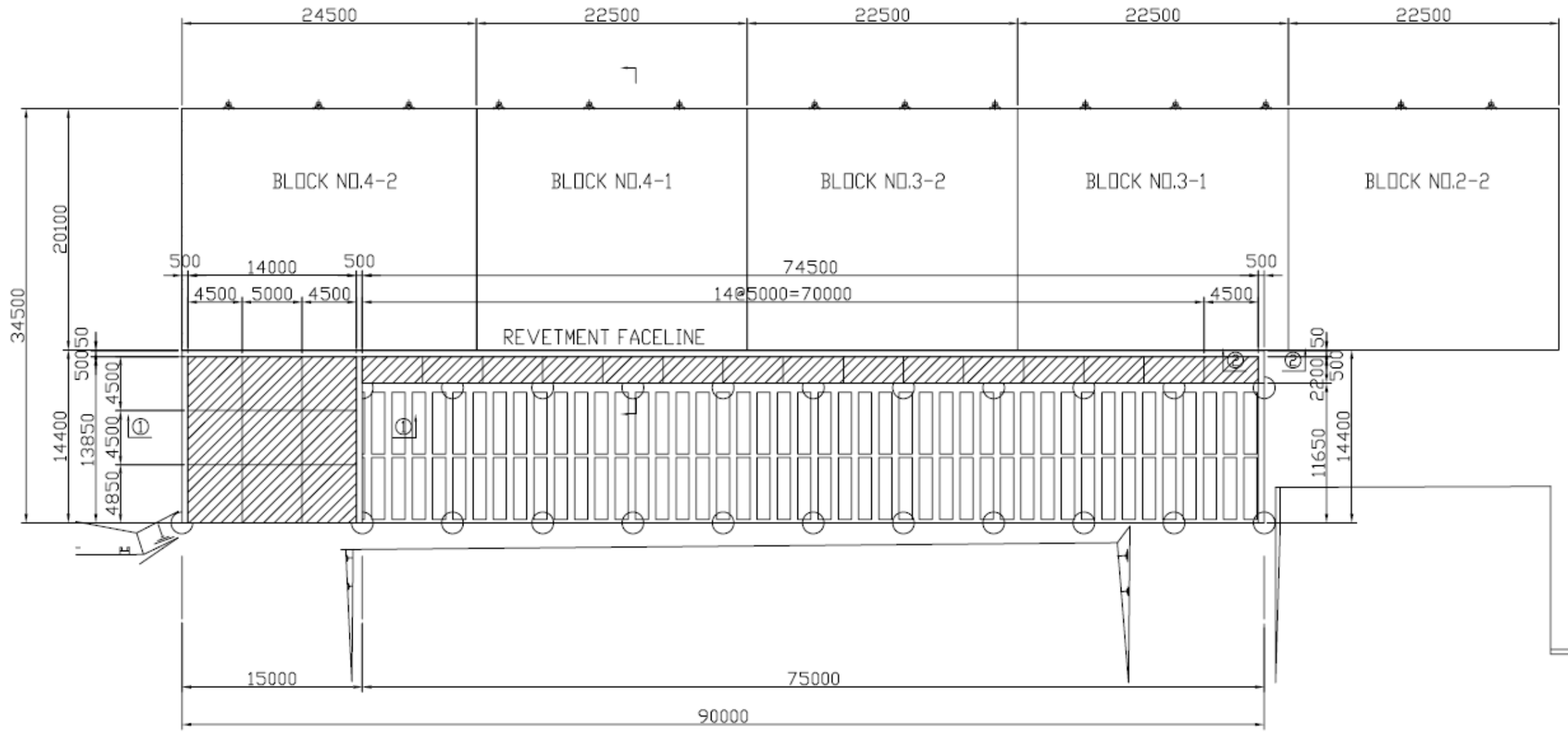
Layout of PC Piles





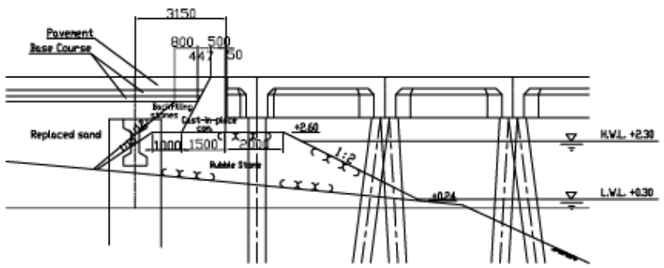
Japan International Cooperation Agency					
The Project for Rehabilitation of Dili Port in East Timor					
TITLE	Laout of PC Piles				
SCALE	A3	1:500		DRAWING NO.	
	A1	1:250		06	
International Development System Inc.					
APPROVED BY.	CHECKED BY.	DESIGNED BY.	DRAWN BY.	DATE. 2005.11.	

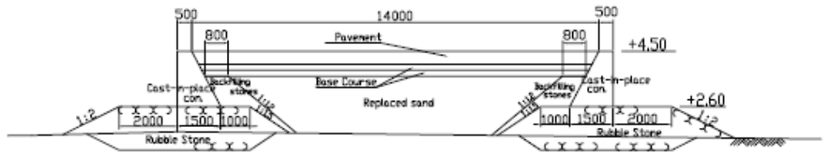
Earth retaining and pavement plan S=1/200



① - ①

Earth retaining typical cross-section S=1/100





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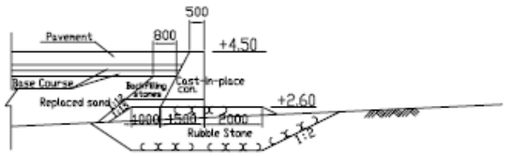


Japan International Cooperation Agency					
The Project for Rehabilitation of Dili Port in East Timor					
TITLE	Earth retaining and pavement plan				
SCALE	A3	1:400			DRAWING NO. 07
	A1	1:200			
International Development System Inc.					
APPROVED BY.	CHECKED BY.	DESIGNED BY.	DRAWN BY.	DATE. 2005.11.	

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

The concept of the implementation is technology transfer to Timor-Leste utilizes of local Consultant and Contractors.

The contents of technology transfer are safety control, quality control and schedule control through the work in consideration of the environment.

2-2-4-2 Implementation Conditions

In Timor-Leste, enough common equipment are existing except for big machines such as pile driving machine, crane with capacity over 30ton and maritime construction equipment.

Accordingly, equipment for the major marine construction work must be imported from the neighboring countries. In this matter an extra expense is required for transportation and cruise costs becomes a big burden.

On this account, the construction scheme has been considered to apply the common use equipment which is available in Timor –Leste as much as possible.

On the other hand, it is indispensable in the project that enough experienced local personnel such as, engineers, technicians, and mechanics for the marine construction that has knowledge of marine conditions and a natural condition well. However, this does not exist in Timor-Leste, therefore these personnel must be imported.

In addition, the environment measures are one of the major points on implementation of the project.

The main portion of the project will be executed in a seawater area therefore the construction scheme should consider the prevention for contamination of seawater, therefore the prevention of falling demolished concrete and/or fresh concrete, is critical.

2-2-4-3 Scope of Works

The scope of the works for which the Japanese Government and Democratic Republic of Timor-Leste are each responsible for are listed below:

(1) Works and Facilities to be undertaken by the Government of Japan

(a) Rehabilitation of wharf.

(2) Works and Facilities to be undertaken by the Government of Democratic Republic of Timor-Leste:

(a) Demolition of transit shed.
(b) Provision of a temporary construction yard.
(c) Provision of yard for demolished material.
(d) Provision of office space for the consultant.
(e) Provision of office space for the contractor.
(f) Arrangement for tax exemption and payment of bank commission fees.
(g) Provision of berthing or mooring facilities in emergency.

2-2-4-4 Consultant Supervision

(1) Schedule of the Consulting Services

The Project will be commenced with the signing of E/N, pertaining to the engineering services for the detailed design and supervision of the construction works between the Government of Japan and the Government of Democratic Republic of Timor-Leste. The contract for the detailed design and supervision of the construction works will be concluded between MTCPW and a Japanese consultant who will provide the following

engineering services within the limits of the Grand Aid.

1) Detailed design stage

The Consultant will carry out the detailed design of the civil works for the Project in compliance with the specifications and concepts of the basic design. The contents of the detailed design are as follows:

- Design criteria and standards,
- Design reports,
- Drawings,
- Quantity and cost estimate,
- Construction planning, and
- Tender and relevant documents,

2) Pre-construction stage

After the completion of the detailed design and tenders documents, MTCPW will select a Japanese contractor through open tender. The Consultant will assist MTCPW on the following tasks;

- Bid announcement,
- Pre-qualification of contractors,
- Pre-bid conference and site inspection,
- Tender and tender evaluation, and
- Contract negotiation.

3) Construction supervision phase

The engineering services for the construction supervision will begin with the issuance of a Notice to Proceed (NTP) to the Contractor by MTCPW.

The Consultant will perform his duties in accordance with the criteria and standards applicable to the construction works and will exercise the powers vested in him as the Engineer under the contract to supervise the field works by the Contractor.

Engineer under the contract to supervise the field works by the Contractor.

The Consultant within his capacity as the Engineer shall directly report to MTCPW about the field activities and shall issue field memo or letters to the contractor regarding the various matters, including progress, quality, safety and payment of the Project.

(2) Staffing

The required staff and their responsibilities at the detailed design and construction supervision stages are described herein blow:

- Team Leader
- Civil Engineer (Marine Civil Engineer)
- Construction Planner / Cost Estimator
- Document Specialist
- Resident Engineer

2-2-4-5 Quality Control Plan

The quality control work will be implemented in accordance with the **Table 2-2-4.1**

Table 2-2-4.1 Item of Quality Control *) see note

Construction Work		Item	Description
Mixing and casting of concrete	Site	Compressive strength test	・Trial mix shall be done 35 days before casting concrete at site. Three test pieces shall be made for each age of 7days and of 28 days. ・When the Engineer decides the test piece would not make enough strength according to compressive strength test result of 7 day age, the Engineer shall instruct the contractor to re-submit mixing design report and to do trial mix again. ・Air content test and slump test shall be done with compressive test above. ・Similar concrete test to test of trial mix shall be done each 100m3 in casting concrete quantity or each concrete working day. ・Temperature of ready mixed concrete shall be between 5 degree and 35 degree centigrade.
	Mixing plant	Grain size analysis test of aggregate	・Grain size analysis test result shall be submitted for each aggregate pile coming in site.
		Salinity test	・Salinity test of ready mixed concrete shall be done periodically at site.
Cutting, bending and assembling of re-bar		Material coming in site	・Length, diameter and quantity shall be checked. ・Unusual exterior condition, rust on re-bar and so on, shall be checked. ・The measurement of keeping material at site shall be checked (Covering with sheet, arrangement of sleepers)
		Cutting, bending	・Difference of dimension from design shall be checked.
		Assembling	・Difference from design in spacing, location of lap and length of lap shall be checked. ・Dirt or rust on re-bar shall be checked.
Form and support		Before assembling	・The form and support shall be checked whether they have enough strength or not according to designing calculation submit beforehand. ・Dirt or rust on re-bar shall be checked before assembling of form .
		After assembling	・Whether covering thickness is enough or not shall be checked according to design. ・Whether allowance of dimension of form is in value specified or not.

***)** note: Referred from 'Specification of Port Construction Project of Ministry of Land, Infrastructure and Transport' in Japan

2-2-4-6 Procurement Plan

(1) Construction Materials

Construction materials will be imported from neighboring countries with exception of which can be supplied in Democratic Republic of Timor-Leste such as sand, aggregate, etc. for concrete. On the other hand, most of the construction materials are able to procure from construction material distributors in Timor-Leste.

The procurement of material is shown in **Table 2-2-4.2**.

Table 2-2-4.2 Procurement of Major Materials

Procure from / Material	Timor-Leste	Neighboring Countries		Japan	Remarks
		Indonesia	Singapore		
Cement	○	○			40kg/bag
Sand/Aggregate	○				
Steel bar	○	○	○		
Steel (H beam etc.)	○	○	○		
Ready mixed concrete	○				
Fuel (gasoline/diesel)	○	○			
Special Materials		○	○	○	Silt curtain / Chemical anchor etc.

(2) Construction Equipment

General construction equipment such as bulldozers, backhoes, dump trucks, etc., most of which are secondhand, is available in Democratic Republic of Timor-Leste.

In present time, construction equipment for offshore work such as 35 tons crawler crane barge and anchor boat, which is in poor condition, is available. On the other hand, the project is planning to commence in 2006, so that at the present, it is uncertain whether these ships are available or unavailable for the project.

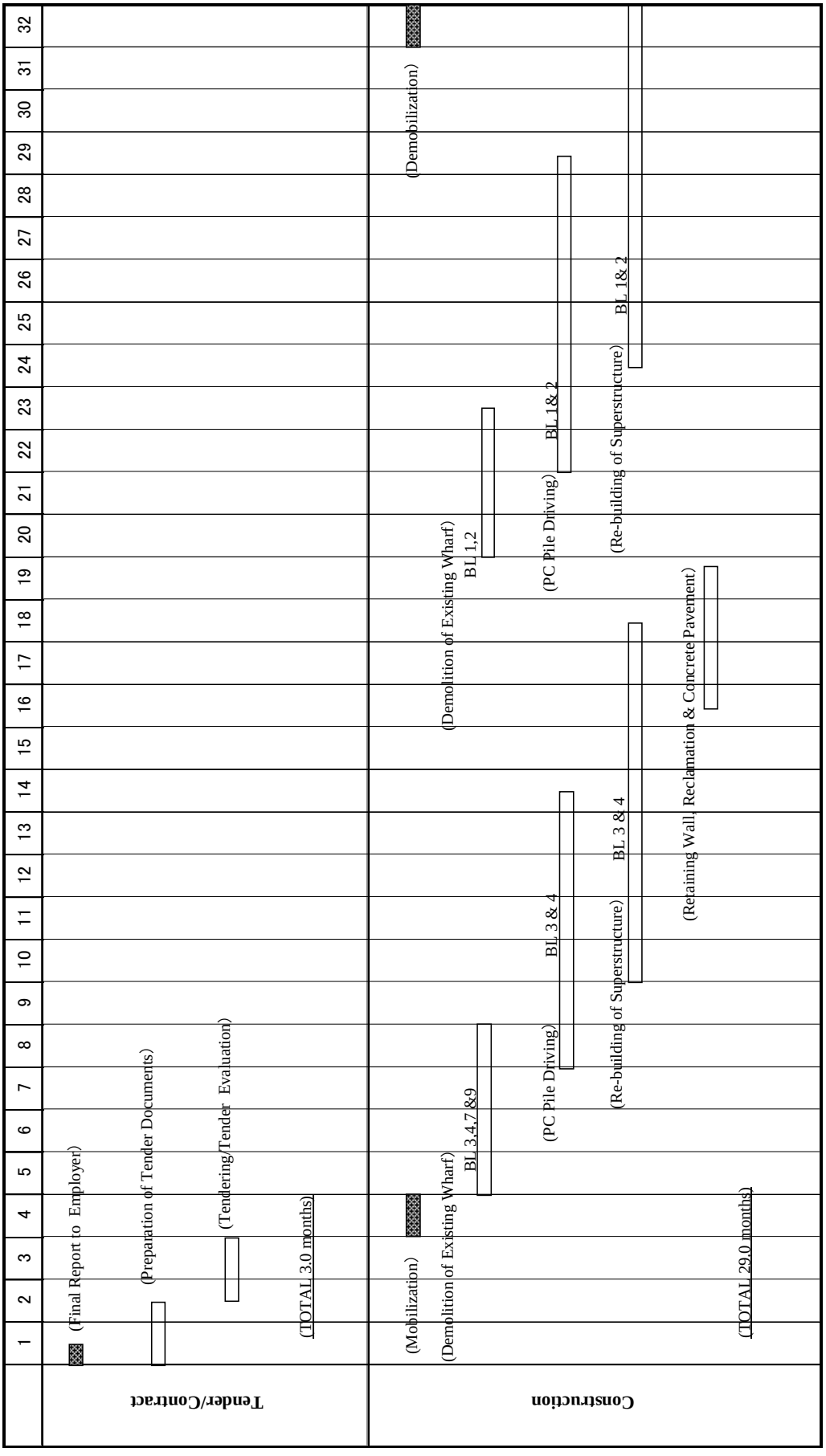
The procurement of major construction equipment is shown in **Table 2-2-4.3**

Table 2-2-4.3 Procurement of Major Construction Equipment

Procure from / Item	Timor-Leste	Neighboring Countries		Japan	Purposes
		Indonesia	Singapore		
Backhoe (0.6m3)	○				Excavation, loading
Giant breaker (600kg class)	○				Demolish of concrete
Crawler crane (45tons)		○	○		Remove of concrete
Crawler crane (35tons)		○	○		Construction for slab
Pile Hammer (K45 class)		○	○		PC pile driving
Dump truck (10tons)	○				Transport of waste concrete
Bulldozer (15tons class)	○				Reclamation and leveling of the ground
Crawler crane barge (35tons class)	○	○	○		Support of forming work, installation/removal of silt curtain

2-2-4-7 Implementation Schedule

Table 2-2-4.4 Implementation Schedule



2-3 Obligations of Recipient Country

- To secure necessary permissions, licenses, and other authorizations for implementing the Project, if necessary.
- To provide the space for the site office, warehouse, materials stockyard, and disposal yard for waste concrete, etc., for the execution of the Project.
- To ensure prompt unloading, tax exemption, custom clearance at the port of disembarkation in Democratic Republic of Timor-Leste and prompt international transportation of the materials and equipment for the Project purchased under the Grant Aid.
- To accord Japanese nationals whose service may be required in connection with the supply of the Project and services under the vertical contract such facilities as may be necessary for their entry in to Democratic Republic of Timor-Leste and stay there for the performance of their work.
- To exempt Japanese juridical and physical nations engaged in the Project from custom duties, internal taxes and other fiscal levies which may be imposed in Democratic Republic of Timor-Leste with respect to supply of the products and services under the verified contract.

2-4 Project Operation Plan

2-4.1 Operation & Maintenance by the Port Authority

The agency in charge of overseeing the Project is the Port Authority under the Ministry of Transportation and Communication. After the completion of the Project, the Port Authority will be responsible for the operation, management and maintenance of Dili Port under supervision of MTC.

2-4.2 Organization

Refer to **"Fig-2-2.1.5 Organization of Port Authority".**

2-4.3 Regulations and Usage

It is determined that the Port Authority shall be a corporation named APORTIL in legislation of law No.3/2003. The Port Authority is managed by DST in the present, however, the port authority shall aim to become an independent organization APORTIL and become a profitable enterprise.

The foundation of APORTIL is still under preparation and the organization would be almost same as the present one composed of three sections (Refer to Table2-2-1.5)

.

2-5 Rough Cost Estimate for the Project

2-5.1 Rough Cost Estimate for the Grant Project

(1) Cost Allocation by the Government of Japan

The following cost estimate is provisional and would be further examined by the Government of Japan for the approval of the Grant Aid project.

Table 2-5.1 Cost Allocation by the Government of Japan

Total Cost : Approximately Nine Hundred Million Yen

Rehabilitation of Dili Port Rehabilitation Area: Approx. 4,041 m^2

Item			Estimated Project Cost (Million Yen)
Facility	Wharf	Demolish Foundation Super Structure Reclamation Other Works	807
Detailed Design, Supervision, Technical Lecture			93

(2) Cost Allocation by the Government of Timor-Leste

The following is the estimated cost of the work shouldered by the Government of the Timor-Leste in connection with the implementation of the Japanese Grant Aid project.

- Demolish and relocation of Transshipment Shed.
- Arrangement for tax exemption and payment for bank commission fees.
- Provide temporary material storage area and equipment parking spaces.

The cost above would be approximately US$70Thousand.

(3) Condition of Cost Estimates

- The Time of Cost Estimates:
  February 29 to March 29 of 2005, therefore the time of cost estimates is March 2005.
- Exchange Rate :
  Exchange Rate : 1 US Dollar = 107.03Yen
  Local Currency : 1 Local Currency (US Dollar) = 107.03Yen
- Others :
  The cost estimates will be carried out in compliance with the methods and the procedures of Japanese Grant Aid Scheme.

2-5.2 Cost for Operation and Maintenance

This Project is for rehabilitation of existing facilities. That is why additional cost for maintenance and for operation would be unnecessary after the Project is completed.

2-6 Environmental Issues

The Ministry of Development and Environment (MDE) classified the Project as category B and requests the Environmental Management Plan (EMP) based on the Scoping and Screening conducted by JICA Preparatory Study Team. (See, **Table 2-6.1**) Therefore, MTCPW has to make EMP in advance of the Project implementation in order to get the approval of the Project.

The recipient government take the initiative in dealing with environmental and social considerations of their projects. However, JICA supports and examines measures for environmental and social considerations that the recipient government implement. In this case, B/D Study Team makes the draft of EMP in cooperation with the counterpart (MTCPW).

As a result of discussions with the officer concerned in MDE, following matters were confirmed.

1) EMP should be made based on the Environmental Guideline #7(3/2/2005). Above Guideline is still draft, but it

could be applied temporarily.

2) Regarding the items which are lacking in this Guideline, Indonesian Standards are available.
3) MDE reviews the Draft EMP and will approve it, or approve it with modifications. MDE must make its decision and inform the Proponent within 30 days of receiving the draft document. (Environmental Guideline #7)
4) MTCPW submit the development proposal application to MDE.

Required elements of EMP are formulated as shown in the **Table 2-6.1**. (Environmental Guideline #7)

Table 2-6.1 Required Elements of EMP

Chapter	Elements
I	Project / Activity Description;
II	Physical, Biological and Social Impacts, and Mitigation Measures;
III	Monitoring, Reporting and Auditing Schedules;
IV	Organizational and Management Structure;
V	Resources and Costs;
VI	Capacity Building and Training;
VII	Declaration of Compliance;

Main items for environmental and social considerations are the impact of concrete waste disposal, impact of air dust and impact of sea water contamination caused by dismantling of existing concrete structures. Concrete waste is separated into concrete and iron at the quarry site, being recycled as construction materials. Additional traffic volumes on the route between the site and the quarry site (AVENIDA DE PORTUGAL) are estimated based on the concrete waste volume, and its impact could be evaluated comparing the original traffic and the additional traffic. And the mitigation methods will be taken, if necessary.

The appropriate countermeasures are adopted to mitigate the impact of air dust and impact of sea water contamination caused by dismantling works of existing concrete structures. Installation of sheet protector and sprinkling are implemented regularly. Construction works should be controlled by monitoring the turbidity and traffic volume.

Table 2-6.2 Scoping Check List Result

Expected somewhat impact/Not clear (Preparatory Study)

Environmental Items	Evaluation	Reason
Social –Environment		
Economic activities	B or C	Limited anchorage / limited berthing
Traffic and public Facilities	C	Routes (land or sea) used for rehabilitation activities are to be considered.
Waste	C	Destination of waste from rehabilitation activities and routes taken are to be considered.
Hazards	C	Detail of rehabilitation activities are to be considered.
Natural Environment		
Hydrological situation	C	Rehabilitation activities may cause some impact.
Pollution		
Air pollution	B or C	Dust from trucks and machines during rehabilitation may cause some impact.
Water pollution	B	Turbidity and sediment movement during rehabilitation may cause some impact.
Noise and vibration	C	Rehabilitation activities may cause some impact.

Note: Evaluation classification

A: Expected serious impact

B: Expected somewhat impact

C: Not clear

D: Not necessary IEE or EIA (not expected impact)

CHAPTER 3

PROJECT EVALUATION AND RECOMMENDATIONS

CHAPTER 3. PROJECT EVAUATION AND RECOMMENDATIONS

3-1 Project Effect

3-1.1 Direct Effect of the Project Implementation

(1) Existing Condition and Problem

The present operation of Dili Port is partly limited and the service of the Port is not enough for all vessels arriving at Dili Port because of defect of the wharf.

In spite that Dili Port is the only international port in East Timor, safety of operation in the Port is not enough because of the defect of the wharf. With such uncomfortable condition of the Port, the cost of daily consumption is rising and the people have to be reconciled to serious loss in this country.

(2) Direct Effect

- Time of stand-by of vessels would be shortened because two berths rehabilitated by the Project would reduce time of loading and unloading of cargoes.
- The safety of arriving vessels would be improved in berthing, in de-berthing, and in loading unloading work.

3-1.2 Indirect Effect of the Project Implementation

Indirect benefit population: around 930,000 persons (Total population of Timor-Leste of 2004)

- Reduction of transportation cost would activate the national economy and promote the foundation of various enterprises.
- The exportation of local products of agriculture mainly would be promoted.
- The opportunity of employment would be increased by the construction work and by the operation of the Port.

3-1.3 Establishment of Result Index and Forecast after Improvement

Result Index for efficiency of loading and of unloading on the wharf is set up. Efficiency means time for loading or unloading cargo of 100ton weight. Time for loading or unloading would be shorten from 4.5 hours/100ton in 2005 to 3.6 hours/100ton in 2020 and efficiency would be improved by 20%.

3-2 Recommendation

It is judged comprehensively that the Japan's Grant Aid Project for rehabilitation in Dili Port is worth doing for Timor-Leste from the viewpoints above.