The Democratic Republic of Timor-Leste
Administração dos Portos de Timor-Leste (APORTIL, I.P.)

The Project on Strategic Port Development Master Plan in Timor-Leste

Final Report (Summary)

June 2024

Japan International Cooperation Agency (JICA)

Ides Inc.
Overseas Coastal Area Development Institute of Japan (OCDI)
Pacific Consultants Co., Ltd.

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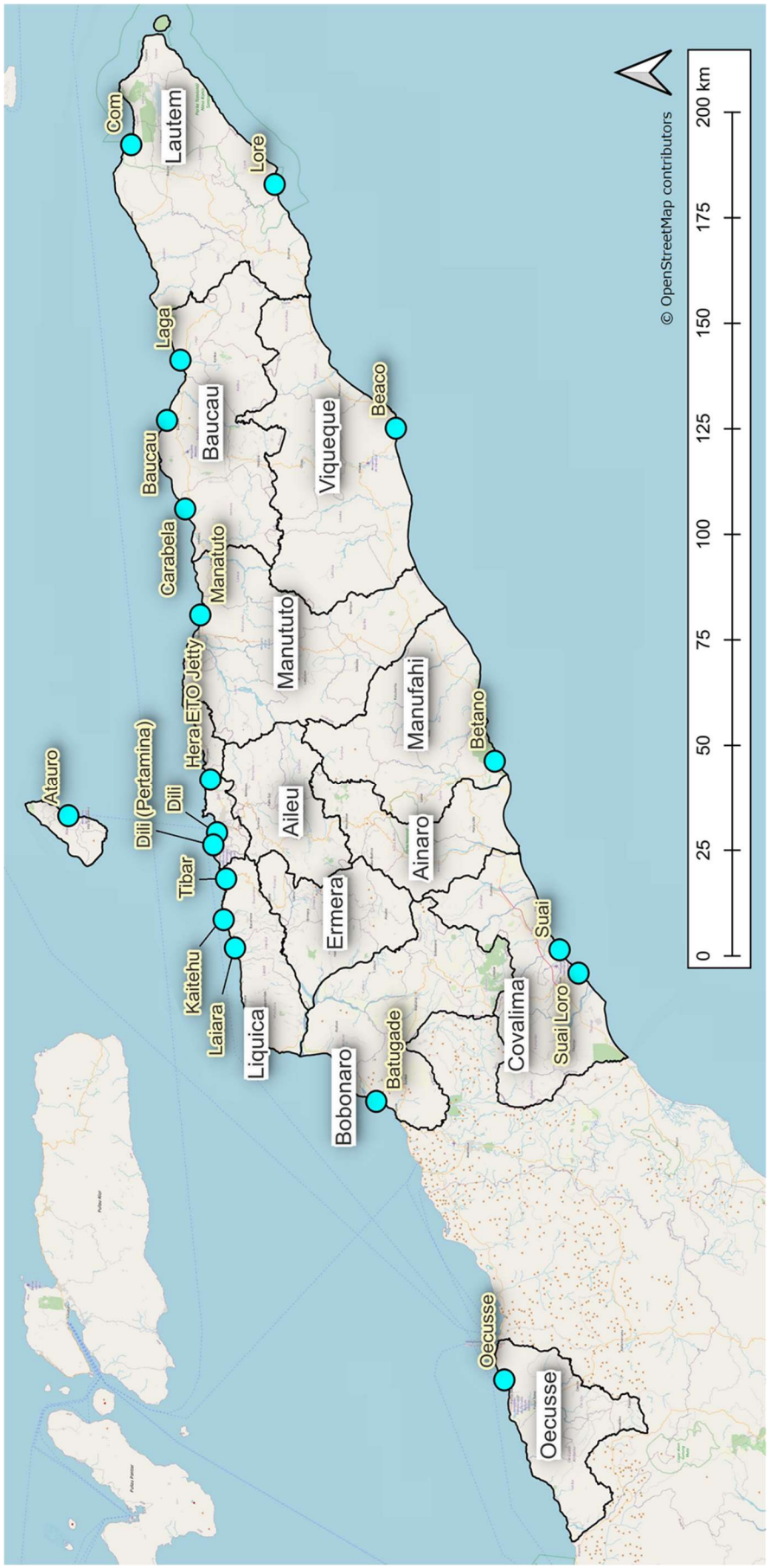
19 Target Ports and Locations



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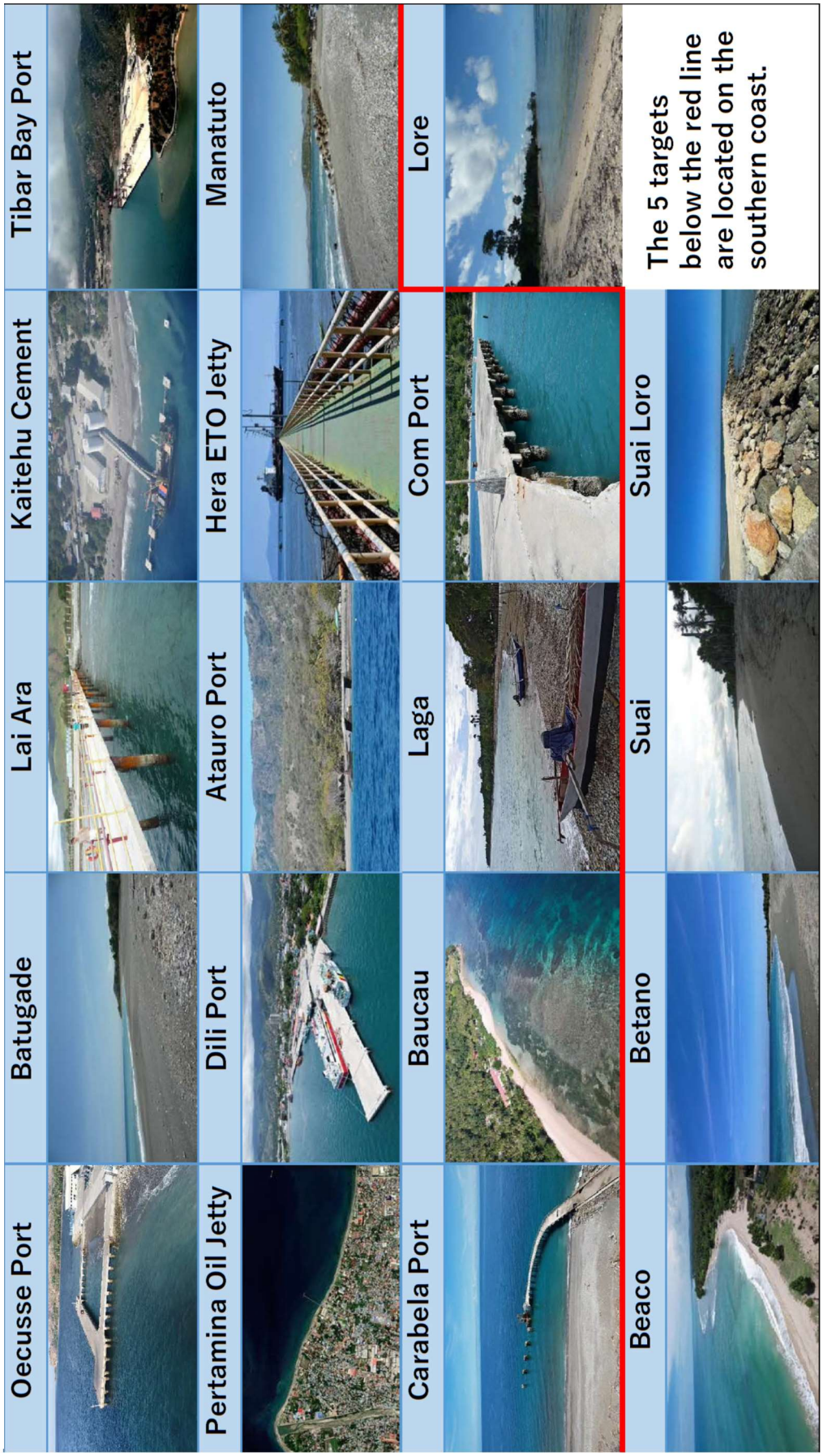
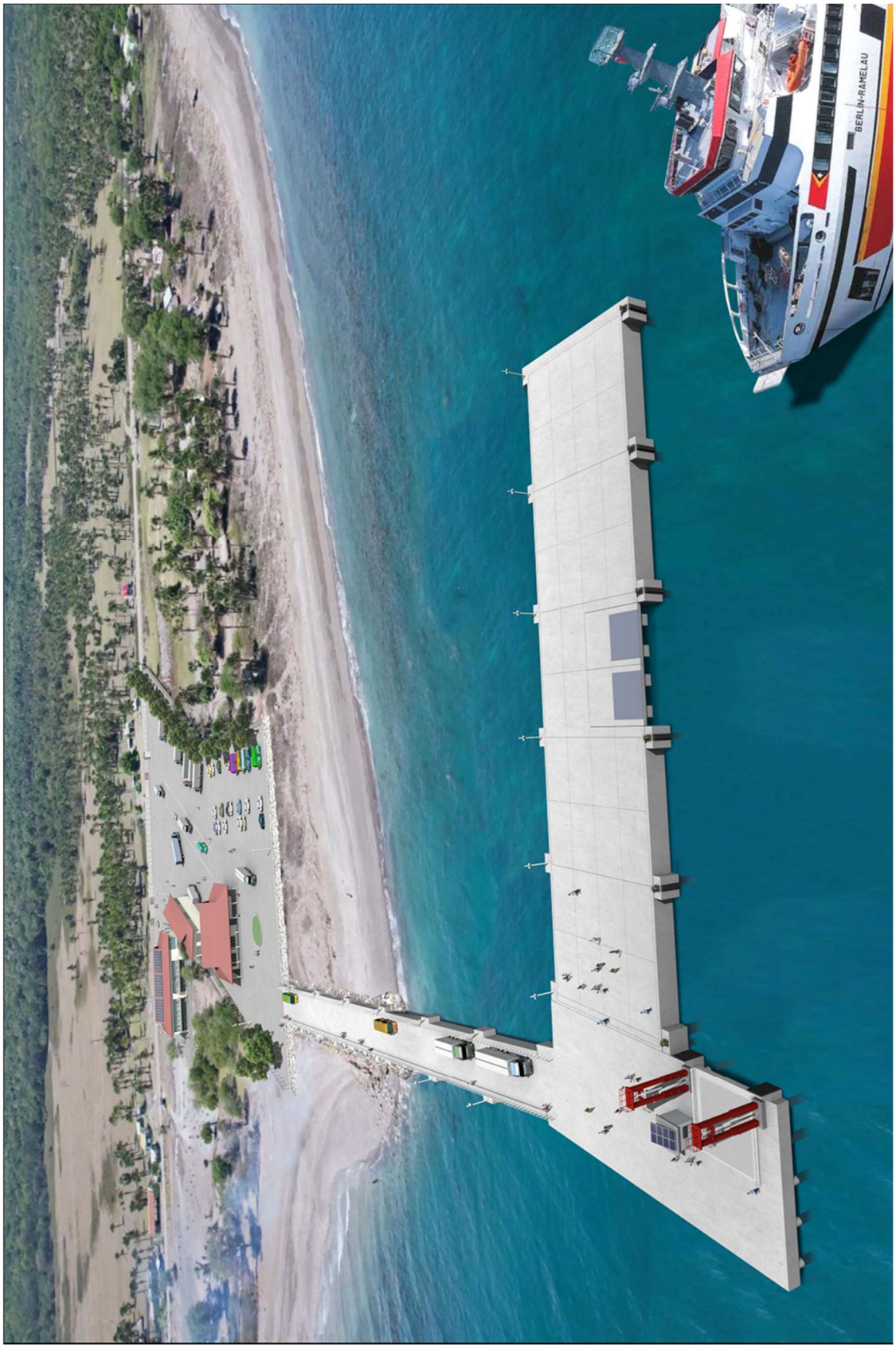


Development plan for high priority port (Carabela Port)



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Exchange Rates

Date: 2023 September

1 USD (US dollar) = 148.73 Japanese Yen

1 IDR (Indonesian Rupiah) = 0.0109 Japanese Yen

ABBREVIAIONS

ADB	Asian Development Bank
APORTIL, I.P.	Port Administration of Timor-Leste
ANLA / NAEL	Agencia Nacional de Licensiamento Ambiental / National Agency for Environmental License
ANATL, E.P.	Administration of Airports and Air Navigation of Timor-Leste
AIS	Automatic Identification System
BLF	Beach Landing Facility
CAFI	Infrastructure Fund Administrative Council
CAPEX	Capital Expenditure
CI	Conservation International
CMTL	Mineral Company of Timor-Leste (Compannia Mineira de Timor-Leste)
CPI	Center for Integrated Planning
COLREG	Regulations for the Prevention of Collisions at Sea
COM	Council of Ministers
CN	Critically Endangered
DGTC	Directorate-General for Transport and Communications
DL	Datum Level
DNTM	National Directorate of Maritime Transport
DNTT	National Directorate for Land Transport
DWT	Deadweight Tonnage
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EIRR	Economic Internal Rate of Return
ELF	Emergency Landing Facility
EN	Endangered
EMP	Environmental Management Plan
FEDA	Ataúro Special Development Fund
FEED	Front End Engineering Design
FIRR	Financial Internal Rate of Return
F/S	Feasibility Study
GDP	Gross Domestic Product
GT	Gross Tonnage
ICD	Inland Container Depot
ICUN	International Union for Conservation of Nature and Natural Resources
IEE	Initial Environmental Examination
IFC	International Finance Corporation

IMO	International Maritime Organization
IPG	Institute of Petroleum and Geology
ISPS	International Ship and Port Facility Security Code
JCC	Joint Coordination Committee
JICA	Japan International Corporation Agency
KBA	Key Biodiversity Area
LAeq	A-weighted, equivalent continuous sound level
Ld	A-weighted day noise level
Ldn	A-weighted day-night noise level
Ln	A-weighted night noise level
MTC	Ministry of Transport and Communications
MAF	Ministry of Agriculture and Fishery
MALFF	Ministry of Agriculture, Livestock, Fisheries, and Forestry
MARPOL	Marine Pollution convention
MOF	Ministry of Finance
MOD	Ministry of Defense
MTCI	Ministry of Tourism, Commerce and Industry
MPS	Major Projects Secretariat
MPSI	Ministry of Planning and Strategic Investment
MPT	Ministry of Planning and Territory
MPW	Ministry of Public Works
MPM	Ministry of Petroleum and Mineral
MSA	Ministry of State Administration
NBSAP	The National Biodiversity Strategy and Action Plan
NDA	National Development Agency
NDLP	National Directory of Land & Property
NOAA	National Oceanic and Atmospheric Administration
NPV	Net Present Value
NT	Near threatened
MPA	Marine Protected Area
MMA	Marine Managed Areas
ODA	Official Development Assistance
PDM	Project Design Matrix
PMU	Project Management Unit
PNOT-TL	Timor-Leste National Spatial Planning Plan
PO	Plan of Operation
PPP	Public-Private Partnership
PFSA	Port Facility Security Assessment
PFSP	Port Facility Security Plan
PSC	Project Supervising Committee

RAEOA	Special Administrative Region of Oecusse Ambeno
RO/RO	Roll-On Roll-Off
SCF	Standard Conversion Factor
SEA	Strategic Environmental Assessment
SEA	Secretary State of Environment
SDP	Strategic Development Plan
SOLAS	International Convention for the Safety of Life at Sea
SMP	Ataúro Island Sustainable Management Plan
SSB	Suai Supply Base
STCW	Standards of Training, Certification and Watchkeeping
TIMOR GAP, E.P.	Timor Gás & Petróleo, Empresa Publica
TOR	Terms of Reference
UNCLOS	United Nation Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UPM	Unidade Polísia Marítima / Maritime Police
USAID	US Agency for International Development
USLCF	Unskilled Labor Conversion Factor
VTS	Vessel Traffic Service
VU	Vulnerable
WB	World Bank
ZEESM	Special Zones for Social Market Economy

SUMMARY

The Government of the Democratic Republic of Timor-Leste recognized infrastructure development in the port sector as one of its priority issues in the Strategic Development Plan 2011-2030 (SDP). In the government program, the development of regional ports was positioned to enable the sea transport of domestic passengers and cargo. Since there are many mountainous areas in Timor-Leste and the road network is under development, sea transport can be an indispensable infrastructure for public transport. Ferry services to rural areas are currently operated between Dili, Oecusse and Ataúro, however, maritime traffic to other regions is not open. While no specific development plan for regional ports has been made due to restrictions on the government budget, it is required to formulate a development plan for the regional ports including consideration of future maritime transport networks for economic development and improvement of living standards of local residents, especially in rural areas. Tibar Bay Port started its official operation from November 2022. The redevelopment plan for Dili Port after the transfer of cargo handling being completed, has been suspended and alternate plan is expected. However, the reorganization plan of APORTIL, I.P., which operated Dili Port, has not yet been considered. In light of this situation and the need to formulate a strategic port development master plan, the Government of Timor-Leste requested Japan to implement a technical cooperation development plan project and R/D (Record of Discussion) with contents of the investigation was signed in May 2022.

The Strategic National Port Development Master Plan consists of the following three core plans.

	Strategic National Port Development Master Plan	Target Year	Referred Chapter
1	National ports development plan	2040	Chapter 5
2	Development plan for high priority ports	2030 or 2035 depending on individual port development	Chapter 6
3	Action plan for improvement of port operation and maintenance by APORTIL, I.P.	2040	Chapter 7

Note: Chapter 2 &3 (Fact Findings), Chapter 4 (Review and Analysis)

In order to formulate those, an 18-member Study Team conducted five missions in Timor-Leste including several field surveys on 19 target ports over two years from 2022.

The structure of this report is as follows.

Chapter 2 describes the current status of the port sector, including national development plans, natural and social conditions, and transportation. The port related policies, planning and projects in SDP, government programs, national spatial planning plan (PNOT-TL), and the transport sector master plan (TSMP) were reviewed. To understand the development program on region and industry, information on the progress of the road rehabilitation projects, programs of MTC and MAF, Dili port redevelopment, and Ataúro island development were gathered and summarized. The natural and social conditions of Timor-Leste were studied to obtain basic information for port development. The current status of all port activities was included.

Chapter 3 presents the current status of port development, port management and operation, and environmental and social considerations. The specific port development plans for the target ports were reviewed. Understanding the administrative role in port development and operation in Timor-Leste, the current status of APORTIL, I.P.'s Port administration division was examined. The legal framework on socio-environmental issues were studied in this chapter.

Chapter 4 describes strategies for port development and port management based on this understanding of the current situation, the social framework and demand forecasts up to the target year of 2040. The strategy process is explained in S1 hereafter.

Chapter 5 describes the national port development plan and the selection of priority development ports. (also refer to S1)

Chapter 6 describes the high priority port development plan. (also refer to S2)

Finally, Chapter 7 proposes the APORTIL, I.P. action plan necessary to smoothly promote port development. (also refer to S3)

150 interviews and discussions were conducted for this purpose with C/P, related organizations, port users, logistic companies, etc.. The list and interview date are shown in APPENDIX-1.

APPENDIX-2 presents the summarized results of site survey to obtain current physical conditions on the target ports. The traffic surveys were also conducted for passenger / cargo movements and summarized in 2.5.2. For detailed information see APPENDIX-3.

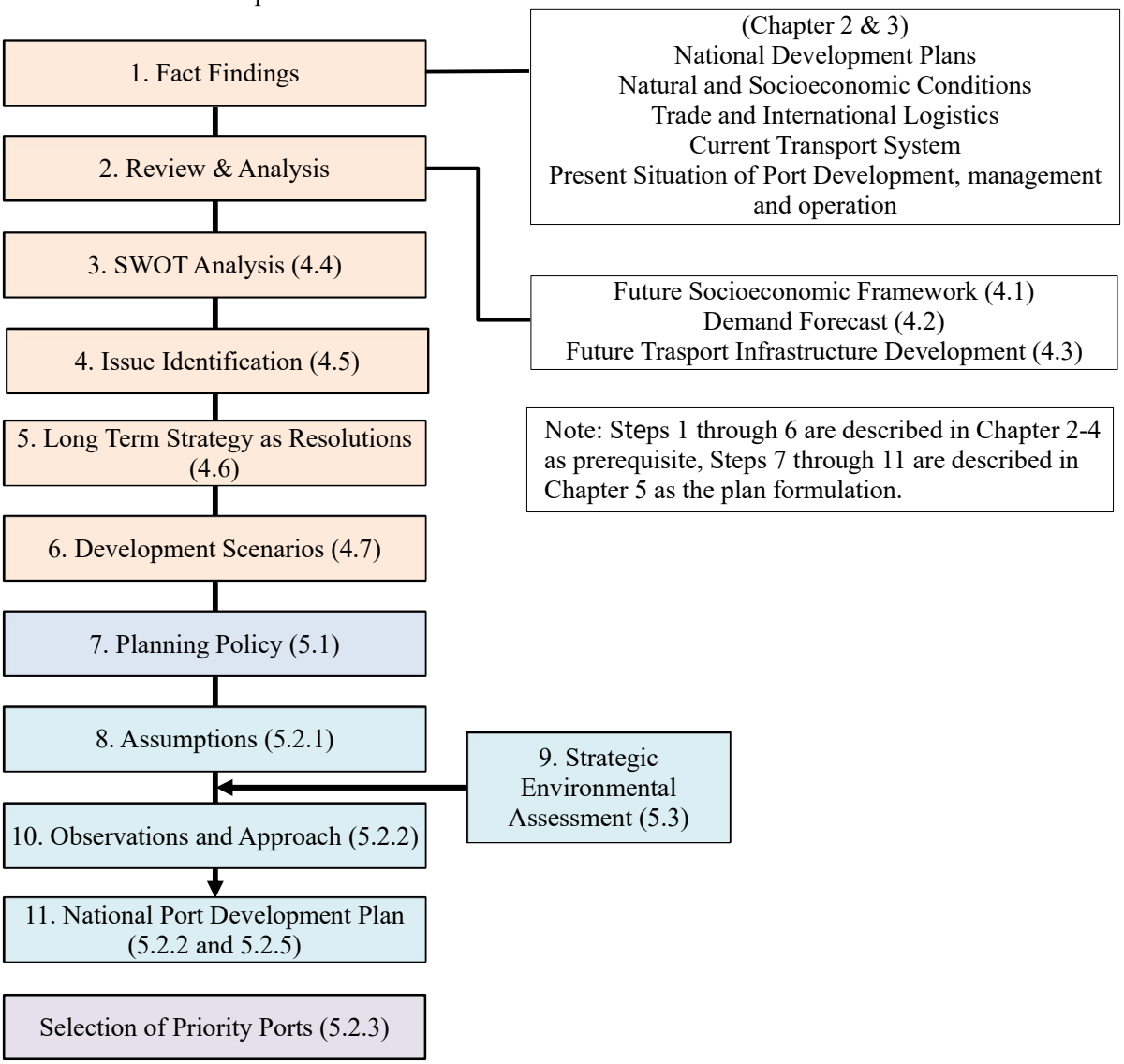
The details of site surveys (Natural and Environmental Conditions) and supplementary information on cost estimates are summarized in APPENDIX-4 through 6.

This report is prepared for presenting the following outcomes.

S1. National Port Development Plan

The long-term strategy for the port sector was devised through a problem-solving approach with the strategic goal of solving the identified issues. Therefore, the current status of the port circumstance (external and internal) and its changes were analyzed, issues were identified, and strategic goals were determined based on SWOT (Strengths, Weaknesses, Opportunities and Threats) factors. The external circumstance included socio-economic trends, market trends related to freight and passenger transportation, and development trends in social infrastructure such as roads. The internal circumstance included the financial situation of APORTIL I.P., organization, personnel system and capacity, legal development such as the jurisdiction of port-related authorities and maintenance and management of port facilities.

The national port development plan was drawn up through the workflow below. The referred chapters and clauses are indicated in parentheses.



S1.1. Issue Identification

Based on the results of the analysis of the current situation in the port sector described in Chapters 2 and 3, and the results of the environmental analysis (SWOT) described in Chapter 4.4, the issues related to port development are identified as follows.

Issues on Port Development

PD1) Among the action plans for the port sector shown in the SDP, none have been realized except for Tibar Bay Port under PPP, and development of regional ports has not progressed at all.

PD2) Currently, the demand for ferry services to Ataúro and Oecusse cannot be fully met.

PD3) There is no organization to plan port development from the viewpoint of national interest, and port-related organizations are proceeding with their respective plans without cooperation.

PD4) Infrastructure development is taking precedence under a plan in which the port's purpose and functions are not clear.

PD5) The port design standards for Timor-Leste have not been developed.

PD6) Maintenance methods for port facilities have not been established.

PD7) Ports to be developed are arbitrarily determined by each organization.

PD8) Necessity of regional port development is generally not recognized.

PD9) Many of the lands are not cadastral, and land-related problems arise from the early stages of development.

PD10) Consideration of environmental conservation is particularly necessary for port development adjacent to Marine Protected Areas.

PD11) Ports located on the southern coast require facility plans to cope with high waves, which affects construction costs.

PD12) There are many port construction candidate sites that do not have road access, so it is necessary to develop them as a whole.

Issues on Port Management and Operation in Timor-Leste

MO1) APORTIL I.P.'s role and management policy after the opening of Tibar Bay Port has not been decided.

MO2) The fact that the income and expenditure of the ferry operation business has remained in deficit is also the reason why the self-supporting accounting system is not introduced for this business.

MO3) As for the maintenance of ferries, daily inspections are carried out by themselves, but large-scale inspections must be carried out at overseas docks because there are no facilities in the country.

MO4) There are few staff members, including executives, who have long-term port management experience, and many staff members leave their jobs. Also, there is no training in the country for personnel who are required to have specialized knowledge such as facility design and maintenance management.

MO5) It was unclear how APORTIL, I.P. was involved in the Dili Port redevelopment project.

MO6) The port tariffs under the jurisdiction of APORTIL, I.P. have not changed since 2003 and are rigid.

MO7) Since the development budget depends on the infrastructure fund, APORTIL, I.P. needs to coordinate with MTC and related ministries. As a result, the independence and originality of APORTIL, I.P. cannot be secured.

MO8) The development of regional ports remains sporadic and neither analytical work, such as demand forecasting, nor systematic and proactive efforts based on a long-term perspective, are being carried out.

MO9) Regarding the development of regional ports, other organizations are free to proceed with their development plans because there is no authority to regulates development activities in the target area.

MO10) In response to the proposed port development scenario, APORTIL, I.P. needs to continue to manage and operate the newly developed regional ports.

MO11) APORTIL, I.P. or DNTM does not have sufficient information on the development plans of private ports or other organizations, nor have a mechanism to coordinate their actions.

MO12) There is no clear procedure for regulating the development of private ports, and there is no mechanism in place to coordinate excessive development activities by the private sector.

S1.2. Long Term Strategy

The long term strategy for the port sector was examined using a problem-solving approach with the strategic goal of solving the identified issues found from the perspective of SWOT elements.

Perspective 1: Leverage Strengths and Take Advantage of Opportunities

1-1) Develop port facilities to meet increasing demand for cargo and passenger transport. (Solution for the issues of PD1, PD2, and MO10)

1-2) Layout ports in order to promote regional development consistent with PNOT-TL. (for the issues of PD3 and PD4)

1-3) Develop port facilities that can strengthen connectivity with neighboring countries as a member of ASEAN. (for the issues of PD3 and PD4)

1-4) Develop a port that strengthens connectivity with the road network as a logistics base that functions in the event of a disaster. (for the issues of PD4 and PD12)

Perspective 2: Overcoming Weaknesses and Countering Threats

2-1) Diversify APORTIL, I.P's sources of income and improve its financial structure. For example, the following method is conceivable: paying an appropriate amount to APORTIL, I.P. from the concession fee paid to the government, collecting fees from private ports, participating in a facility development project for cruise ships, and flexible operation of port tariffs. (for the issues of MO2, MO5 through MO7)

2-2) Clarify division of duties with DNTM and promote cooperation. For example, APORTIL, I.P. or DNTM will conduct demand forecasting while paying close attention to the development trends of other organizations and the private sector, and strengthen the function of proposing drafts of future development plans. (for the Issues of MO8, MO9, MO11 and MO12)

2-3) Clarify the necessary procedures for the department that examines development permits within the MTC, and the department will also be given a role similar to that of the Port Council, a council composed of port-related organizations that discusses important matters related to port development, utilization, conservation, management and operation. Also clarify the processes necessary for port development. (for the issues of PD7, PD9, MO8 through MO12)

Perspective 3: Leverage Strengths to Counter Threats

3-1) Use national politics to gain public understanding of the need for regional ports (industrial development, alternative routes). (for the issue of PD8, PD11and MO10)

3-2) Make effective use of owned land. (for the issues of MO2, MO5 and MO7)

Perspective 4: Overcome Weaknesses and Capitalize on Opportunities

4-1) Recommend legislation clarifying port jurisdiction (for the issues of PD5, PD6, PD9, MO1, MO4, MO5, and MO8 through 12))

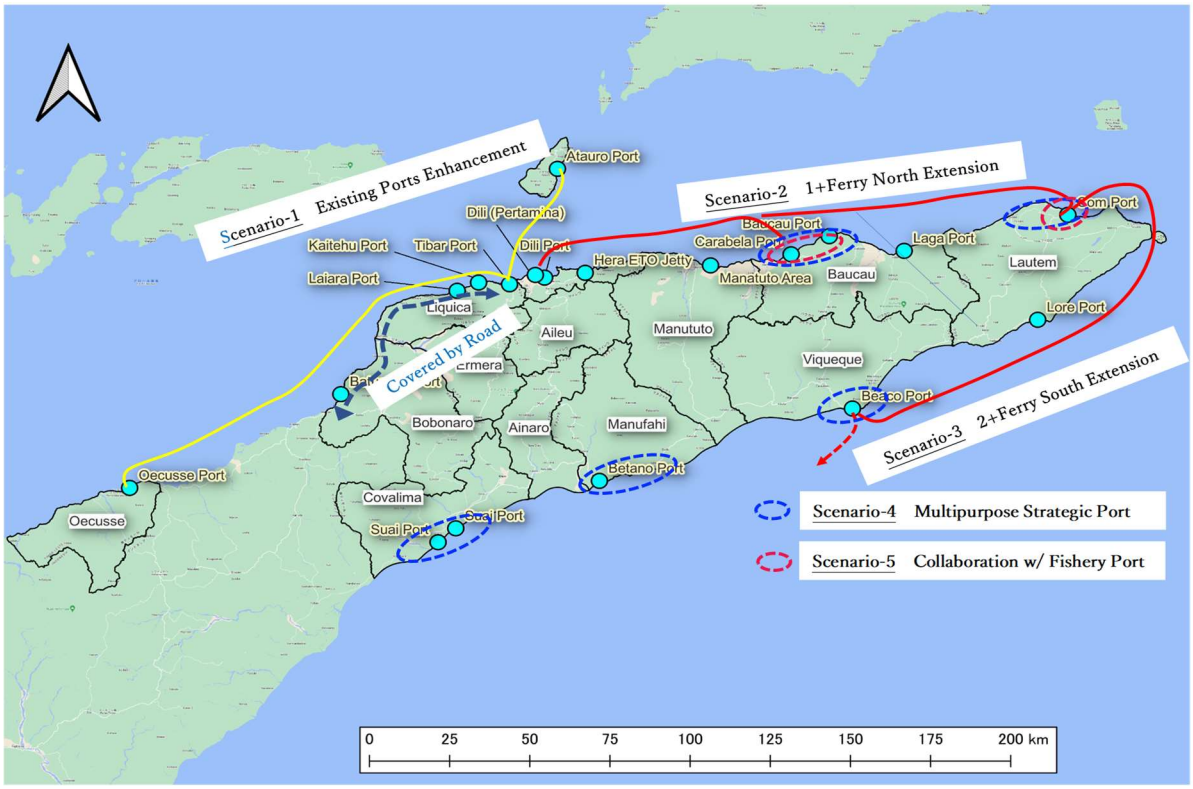
4-2) Clarify the distinction between commercial ports and fishing ports, and promote joint development with MAF. (for the issue of MO9 and MO10)

S.1.3. Development Scenarios

Toward realizing the long term strategy in Perspectives 1-1) through 1-4) and Perspectives 3-1), 3-2) and 4-2), five development scenarios were prepared to determine the port development. (Perspectives 2 and 4 were delt with in the Action Plan.)

Scenario No.	Key words	Description
1	Maintaining the present situation and strengthening facilities	While maintaining the existing ferry routes, the facilities of Ataúro Port will be strengthened. Domestic routes will not be extended, but an increase in the number of services of the ship on current routes.
2	Scenario 1 + Northern ferry route extension	A new ferry route from Dili will be opened to cover part of the increasing passenger demand in the northern coastal region with ferries, develop a port as a hub of regional logistics and in the event of a disaster.
3	Scenario 1 & 2 + Southern ferry route extension	A new ferry route will be extended further south to cover part of the increased passenger demand on the southern coast.
4	Multi-Purpose port for industrial promotion and alternative transportation	Multi-purpose functions such as industrial promotion and transportation substitution are given to the ports in northern and southern ferry route. Refuge port is also included in the purpose. In addition to tourism, fisheries and agriculture, a port that reflects new technology is envisioned for industrial development. Alternative

		transport functions may include emergency marine transport in the event of road damage and irregular heavy cargo transport.
5	Joint development of fishing port	Jointly, with the Ministry of Agriculture and Fisheries (Ministry of Agriculture, Livestock, Fisheries, and Forestry after 2023), a port that integrates a fishing port and a commercial port will be developed.

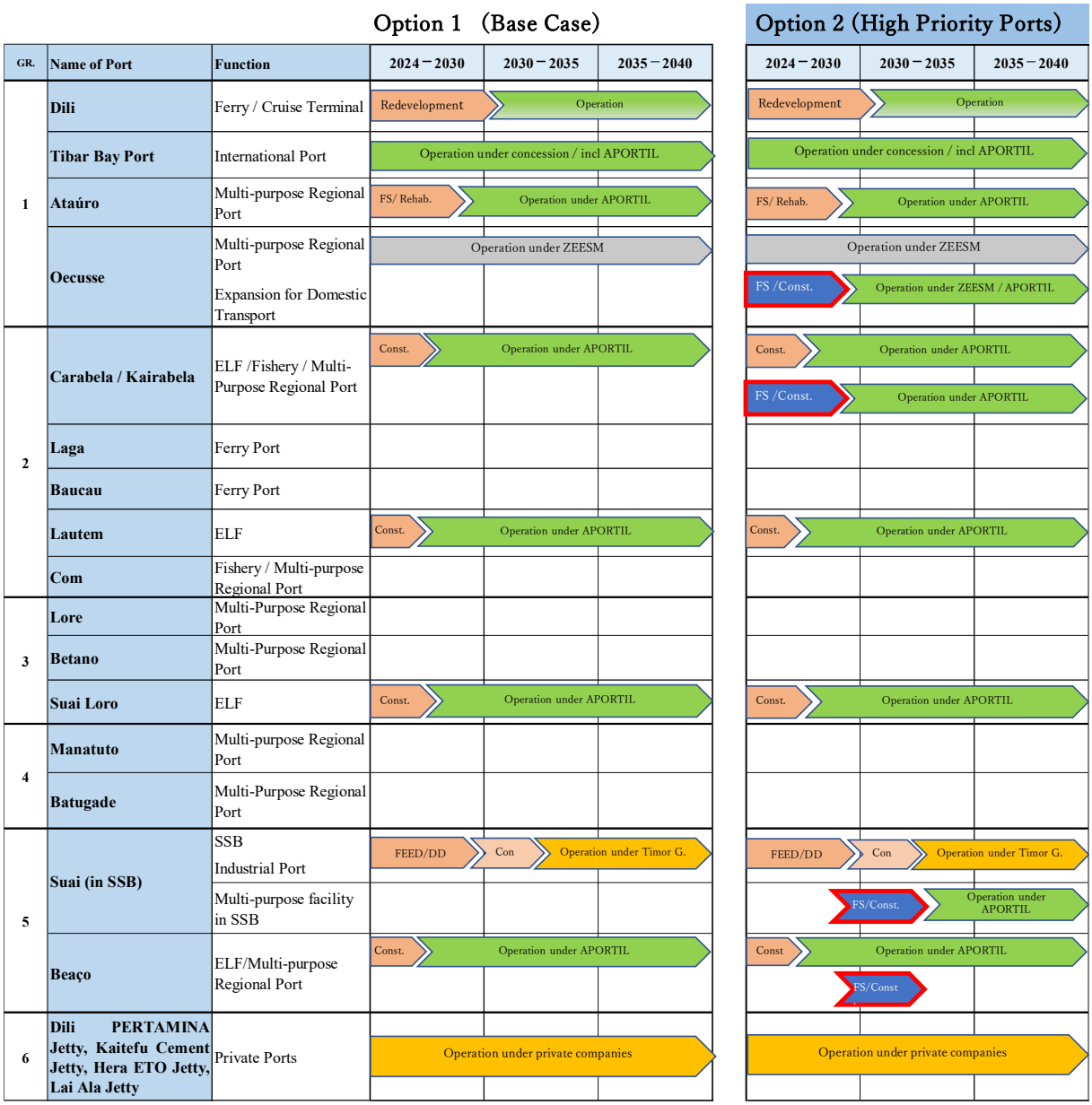


Port Development Scenarios

S1.4. Development Options

Based on the planning policy and assumptions, the four options for the national port development were brought, and option 2 was prioritized. The implementation schedule was also proposed.

Development Option No.	Key words	Description
1	Zero Option	No port development except for the other plan that Timor-Leste is advancing.
2	High Priority Port Development	In addition to the projects that Timor-Leste is advancing, high priority ports; Carabela, Beaço and Suai (within the SSB) are proposed to develop.
3	Priority and Joint Port Development	In addition to the high priority development ports, Betano Port, which was selected as a priority development port, and Com Port, which was selected as joint development site with fishing port, will be developed.
4	Other ports considered for development	Batugade, Manatuto, Baucau and Lore are assumed as candidate ports, but it should be finalized after Option 3 is implemented.



FS: Feasibility Study, Const.: Construction, Rehab. : Rehabilitation, FEED/DD: Front end engineering design & Detailed design
Orange: Timor-Leste public activities, Green: APORTIL in charge. Blue: the National Development Plan proposed

Development Options 1 and 2

FS: Feasibility Study, Const.: Construction, Rehab. : Rehabilitation, FEED/DD: Front end engineering design & Detailed design
Orange: Timor-Leste public activities, Green: APORTIL in charge. Blue: the National Development Plan proposed

Development Options 3 and 4

S2. Priority Port Development Plan

S2.1. Selection of Priority Ports

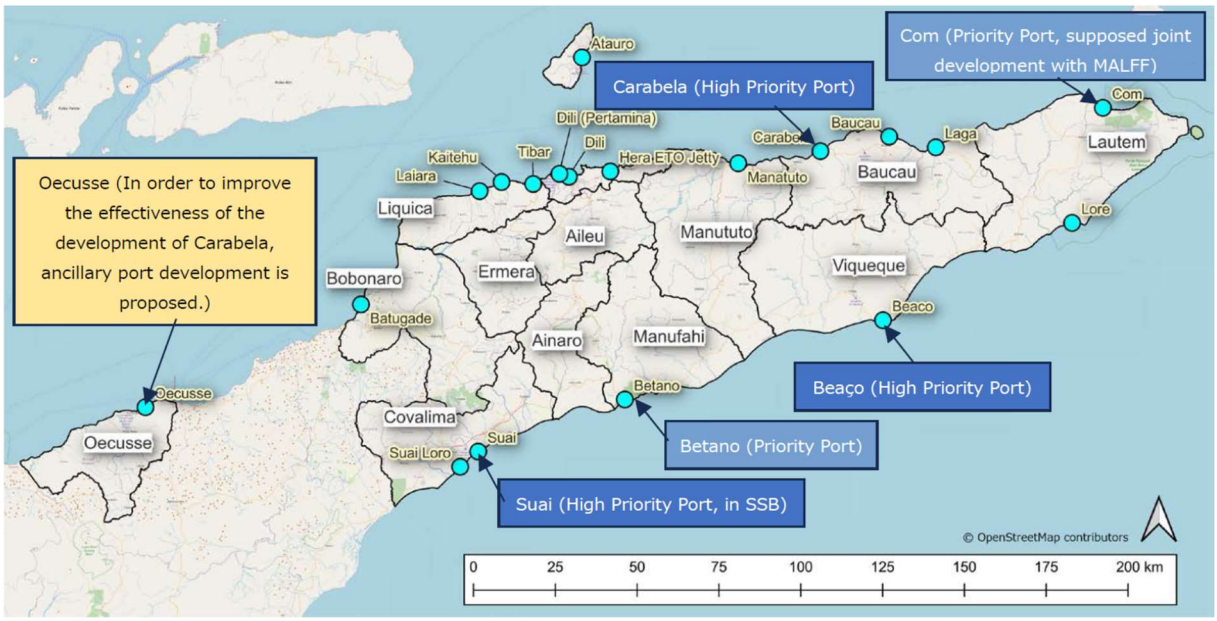
Priority development ports were selected from the target ports based on the following viewpoints.

- Policy of the Government of Timor-Leste
- Contribution to the flow of people and goods

- Support for industries with growth potential
- Development of navigation channel and anchorage and related safety facilities
- Status of access to and around the port
- Comparison of alternatives based on the perspective of strategic environmental and social assessment (see section 5.3)
- Other evaluation items based on discussions with the local side

Based on the above considerations and evaluations, the following ports were selected as priority development ports.

- Carabela Port
- Beaço Port
- Suai Port (SSB)
- Com Port
- Betano Port



Priority Ports

Among the above, Carabela Port, Beaço Port and Suai Port (in SSB) were proposed as high priority development ports. We discussed specific development plans for the two high priority development ports Carabela and Beaço Ports. Suai Port will be developed as a commercial port for transportation to the southern coastal area within the Suai Supply (Logistic) Base that will be developed under the Tasi-Mane Project. The development plan will be formulated based on the progress of the Tasi-Mane project plan.

In order to improve the effectiveness of the development and operation of regional ports on the northern coast, Oecusse was proposed as an ancillary port development plan to handle international break bulk and enable domestic transport to regional ports.

S2.2. Outline of Development Projects

(1) Target Years

The following target years for the high priority port development plan were proposed and agreed by related organizations. In setting the target year, we considered two years for the cooperation preparatory survey and two to three years for the detailed design, construction supervision and construction period, based on the expected implementation period of the national port development plan and Japan's aid process.

Carabela Port Development Plan	2030
Beaço and Suai Port Development Plan	2035

(2) Logistic Demands (Passengers, Cargo and Emergency)

Carabela Port

The scale of the facility will be determined based on the demand for passengers and cargo to Baucau Municipality. the passenger demand from Dili to Baucau was estimated to be 79,391 (2030) from 73,584 (2020) in the base case. Similarly, cargo demand was estimated to range from 8,116 tons (2020) to 13,973 tons (2030) in the base case.

If BERLIN RAMELAU were to operate an extended route based on assuming it operated twice a week between Dili and Carabela, it would be 74,880 passengers: 360 passengers (Passenger capacity of BERLIN RAMELAU) 52 weeks x 2 times/week x 2 (round trip), which would meet the annual demand. It is capable of transporting approximately 79,391 people. On the other hand, BERLIN RAMELAU has a cargo capacity of 64,584 tons (621 tons x 52 weeks x 2 times/week), which is sufficient to meet the annual demand of 13,973 tons/year.

It is desirable that the government and public institutions should be encouraged to use the ferry route from Dili to Carabela for public purpose and take measures to promote when it first opens. Possible options include improving the means of transport from Carabela to Baucau, improving services in ferry operations and ticket sales, and promoting freight transport fares (for example, half price for several years).

Furthermore, the development of Carabela Port will create opportunities for private sector participation.

According to interviews with the private sector, the introduction of speedboats from Dili could also be considered. Additionally, transporting cement from Kaitehu is an alternative option to land transport.

On completion, the facility will produce 1.5 million tons of cement per year, with 30% reserved for domestic use and the remainder earmarked for export for the construction booms in Western Australia and the Northern Territory.

Assuming that 30% of this will be transported by sea, demand is expected to be approximately 100,000 tons.

A new cement factory is planned to be built in Baucau Municipality. Once completed, the facility will produce 1.5 million tons of cement per year, with 30 per cent reserved for domestic use and the remainder exported

to Western Australia and the Northern Territories. Based on this plan, demand in the western region of the country is estimated to be approximately 340,000 tons. Assuming that 30% of this will be transported by sea, demand is expected to be approximately 100,000 tons.

Estimated Cement Demand

Administrative Unit	Population	Area
Dili	324,738	West
Ermera	137,750	West
Baucau	134,878	East
Bobonaro	106,639	West
Liquica	83,658	West
Oecusse	80,685	West
Viqueue	80,176	East
Covalima	73,933	West
Ainaro	73,115	West
Lautem	70,022	East
Manufahi	60,665	West
Aileu	54,324	West
Manatuto	50,859	East
Atauro	10,295	West
Total	1,341,737	

Area	Population	Rate
East	335,935	25.0%
West	1,005,802	75.0%
Total	1,341,737	

TL Cement

Production	1,500,000	ton
Export	1,050,000	ton
Domestic	450,000	ton

Cement volume for each area

East area	112,668	ton
West area	337,332	ton

Cargo to West area by sea

Sea rate	Volume	
10%	33,733	ton
20%	67,466	ton
30%	101,200	ton

Cargo to East area by sea

Sea rate	Volume	
10%	11,267	ton
20%	22,534	ton
30%	33,800	ton

Source: The Study Team

At the time of the interview with the developer on August 23, 2022, the following licenses had been obtained.

Category	Licenses
Land	Ministry of Justice (50 years)
Facility	Ministry of Public Works (1 year)
Environmental	State of Secretary of Environment (1 year)
Port operation	APORTIL, I.P. (1 year)

In addition, at a cost of several million U.S. Dollar, all engineering work, including surveys of the natural conditions on land and sea, was completed, and international bidding was held in 2020. Hyundai/China Harbor and others placed bids, but the bid was canceled due to the COVID-19 pandemic. The developer believed that if they received support from Japan and international organizations, they would be able to start moving again. In the latest information, the Coordinating Minister for the Economy (MoEAC) has announced that the Timor-Leste government has confirmed its intention to continue TL Cement's project in Baucau.

The route to Carabela Port provides an alternative transport route to Baucau Municipality in case the roads become impassable due to disasters such as floods or landslides. In addition, by storing drinking water and rice in the port area, it will serve as a support base in the event of a disaster. For example, when storing 3 days worth of water and rice required by half of the population of Baucau city (130,000 people), the total amount of water is 2L/day x 3 days x 130,000 x 50% = 390 tons, and rice 300g/day x 3days x 130,000 x 50% = 58.5 tons, totaling 448.5 tons. Therefore, it is only necessary to construct a warehouse that can store about 500 tons (about 1,200 m^2, one floor).

For Logistic Demands of Beaço and Oecusse Ports, refer to Chapter 6.2.

(3) Outline of Development Projects

The high priority development projects are outlined in Table S2.1 (refer to Chapter 6).

Table S2.1 Outline Development Projects for High Priority Ports and Oecusse Port

Item \ Port Name		Carabela Port	Beaço Port	Suai Port (in SSB)	Oecusse Port
Target Year		2030	2035	2035	2030
Purpose		Ferry	Ferry	Ferry	Ferry
		Break bulk cargo	Break bulk cargo	Break bulk cargo	Break bulk cargo
		Multi-Purpose	Multi-Purpose	Multi-Purpose	Multi-Purpose
Demand Forecast	Passenger	79,391 (2030)	31,095 (2035)	N.A.	N.A.
	Cargo	13,973 tons (2030)	10,838 tons (2035)	N.A.	37,500 tons of Rice to Carabela (2030)
Mode	Ferry	Two ways	Two ways	Two ways	Two ways
	Break bulk	Mainly unloading	Mainly unloading	Mainly unloading	Transshipment
Target Vessel	Ferry	HAKSOLOK, BERLIN RAMELAU, BERLIN NAKROMA SUCCESS	HAKSOLOK, BERLIN RAMELAU, BERLIN NAKROMA SUCCESS	HAKSOLOK, BERLIN RAMELAU, BERLIN NAKROMA SUCCESS	HAKSOLOK, BERLIN RAMELAU, BERLIN NAKROMA SUCCESS
	Break bulk	2,000DWT: domestic	2,000DWT: domestic	2,000DWT: domestic	5,000DWT: foreign 2,000DWT: domestic
Handling Cargo	Ferry	Passenger and hand carry baggage	Passenger and hand carry baggage	Passenger and hand carry baggage	Passenger and hand carry baggage
	Break bulk	Rice, Cement, etc	Rice, Cement, etc	Rice, Cement, etc	Rice, Cement, etc
Handling Equipment	Ferry	Movable ramp	Movable ramp	Movable ramp	Movable ramp (For New Ferry Berth)
	Break bulk	Truck Crane (30 t)	Truck Crane (30 t)	Truck Crane (30 t)	Truck Crane (30 t)
Facilities to be introduced		Pile supported pier (100 m x 20 m)	Pile supported per (100 m x 20 m)	Vertical Quay wall (complied with SSB plan)	Pile supported pier
		Movable ramp (L20 m x B15 m)	Movable ramp (L20 m x B15 m)	Movable ramp (L20 m x B15 m)	Movable ramp (L20 m x B15 m)
		Trestle B=10 m incl repair of existing causeway	Trestle B=10 m	Not required	Catwalk expansion of existing pier
		N.A.	Breakwater (L=360 m)	N.A.	Breasting and Mooring Dolphins
		Parking (approx.1000m^2)	Parking (approx.1000 m^2)	Parking (approx.1000 m^2)	Existing facility
		Access road (connected to National Road)	Access road (connected to National Road)	(Complied with SSB development plans)	Existing facility
		Admin. Bldg. incl ticket booth (approx.150 m^2)	Admin. Bldg. incl ticket booth (approx.150 m^2)	Admin. Bldg. incl ticket booth (approx.150 m^2)	Existing facility
		Passenger waiting room (approx. 300 m^2)	Passenger waiting room (approx. 300 m^2)	Passenger waiting room (approx. 300 m^2)	Existing facility
		Ancillary facility site (approx. 50 m^2) (Septic tank, etc.)	Ancillary facility site (approx. 50 m^2) (Septic tank, etc.)	Comply with SSB plan	Existing facility
		Public toilet (approx.20 m^2)	Public toilet (approx.40 m^2)	Complied with SSB plan	Existing facility
		Cargo storage (approx.400 m^2)	Cargo storage (approx.400 m^2)	N.A.	Existing facility (Additional 400 m^2)
		Perimeter Fence	Perimeter Fence	Complied with SSB plan	Existing facility
		Gate (W10 m)	Gate (W10 m)	Complied with SSB plan	Existing facility

Item \ Port Name		Carabela Port	Beaço Port	Suai Port (in SSB)	Oecusse Port
		Private transport stand (approx. 500 m^2)	Private transport stand (approx. 500 m^2)	N.A.	Existing (Outside of Gate Fence)
		N.A.	N.A.	N.A.	Solar Facilities (CCTV Camera etc)
Estimated Project Cost (100mil.JPY)	Construction Cost	33.2	129.2	N.A.	27.5
	Contingency (5%)	1.7	6.5	N.A.	1.4
	Project management Fee	2.0 Contingency 5%: 0.1	2.0 Contingency 5%: 0.1	N.A.	2.0 Contingency 5% :0.1
	Local portion	0.5 Contingency 5%: 0.03 Equipment: 0.5	0.5 Contingency 5%: 0.03 Equipment: 0.5	N.A.	0.5 Contingency 5%: 0.03 Equipment: 0.5
	Total	38.03	138.8	N.A.	32.03

(4) Facility Layout

Carabela Port

- Structure type

  ・ Pier

  ・ Port construction in Carabela requires the removal of existing structures prior to the construction of new facilities. In order to complete the work in a limited construction period, it is recommended to use precast components as much as possible.

  Therefore, the pile foundation with PC girder superstructure type used for the new ferry berth at Dili Port in 2016 will be applied.

  ・ Ramp

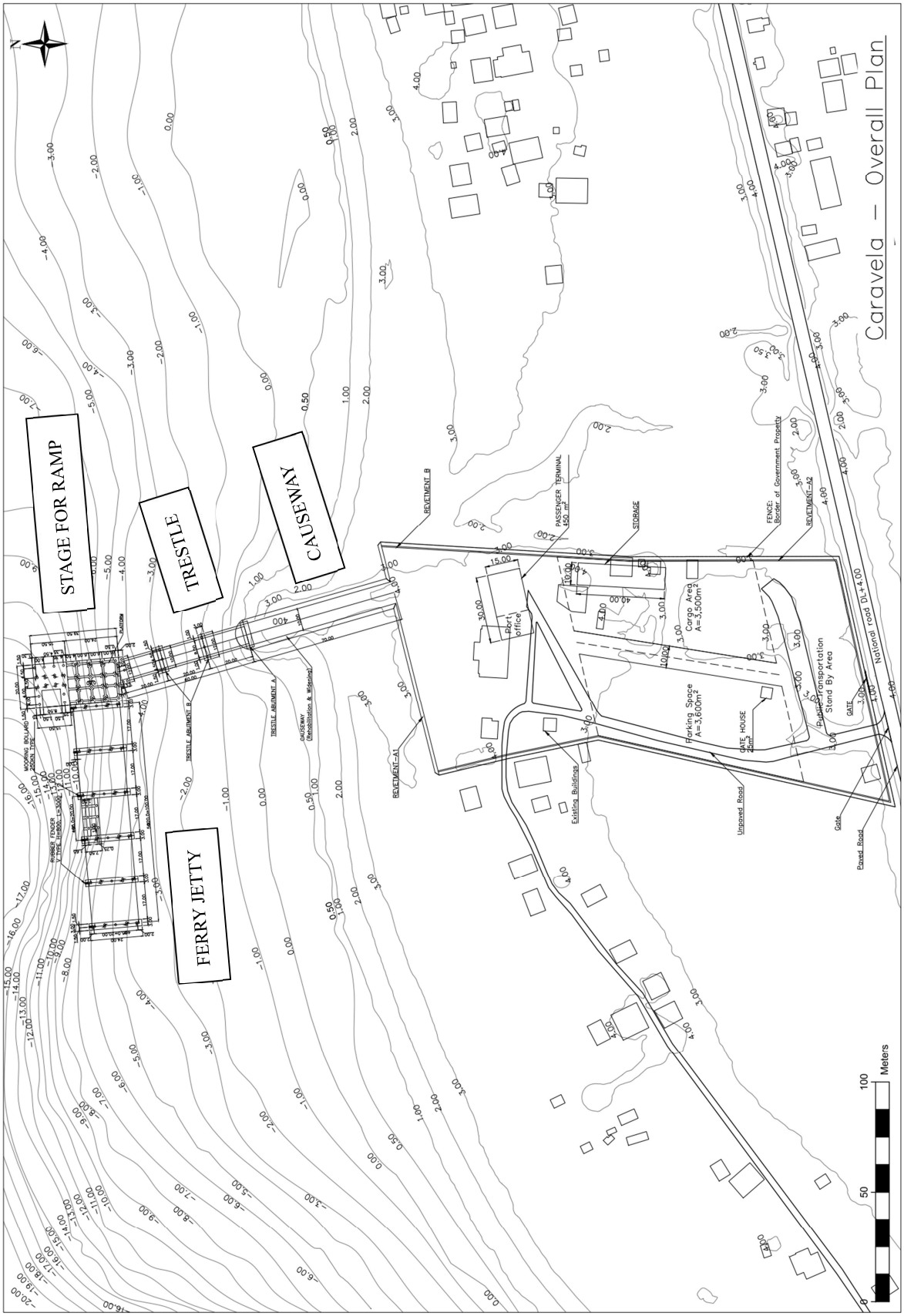
  Ramp will introduce Movable Ramp for RO/RO vessels and HAKSOLOS compatible fixed Ramp. The reason for using Movable Ramp for RO/RO vessels is that there are many variations of RO/RO vessels. The size of the movable ramp is set with reference to the size of the movable ramp at Dili Port, which is in service without problems.

  ・ Trestle + Causeway

  The land connection is to be a Causeway + Trestle. The Causeway will be widened and modified from the existing masonry-type facility, while the Trestle will be a simple PC girder bridge (Pretension prestressed concrete simple girder bridge) with a pile foundation. The superstructure of Trestle is chosen as a PC girder bridge, because, as with the pier, the aim is to shorten the construction period.

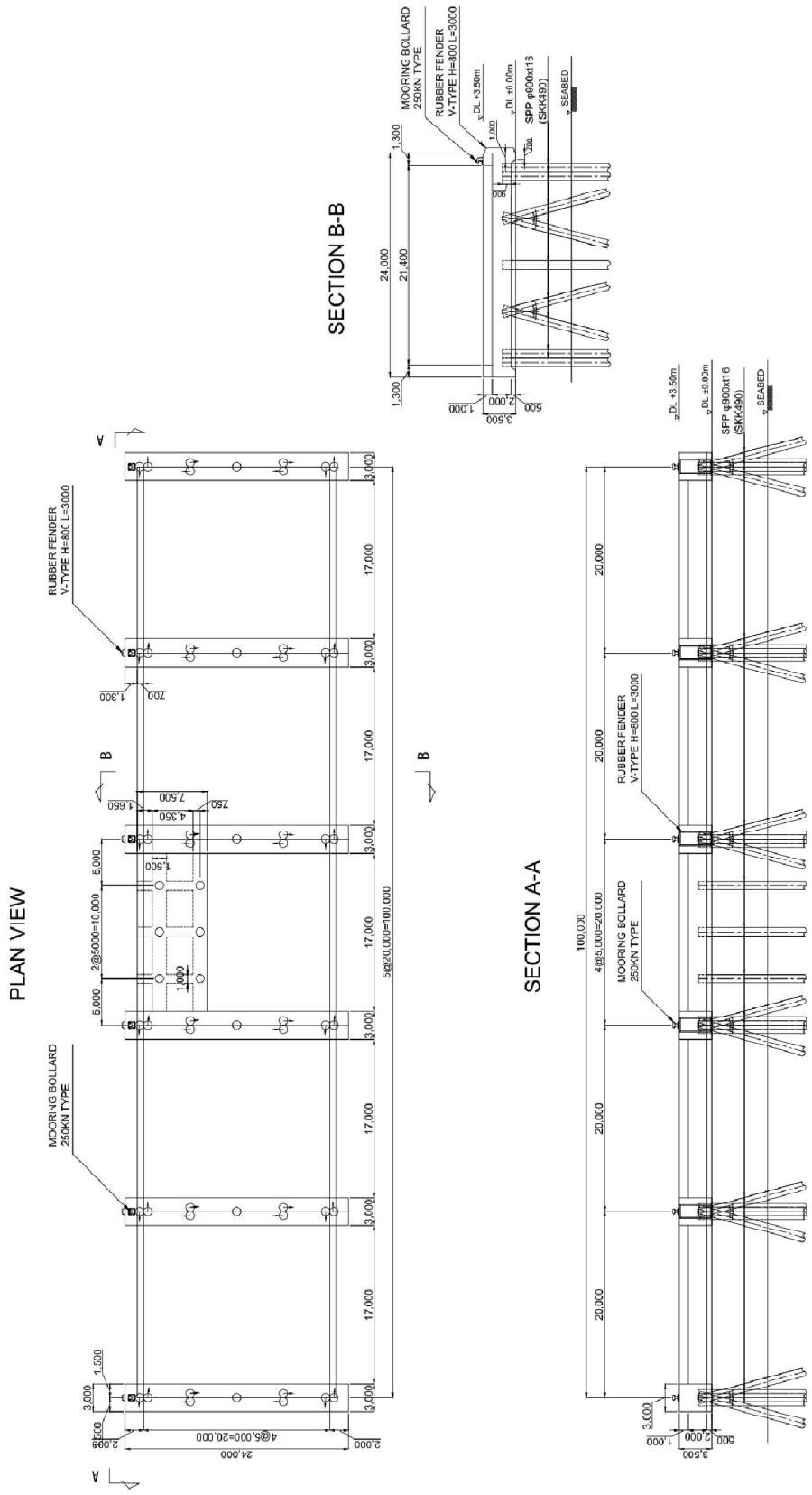
  ・ Utilities

  Utilities such as city water and electric supply is assumed to be able to connect directly. It is necessary to examine the condition and location of existing utility supply line in the detail design stage.



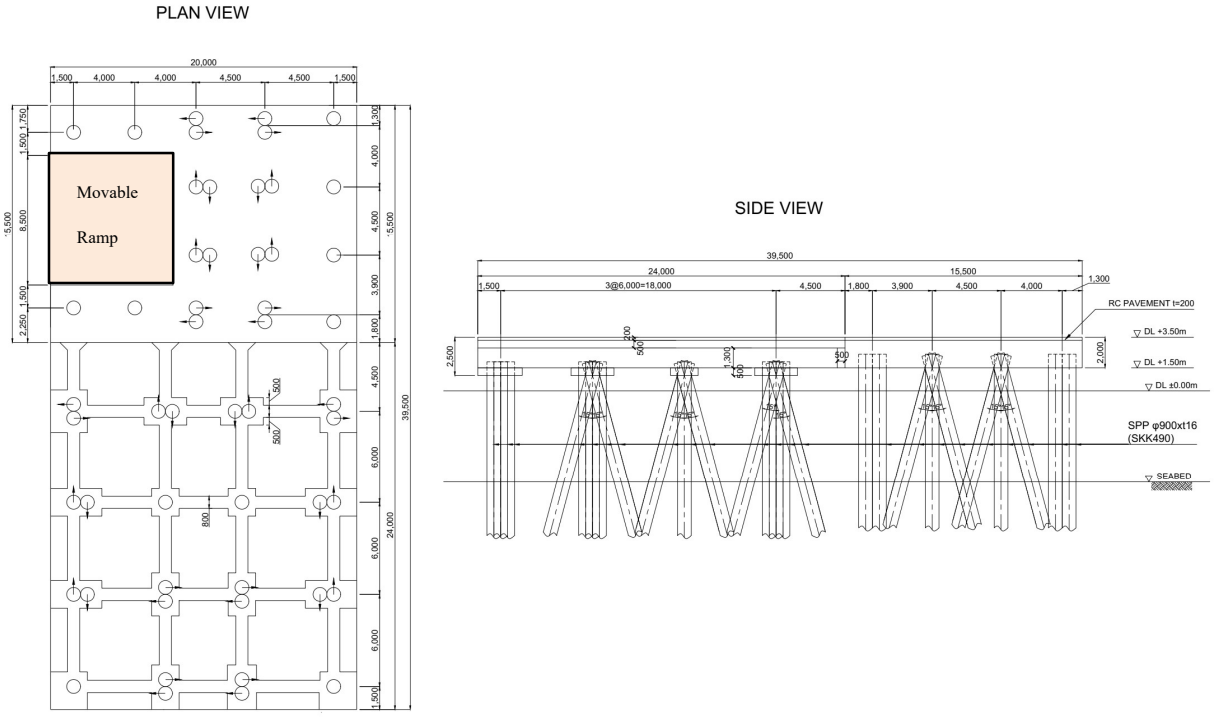
Source: The Study Team

Carabela Port Layout



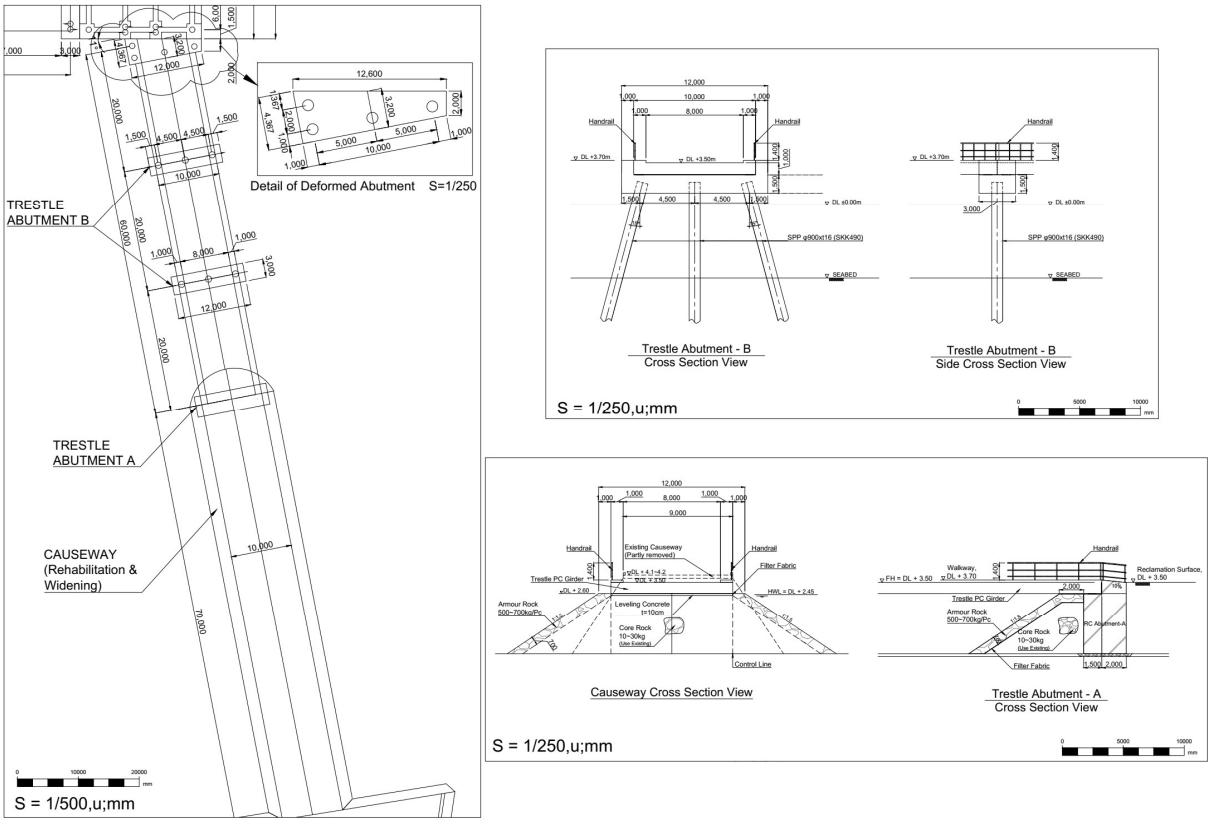
Source: The Study Team

Structure of Ferry Jetty



Source: The Study Team

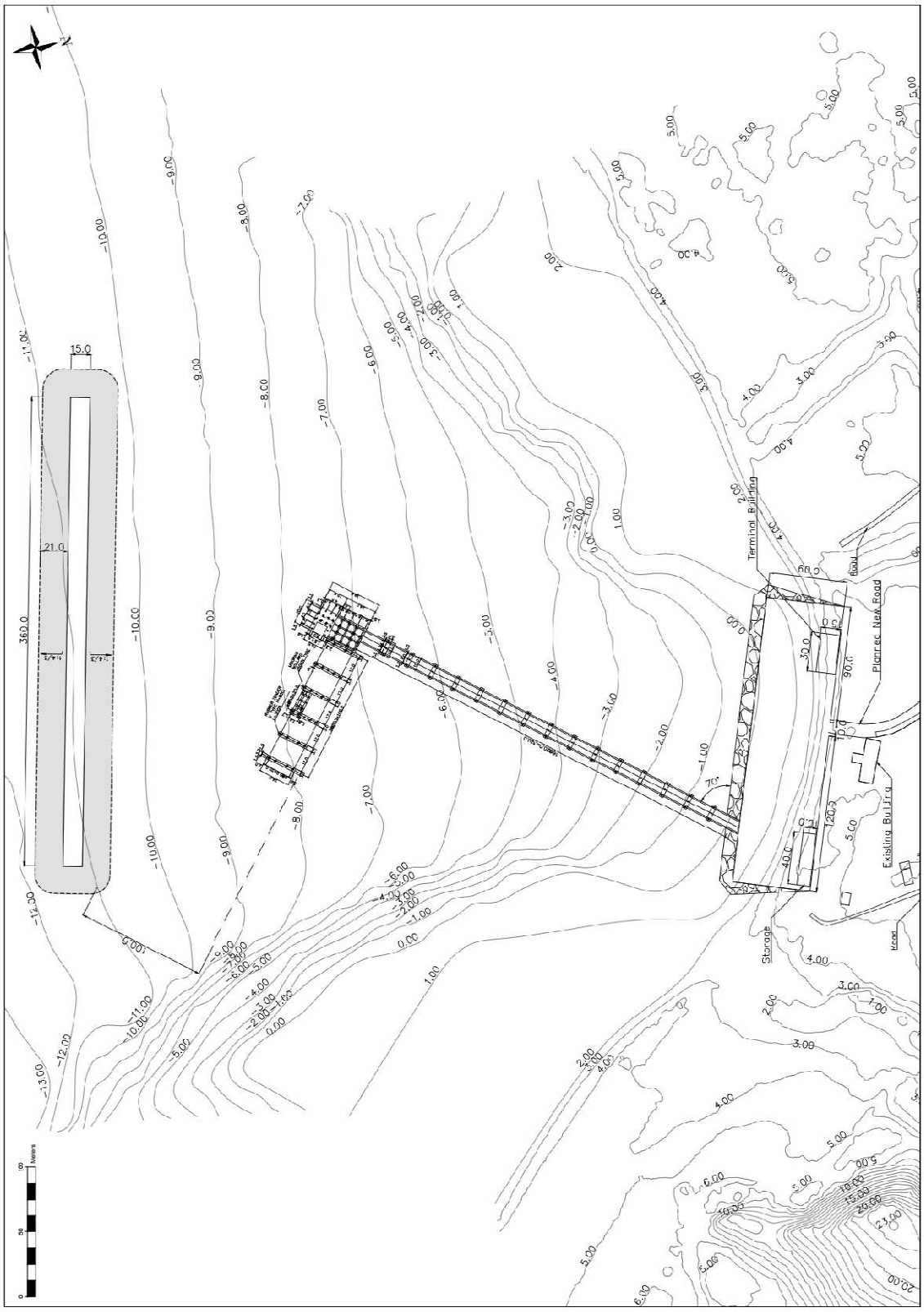
Structure of Stage for Ramp



Source: The Study Team

Structure of Causeway and Trestle

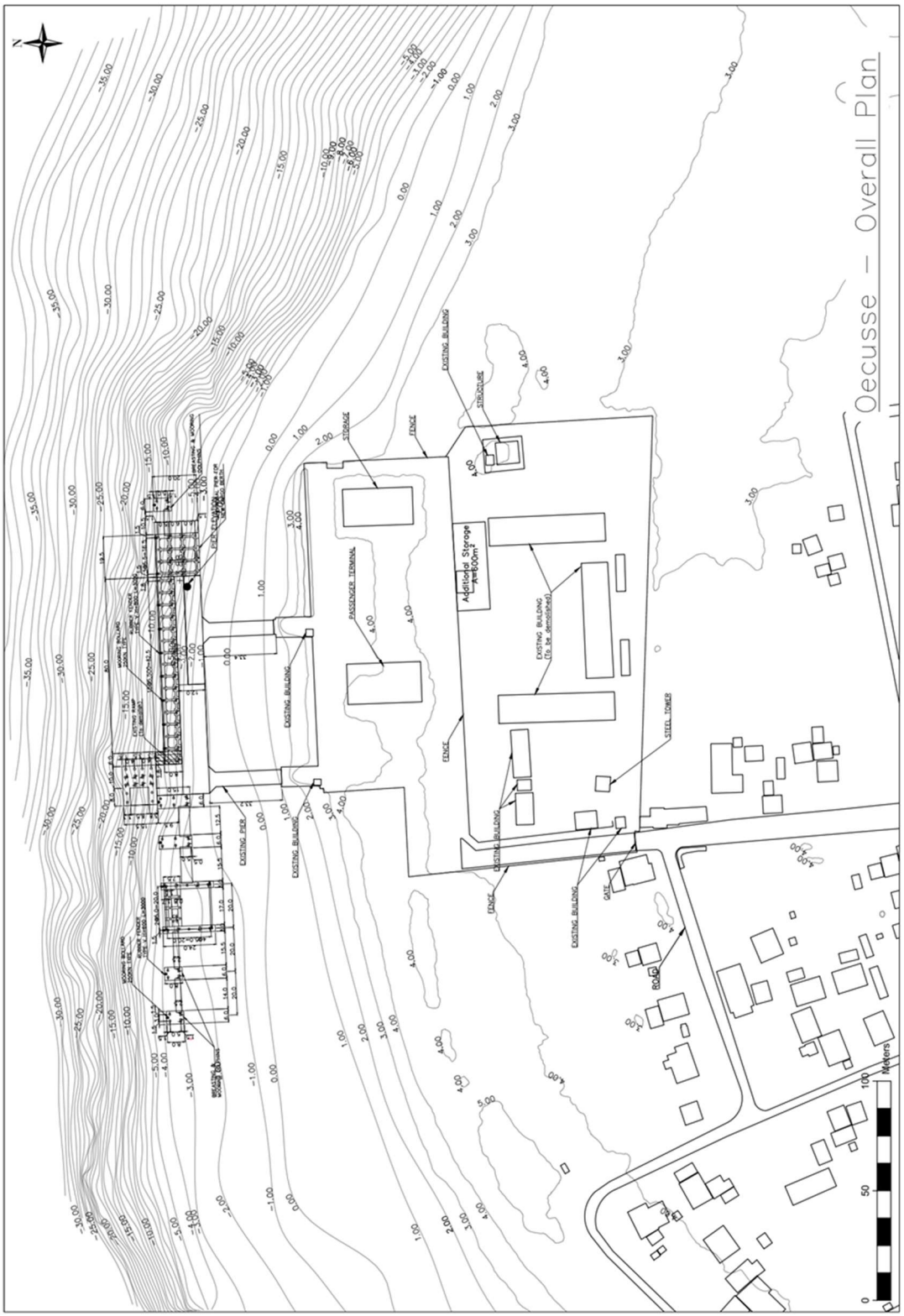
Beaço Port



Source: The Study Team

Beaço Port Layout

Oecusse Port



Source: The Study Team

Oecusse Port Layout

(5) Environmental and Social Consideration

Carabela Port

1) Impact assessment

Table S2.2 summarizes the Impact assessment.

Table S2.2 Impact assessment for Carabela Port

Item	Impact assessment during scoping		Impact assessment based on survey results		Reason of the assessment
	BDC*	DO*	BDC*	DO*	
Air pollution	✓	-	B-	D	Exhaust gas from port construction equipment (including dredging, land reclamation, piling equipment) is expected BDC.
	✓	-	B-	D	Dust from the transportation vehicle is expected BDC.
	-	✓	B-	B-	Exhaust gas from the transportation vehicle/ vessel is expected.
Water pollution	✓	-	B-	D	Turbidity of water from port construction (including dredging, land reclamation, piling) is expected BDC.
	✓	-	B-	D	Wastewater from port construction equipment (including dredging, land reclamation, piling equipment) is expected BDC.
	-	✓	D	B-	Water pollution due to vessel navigation and drainage is expected DO.
Waste	✓	-	B-	B-	Generation and increase of dumped garbage are expected.
Noise	✓	-	B-	D	Noise from port construction equipment (including dredging, land reclamation, piling equipment) is expected BDC.
	✓	✓	B-	B-	Noise from the transportation vehicle is expected.
Sediment	✓	✓	B-	D	Sediment pollution from port construction equipment (including dredging, land reclamation, piling equipment) is expected BDC.
Protected areas	✓	✓	D	D	There are no protected areas adjacent to the port.
Ecosystem	✓	✓	A-	B-	Construction activities and operation activities will affect the ecosystem around the port due to the existence of seaweeds, seagrasses, corals and species classified as VU on the IUCN Red List.
Hydrology	✓	✓	D	D	No notable impact on flow conditions is expected.
Employment and livelihood	✓	✓	D	D	Impact for employment and livelihood is not expected.
Land and local resources use	✓	✓	D	D	Impact for land and local resources use is not expected.
Uneven distribution of damage and benefits	✓	✓	D	D	Uneven distribution of damage and benefits is not expected.
Local conflict of interest	✓	✓	D	D	Local conflict of interest is not expected.

* BDC: Before and during the construction

* DO: During operation

* Positive and negative impacts and their magnitudes are described based on the survey results as shown in

A+/- : Significant positive/negative impact is expected.

B+/- : Positive/negative impact is expected to some extent.

C: Extent of impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D : No impact is expected.

N/A : Impact assessment is not conducted because the item was categorized as no effect in scoping phase.

2) Mitigation measures

Table S2.3 summarizes mitigation measures.

Table S2.3 Mitigation measures for Carabela Port

[Before / during construction]					
Items	Expected Impact	Mitigation measures	Implementing body	Responsible body	Cost
Air pollution	Exhaust gas from port construction equipment and transportation vehicle	Enclose the perimeter of the construction site with a fence, etc.	Contractor	APORTIL, I.P.	
		Select vehicle that has the least gas emission.	Contractor	APORTIL, I.P.	
		Implementation of regular air quality monitoring	Contractor	APORTIL, I.P.	
	Dust from the transportation vehicle	Watering of the field	Contractor	APORTIL, I.P.	
Water pollution	Turbidity of water from port construction (from dredging)	If excess generation of turbidity is found during dredging, enclose the dredged area with silt curtain.	Contractor	APORTIL, I.P.	
	Turbidity of water from port construction (from land area)	Properly operate and maintain the retention pond.	Contractor	APORTIL, I.P.	
	Wastewater from port construction equipment / facility	Properly operate and maintain the wastewater treatment facility.	Contractor	APORTIL, I.P.	
		Proper checking and immediate cleanup of any oil, fuel, or waste spills.	Contractor	APORTIL, I.P.	
Waste	Generation and increase of dumped garbage	Compliance with waste management procedures to handle waste	Contractor	APORTIL, I.P.	
Noise	Noise from port construction equipment	Select equipment that has the least noise level.	Contractor	APORTIL, I.P.	
		Keep storage facilities distant from sensitive receptors.	Contractor	APORTIL, I.P.	
	Noise from the transportation	Select vehicle that has the least noise level.	Contractor	APORTIL, I.P.	

[Before / during construction]					
Items	Expected Impact	Mitigation measures	Implementing body	Responsible body	Cost
	vehicle				
Sediment	Sediment pollution from port construction equipment	Use appropriate construction equipment to reduce pollution.	Contractor	APORTIL, I.P.	
Ecosystem	Impact on valuable ecosystem around the port.	Refrain from piling, anchoring, or dredging in the vicinity of the Valuable Ecosystem for water quality conservation.	Contractor	APORTIL, I.P.	
		If any changes are observed in corals or their habitat, construction will be temporarily suspended. In addition, mitigation measures will be considered and introduced according to the type and magnitude of the environmental impact.	Contractor	APORTIL, I.P.	
[During operation]					
Items	Expected Impact	Mitigation measures	Implementing body	Responsible body	Cost
Air pollution	Exhaust gas from transportation vehicle/vessel	Select vehicle that has the least gas emission.	Operator	APORTIL, I.P.	
		Regular visual check of exhaust gas emission from vehicles / vessels.	Operator	APORTIL, I.P.	
Water pollution	Water pollution due to vessel navigation and operation of port terminal	Carry out regular ship inspections.	Operator	APORTIL, I.P.	
		Proper management of wastewater treatment system	Operator	APORTIL, I.P.	
Waste	Generation and increase of dumped garbage	Compliance with waste management procedures to handle waste	Operator	APORTIL, I.P.	
Noise	Noise from the transportation vehicle	Select vehicle that has the least noise level.	Operator	APORTIL, I.P.	
Ecosystem	Impact on valuable ecosystem around the port	Regular visual check of surrounding ecosystem.	Operator	APORTIL, I.P.	

3) Monitoring plan

The following table summarizes the monitoring plan.

Table S2.4 Monitoring plan for Carabela Port

[Before / during construction]							
Item	Mitigation measures	Monitoring item	Standard	Location	Implementing body	Period and frequency	Cost / year
Air pollution	Enclose the perimeter of the construction site with a fence, etc.	Enclosed properly or not	None	Project site (construction site)	Contractor	1 time/week	
	Select vehicle that has the least gas emission.	Managed properly or not	None	Project site	Contractor	1 time/week	
	Implementation of regular air quality monitoring	Implemented or not $PM_{2.5}$, PM_{10}, NO_2, SO_2	WHO Global Air Quality Guidelines	Project site border near the residential area	Contractor	1 time/week	
	Watering of the field	Watered or not	None	Project site (construction site)	Contractor	Daily	
Water pollution	If excess generation of turbidity is found during dredging, enclose the dredged area with silt curtain.	Turbidity	WHO/TL Guidelines	Sea area/ 5 points around the construction area	Contractor	1 time/week	
	Properly operate and maintain the retention pond.	Operated properly or not	None	Project site	Contractor	1 time/week	
	Properly operate and maintain the wastewater treatment facility.	Water temperature, pH, BOD	WHO/TL Guidelines	Wastewater treatment facility outlet	Contractor	1 time/week	
	Proper monitoring and immediate cleanup of any oil, fuel, or waste spills.	Proper or not	None	Project site	Contractor	1 time/week	
Waste	Compliance with waste management procedures to manage waste	Amount of garbage dumped	None	Project site	Contractor	1 time/week	
Noise	Select equipment that has the least noise level.	LAeq	IFC standards	Project site border near the residential area	Contractor	1 time/week	
	Keep storage facilities distant from sensitive receptors.	Distance	None	Project site	Contractor	1 time/week	
	Select vehicle that has the least noise level.	Selected or not	None	Project site	Contractor	1 time/week	
Sediment	Use appropriate construction equipment to reduce pollution.	Used or not	None	Project site	Contractor	1 time/week	
Ecosystem	Refrain from piling, anchoring, or dredging in the vicinity of the Valuable	Turbidity, Water temperature, Salinity	None	Project site	Contractor	Continuous measurement	
		Diving	None	Project site	Contractor	1 time /	

[Before / during construction]							
Item	Mitigation measures	Monitoring item	Standard	Location	Implementing body	Period and frequency	Cost / year
	Ecosystem for water quality conservation.	observation				month	
	If any changes are observed in corals or their habitat, construction will be temporarily suspended. In addition, mitigation measures will be considered and introduced according to the type and magnitude of the environmental impact.	Habitat status (quadrat survey)	None	Project site	Contractor	Several times during construction	
		Health level	None	Project site	Contractor	Several times during construction	
		Water temperature	None	Project site	Contractor	Monthly	
		Salinity	None	Project site	Contractor	Monthly	
		Turbidity	None	Project site	Contractor	Monthly	
		Sediment	None	Project site	Contractor	Monthly	

[During operation]							
Item	Mitigation measures	Item	Standard	Location	Implementing body	Period and frequency	Cost
Air pollution	Select vehicle that has the least gas emission.	Selected or not	None	Project site	Operator	1 time/week	
	Regular visual check of exhaust gas emission from vehicles / vessels.	Implemented or not	None	Project site	Operator	Daily	
Water pollution	Carry out regular ship inspections. (Visual check)	Carried out or not	None	Project site	Operator	Each time a ship calls	
	Proper management of wastewater treatment system (Visual check)	Proper or not	None	Project site	Operator	1 time/week	
Waste	Compliance with waste management procedures to manage waste (Visual check)	Amount of garbage dumped	None	Project site	Operator	1 time/week	
Noise	Select vehicle that has the least noise level. (Visual check)	Selected or not	None	Project site	Operator	1 time/week	
Ecosystem	Regular visual check of surrounding ecosystem	Diving observation	None	Several locations around Project site	Operator	1 time / year	

For Environmental and Social Consideration of Beaço and Oecusse Port, refer to Chapter 6.6.

S2.3. Assessment of the Projects

The economic benefits of saving transportation cost between trucks on without-case and ships (ferry and bulk ship) on with-case, and of saving maintenance costs to avoid heavy trucks pass were estimated for the economic analysis.

The port tariff of cargo and ship, project cost in market price, operation and maintenance costs, and renewal investment costs were estimated for the financial analysis over thirty years of the project life.

(1) Carabela Port

The Project EIRRs of all sensitivity cases in economic analysis exceed the social discount rate of 12%, and other indicators satisfy the required standards (see table below). This is a public port development project that contributes to enhance social benefit, therefore the Project is proposed to be implemented as early as possible from the viewpoint of the national economy.

On the other hand, the Project is unfeasible from a financial perspective under the current tariff even though it is assumed to be minus 30% of the project cost (FIRR negative in table below). It means that the fund-raising scheme of loan assistance has no bankability to repay the principal and interest of the loan from the revenue of the Project. Meanwhile, the port can operate in the black if no burden on the initial cost is incurred.

In conclusion, the Study Team recommends that the Project of Carabela Port is implemented in the scheme of grant.

Index Base Case	NPV (1,000USD)	B/C	IRR
Economic	6,805	1.3	15.8%
Financial	- 20,465	0.3	- 7.3%

NPV: Net Present Value, B/C: Benefit / Cost ratio. IRR: Internal Rate of Return

(2) Oecusse Port

The Project EIRR of Base Case in economic analysis exceeds the social discount rate of 12%, although other sensitivity cases remain lower. The Project, however, is expected to produce quantitative effect in the case of simultaneous development with Carabela Port such as the enhancement of the marine transport network in Timor-Leste, the reduction of CO_2 / NOx emission by modal shift from land to sea, the shortened lead time for entering the port and handling cargo at the terminal, lowering the risk of damage to cargo, and enhancing the punctual time of transportation

From a financial perspective the Project is unfeasible under the current tariff even though it is assumed to be minus 30% of the project cost. It means the fund-raising scheme of loan assistance has no bankability to repay the principal and interest of the loan from the revenue of the project. Meanwhile, the port can operate in the black if no burden of the initial cost is incurred.

In conclusion, the Study Team recommends that the Project of Oecusse Port is implemented to improve the efficiency of the Project of Carabela using the scheme of grant.

Index Base Case	NPV (1,000USD)	B/C	IRR
Economic	1,605	1.1	13.2%
Financial	- 13,591	0.5	- 4.1%

NPV: Net Present Value, B/C: Benefit / Cost ratio. IRR: Internal Rate of Return

(3) Beaço Port

The Project EIRR in Base case remains far lower than the social discount rate of 12% (see table below). This evaluation shows that the Project is unfeasible from the viewpoint of the national economy. Furthermore, the Project is also unfeasible from a financial perspective under the current tariff, and the port cannot operate in the black even if no on the initial cost is incurred.

Without the breakwater, which is the large portion of CAPEX, a much better EIRR, however, can be estimated. Beaço Port should be strategically located to promote the regional industry such as forest, agriculture, tourism and to support the Tasi-Mane project.

In conclusion, the Study Team recommends that the Project of Beaço Port will start the feasibility study, monitoring the situation of the progress of regional development which causes upward passenger and cargo demand in the medium to long term.

Index Base Case	NPV (1,000USD)	B/C	IRR
Economic	- 69,325	0.1	-3.6 %
Financial	- 101,778	0.0	Incalculable

NPV: Net Present Value, B/C: Benefit / Cost ratio. IRR: Internal Rate of Return

S3. Action Plan for Improving Port Operation and Maintenance System by APORTIL, I.P.

Once the ports are strategically and properly allocated across Timor-Leste, and a maritime network is established, a large volume of goods and people can be transported at a low cost. APORTIL, I.P. needs to play a major role in realizing the marine network in Timor-Leste. Three pillars which will serve as the foundation for improving the present situation were proposed.

Three Pillars for improving APORTIL, I.P.

The Study Team prepared “To do plan” and “The phasing plan” as shown below.

Table S3.1 Action Plan to do list

1. Port Management		
Background	Timor-Leste citizens are suffering from high land transport costs. Once the ports are strategically and properly allocated across Timor-Leste and a maritime network is established, a large volume of goods and people can be transported at a low cost. APORTIL needs to play a major role in realizing the marine network in Timor-Leste.	
Measures	**1-1. Port management office**	
	a) Establishment of Port management offices	APORTIL should set up a port management office to manage port properly.
	b) Port usage regulation	APORTIL should establish port usage rule to ensure the proper management of ports.
	c) Tariff setting	APORTIL should set the tariff to ensure the proper management of port facilities
	1-2. Marketing for port users	
	a) Establishment of port marketing unit	APORTIL should arrange an environment to promote the marine transportation business in Timor-Leste. Because the cargo owners don't fully understand the characteristics of the maritime transportation.
	b) Listening from port user's voice	APORTIL should conduct promotional activities which stress the advantages of maritime transportation and regularly interview cargo owners to ascertain how service can be improved to further enhance maritime transportation's competitiveness.
	c) Social benefits of marine transport	Ditto
	1-3. Clearing bottlenecks in shifting land transport to marine transport	
	a) Port development regulation	DNTM, as a regulatory authority, should ensure that port development is conducted in an orderly manner so as not to over-invest.
	b) Port statistics	APORTIL should prepare for port statistics to monitor the status of port operations.
	c) Regulation on vessel registration	DNTM should establish the vessel registration system to help to ensure safe commercial transportation within Timor-Leste.
2. Asset Management		
Background	International cargo handling operations were diverted to Tibar Bay port from Dili port which significantly reduced APORTIL's income. Therefore, APORTIL needs to improve its financial condition so that it can be an engine for realizing the marine transportation network in Timor-Leste.	
Measures	**2-1. Oversee the construction of five regional ports**	APORTIL should set up a unit to oversee the port construction and purchase.
	2-2. Management of new regional ports	APORTIL should set up regional port offices to properly manage the newly developed ports.
	2-3. Establishment of port asset management	APORTIL should establish a facility maintenance team to monitor and repair facilities once the new ports are developed.
	2-4. Utilization of obsolete wharf in Dili port	APORTIL should revitalize the obsolete area as a landlord because the location has good development potential being in the center of Dili city.
	2-5. Port business contingency plan	APORTIL should prepare port business continuity plans (BCP) to ensure stable cargo handling and emergency vessel calls in the event of disasters such as earthquakes, tsunamis, and hurricanes.
3. Ferry Operation		
Background	As APORTIL's ferry operations are still causing significant losses, The Study Team stresses the importance of improving ferry operations.	
Measures	**3-1. Separate financial statement administration & ferry operation**	APORTIL should separate financial statements into the port management division and the ferry operation division to clarify the financial situation of ferry operations.
	3-2. Examine options improve ferry boat operation.	APORTIL should consider outsourcing ferry operations to the private sector based on necessary conditions.

The Study Team recommends APORTIL I.P. to address the following items among the above list for the First Phase within one or two years:

1. Port Management	
	Port usage regulation / Port Statistics
	Establishment of port marketing unit
2. Asset Management	
	Establishment of port asset management
3. Ferry Operation	
	Separate financial statement administration & ferry operation

(1) Port Usage Regulations / Port Statistics

APORTIL I.P. has experience in port management in the existing ports of Dili, Ataúro, and also Oecusse in collaboration with ZEESM. APORTIL I.P. needs to prepare for managing new regional ports by making use

of that experience, plus brushing up by reviewing what happened in the actual operations in sites and what will happen in future operations.

If a new regional port, e.g., Carabela Port, is different in its local conditions, APORTIL I.P. needs to modify the existing regulations to adapt them to Carabela Port smoothly.

In addition to port usage regulations targeting port users, APORTIL I.P. needs to review the internal rules or workflows targeting at the APORTIL I.P.'s officers working in the port management offices and modify them if necessary, to fulfill their responsibilities, including for appropriate port statistics.

Port statistics are indispensable to grasp the status of port operations in Timor-Leste, and is fundamental information for developing strategies. So, recording and collating the activities in the port are essential in addition to providing port facility.

The Study Team found a small example to consider in port statistics matter. In Oecusse port, there are statistics for port calls and throughputs of passengers. But these are the data only for ferry boats, not including cargo vessels. This example gives some ideas for the management of new regional ports to prepare for.

From the nationwide point of view, DNTM should organize the statistics targeting the activities carried out at all the ports, including private ports. Such statistics are indispensable in evaluating and estimating the demand for port facilities.

APORTIL I.P. should report to DNTM the data for the port statistics related to all the port facilities managed by APORTIL I.P. periodically.

The Study Team also found good practices in monitoring the port users' activities. ZEESM is responsible for keeping the port facility in good condition in Oecusse Port and the officers in charge supervise the port users' operation so as not to damage the facility. If the officers notice failures in the facility, they take measures to repair, clarify what caused the failure and record the details - e.g., when cargo handling equipment damages the surface of the apron of the jetty, the officers contacted the responsible persons for the cargo handling operation and have them repair the failure, and record the situation before and after the repairs with photos. Such practices should be shared across APORTIL I.P. and implemented in the new regional ports through internal rules or workflows.

(2) Establishment of Port Marketing Unit

In addition to developing new regional ports, marketing the new regional port for port users is indispensable. Developing a maritime transport network needs both ports and ships. Ships will sail where cargo owners and shipping companies exist.

Of course, APORTIL I.P.'s ferry boats, for example - BERLIN RAMELAU, are one option to realize a maritime network to and from a new regional port. In addition, promoting private sector participation in the marine transportation market is one of the essential missions for the government side.

If a private company explores a new business, for example - deploying fleets to a new route, they will develop a business plan to examine the profitability. A new business involves new things. So, they make a business plan with many assumptions.

If the new business involves using a new port, providing the information about the new port is valuable for them, for example - when the port will be in operation, what the port specifications are, and how much the port charges are - such information will directly affect the business plan.

In addition, the status of private businesses around the port that will support the shipping business, e.g., stevedoring, warehousing, and trucking, may affect the decision-making.

The Study Team's recommendation is to set up units for marketing to port users and have and keep dialogues with them. The unit needs to do the following.

1) Listening to Port Users' Voices

Listening to Port Users is useful for APORTIL I.P. to specify the bottlenecks, as mentioned in section 7.3.

2) Social Benefits of Marine Transport

Maritime Transportation is socially beneficial for energy efficiency and an alternative means of transportation in case road transportation is hindered due to a natural disaster. Raising public awareness on these points should be addressed as one of the promotional measures of the maritime transport network, as mentioned in section 7.3.

(3) Establishment of Port Asset Management Unit

The redevelopment plan of the Dili Port area is under consideration by the government of Timor-Leste in place of the suspended study supported by USAID. Currently, the detailed APORTIL I.P. Action Plan awaits the redevelopment plan by the government. Nevertheless, the Study Team recommends that APORTIL I.P. start consideration on revitalizing the obsolete area in Dili Port.

Dili Port is the most appropriate in Timor-Leste to accommodate Cruise Ships because of its vicinity to the city center. Cruise ship passengers can wander around downtown and there is space to park cars and buses for land excursions. Dili Port also keeps accommodating ferry boats and other vessels for domestic marine transportation. The knowledge and experiences of port and maritime affairs accumulated in APORTIL I.P. should contribute to optimizing the land use of the Dili Port area. APORTIL I.P. should promptly establish the unit for this purpose and collaborate with the related organizations in the government.

Port facility engineers should be involved in asset management in terms of the structural durability of the port facility, as mentioned in section 7.4. In addition to monitoring by the officers in the port management offices through supervision of port users' activities, the team, including port facility engineers, should inspect cracks in concrete structures and corrosion in steel structures in every certain period to repair them in an

earlier stage of aging degradation. It will be beneficial to avoid large-sized works such as reconstruction of facilities.

(4) Separate Financial Statements for Administration & Ferry Operations

Securing maritime transportation to remote areas such as Ataúro and Oecusse is a national mission, and APORTIL I.P. is responsible for that. The government of Timor-Leste financially supports APORTIL's operations of the two ferry boats - BERLIN NAKROMA and BERLIN RAMELAU, as of now, even if the operations are causing losses after the international cargo handling operation moved to Tibar Bay Port.

Nevertheless, APORTIL I.P. should actively explore ways to improve the financial situation as an organization responsible for the sustainability of ferry operations. If the ferry operations expand to new regional ports, without improvement financially, it only means expansion of losses.

For the first step, financial statements should be separate for the port management division and the ferry operation division to clarify the situation of ferry operations. These financial statements are the foundation for examining the options to improve ferry operations financially.

The Study Team found that the coding/description of the items for budget and execution (i.e., expenditure) differ year to year due to the modification of coding/description in the registration system prepared by the Ministry of Finance. As a result, comparing amount with the same coding/description across years is difficult, making it difficult to identify the points to review.

APORTIL I.P. needs to make a way to sort the items of budget and expenditure free from the coding/description modification made by the Ministry of Finance if necessary.

Table S3.2 Phasing action plan