No.

Japan International Cooperation Agency (JICA)
Ministry of Transport (MINTRANS)

Final Report

The Study on Urgent Rehabilitation Program of Ports in the Republic of Angola

Summary

August 2006

The Overseas Coastal Area Development Institute of Japan
Ecoh Corporation

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PREFACE

In response to a request from the Government of the Republic of Angola (hereinafter referred to as "GOA"), the Government of Japan decided to conduct a Study on Urgent Rehabilitation Program of Ports in the Republic of Angola and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team to Angola four times between March 2005 and August 2006, which was headed by Dr. Haruo Okada and composed of members from the Overseas Coastal Area Development Institute of Japan (OCDI) and Ecoh Corporation.

The team held discussions with the officials concerned of the GOA and conducted the field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this rehabilitation plan and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of GOA for their close cooperation extended to the team.

August 2006

Kazuhisa Matsuoka

Vice President

Japan International Cooperation Agency

LETTER OF TRANSMITTAL

August 2006

Mr. Kazuhisa Matsuoka
Vice President
Japan International Cooperation Agency

Dear Mr. Matsuoka,

It is my great pleasure to submit herewith the Final Report of the Study on Urgent Rehabilitation Program of Ports in the Republic of Angola.

The study team composed of the Overseas Coastal Area Development Institute of Japan (OCDI) and Ecoh Corporation conducted surveys in the Republic of Angola over the period between March 2005 and August 2006 according to the contract with the Japan International Cooperation Agency (JICA).

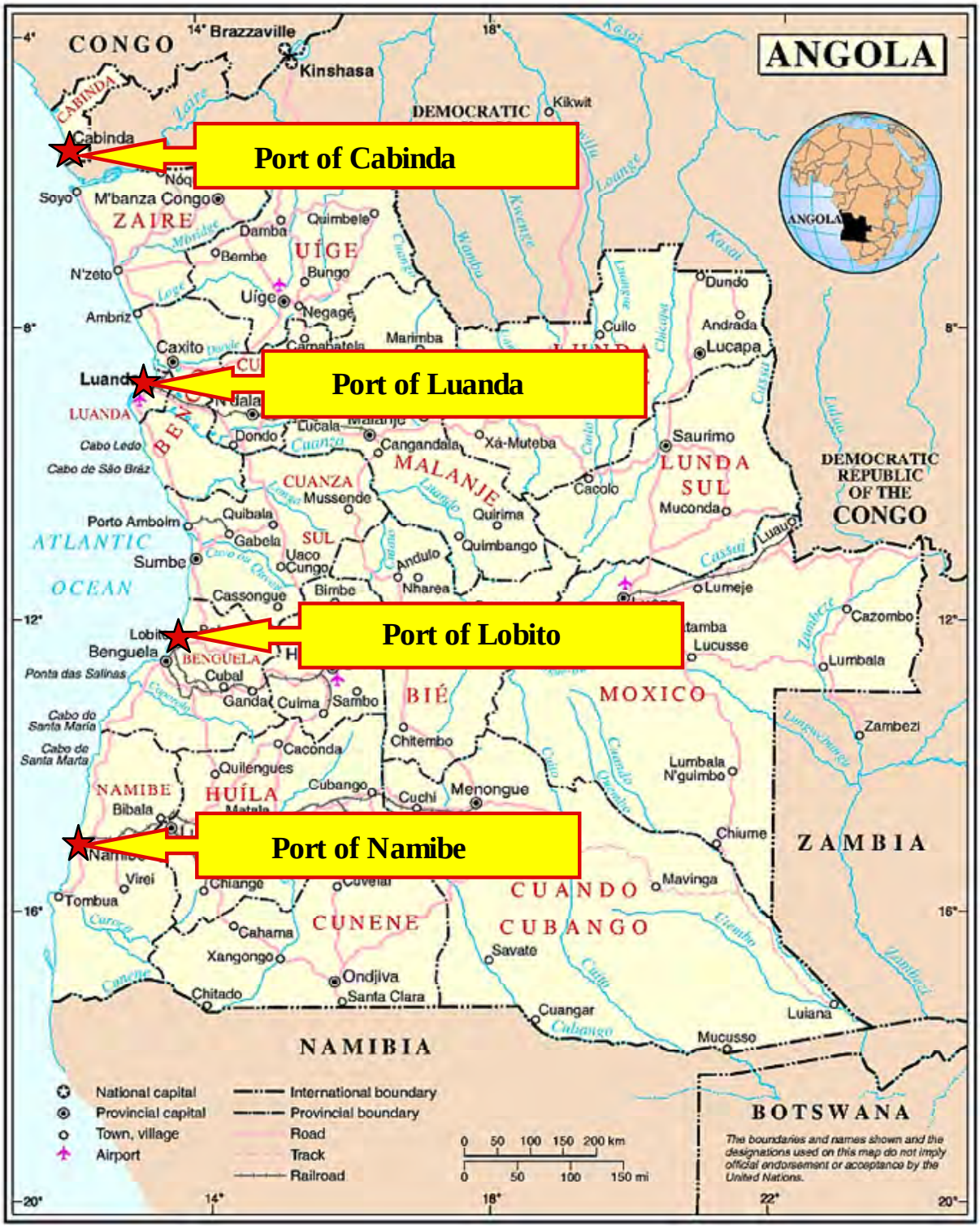
The study team compiled this report, which proposes a short term port rehabilitation plan for 2010, an urgent rehabilitation program of port facilities, and an action program for the improvement of port management and operation, through close consultation with officials of the Government of the Republic of Angola and other authorities concerned.

On behalf of the study team, I would like to express my sincere appreciation to the Government of Angola and other authorities for their diligent cooperation and assistance and for the heartfelt hospitality, which they extended to the study team during our stay in Angola.

I am also very grateful to the Japan International Cooperation Agency, the Ministry of Foreign Affairs of Japan, the Ministry of Land, Infrastructure and Transport of Japan, Mr. Carlos A.S.S.H. de Freitas, the former Japanese honorary consul, and the Embassy of Japan in the Republic of Angola for giving us valuable suggestions and assistance during the course of the study.

Yours faithfully,

Haruo Okada
Team Leader
The Study on Urgent Rehabilitation Program of Ports in the Republic of Angola



Location Map

Table of Contents

List of Figures

List of Tables

List of Photos

ABBREVIATIONS

A	AfDB	African Development Bank
	AIDS	Acquired Immunodeficiency Syndrome
B	B/L	Bill of Lading
C	CBD	Convention on Biological Diversity
	CDL	Chart Datum Level
	CFB	Benguela Railway
	CFL	Luanda Railway
	CFM	Moçamedes Railway
	CFS	Container Freight Station
	CIA	Central Intelligence Agency
	CIF	Cost, Insurance and Freight
	CLC	International Convention on Civil Liability for Oil Pollution Damage
	COD	Chemical Oxygen Demand
D	DBSA	Development Bank of Southern Africa
	DNMMP	National Directorate of Merchant Marine and Transport
	DRC	Democratic Republic of Congo
E	EC	European Community
	ECP	Poverty Reduction Strategy (Estrategia de Combate a Pobreza)
	EDI	Electronic Data Interchange
	EDP	Electronic Data Processing
	EIA	Environmental Impact Assessment
	EIS	Environmental Impact Study
	EMRP	Emergency Multisector Recovery Project
	EPC	Public Corporation of Port of Cabinda
	EPL	Public Corporation of Port of Luanda
	EPLo	Public Corporation of Port of Lobito
	EPN	Public Corporation of Port of Namibe
	EPS	Public Corporation of Port of Soyo
	EU	European Union
F	FAO	Food and Agricultural Organization of the United Nations
	FRP	Fiber Reinforced Plastic
G	GDP	Gross Domestic Product
	GEPE	Cabinet of Study, Planning and Statistics
	GRC	Glass Fiber Reinforced Cement
H	HDI	Human Development Index
	HIV	Human Immunodeficiency Virus

I	IBRD	International Bank for Reconstruction and Development
	ICT	Information and Communication Technology
	IEE	Initial Environmental Examination
	IMF	International Monetary Fund
	IMO	The International Maritime Organization
	INAMET	The National Institute of Meteorology and Geophysics
	INEA	National Institute for Roads in Angola
	ISPS	International Ship and Port Facility Security
	IUCN	International Union for Conservation of Nature and Natural Resources
J	JICA	Japan International Cooperation Agency
K	Kz	Kwanza
L	LDC	Less Developed Country
	LDC/LC	London Dumping Convention (Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter)
	LNG	Liquefied Natural Gas
	LRRD	Link Between Relief, Rehabilitation and Development
M	MDG	Millennium Development Goals
	MHWN	Mean High Water Neap
	MHWS	Mean High Water Spring
	MINADER	Ministry of Agriculture and Rural Development
	MINARS	Ministry of Social Affairs and Reintegration
	MINOP	Ministry of Public Works
	MINPLAN	Ministry of Planning
	MINTRANS	Ministry of Transport
	MINUA	Ministry of Urban Affairs and Environment
	MIREX	Ministry of External Relationship of Angola
	MSL	Mean Sea Level
	MLWN	Mean Low Water Neap
	MLWS	Mean Low Water Spring
	MPLA	The Popular Movement for Liberation of Angola
N	NEPAD	New Partnership for Africa's Development
	NGO	Non-Governmental Organization
O	OCDI	The Overseas Coastal Area Development Institute of Japan
	OCHA	Office for the Coordination of Humanitarian Affairs
	ODA	Official Development Assistance
	OGE	Orçamento Geral do Estado
	OJT	On-the-Job Training
	OPRC	International Convention on Oil Pollution Preparedness, Response and Co-operation

P	PIC	Polymer Impregnated Concrete
	PMAWCA	Port Management Association of West and Central Africa
	PPMRRP	Priority Phase Multisector Rehabilitation and Reconstruction Program
	PRSP	Poverty Reduction Strategy Paper
	PSP	Port Security Plan
S	SADC	Southern African Development Community
	SONANGOL	Angola's National Oil Company
	SPT	Standard Penetration Test
T	TAAG	Angola Airlines
	TEU	Twenty-Foot Equivalent Unit
	TOR	Terms of Reference
U	UN	United Nations
	UNCCD	United Nations Convention to Combat Desertification
	UNCLOS	United Nations Convention on the Law of the Sea
	UNDP	United Nations Development Program
	UNESCO	United Nations Educational, Scientific and Cultural Organization
	UNFCCC	United Nations Framework convention on Climate Change
	UNITA	The Union for the Total Independence of Angola
	UPOE	Unit of Protection for Strategic Objectives
	USAID	U.S. Agency for International Development
W	WB	The World Bank
	WFP	World Food Programme
	WHC	World Heritage Center -UNESCO
	WHO	World Health Organization
	WTO	World Trade Organization

Executive Summary

1) Situation of the Angolan Ports

Following the end of civil war, the cargo throughput of Angolan ports has dramatically increased in accordance with the economic reconstruction. In particular, container throughput grows larger every year; throughput in 2005 is twice recorded in 2001. However, the port facilities are too poor to meet the increasing demand. Since the maintenance of the four ports was not conducted for nearly thirty years, their yard pavements, coping concrete of quay walls, rubber fenders, cargo handling equipment, roads and railroads in the ports, warehouses and other port facilities are in very poor condition. Consequently, the cargo handling operations suffer from low productivity and remain unsafe.

Furthermore, the waiting time of entering ships at the Port of Luanda has risen to 5-7 days due to the cargo increase. Shipping companies levy ship congestion surcharges and emergency terminal congestion surcharges on their freight rates to Luanda. Consequently, the freight rates to Angola are very expensive and the consumer prices of imported commodities are at very high level compared with other developing countries. Since the cargo throughput of major Angolan ports will increase more and more in the near future, it is obvious that ship waiting time will increase and become a bottleneck for the economic recovery of the country. It is indispensable to increase the capacity of major ports by modernizing the port facilities, developing new terminals and improving the productivity of cargo handling.

2) Government's Post-war Restoration

Angolan Government adopted the poverty reduction strategy (Estrategia de Combate a Pobreza) in 2004 as the highest priority national policy. ECP runs from 2003-2007 and aims at both post-war restoration and mid-term economic growth with a budget of $US3.17 billion. The government has also authorized the Priority Phase Multisector Rehabilitation and Reconstruction Program (PPMRRP), which aims at implementing urgent rehabilitation of infrastructure and building effective administration system. PPMRRP includes a component of restoring critical infrastructures in transport networks, in which the rehabilitation and improvement of ports, roads, railways and bridges play a key role, particularly in the Strategic Transport Loop.

3) Cooperation of International Organizations

WB signed the loan agreement on the Emergency Multisector Recovery Project (EMRP) in May 2005. The first phase of EMRP is mainly for the capacity development and the second phase is to improve the water supply, power generation and transport infrastructure in Angola. The amount of assistance by WB is estimated at about US$100 million by the year 2010.

The NEPAD, as a framework for socio-economic development of African countries, has a Short-term Action Plan (STAP) for developing regional infrastructure covering sectors of transport, energy, information and communication, water and sanitation. In the field of ports, STAP includes projects on the rehabilitation of Angolan ports. NEPAD regards corridors from inland countries to sea ports as important international routes. In particular, Lobito corridor, consisting of Benguela Railway and the Port of Lobito, is deemed as an important unique international corridor for the west coast of Africa. The Development Bank of Southern Africa (DBSA), as a funding agency for projects promoted by NEPAD, is now appraising reconstruction projects in Angola inclusive of the Port of Luanda.

4) Natural Conditions of Ports

The study team implemented a field survey on soil conditions and the ground level in the Ports of Lobito and Namibe. Boring survey in the Port of Lobito revealed a clay layer at a depth of 25-31 meters at one point, however, the layer at a depth of 12-20 meters is strong enough as the foundation at three points in the port. The ground level survey revealed that part of the yard area within 80 meters from the quay wall subsided about 4-17 cm, which indicates serious leakage of soil may not have happened in the area. Boring survey in the port of Namibe showed that a strong foundation layer exists at a depth of 8-11 meters at three points in the port. The ground level survey proved that the maximum subsidence in the north area of the wharf was 22 cm and that in the south area was 36 cm, which would not be caused by the leakage of soil from the quay walls.

5) Environmental Conditions

Environmental conditions around the four ports were examined by making reference to past studies. Since no data were found on the water quality of the port waters, the study team implemented a water quality test by a handy method at the time of a flood tide and an ebb tide during September to October 2005. Items of the test were transparency, COD and Coliform Count. In general, COD figures were not so high as to indicate the water pollution by organic matter, however, the deterioration in water quality was found in the waters in the inner part of Lobito Bay and Luanda Bay as both samples showed more than 4 mg/l of COD. Water samples of the same points also showed more than 5,000 MPN/100mg of Coliform Count, a high level of pollution. Water quality figures of the three items showed no pollution in the Port of Cabinda, while the transparency is low owing to the sand drift from the go river. Water quality figures of the Port of Namibe revealed no pollution in the Bay.

6) Deterioration of Port Facilities

The deterioration of port facilities was examined by visual inspection of 528 facilities of the four ports. In case of need for further diagnosis, the deterioration of facilities was checked by portable equipment, namely, 1) nondestructive reinforcing bar detector to measure the thickness of concrete cover and the pitch of reinforcing bar; 2) ultrasonic thickness meter to measure the thickness of steel material; 3) Schmitt hammer to measure the compressive strength of concrete; and 4) phenolphthalein solution to measure the carbonation depth of concrete.

Among 283 facilities examined in the Port of Lobito and 210 facilities in the Port of Namibe, 200 and 167 were found in need for rehabilitation respectively. It was also found that all of the yard pavement, coping concrete of the quay walls and rubber fenders need rehabilitation. Regarding cargo handling equipment, it was found that 35 of 69 facilities need repair or replacement. Among 32 facilities examined in the Port of Cabinda, it was found that 28 facilities were already repaired or replaced recently and only 4 facilities need rehabilitation. Regarding the Port of Luanda, three buoys in the port waters were examined and found to be in need of rehabilitation. While the terminal facilities in the Port of Luanda are not included in the scope of work, most of their facilities seem to have need for rehabilitation judging from visual inspection.

7) Port Rehabilitation Policy

Short-term Port Rehabilitation Plan, which could effectively respond to the urgent demand in the post war restoration period, was proposed with a target year of 2010. In addition, urgent rehabilitation program was identified among the facilities in Short-term Rehabilitation Plan. Port facilities are basically rehabilitated to restore capacities up to the original design level in the Short-term Rehabilitation Plan.

The plan aims at 1) supporting the on-going national restoration projects in the hinterlands; 2) synthesizing the rehabilitation of facilities and the improvement in port management;

3) promoting functional allocations among major ports in connection with road/railroad network in the hinterland; 4) assisting human resources development of major ports; 5) paying special attention to the social and environmental conditions as well as the safety in the ports; and 6) contributing to the economic development of inland countries.

Since the Benguela railway connects DRC, Zambia, Zimbabwe, and Botswana with the Port of Lobito and makes up the Lobito Corridor, the rehabilitation of the port shall be implemented simultaneously with the rehabilitation of the railway. The Port of Namibe suffers from poor facilities so that urgent rehabilitation shall be carried out to improve the safety in cargo handling operations. The Port of Luanda needs urgent rehabilitation of facilities and expansion of container handling capacity in cooperation with private terminal operators. It is important for the Port of Cabinda to build a new wharf with a deeper basin to accommodate larger vessels and to avoid the use of barges.

8) Demand Forecast

World Bank predicted a GDP growth rate of 19.4% per year for Angola by 2008. IMF also predicted GDP growth rates of 14.7% in 2005 and 27.6% in 2006. Taking into account both predictions, this study assumed a GDP growth rate of 19.4% by 2008, as predicted by WB, and supposed that the rate of 19.4% would continue from 2009 to 2010 in a high growth case. Since the Angola 2025, Angolan long-term national economic development plan, predicted a GDP growth rate of 6.4% on a long-term basis, this study supposed that the rate of 19.4% would continue till 2008 and the rate of 6.4% from 2009 to 2010 in a low growth case.

Assuming the correlation between cargo throughput and GDP in Angola, this study forecasted future cargo throughput of Angolan ports. Cargo throughput demand for the Port of Luanda will increase from 3.15 million tons in 2004 to 7.03-8.97 million tons in 2010, 2.2-2.8 times larger than at present. That for the Port of Lobito will increase from 0.87 million tons in 2004 to 2.0-3.1 million tons in 2010, 2.3-3.5 times its current level; and for the Port of Namibe from 361,000 tons in 2004 to 618,000-6,794,000 tons in 2010, 2.4-26.0 times. A high growth case prediction for the Port of Namibe includes the export of iron ores from Sacomar. Cargo throughput of the Port of Cabinda will increase from 81,600 tons to 194,000-294,000 tons in 2010, 2.4-3.1 times its current level. Total cargo throughput of the four ports will increase from 4.4 million tons in 2004 to 9.8-19.1 million tons in 2010, 2.2-4.3 times the current level.

Container cargo throughputs of each port within the above forecasts are also estimated as follows: 1) the Port of Luanda's container cargo throughput will increase from 294,000 TEUs in 2004 to 698,000-906,000 TEUs in 2010, 2.4-3.1 times its current level; 2) the Port of Lobito from 37,000 TEUs in 2004 to 92,000-120,000 TEUs in 2010, 2.5-3.2 times; 3) the Port of Namibe from 8,300 TEUs in 2004 to 19,000-24,000 TEUs in 2010, 2.2-2.9 times; 4) the Port of Cabinda from 4,500 TEUs in 2004 to 12,000- 15,000 TEUs in 1020, 2.7-3.5 times. Total container throughput of the four ports will increase from 341,000 TEUs in 2004 to 807,000-1,048,000 TEUs in 2010, 2.4-3.1 times its current level.

Table 1 Future Container Throughput (1,000 TEU)

Year/Ports		Luanda	Lobito	Namibe	Cabinda	Total
2004		289	33	7	4	334
2010	High Case	906	120	24	16	1,066
	Low Case	698	92	19	12	815

9) Maximum Size of Calling Vessels

The tonnage of largest container vessel calling at the Port of Lobito is 41,500 DWT with a length of 231 meters and a maximum draft of 12 meters. That of the largest bulk vessel is 50,000

DWT with a length of 190 meters and a maximum draft of 11.9 meters. Since the operating draft of a container vessel is usually about 70%-80% of its maximum draft, a container vessel of 40,000 DWT class can enter the Ports of Luanda, Lobito and Namibe. Therefore, facilities of the short-term rehabilitation plan for 2010 are designed to accommodate vessels with the above mentioned size in the Ports of Lobito and Namibe.

10) Short-term Rehabilitation Plan

The assessment of deterioration of port facilities showed that the pavement of yard and apron, rubber fenders and coping concrete of the quay walls are in very poor condition and in need of repair as soon as possible. Demand forecast showed that cargo throughput would increase dramatically in the near future and all facilities should be utilized to meet the demand for 2010. In this connection, it is necessary for the Port of Lobito to implement the rehabilitation all over the North Wharf and the South Wharf, with a total area of 15 ha. Rehabilitation is also necessary for the Port of Namibe over an area of 11 ha in the No.1-3 Wharves. Rehabilitation of terminals in the Port of Luanda is the responsibility of concessionaires, so that the Study proposed the short-term rehabilitation plan for navigational aid facilities in the Port of Luanda.

To increase the productivity of cargo handling operations, the plan proposes the procurement of reach stackers, folk lifts, top lifters and mobile cranes for the Ports of Lobito and Namibe. The plan also proposes the installation of reefer plugs and power generator for the both ports. The procurement of such equipment is the responsibility of concessionaires at the Port of Luanda. It is also urgently necessary to repair roads in the port, demolish unused warehouses and quay cranes, repair water pipe and fuel oil pipe, and install the electronic data interchange system.

Regarding navigational channel and basin, it is recommended to implement a bathymetric survey to confirm the depth of channel and basin, particularly in the Bay of Luanda and along the navigational channel of Cabinda.

The cost of the short-term rehabilitation plan is estimated at US$35 million for the Port of Lobito and US$29 million for the Port of Namibe. The cost of bathymetric survey and repair of buoys is estimated at about US$0.5 million at the Port of Luanda. The clearance of broken ships and dredging in the Port of Luanda are assumed to be carried out after the completion of the short-term rehabilitation plan. Since the rehabilitation of the Port of Cabinda has already been implemented by the port authority, short-term development plan is not proposed for that port.

Preliminary economic analysis and financial analysis showed that FIRR of the short-term rehabilitation plan is 6.7% for the Port of Lobito and 5.1% for the Port of Namibe. Comparing with and without cases, EIRR is estimated at 28% for the Port of Lobito and 24% for the Port of Namibe.

Table 2 Summary of Short-term Rehabilitation Plan

Facilities	Luanda Port	Lobito Port	Namibe Port
Pavement in the yard and apron; Quay wall capping concrete and rubber fenders	By Concessionaires GC*1: 10 ha MPT: 19 ha CT: 14 ha	North and South Wharves: 15 ha、 Quay l: 1,112m	Yard and Berths No.1-3: 11 ha、 Qua: 680m
Procurement of cargo handling equipment	By Concessionaires	Additional one MC*2; two RS, and two FT	Additional two RS, one FT, and one TP
Navigational channel and basin	Bathymetric survey: 15.6km2 Two buoys and one light beacon	To be discussed in the next phase	To be discussed in the next phase
Reefer facilities and power supply	By Concessionaires	Reefer plugs and power generator	Reefer plugs and power generator
Others	By Concessionaires	Water and fuel oil supply pipes;	Inner port road; Yard lighting; Demolition of quay cranes and a warehouse; Water and fuel oil pipes;
Estimated cost	US$ 0.5 million*3	US$ 35 million	US$ 29 million
Preliminary Economic and Financial Analysis		EIRR 28% FIRR 6.7%	EIRR 24% FIRR 5.1%

Note: The Port of Cabinda is not included in the Short-term Development Plan
*1 GC: General Cargo Terminal, MPT: Multi-purpose Terminal, CT: Container Terminal
*2 MC: Mobile Crane, RS: Reach Stacker, FL: Folk Lift, TP: Top Lifter
*3 Rehabilitation of buoys only. In the General Cargo Terminal, Multi-Terminal Co. plans to invest US$19million.

11) Priority for Rehabilitation

Priority of the short-term rehabilitation plan is examined from the viewpoint of 1) the promotion of economic reconstruction of Angola and the development of damaged regions by the civil war, 2) the connection with Priority Phase Multisector Rehabilitation and Reconstruction Program and the multiplier effect of railway and road rehabilitation projects, 3) the extent of deterioration of port facilities and the safety and productivity of cargo handling operations, 4) requirements from port authorities, and 5) the possibility of development of port facilities by the concession to private sectors.

Evaluation of each port was made by judging priority of the above items 1) to 5) using priority A to C. The Ports of Lobito and Namibe were evaluated as 3A, Luanda was as 1A, and Cabinda was as 3B. Since the Ports of Lobito and Namibe have the same score, priority shall be given to the Port of Lobito in case of need for encouraging the economic development of hinterland and land-locked countries, but priority shall be given to the Port of Namibe in case of need for placing emphasis on the deterioration of port facilities and difficulties in attracting private sector participation.

12) Urgent Rehabilitation Program

Urgent rehabilitation area is selected from the short-term rehabilitation plan in view of the effective use of the port and demand for the facilities. Berths No.7/8 and its back yard in the Port of Lobito and Berth No.3A and its back yard in the Port of Namibe are selected for urgent rehabilitation areas. Urgent rehabilitation program of the both areas consists of civil works, procurement of cargo handling equipment and installation of incidental facilities such as reefer container storage, power supply, yard lighting, water and fuel supply, warehouses, silo and other facilities.

The cost of the urgent rehabilitation program is estimated at US$9.9 million for the Port of Lobito and US$9.4 million for the Port of Namibe. Civil works, procurement of cargo handling equipment and installation of incidental facilities are so synergetic that they shall be carried out simultaneously in order to enhance the productivity. Physical construction work will take twelve months. Taking into account that contract procedures and design work will take a considerable period of time, urgent rehabilitation program shall be started as soon as possible.

Table 3 Summary of facilities and Equipment for Urgent Rehabilitation

Facilities and Equipment	Lobito Port	Namibe Port
Pavement in the yard and apron; Coping concrete, car stoppers and rubber fenders on the quay wall	Yard behind the Berth No.8 and part of the Berth No.7 with a total area of 4.6 ha, a length of 240m	Yard behind the Berth No.3A with an area of 2.3 ha, a length of 240m
Cargo handling equipment	Additional one reach stacker and one top lifter	Additional one reach stacker, one mobile crane and one forklift
Reefer facilities and power supply	Reefer plugs and power generator	Reefer plugs and power generator
Others	Water and fuel oil supply pipes	Inner port road 620 m, Yard lighting towers, Removal of warehouse and quay cranes, Water and oil supply pipes
Estimated cost	US$9.9 million	US$9.4 million

13) Emergency Rehabilitation Equipment

Based on the assessment of deterioration of port facilities in the four ports, the Study team discussed emergency measures for improving the present situation with port authorities. For the Port of Luanda, necessary items selected are 1) rehabilitation of navigational aids; 2) removal of sunken ships and wrecks; 3) monitoring of the depth in port waters. For the Port of Lobito, emergency measures discussed are 1) temporary repair of pavement; 2) floating fenders for container berth; 3) installation of steel plates to repair uneven yard surface. For the Port of Namibe, emergency measures are 1) floating fenders for No.3 Berth; 3) installation of steel plates to repair uneven yard surface. Since the Port of Cabinda suffers from sedimentation and needs maintenance dredging, necessary item is the monitoring of water depth along the channel and anchorage.

Taking into account the urgency of items, cost and benefit, procurement of items and necessary time, JICA supplied 20 pieces of steel plate each to the Ports of Namibe in January 2006, and to the Port of Lobito in February 2006. JICA also supplied a set of echo sounders each to the Ports

of Luanda and Cabinda. Demonstration on the use of echo sounder was held in March 2006 at the Port of Luanda with participation of officials from the both ports.

14) Port Management and Operation

Angola has six commercial ports, namely the Ports of Luanda, Lobito, Namibe, Cabinda, Soya and Porto do Amboim, and each port is administered by respective port authorities. Angolan government agencies are divided into two categories, i.e. commercial service department and noncommercial department. The agencies categorized as commercial service have been requested to introduce privatization since 2000, and the port authorities became self-supporting accounting bodies. The Port of Luanda, therefore, adopted privatization of terminal operations and gave the concession of general cargo terminal and multi-purpose terminal to two private operators for 20 years in 2005. Concessionaire of the container terminal has not been decided yet but it will soon be handed over to a private operator. Terminals in the other ports are operated by port authorities on a self-supporting basis, and their privatization is not scheduled at this stage of rehabilitation. Financial situation of the four ports has recently improved owing to the increase of cargo throughput, however, the Port of Cabinda still shows a loss and the Port of Namibe suffers from little allowance for investment. Neither port has sufficient funds for investment and, therefore, needs assistance by the national government or international ODA.

Problems in port management and operation of Angolan ports are 1) low productivity of cargo handling due to poor infrastructure and equipment; 2) slow documentation for gate clearance/billing and long dwelling time of cargo due to the lack of computerization; and 3) low skilled labors due to lack of training opportunities. In case of the concession, problems are in the administrative role of the port authority, i.e. to encourage concessionaires to improve port facilities, cargo handling equipment and productivity. The Port of Luanda has to enhance the ability to coordinate concessionaires and manage the port as a whole.

Average ship waiting time for entering the Port of Luanda increased to 5-7 days in the second half of 2005. Congestion surcharge is levied on the ocean freight rates to Luanda and emergency terminal congestion charge is also levied on the rates. Therefore, container freight rates from Europe to Luanda are 40%-45% higher than the rates to nearby ports, such as the Port of Abidjan or Cape Town. It is urgently requested that the Port of Luanda reduce ship congestion. Together with economic growth in Angola, ship congestion will become worse if necessary rehabilitation and development do not take place in the near future. Ocean freight rates to the Ports of Lobito and Namibe are also high due to low volumes of cargo and low productivity of cargo handling. Ship waiting queue may appear at the Ports of Lobito and Namibe in the near future if port capacity remains at the present level.

To realize the modernization of ports, it is indispensable to invest in port facilities and raise the capability of port management bodies. A concession to private operators is not a solution to cope with increasing demand for cargo throughput. Port authorities shall be responsible for the whole management and operation, demand forecast in the future, master plan of the port development, and security and environmental regulation in their ports. Based on the proper supervision by port authorities, terminal operations shall be handed over to commercial entities. Since private terminal operators in Angola do not have enough funds for port rehabilitation and development, port authorities shall assist them in raising funds or shall develop some port facilities and lease them to private operators. It may be effective for the Ports of Lobito and Namibe to avail themselves of international ODA funds.

15) Capacity Development

Reconstruction of Angola requires capacity development in order for a port authority to act on its own initiative in planning and implementing the projects. Capacity development of port authorities is important in view of three elements of the capacity, namely, administrative institution,

human resources and infrastructure. To improve the capacity of Angolan ports, it is indispensable to enhance the institutional framework and human resources of port management as well as port infrastructure including equipment and computer.

Port authorities shall introduce Electronic Data Processing to improve port management and operation. In particular, cargo information, billing and other documentation require computerization. Efforts shall be made to train port officials and enhance their capacity.

16) Workshops and Seminars

Workshops on recent issues related to world shipping and modern ports were held 17 times during the stay of the Study team with the participation of officials mainly from the Port of Luanda. Seminars on port rehabilitation and modernization were also held in Luanda and Lobito with the participation of managers and officials from MINTRANS, each port authority and relevant organizations.

Moreover, special workshops were held at the Port of Namibe to transfer a container tracking method using a bar code system. Trainees studied a method of container tracking with a bar code attached to a box. Participants learnt how to process data on the location of containers, in and out dates of containers, and other cargo related information on computer. Port authorities are expected to introduce such a container tracking system, which is a prologue to RFID (Radio Frequency Identification).

17) Recommendations

Development of a modern container terminal in the Port of Luanda can reduce port congestion and provide users with prompt container operation services. Development of bulk cargo facilities is also necessary at the Ports of Luanda, Lobito and Namibe to realize lower cost by modern cargo handling system. Since the multi-modal transport will soon become popular in Angola, it is essential to develop a container marshalling yard adjacent to the port to transfer containers to railway or trucks. As the Ports of Luanda, Lobito and Namibe have railway tracks in the ports, it is necessary to change the old railway, which was developed for bulk and break bulk cargoes, into a means compatible with the transport of containers. It is also important to rehabilitate and develop access roads to the ports.

Electronic data processing is essential for improving the efficiency of port operation. Electronic data interchange is also necessary to exchange information on cargoes, arriving and departure date, ship entering and others between customs, port authorities, immigration and other relevant organizations. It will enable the port to offer one stop service for all documentation and provide port users with fast and smooth service.

Ports are basic infrastructure to support the national economy through the efficient handling of imports and exports. The government shall take necessary measures to avoid economic loss resulting from ship congestion, slow cargo operation, and expensive port/terminal charges. It shall be encouraged to introduce private terminal operators in view of providing competitive services and quality. Port authorities shall provide services or develop facilities which private companies cannot provide due to financial reasons.

Problems of Angolan ports will not be solved simply by granting concessions to private companies. The government shall make a plan to cope with ship congestion and have a strategy to modernize the ports and raise funds. Port authorities shall make a demand forecast and authorize a master plan. To realize the plan, port authorities shall coordinate the investment of private operators and funds offered by international aid agencies or donor countries. At the first stage of port development, many developing countries utilized foreign funds, so the government shall have a scheme to develop ports with public private partnership and have the financial means to encourage

port development by port authorities and private companies.

To provide better services at ports, it is necessary to improve not only the infrastructure but also the productivity and efficiency of terminal operations. Capacity development program of the port authorities plays a key role in enhancing individual capability of officials and institutional capability of the port authorities.

At the Port of Luanda, two terminals are operated by concessionaires and container terminal operation will be transferred to a private operator in the near future. However, the port authority of Luanda shall be responsible for ship/terminal congestion as a landlord. The authority shall monitor the operation of terminals and take necessary action to reduce ship waiting queue and congestion surcharges. Moreover, the authority shall propose a strategy to develop a new container terminal which will play a key role in maritime transportation of Angola.

At the Ports of Lobito, Namibe and Cabinda, respective port authorities provide cargo handling services and other port services. In accordance with cargo increase, private companies shall be invited for cargo handling operations or as terminal operators to provide competitive and efficient services. The port authorities shall be responsible for port management as a whole and take necessary action to expand the capacity and reduce ship congestion as a landlord.

A comprehensive study for the master plan of each port will be necessary to give shape to future plans indicated in this report. From the viewpoint of port development, effective use of the port and the protection of the environment, the study shall examine 1) future demand for the port, 2) navigational requirements for channel, basin and quays, 3) proper scheme for the development and operation of terminals, and 4) financial feasibility of the development. It is also important to have a master plan of the transportation network in Angola including roads, railways, airways, shipping routes and ports.

1. Background, Objectives and Outline of the Study

1.1 Background of the Study

Angolan ports are sharing common problems of their deteriorated and old-fashioned port facilities and delay in taking action on modern container transportation. In addition, human resources were greatly depleted during the civil war. It is thus necessary to develop expertise in port management, operations and port engineering.

In light of this situation, the Government of the Republic of Angola has requested the Government of Japan to undertake the study on the urgent rehabilitation program which is comprised of three main items, namely 1) Urgent rehabilitation program of major ports, 2) Long-term port development plan all over the country, and 3) Establishment of an organization and operation system in the ports. In accordance with this request, a preparatory study team was dispatched to the Republic of Angola in October 2004 and signed the Scope of Work, in which it was agreed that the Study would give high priority to formulating an urgent port rehabilitation program of four major ports while the formulation of a long-term port development plan would be beyond the scope of the study. The Study is carried out by the Japan International Cooperation Agency, who has commissioned a study team comprising the Overseas Coastal Area Development Institute of Japan and ECOH Corporation.

1.2 Objectives of the Study

The purpose of the Study is to formulate a rehabilitation plan of the Ports of Luanda, Cabinda, Lobito and Namibe in order to improve old and damaged port facilities. Specific objectives of the study are as follows:

To formulate a short term port rehabilitation plan for 2010;

To formulate an urgent rehabilitation program of port facilities and to select some items for urgent implementation;

To formulate an action program for the improvement of port management and operation; and

To carry out a capacity development program of port management and operation including the privatization of the Port of Luanda.

1.3 Outline of the Study

1.3.1 Scope of the Study

Rehabilitation of ports all over the country is a critical policy issue for the rebuilding of the national economy. After identifying the current condition of each port, the study aims at formulating a short-term development plan as well as an urgent program and action plan for the capacity development.

A capacity development program will be formulated to cope with the privatization of the Port of Luanda, which is one of the most important components for improving the port performance. The Study encompasses the following nine aspects:

Review and analysis of the present condition;

Formulation of basic policy for rehabilitation;

Formulation of short-term rehabilitation plan;

Formulation of urgent rehabilitation program;

Execution of emergency rehabilitation program;

Development of Action Plan for improvement of port management and operation;

Consideration of socio-environmental aspects;

Recommendation for future port development; and

Capacity development and Technology transfer.

1.3.2 Study Schedule

The study consists of four phases in Angola and study reports are prepared for the consideration of counterparts at each phase of the study. The final report will be submitted to the Government of Angola after the official approval of JICA.

- First visit to Angola : March - June 2005
- Progress Report : September 2005
- Second visit to Angola : September - December 2005
- Interim Report : January 2006
- Third visit to Angola : February - March 2006
- Draft Final Report : May 2006
- Fourth visit to Angola : June 2006
- Final Report : August 2006

1.3.3 Members of the Study Team

The Study Team is headed by Professor Dr. Haruo Okada and consists of seven members from the Overseas Coastal Area Development Institute of Japan, three members from ECOH Corporation and an interpreter. Members and their specialties are listed hereunder:

Prof. Dr. Haruo Okada	Team Leader	OCDI
Dr. Sumio Suzuki (Dr. Hiroshi Ueda)	Port Development/ Restorative Planning	OCDI
Mr. Junichi Takemura	Demand Forecast/Financial Analysis	OCDI
Mr. Osamu Kunita	Port Management	OCDI
Mr. Ado Yoshimoto	Privatization/Capacity Development	OCDI
Mr. Takeshi Nakano	Cargo Operation/Yard Planning	OCDI
Mr. Fumiaki Kiyosue	Deterioration Survey/Facility Design	OCDI
Mr. Takahisa Aoyama	Natural Conditions	ECOH
Mr. Takeaki Hoshino	Construction/Cost Estimate/Rehabilitation	ECOH
Mr. Kenji Kuroki	Socio-Environmental Considerations	ECOH
Mr. Yuji Osaki (Mr. Yousuke Agari)	Business Coordination	OCDI
Ms. Keiko Fujisawa	Interpreter	OCDI

1.3.4 Counterparts

The Study Team has collaborated with the Angolan counterpart members listed hereunder.

1) Head Office

Dr. Filomeno Silva	National Director of DNMMP
Dr. José Kuvíngwa	National Director of GEPE
Mr. Diur K. Angelo	Chief of Port Department of DNMMP
Mr. Kama Ndungu	Chief of Section of DNMMP
Mr. Tiago Neto	Chief of MM Department of DNMMP
Mr. Miguel Alexandre	Superior Technician of GEPE
Mr. Vita	Superior Technician of DNMMP
Mr. Manuel Lemos	Superior Technician of DNMMP
Mr. José Condesso Carvalho	Technician of DNMMP
Mr. Manuele Narciso	Technician of DNMMP
Mr. Barnabé Janota	Superior Technician of DNMMP
Mr. Victor Carvalho	Assessor of DNMMP

2) Port of Luanda

Mr. Silvio Barros Vinhas	Director General
Mr. Abel Cosme	Commercial Director
Mr. Rui Mendonça	Commercial Director
Mr. Sansão Pitra	Technical Director
Ms. Maria Cândida Gaspar Cohen	Chief of Study Cabinet
Mr. José M. Silva Neto	Economist
Mr. Bengui	Technician
Mr. Natalino	Superior Technician
Mr. Augusto Salvador Sebastião	Chief of Training Department

3) Port of Lobito

Dr. José Carlos Gomes	Director General
Mr. Pedro Joaquim	Deputy Director
Mr. Manuel da Cruz do Rosário	Chief of Maintenance Department
Mr. José André	Vice-Chief of Operation Department
Mr. Faustino Venâncio	Vice-Chief of Cargo Handling
Mr. Vicente F. Albano	Chief of Planning Department
Mr. Cacesto Simão	Chief of Human Resources Department

4) Port of Namibe

Mr. Bento Da Paixao Dos Santos	Director General
Dr. Emídio R. André	Financial Director
Mr. Pedro Kahamba	GRPN Director
Mr. João Mzumbi Mateketa	Chief of Financial Department
Mr. Virgílio Saprinho Tchimbuli	Chief of the Section of Planning
Ms. Conceição F. Benza	Commercial Director
Mr. Luís Gonzaga Kalui	Human Resources Director
Mr. José João Lau	Sub Director of Production Department
Mr. Destino Bunga	Chief of Maintenance Department

Dr. Eduardo Belo	Health Director
Mr. Pompeu António	Environment Director

5) Port of Cabinda

Mr. Osvaldo Lobo do Nascimento	Director General
Mr. Salustiano F. Pinto Ferreira	Chief of Infrastructure Department
Mr. Artur A. F. Carvalho	Port Operation Coordinator
Mr. Joaquim Laurindo Meconda	Chief of Administration and Finance Department
Ms. Arlete Arminda Puti Pongo	Chief of Cabinet of Planning and Statistics

1.4 Relevant Institutions

1.4.1 Steering Committee

Effective implementation of the study requires that 1) the Study Team and executive members of relevant ministries discuss government policies on the reconstruction and development of transport infrastructure, and 2) the Study Team can obtain the assistance of relevant local organizations under each ministry. In this regard, steering committee is organized by executive members of related organizations as follows:

- Cabinet Secretariat (CS)
- Ministry of Transport (MINTRANS)
  Dr. Filomeno H.C.M. da Silva (National Director of DNMMP)
  Dr. José João Kuvíngwa (National Director of GEPE)
  Mr. Diur Kassul Angelo (Chefe de Departamento, MINTRANS-DNMMP)
  Mr. Victor Alexandre de Carvalho (Técnico Superior/Assessor, MINTRANS-DNMMP)
- Ministry of Planning (MINPLAN)
  Mr. Miguel Chaves (Deputy Director of Investments)
- Ministry of Urban Affairs and Environment (MINUA)
  Mr. Manuel Zangui (National Director)
- Ministry of Social Assistance and Re-integration (MINARS)
  Mr. Marcelino Bonzela Franco (Minister's Counsellor)
- Ministry of Public Works (MINOP)
  Mr. Fernando Sebastião Francisco (Chefe de Departamento)

1.4.2 Relevant Ministries and Public Agencies

The Study team visited and had a discussion with following organizations:

- Department of Surface Transport
  Mr. José António de Freitas Neto (National Director)
- Ministry of Commerce
  Mr. Jeremias Amaral dos Santos
- Ministry of Public Works
  Mr. António G. Montenegro F. Duarte
- Ministry of Fishery (Namibe)
- Ministry of Agriculture (Luanda)
  Mr. António Cardoso (Director Nacional, Planeamento e Estatíca, Gabinete de Estudos)

- Instituto Nacional de Meteorologia e Geofisica (INAMET)
- Instituto de Estradas de Angola (INEA)
  Mr. Joaquim D. Malichi (Chefe do Dept. Construção)
- City of Lobito
  Mr. Antonio Bencourt (Administrator)
  Mr. Matias
- City of Namibe
  Mr. Kapapa
- Caminhos De Ferro De Benguela (CFB)
  Mr. Vaz de Carvalho (senior advisor)
- Caminhos De Ferro De Mocamedes (CFM)
  Mr. Paulo (Director)
- Marine Research Center (Lobito)
  Ms. Vanaquissa Jonico (Biologist)
  Mr. Marcelo Calisto (Veterenário)

1.4.3 Relevant International Organizations and Relevant Enterprises

The Study team visited and had a discussion with following international organizations and enterprises:

- The New Partnership for Africa's Development (NEPAD)
- United Nations World Food Program (WFP)
- United Nations Development Programme (UNDP)
- Food and Agriculture Organization of the United Nation (FAO)
- The World Bank (WB) Angola Country Office
- Development Bank of Southern Africa (DBSA)
- AFRIKALINE
- Angonal Shipping Agency
- CHEVRON
- CIMANGOLA
- Construtora
- Manubito, Lda.
- MARESK SEALAND (Luanda, Lobito, Namibe)
- NILE DUTCH AFRICA LINE Lad.
- OREY (Angola) – Comércio e Serviços Lda.
- Sicap, Lda
- SONAMET
- SONANGOL
- SONILS
- Sulservices, LDA.

2. Geographical and Social Situation of Angola

2.1 Topography

Angola's rectangular land extends over a length of 1,300 km east to west and 1,100 km north to south with an area of 1,240,000 km^2, which is about 3.3 times as large as Japan. The country is bounded on the north and northeast by the Democratic Republic of the Congo, on the east by Zambia, on the south by Namibia and faces the Atlantic Ocean in the west. Cabinda province, located about 400 km north of Luanda, is an isolated territory of Angola bordered by the Republic of the Congo and the Democratic Republic of the Congo.

2.2 Civil War and Reconstruction

Following the civil war, public security and economic stability have been the two main themes of the government as well as sustaining daily lives of returnees. WFP indicated that the food supply emergency subsided after the end of civil war.

2.3 Social and Economic Conditions

Angola's population[1)] is estimated at 12.1 million in 2005, which is approximately 10 % of Japan's population though the area is 3.3 times larger. Population growth rate[1)] is also estimated at 2.45 % in 2005, which is the same level as the average of central and southern African countries. By age group, 43.7 % are under 14 years of age, 53.5 % are between 15 and 64 and 2.8 % are over 65 in 2005. Life expectancy[1)] is 38.62 years due to the high infant mortality rate of 185.36 deaths per 1,000 live births, which is the highest rate in the world. Child mortality[2)] under the age of five is 260 deaths per 1,000 lives, which is much higher than an average of 156 deaths among Less-Developed Countries, while it is slightly lower than 284 deaths of Sierra Leone and 262 deaths of Niger.

Note 1) The World Fact Book 2006, CIA, USA
Note 2) UNDP Human Development Report 2005

2.4 Outline of the Related Inland countries

DRC, Zambia, Zimbabwe, and Botswana, which are located inland from Angola, have many kinds of natural resources, and thus there is potential for sustainable development and growth.

DRC, Zambia are categorized as Least Developed Countries (LDCs) like Angola. In the program of action for the LDCs, adopted by the Third United Nations Conference in Brussels on 20 May 2001, the overarching goal is to make sustainable progress toward halving the proportion of people living in extreme poverty and suffering from hunger by 2015 and promote the sustainable development of the LDCs. And one of the priorities is accelerating LDCs' growth with the aim of enhancing their share in the world trade and global financial and investment flows.

Botswana, Zambia and Zimbabwe are landlocked developing countries. Land locked developing countries are disadvantaged by high transportation costs due to the geographical constraint of isolation from the sea. In the Almaty Programme of Action adopted by the International Ministerial Conference of Landlocked and Transit Developing countries and Donor Countries and International Financial and Development Institutions on Transit Transport Cooperation in Almaty on 28-29 August 2003, infrastructure development and maintenance including ports are mentioned as priorities. It is also stated that landlocked and transit developing countries should seek cooperative arrangements to improve port facilities and services for transit goods, including the modernization of existing terminals, the establishment of new ones and simplification of procedures where appropriate. It is also mentioned that the New Partnership for Africa's Development (NEPAD) is an important initiative, as most landlocked and transit developing countries are in this content, and may well boost the creation of sub

regional and regional infrastructure. Due to the importance of Angolan Ports Rehabilitation for Southern African region, NEPAD adopted Angolan Ports Rehabilitation Project as one of its Infrastructure Short term Action Plan (STAP) in 2005.

Southern African railway network in early 1970's is shown in Figure 2-1. Most of railways run from port to its inner hinterland. The railways, starting from Dar es Salaam, Beira and Maputo, those cities are located in the east coast, and the railway starting from Lobito in the west coast were well-developed and reached to inland countries such as DRC, Zambia and Zimbabwe.

Figure 2-1 Southern Africa Railroad Network (Peak Period)

After the rehabilitation of Angolan ports and Railway network, west part of LLCs will be the hinterland of Angolan ports the same as before. If the Angolan side provides better transport services such as lower price or punctual delivery compared with the service provided by eastern ports and corridors, even the eastern part of LLCs can be part of the Angolan hinterland. For the western area of LLCs, cheaper transportation means to sea ports will be provided and that will enhance competitiveness of export goods in the international market. That also reduces the price of import goods to LLCs and that will contribute to stable national development there. The eastern area of LLCs is also suffering from high transportation costs due to the monopolistic condition. By adding another route for international trade, east side transport corridor including ports will improve their service to keep their customers. Therefore, international traffic conditions will be improved even in eastern area of LLCs as a result of new competition. In fact, the study team was told by the NEPAD Secretariat, the improvement of entire southern African transport network was expected as a result of the rehabilitation of Angolan ports.

3. Government's Post-war Restoration Policy and Donor's Activities

3.1 Angolan Government's Post-war Restoration Policy

3.1.1 Poverty Reduction Strategy

Angolan Government approved a poverty reduction strategy, Estrategia de Combate a Pobreza (ECP), on January 2004 as the highest priority national policy. ECP runs from 2003-2007 and aims at both post-war restoration and mid-term economic growth with a budget of $US3.17 billion.

3.1.2 Priority Phase Multisector Rehabilitation and Reconstruction Program (PPMRRP)

The Angolan Government has authorized various post-war restoration projects of which several projects are closely coordinated with ECP. Among these projects, the most typical project is the "Priority Phase Multisector Rehabilitation and Reconstruction Program (PPMRRP)". PPMRRP is set as the first phase project of the "Rehabilitation and Reconstruction Program" and runs from 2003-2007.

Transport sector has set up the "Strategic Transport Loop", which consist of Luanda, Uige, Malange, Saurimo, Luena, Kuito, Huambo, Benguela, and Lobito. Ports, roads, railways and bridges included in the Strategic Loop are to be urgently rehabilitated and reconstructed under PPMRRP (see Figure 3-1).

3.2 Cooperation of International Organizations

Angola has been able to sustain a peaceful environment since the cease-fire agreement in 2002. Reflecting such positive change, the Angolan government has given the highest priority to the above-mentioned nationwide restoration programs. In line with the government's policy, international organizations and donor countries have shifted their focus of assistance from basic human needs to mid-term economic growth.

3.2.1 NEPAD

The New Partnership for Africa's Development (NEPAD) is a framework for socio-economic development of African countries. Its establishment was adopted by the Organization of African Unity (present African Union) in 2001 based on the document drafted by Algeria, Egypt, Nigeria, Senegal and South Africa. Secretariat of the NEPAD is located in South Africa. Highest authority of the NEPAD is Heads of State and Government Summit of the African Union, in which 53 countries are participating. The aim of NEPAD is to eradicate poverty, to achieve sustainable growth and development, to halt the marginalization of Africa in the globalization process, and to accelerate the empowerment of women.

The NEPAD program of action places priority in 1) the short-term development of regional infrastructure covering sectors of transport, energy, information and communication, water and sanitation, 2) the implementation of the food security and agricultural development program, 3) the coordination of African position on market access, debt relief and ODA reforms, and 4) the Millennium Development Goals in the areas of health and education.

In the transport sector, NEPAD Short-term Action Plan (STAP) aims to develop 1) trade corridors without borders and barriers, 2) better and safer roads to bring Africa together, 3) competitive and seamless rail services, 4) efficient ports and safe seas, and 5) safe, secure and efficient skies and airports. In order to realize efficient ports, STAP includes projects of port rehabilitation or development of ports of Mombasa (Kenya), Nacala (Mozambique), Lobito (Angola), Abidjan (Cote

d'Ivoire), Dakar (Senegal) and Djibouti (Djibouti).

In the area of railways, STAP includes a study on needs for the rehabilitation of Benguela railway from the viewpoint of DRC and other inland countries. NEPAD regards corridors from inland countries to sea ports as important. In particular, Lobito corridor is deemed important as it is the only international corridor to the west coast from inland countries in the central and southern Africa.

3.3 Bilateral Cooperation

Current lateral cooperation of China is worth mentioning. China has recently signed a loan agreement in the amount of $US 2.0 billion, most of which is to be used for the rehabilitation of railways. India is also cooperating in a railway project which includes procurement of locomotives and trains for Mocamedes Railway with the amount of $US 40 million.

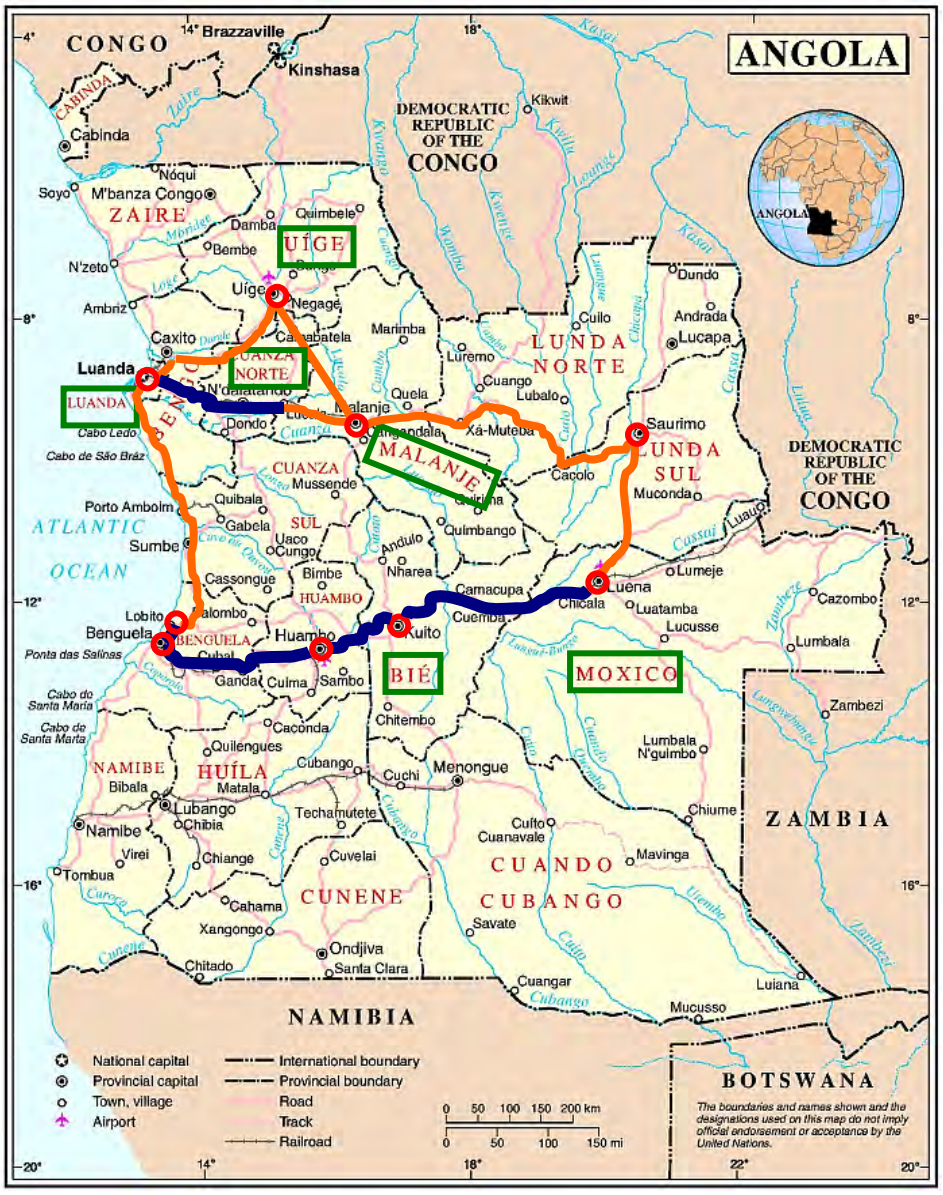


Figure 3-1 PPMRRP Strategic Loop and Project Province

Project Province Road Railway

4. Overview of Transport Sectors

4.1 Land and Air Transport Systems

4.1.1 Railways

1) General

There are 3 railway lines in Angola (1,376 km in length). One is Luanda railway (CFL) starting from Luanda port, another is Benguela railway (CFB), starting from Lobito Port and the other is Mocamedes railway (CFM), starting from port of Namibe. Due to its importance for Angolan society and economy, it was attacked and damaged severely during the civil war. Ministry of Transport made 'ANGOFERRO', which is the master plan of railway rehabilitation in Angola. Total budget of the railway rehabilitation is US$ 4 billion. Rehabilitation of the existing railway is included in the first phase. Modernization works including a new line will be carried out in the 2nd Phase or later.

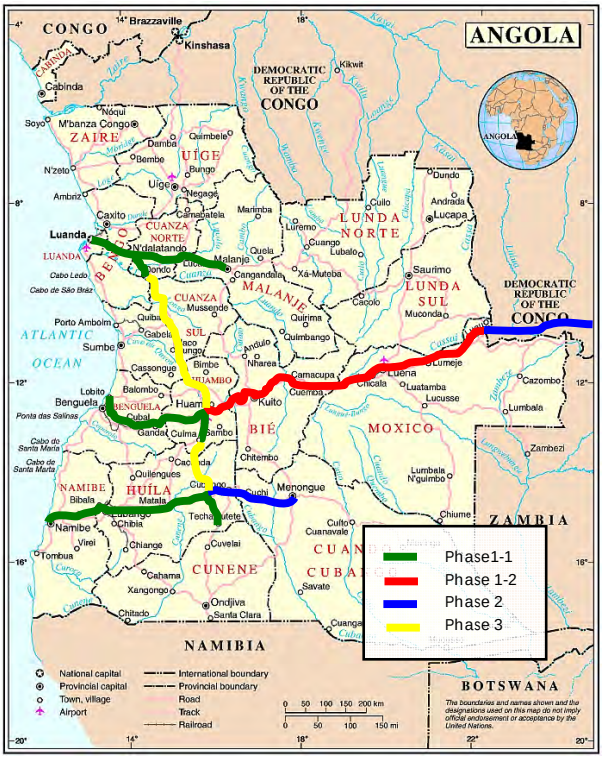


Figure 4-1 ANGOFERRO Phase1 to 3

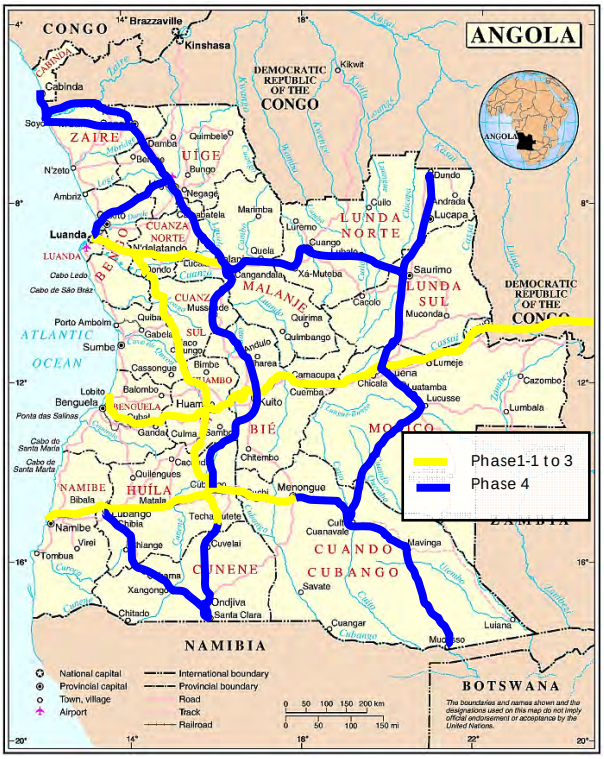


Figure 4-2 ANGOFERRO Phase 4

(Source: MINTRANS)

4.1.2 Roads

Total length of main roads in Angola is 15,500 km, including 7,950 km of paved road. Major roads are administrated by the Instituto de Estradas Nacional de Angola (INEA). Figure 4-3 shows main road rehabilitation works in Angola. INEA is rehabilitating 1,200km of principal roads per year.

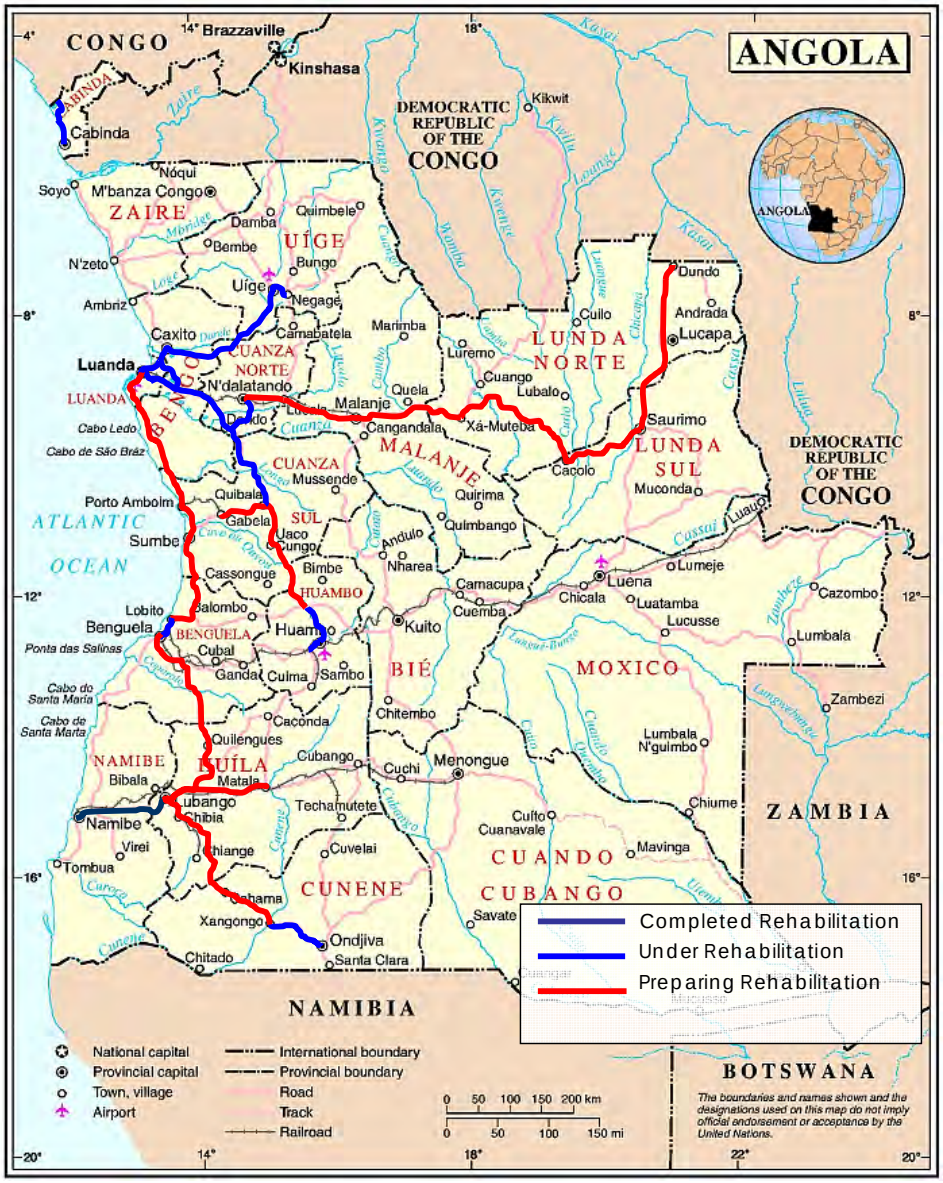


Figure 4-3 Road Rehabilitation in Angola

4.2 General Situation of Shipping and Ports

4.2.1 Latest Situation of Shipping in West Africa and in Angola

1) Latest Situation of Shipping in West Africa

West Africa exports natural resources, but greatly depends on imported goods because of insufficient development of inland industries. On the other hand, oil and natural gas development projects are being carried out. Once these projects are realized, oil and natural gas will be transported by tankers.

It is noteworthy that no gearless container vessel (container vessel without own gear) has been launched into this area. Loading/discharging operation of gearless vessel is very difficult because few container terminals have been constructed at this stage in most ports. Therefore only geared vessel

(container vessel equipped with own gear) and Ro-Ro vessel are used. In world shipping, however, gearless container vessels are the norm. Also in West Africa, the main fleet will consist of gearless container vessels in future.

2) Number of Handled Containers (TEU)

	1980	1990	2000	2001	2002	2003
Angola	**46**	**4,325**	**60,573**	**65,000**	**191,750**	**207,090**
Benin	7,689	19,211	81,862	85,000	90,950	98,226
Cameroon	35,363	80,717	126,958	139,587	146,737	156,000
Congo	10,778	15,000	22,000	15,000	16,050	17,334
Cote d'Ivoire	133,858	181,037	434,654	543,846	579,055	625,379
Gambia	700	10,710	28,743	30,094	35,344	44,152
Ghana	7,994	64,157	169,679	187,227	223,377	200,000
Guinea	3,500	20,593	44,431	60,000	64,200	69,336
Liberia	15,783	12,500	7,500	10,000	10,700	11,556
Mauritania	4,500	13,258	32,665	35,000	37,450	40,446
Nigeria	210,805	208,144	155,466	232,000	248,240	268,099
Senegal	35,000	78,842	165,176	170,450	164,341	177,488
Sierra Leone	10,475	15,989	21,000	21,000	22,470	24,268
Togo	30,000	42,240	57,350	60,000	84,783	166,441
Zaire	20,000	37,833	32,000	35,000	37,450	40,446
W.AFRICA TOTAL	526,491	804,556	1,440,057	1,689,204	1,952,897	2,146,261

Source: Drewry Consultants report in third quarter 2004

（Note）including export/import containers, empty vans and transshipped containers at terminal i.e. all handled containers at container terminal.

It was considered that nations in West Africa shared about 1.5% of world wide container handling volume in the 1980's. They have increased their volume since then but have not been able to catch up with development of other countries. Their share is only about 0.7% in 2003, due to the stagnant economy and delay in construction of container terminals in West Africa (Source: Drewry Consultants report in third quarter 2004).

3) Main shipping lines and their route

Various companies are operating direct service to West Africa of which details are as follows;

- Map of main ports in West Africa (see Figure 4-4)
- Typical example of main routes of main three companies i.e. DELMAS/OTAL, Maersk Sealand/Safmarine group and NDS (see Figure 4-5 to)
- Direct service details from all over the world to West Africa (see Appendix)

Even if a shipping line has no direct route from a remote port to West Africa, it can transport containers without any problem. One way is to transship the container from its east-west route to north-south route at some European port. The other way is to borrow slots on the east-west route of some other shipping line and to transship the container onto its own north-south route at a European port.

For example, NILE DUTCH AFRICA LINE transports containers from Japan to Antwerp by utilizing slots of CMA CGM and transships them at Antwerp onto NDS's own service to West

Africa. It issues its own through bill of lading covering the loading port in Japan to discharging port in West Africa.

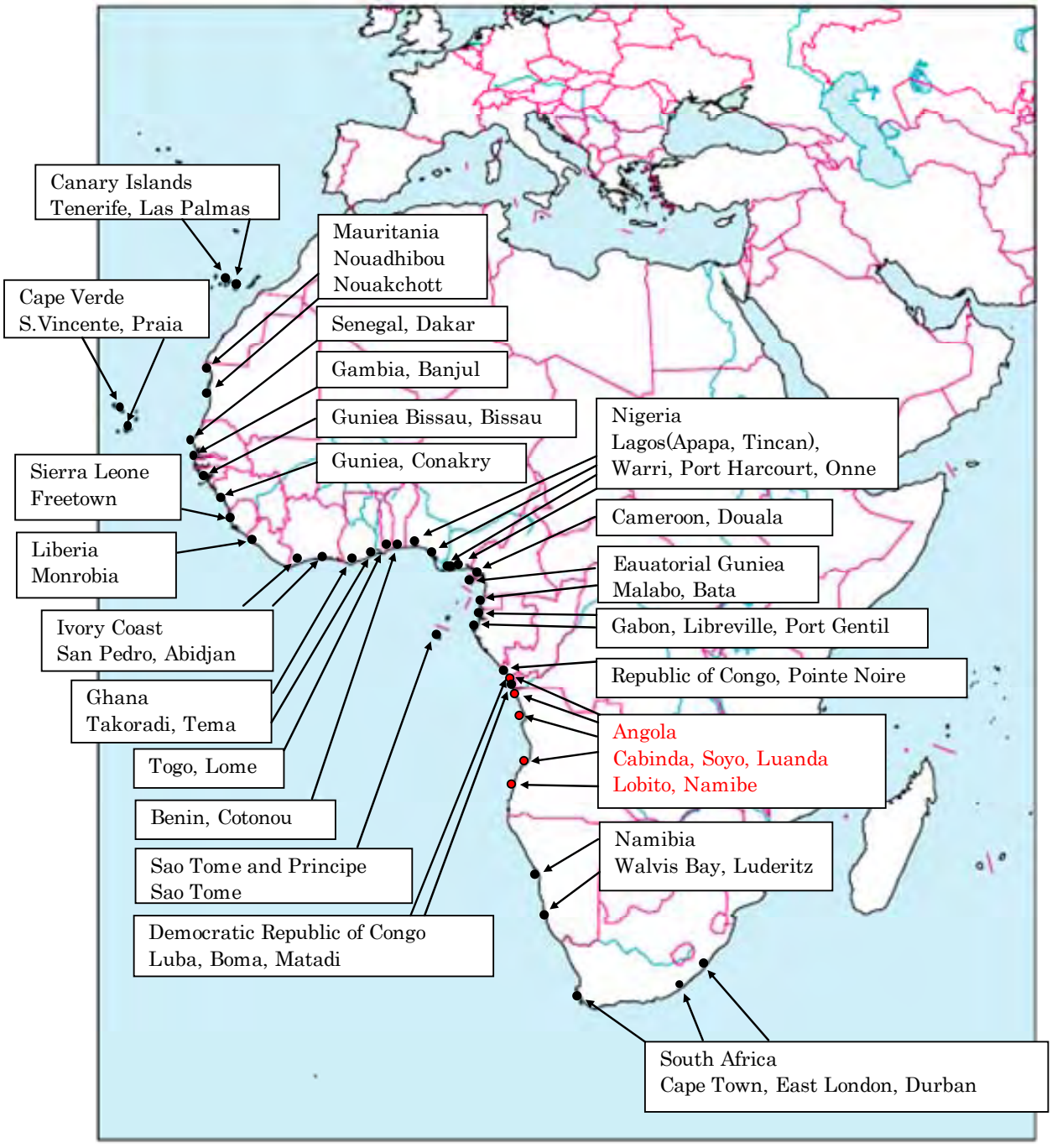


Figure 4-4 Map of main ports in West Africa

1. DELMAS/OTAL Angola Shuttle: 14 days, 42 days, 3 vessels

Leixoes(Portugal) ― Lisbon(Portugal) ― Dakar(Senegal) ― Abidjan(Ivory Coast) ― **Luanda(Angola)** ― Abidjan(Ivory Coast) ― Freetown(Sierra Leone) ― Monrovia(Liberia) ― Dakar(Senegal)―Leixoes(Portugal)

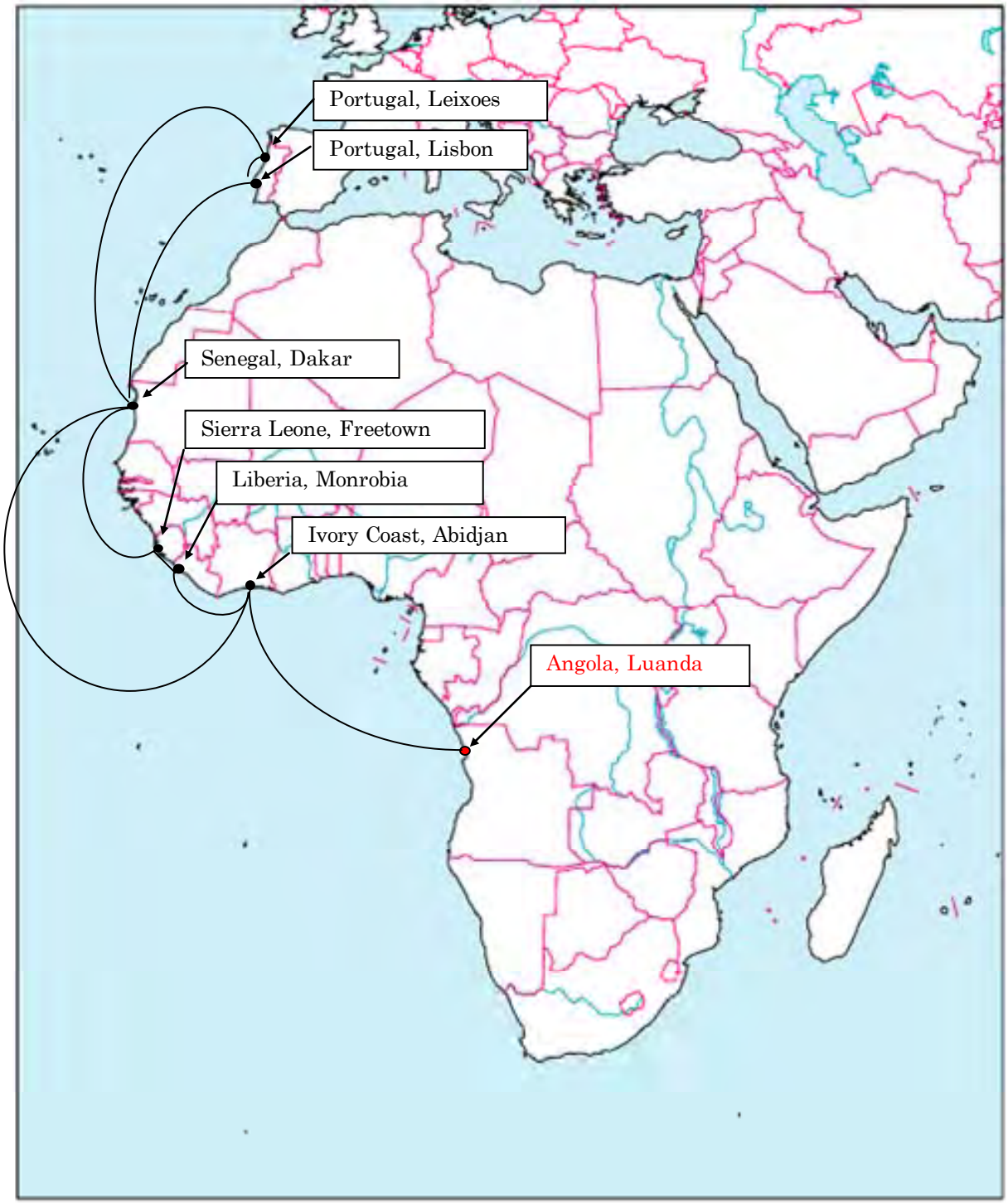


Figure 4-5 DELMAS/OTAL Angola Shuttle

2. MAERSK SEALAND Safmarine Group SAFWAF COMBO Service: 9 days, 45 days, 5 vessels

Durban(South Africa)－Cape Town(South AFRICA)－Walvis Bay(Namibia)－**Namibe(Angola)** － **Lobito(Angola)** － **Soyo(Angola)** － **Cabinda(Angola)** － Matadi(Democratic Republic of Congo)－Luba(Democratic Republic of Congo)－Douala(Cameroon)－Libreville(Gabon)－Port Gentil(Gabon)－Pointe Noire(Republic of Congo)－Durban

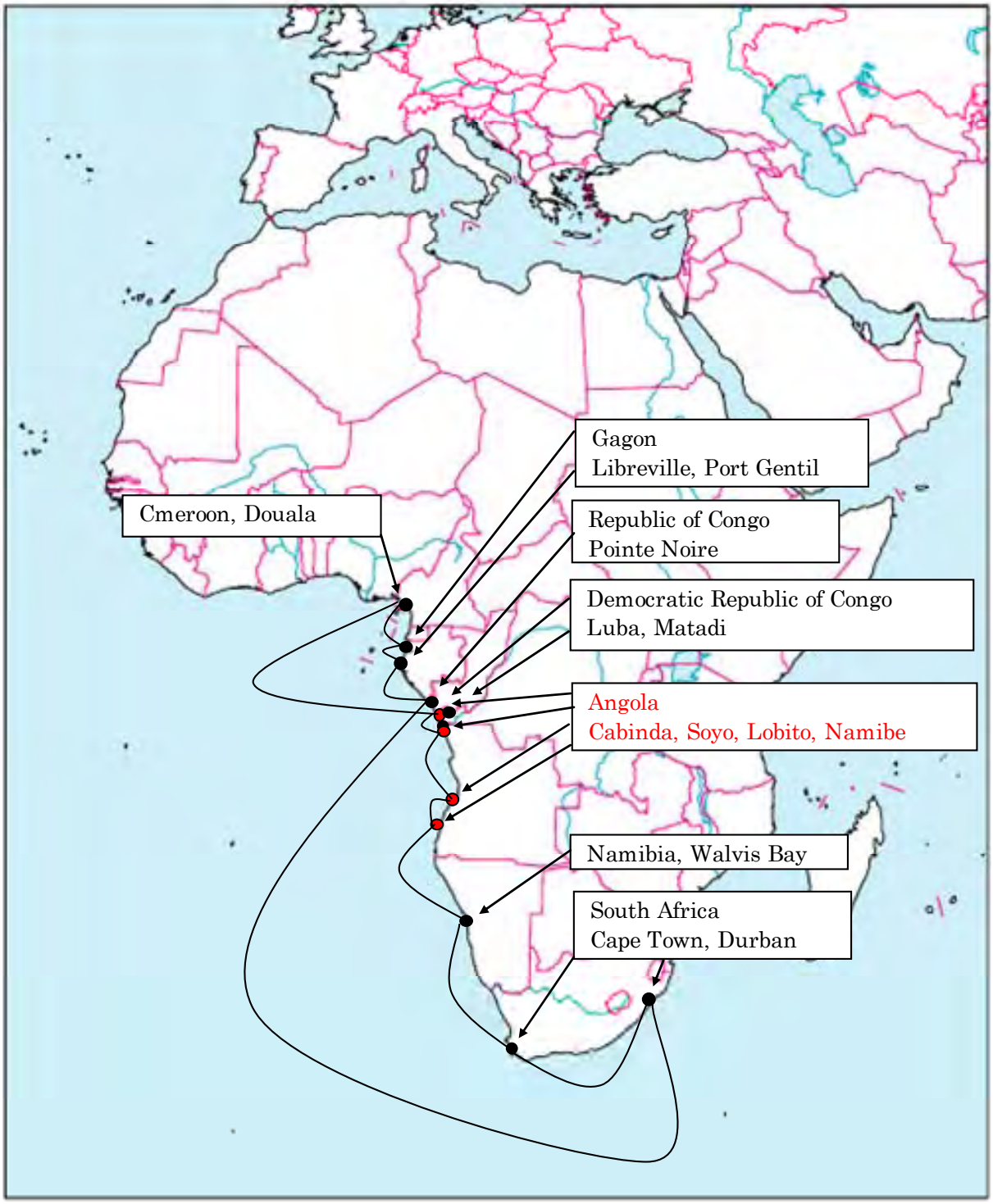


Figure 4-6 MAERSK SEALAND Safmarine Group SAFWAF COMBO Service

4) Latest situation of Angolan shipping

i) Angolan world-wide shipping

Angonave UEE transported cargoes between Angola-South America and Angola-Europe but went bankrupt in 2003. There is no Angolan national flag shipping line supplying world-wide service. There being neither marine college nor seaman school, required talent for shipping can not be produced. They are depending on imported subsistence commodities taken by vessels with foreign flag.

Angola has not been able to foster local industries. Daily goods exclusively depend on imports. Main import cargoes and export country are as follows.

Rice (China and Vietnam), Maize powder (Argentina), Potato (South Africa), Beef (Argentina and India), Chicken Meat (Brazil), Furniture, (China), Construction machine (China).

99% of containers are handled at Luanda port. Lobito and Namibe handle rice and maize powder.

ii) Angolan domestic shipping

Considering the increase of demand for reconstruction materials after civil war, transport of woods from Cabinda to Luanda and cement from Luanda to Namibe, Amboin and Lobito is expected. Inland logistic cost by truck is very expensive. It is one of the reasons for the high price of commodities in local cities. Transportation by sea is economical and can make for not only price reduction but also support for reconstruction in local areas.

Domestic transportation by sea by foreign flag vessel is prohibited. Only an Angolan shipping line with domestic transportation license can transport domestic cargoes. This condition being fulfilled, shipping line is not required to use a vessel with Angolan flag. It is able to use a vessel with foreign flag such as Panama.

Now there is no domestic liner service in Angola. Interline (subsidiary of INTERTRANSIT, a one-time terminal operator in Luanda Port) was once operating liner service by Ro-Ro vessel. However it has suspended service due to demand shortage. Its Ro-Ro vessel is berthed in front of Luanda port without being used.

Domestic sea transportation is only available in case shipper's request meets vessel's schedule. However no suitable large ship can be used because of their old age and lack of safety certificate. Vessels' owners have let certificates expire due to expensive fee for renewal. Therefore only small vessels (about 300 tons or smaller), small fishing boats and barges are used for domestic transportation by sea. There is a harbor at the groin of the sandbar covering Luanda port.

iii) Imports to Angola

More than 15 shipping lines are calling Angolan ports. Main carriers and their share in 2004 are as follows. MAERSK SEALAND (25.3%), NILE DUTCH AFRICA LINE (20.3%) and DELMAS (13.4%).

Table 4-1 Angolan imports by region (TEU)

	2002	2003	2004	Jan.～Jun. 2005
Europe	50,765	53,637	52,403	26,422
Africa	28,227	30,065	29,157	11,604
Middle East	6,783	10,664	12,888	6,646
Far East	10,469	14,517	19,760	12,941
South America	11,179	20,148	19,323	11,450
North America	6,217	8,229	6,297	3,104
	113,640	137,260	139,828	72,167

By manifest of Angolan cargo handling companies organization

Above figures are the actual volumes of imported containers. They are different from Drewry's figures which include loading/discharging of empty vans and transshipment containers.

iv) Export from Angola (except oil and LNG)

Few cargoes have been exported. Coffee, fruit (banana, pineapple and sugar corn), fish meal, sea products (crab, shrimp, and horse mackerel), granite and scrap are the main items. A Japanese company seems to be planning to export iron from an iron mine located close to Namibe port.

4.2.2 Ports

1) Commercial ports in Angola

The coastline of Angola stretches 1,650 km from North to South. The main ports in Angola are Cabinda, Soyo, Luanda, Lobito, and Namibe, and are scattered evenly along the Angolan coastline. Luanda is the biggest port among them. Middle class ports are Lobito and Namibe, and the small class ports are Cabinda, Soyo and the Porto Amboim.

Six ports are sequentially located from the north starting with Cabinda Port, Soyo Port, Luanda Port, Porto Amboim, Lobito Port, and Namibe Port. Porto Amboim is the smallest commercial port, and has a single mooring buoy and a 25m pier. Sonangol unloads petroleum products here for domestic use.

2) Fishery Ports

The big fishery ports have jetties that can accommodate fishing boats of hundreds of tons. But small fishery ports have no berthing facilities. The natural beach slope is used for unloading the fish. The beach also has the role of market place.

4.3 Regional Transport Corridor

In the Southern African region, plenty of natural resources and agricultural products have been transported from the inland area to ports and shipped to EU or other various countries for hundreds of years. Many roads and railways have been constructed from ports to the inland area. This network reaches to landlocked counties such as Zimbabwe or Zambia.

This transport system, which consists of ports, roads and railways and connects overseas countries with the inland region, is called a transport corridor. Developing and using the transport corridor, donor countries can provide their assistance materials smoothly and SADC countries can export their natural resources and agricultural products to other countries and activate their economies.

On the SADC home page, the importance of the transport corridor is described as follows; there has also been considerable interest in the transport corridors in a wider development perspective, with ports and their connecting road and rail systems developed in conjunction with investment in industry, mining, agriculture and tourism. The concept has been introduced to the other corridors linking regional ports with their hinterlands, and is being rolled out all over the region.

On the SADC home page, ten transport corridors are introduced as key transport corridors.

5. Present Status and Issues of the Target Ports

5.1 Port of Luanda

5.1.1 Overview

The Port of Luanda is the biggest port in Angola located in the capital Luanda which has a population of 3 million. Opened by Portugal in 1576, it is now the physical distribution base of the North West area of the country. This port has been famous for its natural fine port since it is located at the head of the bay where is deep in water and calm surrounded by sand bank. This port handles 3/4 of ocean cargoes in Angola except crude oil and it is functioned as gateway to other areas by importing general cargoes, food and industrial commodities from overseas. The port is now becoming narrower due to a rapid increase in cargo throughput since the end of civil war. General Cargo Terminal and Multi-Purpose Terminal have been privatized under the 20 years concession contract, Port Authority manages channel, basin and navigation aid. Figure 5-1 shows the layout of the Port of Luanda and Photo 5-1 shows a panoramic view of the Port of Luanda.

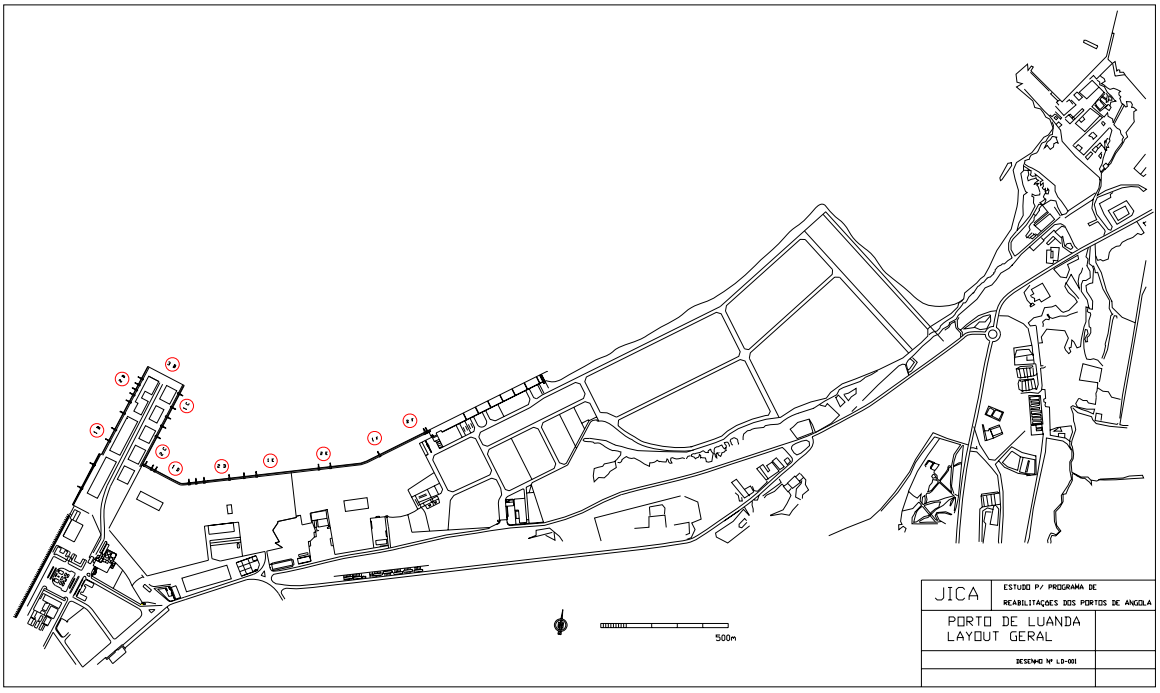


Figure 5-1 Present Layout of the Port of Luanda

Cabotage and Multipurpose Terminal

Multipurpose and Container Terminal

Photo 5-1 Panoramic View of the Port of Luanda (2005)

5.1.2 Natural Condition

More than 10 meters water depth is kept around the wharf with the exception of front side of cabotage wharf. The front basin of container terminal was dredged and has a depth of ten meters. Figure 5-2 shows sounding survey results in front of the cabotage wharf.

The black dotted line indicates sounding's survey in 1993 by World Bank and the red line indicates sounding's surveyed in May 2005 in Figure 5-2. The depth contours of 1.0, 2.0 and 3 meters come closer to wharf at Zone 1 of Sector A where planned depth was 3.5 meters. Depth of Zone 2 of Sector A, which planned depth was 5.5 meters, has also become shallow. It is therefore necessary to implement periodical water depth survey by using echo sounder and estimate the volume of sedimentation. Based on the estimation, maintenance dredging shall be carried out to clear the basin and keep the design depth.

The Study Team carried out sounding survey in cooperation with DNMMP and Port of Luanda. The Study Team also made a lecture on maintenance dredging and sounding survey based on the manual with participation of technical staff members of DNMMP and Port of Luanda. As 27th PMAWCA annual council held in January 2005 recommended to build technical capacities in terms of processing of oceanographic, hydrographic and hydro-sedimentary data, and lectures have been held in this line.

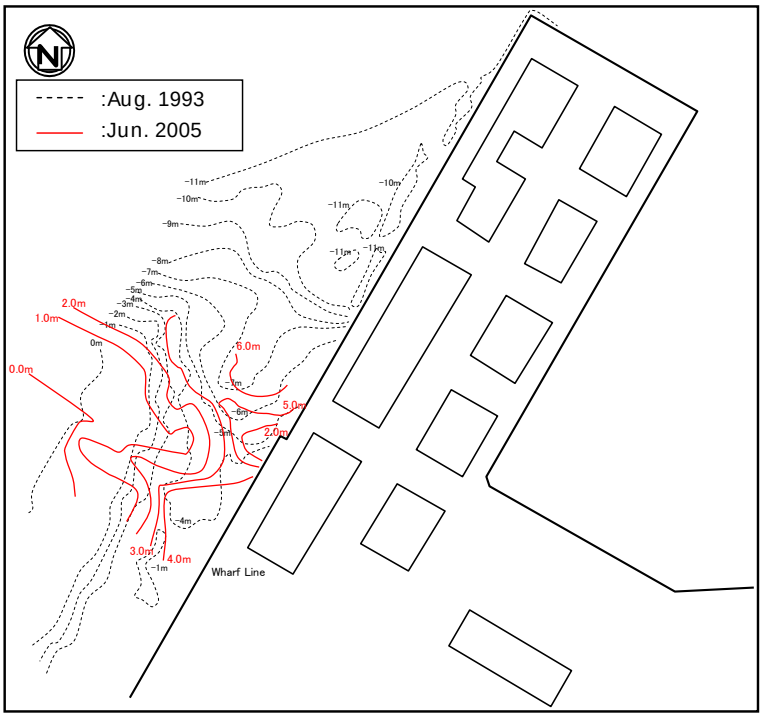


Figure 5-2 3.5m wharf sounding chart (Dotted line: 1993, Red Line: 2005)

5.1.3 Port Facilities

The port of Luanda has a total berth length of 2,684 meters composed of berths for foreign trade with depths of 10.5 and 12.5 meters and for domestic trade with depths of 3.5 to 5.5 meters. The structure of the berths is gravity type. The port of Luanda has a total surface area of about 792,219 m^2, including twenty warehouses with a total area of about 55,000 m^2.

Full-scale privatization is currently ongoing in the port of Luanda, and it has been stipulated that the maintenance and rehabilitation of existing port facilities on "land areas" to be the

responsibilities of concessionaires. Taking this fact into consideration, Luanda Port Corporation and the Study Team have agreed to exclude the formulation of rehabilitation plan of port facilities on land areas from the scope of the Study for the port of Luanda.

5.1.4 Volume of Traffic

Total cargo and container volume trends at Luanda port are shown in Table 5-1 and Table 5-2. Since 2000, both total cargo and container volumes have been increasing at a fast pace. In line with the increase in cargo, number of ships is also increasing. Demand has surpassed Luanda port's capacity, and resulting in inefficient of cargo handling at yard and demurrage. The proportion of container cargo to total cargo in Luanda port is nearly 60%.

Table 5-1 Cargo Throughput of Luanda Port

Year	Unloaded (ton)	Loaded (ton)	Total (ton)	Rate of Increase
1998	1,321,180	166,084	1,487,264	
1999	1,249,049	158,997	1,408,046	-5.3%
2000	1,643,259	224,309	1,867,568	32.6%
2001	1,860,581	259,653	2,120,234	13.5%
2002	2,279,932	325,397	2,605,329	22.9%

Table 5-2 Container Throughput of Luanda Port

Year	Import	Export	Total (unit)	Annual Increase	Total (Metric ton)
1998	49,873	41,063	90,936		800,971
1999	37,617	36,496	74,113	-18.5%	678,766
2000	26,697	23,573	50,270	-32.2%	471,305
2001	67,733	59,237	126,970	152.6%	1,224,576
2002	90,544	75,327	165,871	30.6%	1,527,943

5.1.5 Cargo Handling and Security Issues

1) Present Situation and Problems

i) Cargo Handling Equipment

Container handling is performed using ship's gear due to insufficient capacity of quay crane. A reach stacker is used to transport cargo across a wide area, But loading and unloading of containers is none by ship's gear (from the yard to the quay). Another problem is that devanning is done in the yard.

Bulk cargo handling at the quay is performed by ship's gear or quay crane. Landside handling is carried out forklift.

Cargo handling Equipments of the port of Luanda is shown in the following table.

Table 5-3 Cargo handling Equipment of the port of Luanda

Type of Facility	Numbers	Capacity
Quay Crane	37*	3t～22t
Reach Stacker	9	Capacity 45t
Forklift	3	

* of which twenty nine were broken

ii) Warehouse

Warehouses are used as offices and storage shelters.

iii) The Policy of the Concessionaire

The concessionaire is responsible for procuring cargo handling equipment such as a reach stacker and lent those to the port public corporation. In addition, the concessionaire is also responsible for the removal of unnecessary warehouses and securing the yard area.

2) Security Issues

i) Current situation

A port security committee comprised of port-related person was established in Luanda. Port Facility Security Plan (PFSP) was submitted to IMO after consultations with this committee in June 2004.

5.2 Port of Lobito

5.2.1 Overview

Port of Lobito is located at 30km north of Benguela, in middle area of Angolan coast and physical distribution base in Middle West area utilizing Benguela Railway connecting to inland areas. City of Lobito has about 800 thousand population and the main industries are Benguela Railway, Petroleum, Cement, Brewery, Water and Sewer Company including Lobito Port Authority. The port has been constructed in 1903 by landfill of everglade. The port has the same location pattern as port of Luanda and good natural port. Main handling cargos are daily commodity and restoration related material such as construction material, oil, flour, sugar, grain and general cargo. At this moment, the restoration works of Benguela railways is underway and the port is expected to be important as international hub port for the countries like Zambia, Botswana and Zimbabwe who have no coast and Congo. Figure 5-3 shows the layout of the Port of Lobito and Photo 5-2 shows a panoramic view of the Port of Lobito.

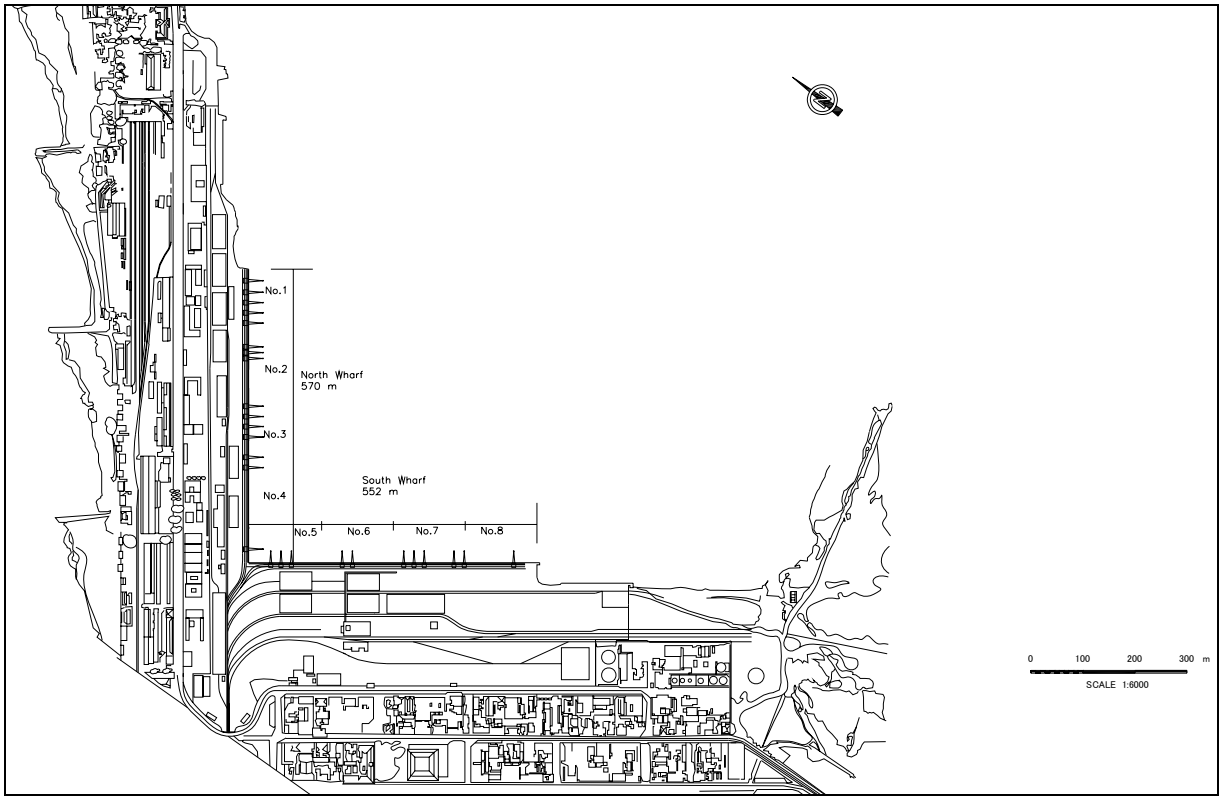


Figure 5-3 Present Layout of the Port of Lobito

Photo 5-2 Panoramic View of the Port of Lobito (2005)

5.2.2 Natural Condition

1) Topography and Bathymetry

i) Topography

Topographic survey was carried out at port of Lobito during 6 to 17 June, 2005 in order to verify ground surface bump. Survey area was 55,000m^2 in North and South wharf.

ii) Bathymetry

Average depth of North quay is 8.4 m and it has range between 7.5 m and 9 m. Average depth of South quay is 9.0 m and it has range between 8.2 m and 10.0 m. There were 4m depth offshore of east side of South quay, SONAMET carried out dredging this area.

iii) Soil Conditions

Geological condition of Lobito area consists of recent costal terrace and beach deposits comprising of sand, silt, clay and minor gravel. Block sand stone and alternate layers of sand stone and shale are observed at cliff around the Lobito bay. There is a sandy soil around port area. Soil investigation survey is carried out at Port of Lobito during from 13th to 19th May. Figure 5-4 shows location of bore hole. A summary of the results of the logging is given in Table 5-4.

Table 5-4 Summary of Soil Profile and Consistencies

BH No.	Loose sand (N Values)	Medium Dense sand (N Values)	Dense to very Dense sand (N Values)	Stiff clay (N Values)
L1	1.60 – 9.00m (N=8)	9.00 – 22.00m (N=22) & 25.00 – 27.00m (N=12)	22.00 – 25.00m (N=33)	27.00 – 30.45m (N=12)
L2	3.00 – 4.00 (N=9) & 6.00 – 8.00m (N=7)	4.00 – 6.00m (N=21) & 8.00 – 10.00m (N=20)	0.00 – 3.00 (N=40) & 10.00 – 20.45m (N=56)	
L3	2.45 – 6.00m (N=5)	0.00 – 2.45m (N=12) & 6.00 – 20.45m (N=20)		

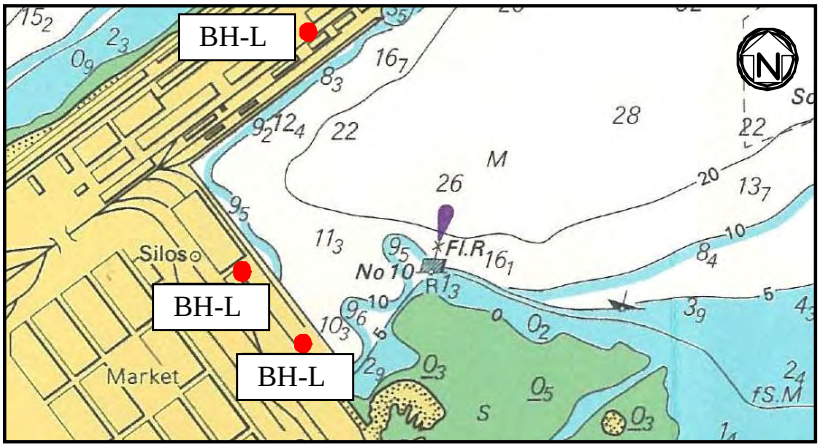


Figure 5-4 Location of Bore Hole

5.2.3 Port Facilities

The port of Lobito has North quay with a length of 570 meters and South quay with a length of 552 meters in L-shaped arrangement with a depth of 10.36 meters which can accommodate eight vessels at a time. The structural type of both quays is concrete blocks masonry structure.

The port of Lobito has a covered area of about 24,500 m^2 with 13 warehouses, a container yard with 64 of reefer facilities and a general cargo yard.

1) Quay Wall

The quay wall survey was conducted from the sea side by use of a small craft and managed by the location No. of the mooring bollards. The northernmost mooring bollard on the north quay was numbered as No.1, and then the west end mooring bollard on the south quay was No. 38.

i) North Quay

Seventeen power sockets for quay cranes and 14 water supply bulbs for vessels installed on the coping concrete seem to be kept in good condition and are operational.

ii) South Quay

Seventeen power sockets for quay cranes and 12 water supply bulbs for vessels installed on the coping concrete seem to be kept in good condition and are operational.

2) Apron Pavement

Unevenness and cracks were observed on the apron pavement. Bumps stretching more than 20 cm on the apron pavement constitute a serious obstacle to safe operation of the cargo handling equipment.

3) Railway

Eighteen railway tracks placed in the 1950's were found on the port premises; 6 lines in North quay and 12 lines in South quay. Unevenness and distortion were observed in many places on the railways. Some railways were buried under containers or cargoes and others were found to be buried in subgrade.

4) Berthing and Mooring Facility

A mooring bollard of No.12 is missing.

5) Warehouse

The chillroom and freezing compartment on the second floor of the warehouse No.1 were found to be seriously deteriorated. As for the other warehouses, although some small holes on the roof were found, the general conditions were good. In addition, during the second site survey, some rehabilitation works were in progress.

The formerly-utilized grain ship loader, which is equipped with belt conveyor system, was used for exporting cereals produced in hinterland. Although it has been a long time since the port of Lobito ceased operations, the facility was found to be well-organized

6) Cargo Handling Equipment

The port of Lobito introduced the latest model of reach stacker with a unique shape of boom in 2005.

5.2.4 Volume of Traffic

Total cargo and container volume trends at Lobito port are shown in Table 5-5 and Table 5-6. Since 2000, both total cargo and container volumes have been increasing at a fast pace.

Table 5-5 Cargo Throughput of Lobito Port

year	International (ton)			Domestic (ton)			G. Total (ton)	Rate of Increase (%)
	Import	Export	Total	Inbound	Outbound	Total		
1995	52.4	0.0	52.4	38.9	30.6	69.5	121.9	
1996	94.8	0.0	94.8	18.7	14.9	33.6	128.4	5.3%
1997	259.4	0.0	259.4	94.4	57.2	151.6	411.0	220.1%
1998	242.5	0.0	242.5	137.8	81.0	218.8	461.3	12.2%
1999	199.4	0.0	199.4	117.5	68.1	185.6	385.0	-16.5%
2000	300.3	0.0	300.3	152.3	83.3	235.6	535.9	39.2%
2001	349.8	0.0	349.8	248.7	103.7	352.4	702.2	31.0%
2002	405.2	0.0	405.2	195.0	72.8	267.8	673.0	-4.2%
2003	610.8	0.0	610.8	156.4	75.4	231.8	842.6	25.2%
2004	575.6	91.0	666.6	13.0	70.2	83.2	749.8	-11.0%

Table 5-6 Container Throughput of Lobito Port

Year	Unloading (Unit)	Loading (unit)	Handover (unit)	Total (unit)	Rate of Increase (%)
2000	7,410	7,675		15,085	
2001	9,099	8,314		17,413	15.4%
2002	11,228	19,696		30,924	77.6%
2003	12,413	11,496	7,855	31,764	2.7%
2004	14,404	14,546	9,100	38,050	19.8%

5.2.5 Cargo Handling and Security Issues

1) Present Situation and Issues

i) Cargo Handling Equipment

Container handling is performed using ship's gear due to insufficient capacity of quay crane. A reach stacker is used to transport cargo across a wide area, But loading and unloading of containers is none by ship's gear (from the yard to the quay). But a ship gear and a chassis are waiting for a container which a reach stacker carries.

Bulk cargo handling at the quay is performed by ship's gear or quay crane. Landside handling is carried out by forklift.

Cargo handling Equipments and warehouses of the port of Lobito is shown in the following table.

Table 5-7 Cargo handling equipment of the port of Lobito

Type of Facility	Numbers	Lifting Capacity
Quay Crane	25*	3t～22t
Mobile Crane	3	16t～150t
Floating Crane	1	120t
Grain Ship Loader	2	200t/h
Reach Stacker	2	40t～45t
Top lifter	2	40t
Forklift	24	2.5t～40t

* of which one was under repair, two were broken

ii) Warehouse

All warehouses are used by some uses (partly used for offices). There is only a distance of about 17m from the quay front to this warehouse, and this has a negative impact on the cargo handling efficiency.

There were two warehouses about a silo at first, one silo is improved to office, and the other silo is not operating in the case of the import and export.

Table 5-8 Warehouse and Silo of the Port of Lobito

Type of Facility	Numbers	Capacity
Warehouses	14*	Total Floor: 22,710 m^2
Silo	1	Capacity: 20,000t

* Under Repair x1

iii) Current Status of Port Administrator

The port administrator is responsible for procuring cargo handling equipment such as reach stacker if necessary. In addition, the port administrator depends in a list of repair demands of every year, and they repair an approved institution about an existing institution such as a key crane and a warehouse. At present, No. 25 quay crane and No. 10 warehouse are undergoing repair works.

2) Security Issues

i) Present situation

Approximately 100 persons are working in the Security Division. Security facilities such as gates a fences, and lights are generally sufficient. A Port administrator publish an identification of traffic every following cases and, about management of comings and goings, check it with a gate.

The uniform is provided for personnel at the port, and shape and a color are different for each post.

ID card and the traffic certificate are issued.

A one year permit (company card) is provided for the person who often visits the port over a long period of time.

A special gate is prepared for foreign crew etc.; such persons can only enter and exit through this gate.

ii) Current Status of Port Administrator

The port administrator installed a fence and a gate by July 2005 and is now installing lights in the yard. They installed one CCD camera in the roof of an office in other. They have a plan to introduce an identification card with magnetic reading in the future. In addition, they plan to install a wide- raging camera that can monitor the arrival of ships as well as the port area.

5.3 Port of Namibe

5.3.1 Overview

The Port of Namibe is located at 230km north from neighboring country, Namibia boarder and physical distribution base to southern areas connecting to inland areas through Mocamedes Railway. The port was constructed in 1958 and dispersed with Saco Mar port in north putting Namibe mortar shaped bay. Main handling cargos in the port are food, construction materials, fish, agricultural product, marble, granite and so forth and Saco Mar port has been functioned as exclusive terminal of iron ore but now changed to the terminal for oil and natural gas. Port of Namibe is expected to bear the strategic role as resources export of not only Angola but also southern African countries in the future since potentiality of mineral resources and agricultural products are rich in surrounding areas of port of Namibe. Figure 5-5 shows the layout of the Port of Namibe and Photo 5-3 shows a panoramic view of the Port of Namibe.

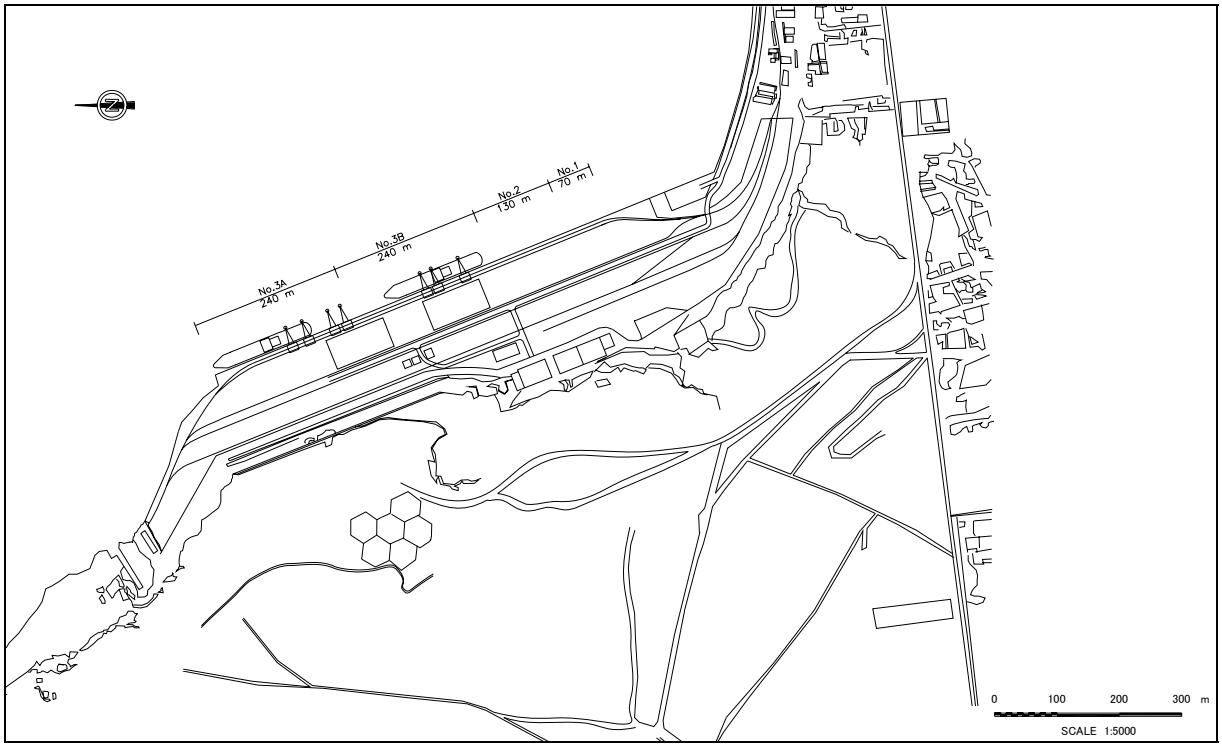


Figure 5-5 Present Layout of the Port of Namibe

Photo 5-3 Panoramic View of Port of Namibe (2005)

5.3.2 Natural Condition

1) Topography and Bathymetry

i) Topography

Topographic survey is carried out in Port of Namibe from 27th April to 11th May, 2005 in order to verify ground surface bump. Survey area was 88,000m^2 on the wharf.

ii) Bathymetry

As the result of survey of water depth, average depth from north end to 460 m point is 9.3 m with the range between 8.5 m and 10m. Average depth from 460m point to 580 m point is 6.2 m with the range between 5.8 m and 6.8 m. Average depth from 580 m point to 660 m point is 4.3 m with the range between 3.7 m and 5.5 m. These results nearly met with the results of survey made in March, 1996 by Port of Namibe. Thus, depth in front of quay wall has not been changed for 9 years.

2) Soil Conditions

Soil investigation survey is carried out at Port of Namibe during from 31st May to 10th July. Composition of cliff behind the Port of Namibe is sandstone and sand. A summary of the results of the logging is given in Table 5-9. Figure 5-6 shows location of boreholes.

Table 5-9 Summary of the Results of the Logging

BH No.	Location	Remarks
N1	Center	High SPT values and refusal occurred on marl and sandstone
N2	North	High SPT values and refusal occurred on marl and sandstone
N3	South	High SPT values and refusal occurred on marl and sandstone

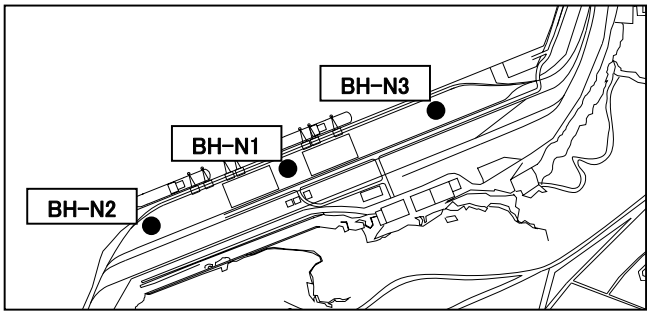


Figure 5-6 Location of Boreholes at Port of Namibe

5.3.3 Port Facilities

The port of Namibe has a total berth length of 680 meters composed of berth No.1 with a length of 70 meters, berth No.2 with a length of 130 meters and berth No.3 with a length of 480 meters. The structure of the quays is concrete blocks masonry type. There are 7 various electric cranes with lifting capacity of between 5 and 22 tons. The port of Namibe has two warehouses, but the south one is unusable. Other than the commercial port, there is a berth for export of iron ore and for import of fuel oil at the opposite shore, the port of Saco Mar.

1) Quay Wall

Twenty-three power sockets for quay crane and 10 water supply bulbs for vessels are installed on the coping concrete. While some parts of the power sockets are operational, no water supply bulb is workable. Rehabilitation works for the water distribution facility are planned.

2) Railway

Ten railway tracks placed in the 1960's were found on the port premises. Unevenness and distortion were observed in many places on the railways. Some repair traces of filling with crushed stones ballast were found in place. As for the railways in the landside yard, no railway is in service except for the one located near the granite stock yard.

3) Cargo Handling Equipment

The port of Namibe has 7 quay cranes, 1 reach stacker, 2 top lifters and 6 forklifts. Most of the quay cranes are not in service due to troubles and damages.

5.3.4 Volume of Traffic

Total cargo volume and container volume trends at Namibe port are shown in Table 5-10 and Table 5-11. Since 2000, containers have been increasing at a fast pace. The proportion of container cargo to total cargo in Namibe port is nearly 20-30%. This rather low ratio is due to the import of principle commodities such as rice and wheat and exported granite stone as bulk cargo.

Table 5-10 Cargo Throughput of Namibe Port

Years	Unloaded									Loaded					Annual Increase
	Rice	Sugar	Beans	Flour	Corn	Cargo Container	Vehicles	Cement	Others	Cargo Container	Dry fish frozen	Granite Blocks	Others	Total tons	
1997	5,050	3,264	1,700	7,509	8,984	20,747	333	1.548	10,963	722	756	2,437	3,226	67,239	
1998	2,597	7,931	680	6,246	11,894	23,427	275	1,493	4,964	3,303	310	5,586	2,242	70,948	5.5%
1999	528	5,825	496	4,852	14,262	22,911	268	1,164	7,100	1,744	406	10,334	12,595	82,485	16.3%
2000	6,911	9,490	1,756	11,717	19,705	18,052	477	6,203	6,708	4,508	780	33,664	30,349	150,320	82.2%
2001	613	8,972	1,756	10,651	13,262	30,271	788	11,724	6,887	21,003	1,766	29,767	13,963	151,423	0.7%
2002	15,088	14,699	50	15,524	15,610	35,157	307	15,187	4,812	10,518	573	40,268	6,174	173,967	14.9%
2003	13,669	42,181		16,577	6,785	46,040	273	27,162	2,780	8,812	568	39,092	3,134	207,073	19.0%
2004	29,723	37,216		31,826	11,081	54,206	321	11,672	9,761	9,952	64	64,359	884	261,065	26.1%
Total tons	74,179	129,578	6,438	104,902	101,583	250,811	3,042	74,607	53,975	60,562	5,223	225,507	72,567	1,164,520	

Table 5-11 Container Throughput of Namibe Port

Years	Unloading (unit)	Loading (unit)	Total (unit)	Annually Increase	Unloading (t)	Loading (t)	Total (t)	Annually Increase	Ratio to Total Cargo
2000	1,121	1,053	2,174		20,921	3,738	24,659		16.4%
2001	2,637	1,671	4,308	98.2%	30,925	11,669	42,594	72.7%	28.1%
2002	2,673	1,811	4,484	4.1%	34,021	5,862	39,883	-6.4%	22.9%
2003	2,344	1,929	4,273	-4.7%	43,400	8,373	51,773	29.8%	25.0%
2004	2,760	2,398	5,158	20.7%	50,479	8,654	59,133	14.2%	22.7%

5.3.5 Cargo Handling and Security Issues

1) Present Situation and Issues

i) Cargo Handling Equipment

Empty twenty feet containers are handled by quay crane, but other container cargo is loaded and unloaded by ship's gear because of the quay crane's low capacity. A reach stacker, top lifter or forklift is used for transporting cargo from the yard to the quay but the cargo is loaded by ship's gear. But a ship gear and a chassis are waiting for a container which a reach stacker carries.

On the other hand, a quay crane is used to handle bulk cargo (except back granite stone). Black granite stone is handling by ship's gear due to the insufficient capacity of the crane. A forklift is used to transport cargo from the yard to the quay but cargo is generally loaded by ship's gear. In addition, ship gear and chassis is waiting for cargo (container or black granite stone) which a reach stacker or forklift carries.

Cargo handling equipment and warehouses of the port of Namibe is shown in the following table.

Table 5-12 Cargo handling equipment of the port of Namibe

Type of Facility	Numbers	Capacity
Quay Crane	7*	1.5t～10t
Reach Stacker	1	40t～45t
Top lifter	2	40t
Forklift	6	2.5t～40t

* of which three were broken

ii) Warehouse

Warehouse No. 2 has no roof and not serviceable. Warehouse No.1 is used partly as an office. There is only a distance of about 15m from the quay to the warehouse, and this has a negative impact on cargo handling efficiency. The number of warehouses at the port of Namibe is shown in the following table.

Table 5-13 Warehouses of the Port of Namibe

Type of Facility	Number	Capacity
Warehouses	2	Floor 7,200 m^2

iii) Current Status of Port Administrator

The port authority faces a difficulty in repairing cargo handling equipment and warehouse, despite their poor condition.

2) Security Issues

i) Present situation

The security division has a staff of 140 persons. Access control of people and vehicle is conducted at the main gate but identification cards or a monitor camera have not been introduced.

ii) Current Status of Port Administrator

The security facilities are basically acceptable. There is a plan to raise the outer wall by 4m and to procure a metal detector.

5.4 Port of Cabinda

5.4.1 Overview

Port of Cabinda is physical distribution base located in Cabinda Bay where is northern isolated enclave. Cabinda has about 200 thousand population. The port was constructed in 1956 and is functioned as the base facility of offshore oil which occupies most of Angolan crude oil and export terminal of lumber. The jetty of the port has been constructed using steel pile and truss and upper deck was made by wood. It was constructed in 1974 but because of no maintenance and no rehabilitation from its berth the accident has occurred during cargo handling operations in January 2004. Therefore, the jetty is now under rehabilitation. The port is too shallow because of deposit of sand and the loading and unloading works are done offshore not on the jetty. Figure 5-7 shows the layout of the Port of Cabinda and Photo 5-4 shows a panoramic view of the Port of Cabinda.

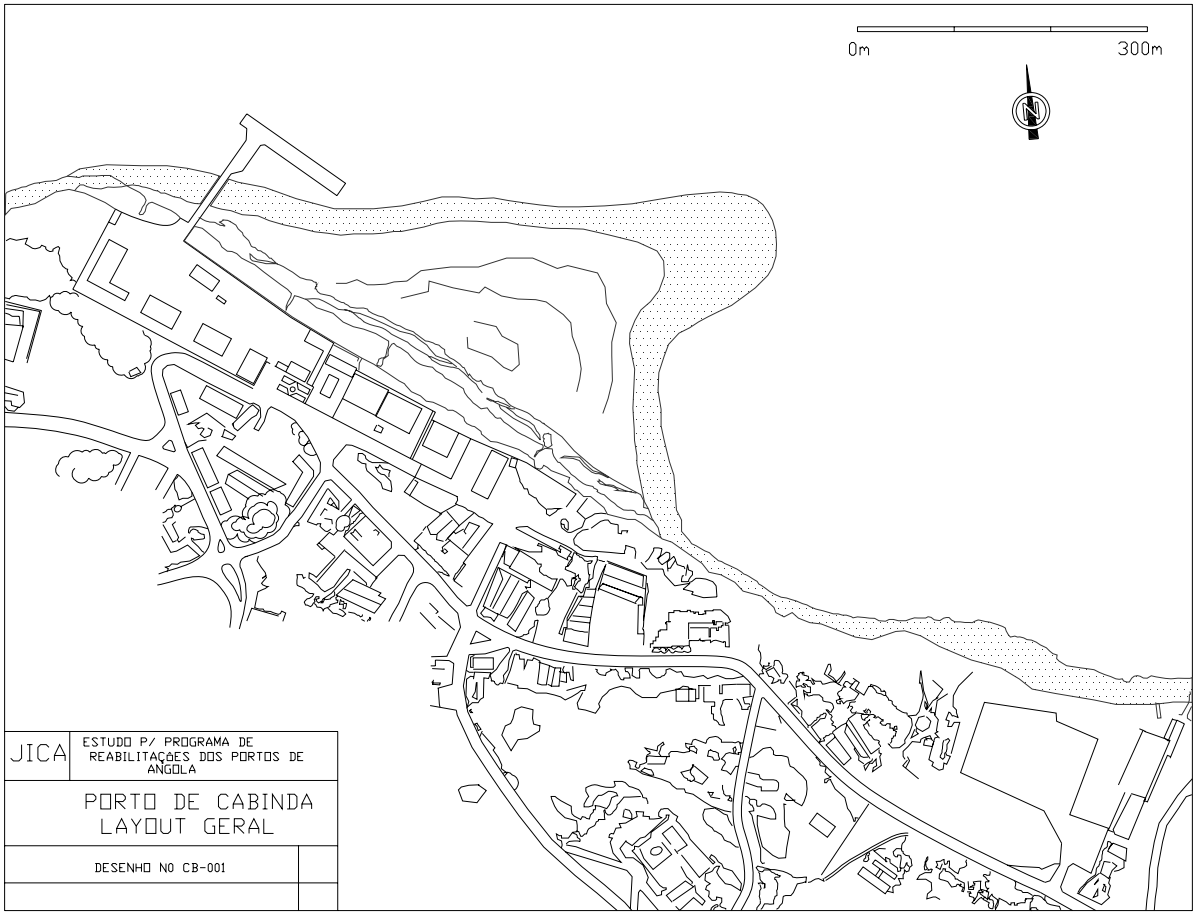


Figure 5-7 Present Layout of the Port of Cabinda

Photo 5-4 Panoramic View of Port of Cabinda (2005)

5.4.2 Natural Condition

1) Topography and Bathymetry

i) Topography

Flat land less than 200 meters ASL stretches out in Cabinda province except north-east area. There was a boat mooring behind the jetty in1998, however, the depth around here is now CDL 0.4 meters only, and no boat is able to moor behind the jetty.

ii) Bathymetry

It is conceivable that there is typical littoral drift around shore of Cabinda because tidal current direction is south-east and Port of Cabinda is located north of the Congo River. We found that it keeps in certain depth at middle part of the jetty, however sand had accumulated behind the jetty and east end of the jetty.

5.4.3 Port Facilities

The port of Cabinda has a L-type jetty with a length of 124 meters and with a depth of 3.4 meters.

1) Berthing Basin

The port of Cabinda introduced dredging equipment for its maintenance dredging around the jetty in 2005.

2) Jetty

After the rehabilitation work for the wooden deck was completed, dredging works at landside of the jetty and installation works of rubber fenders were being conducted.

3) Yard

The yard was found to be unpaved and uneven. A maintenance shop is located in the yard. According to the port of Cabinda, 7,000m^2 out of 9,000m^2 of unpaved yard will be paved by May 2006.

4) Berthing and Mooring Facility

Rehabilitation works for the fendering system were completed. Timber beams which come into contact with the vessel's hull were replaced by large rubber tires. In addition, deteriorated steel piles driven at the landside of the jetty were repaired. Mooring bitts are welded on the steel deck beam. The condition of paint was found to be good. The capacity of the mooring bollard is 35 t. There are 35 mooring bollards on the jetty.

5.4.4 Volume of Traffic

Total volume and container volume trends at Cabinda port are shown in Table 5-14 and Table 5-15. Cargo has been increasing since 2000.

Table 5-14 Cargo Volume of Cabinda Port

Year	Volume (ton	Annual Increase (%)
2000	29,500	
2001	37,900	28.5%
2002	40,400	6.6%
2003	50,100	24.0%
2004	81,600	62.9%

Table 5-15 Container volume of Cabinda Port (2004)

(ton)

Year	Unloaded			Loaded			G. total
	Domestic	International	Total	Domestic	International	Total	
2004	15,900	37,600	53,500	2,800	25,300	28,100	81,600

5.4.5 Cargo Handling and Security Issues

1) Present Situation and Problems

i) Cargo Handling Equipment

As the port is not equipped with a quay crane, all containers handled by ship's gear. But in the case of barge transportation service, containers are handled by mobile crane. A Reach Stacker is used to transport cargo from the yard to a quay. There are two empty container yards but one empty yard is far position from the main yard. In addition, the container yard is severely congested due to its in sufficient size.

Bulk cargo is also loaded and unloaded by ship's gear. In the case of barge transportation service, the cargo is loaded / unloaded by mobile crane. A forklift is used to move the cargo from warehouse to the quay. Cargo handling equipment of the port of Cabinda is shown in the following table.

Table 5-16 Cargo Handling Equipment of the Port of Cabinda

Type of Facility	Number	Capacity
Mobile Crane	4	25t～65t
Reach Stacker	1	40t～45t
Top lifter	2	40t
Forklift	5	2.5t～5t

ii) Warehouse

All warehouses are used for office and waiting room. The number of warehouse of the port of Cabinda is shown in the following table.

Table 5-17 Warehouse of the port of Cabinda

Type of Facility	Number	Capacity
Warehouses	4	

iii) Current Status of Port Administrator

A chassis and top lifter have been introduced recently.

2) Security Issues

Access control of people using identification cards is conducted at the main gate and at the pier gate. About a vehicle. There are two gates to go in and out in an entrance. Gates and fences are generally sufficient.

6. Deterioration Assessment of the Port Facilities

6.1 General

The present status of the port facilities was surveyed during the first visit to Angola in order to grasp the physical deterioration degree and cause of the degradation which are necessary for formulating the port rehabilitation plan. In the course of the second visit to Angola, the port facilities which had been assessed as having "Deterioration Degree 1" and had not been investigated sufficiently during the first visit to Angola were the focus of the detailed visual inspection. Focusing on the necessity of their rehabilitation, the deterioration degrees of the target port facilities, which serve as a basis for formulating the port rehabilitation plan, were assessed. The final results of the deterioration assessment are to be divided into two categories, namely, "rehabilitation is necessary" and "rehabilitation is unnecessary". Figure 6-1 shows the flow chart from checking facility to formulation of rehabilitation plan.

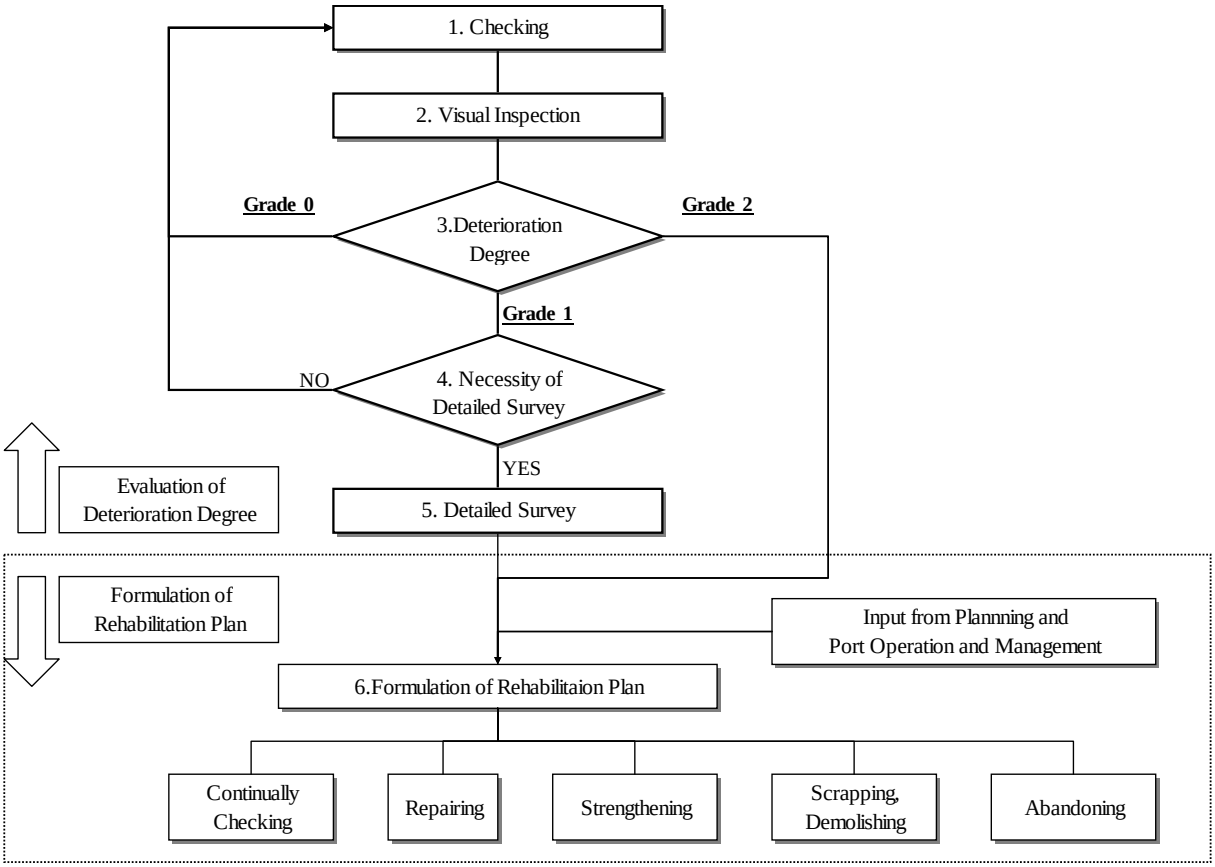


Figure 6-1 Flow chart from checking facility to formulation of rehabilitation plan

6.2 Method of Facility Survey and Deterioration Assessment

6.2.1 Method of Survey

Facility survey was carried out in accordance with the methods shown in Table 6-1.

Table 6-1 Method of Survey on Port Facility

Survey Object	Survey Unit	Method of Survey	Survey Item
Navigational aids	Each facility	Visual inspection by use of a small craft Night-time observation	Lighting condition, Existence of damage
Superstructure (both gravity and jetty type)	Each block	Visual inspection on foot and by use of a small craft Measurement by use of portable equipment	Existence of damage
Quay wall and substructure of jetty	Each block	Visual inspection by use of a small craft Beating test of concrete Measurement by use of portable equipment	Existence of damage
Apron pavement	Each block	Visual inspection on foot	Existence of damage
Rail track (crane rail, railway)	Each block	Visual inspection on foot	Existence of damage
Miscellaneous Accessories (Rubber fender, mooring bollard)	Each facility	Visual inspection on foot and by use of a small craft	Existence of damage
Warehouse	Each facility	Visual inspection by walk	Existence of damage
Cargo handling equipment, work vessel	Each facility	Visual inspection	Existence of damage

6.2.2 Method of Deterioration Assessment

According to the visual inspection of the port facility, the deterioration assessment was conducted based on the criteria. One example of the criteria is shown in Table 6-2.

Table 6-2 Criteria for the Deterioration Assessment (Navigational aid)

Deterioration Degree / Checking Item	0	1	2
Lighting condition	Blinking	—	Not blinking
Corrosion	No	Partially	Wholly corroded
Deterioration	No	Partially	Widespread
Fouling	No	Partially	Great amount

6.3 Summary of Deterioration Assessment

Table 6-3 shows the comprehensive deterioration assessment of the port facility. In the course of the second visit to Angola, the port facilities which had been assessed as having "Deterioration Degree 1" and had not been investigated sufficiently during the first visit to Angola were surveyed by detailed visual inspection to judge the necessity of their rehabilitation. Out of a total of 528 surveyed facilities, 154 were judged as "rehabilitation is unnecessary (grade 0)" and 374 as "rehabilitation is necessary (grade 2)". Summaries of individual target ports are also shown from Table 6-4 to Table 6-7.

Table 6-3 Comprehensive Deterioration Assessment

Type of Facility	Total Number of Checked Items	Number of Facilities Deterioration Degree	
		0	2
Navigational aid	**12**	**7**	**5**
Coping concrete	**75**	**0**	**75**
Quay wall	**75**	**56**	**19**
Concrete deck slab	**7**	**2**	**5**
Steel pipe pile	**1**	**0**	**1**
Wooden deck	**4**	**3**	**1**
Apron pavement	**75**	**0**	**75**
Crane rail	**4**	**0**	**4**
Railway	**27**	**0**	**27**
Fendering system	**9**	**3**	**6**
Mooring system	**75**	**1**	**74**
Warehouse	**23**	**19**	**4**
Miscellaneous accessories	**41**	**1**	**40**
Cargo Handling Equipment	**69**	**34**	**35**
Work Vessel	**6**	**6**	**0**
Other Equipment	**20**	**19**	**1**
Steel Pile	**4**	**3**	**1**
Yard Pavement	**1**	**0**	**1**
Total	**528**	**154**	**374**

Table 6-4 Summary of Deterioration Assessment of Port of Luanda

Type of Facility	Total Number of Checked Items	Number of Facilities Deterioration Degree	
		0	2
Navigational aid	**3**	**0**	**3**
Total	**3**	**0**	**3**

Table 6-5 Summary of Deterioration Assessment of Port of Lobito

Type of Facility	Total Number of Checked Items	Number of Facilities Deterioration Degree	
		0	2
Navigational aid	**6**	**5**	**1**
Coping concrete	**40**	**0**	**40**
Quay wall	**40**	**27**	**13**
Apron pavement	**40**	**0**	**40**
Crane rail	**2**	**0**	**2**
Railway	**16**	**0**	**16**
Fendering System	**2**	**0**	**2**
Mooring system	**38**	**0**	**38**
Warehouse	**21**	**19**	**2**
Miscellaneous accessories	**24**	**1**	**24**
Cargo Handling Equipment	**40**	**18**	**22**
Work Vessel	**4**	**4**	**0**
Other Equipment	**10**	**9**	**1**
Total	**283**	**83**	**200**

Table 6-6 Summary of Deterioration Assessment of Port of Namibe

Type of Facility	Total Number of Checked Items	Number of Facilities Deterioration Degree	
		0	2
Navigational aid	**3**	**2**	**1**
Coping concrete	**35**	**0**	**35**
Quay wall	**35**	**29**	**6**
Concrete deck slab	**7**	**2**	**5**
Steel pipe pile	**1**	**0**	**1**
Apron pavement	**35**	**0**	**35**
Crane rail	**2**	**0**	**2**
Railway	**11**	**0**	**11**
Fendering system	**4**	**0**	**4**
Mooring system	**36**	**0**	**36**
Warehouse	**2**	**0**	**2**
Miscellaneous accessories	**16**	**0**	**16**
Cargo Handling Equipment	**19**	**6**	**13**
Work Vessel	**2**	**2**	**0**
Other Equipment	**2**	**2**	**0**
Total	**210**	**43**	**167**

Table 6-7 Summary of Deterioration Assessment of Port of Cabinda

Type of Facility	Total Number of Checked Items	Number of Facilities Deterioration Degree	
		0	2
Wooden deck	**4**	**3**	**1**
Fendering system	**3**	**3**	**0**
Mooring system	**1**	**1**	**0**
Miscellaneous accessories	**1**	**0**	**1**
Cargo Handling Equipment	**10**	**10**	**0**
Steel Pile	**4**	**3**	**1**
Yard Pavement	**1**	**0**	**1**
Other Equipment	**8**	**8**	**0**
Total	**32**	**28**	**4**

7. Environmental and Social Consideration

7.1 Natural and Social Environment of Angola

7.1.1 Water Quality

Water quality survey has not been conducted so far in the ports nor is there any existing data. A request for a water quality survey in the ports was made at the stakeholders meeting which is described in 7.3. Surveys of Transparency, COD and Coliform Count were conducted by simple pack test to obtain the water quality of each port. Two surveys were conducted at the time of flood tide and ebb tide during September and October, 2005. Water samples from outside of the bay were also taken for comparison.

Since COD levels were not high as a whole, the water does not seem to be organically polluted. However, the water quality behind the Port of Luanda and at the east side of the Port of Lobito has COD levels over 4mg/l due to untreated effluent. Number of Coliform levels in these two water areas is also too high, exceeding 5,000MPN/100mg. According to the local hearing it is said that this is due to the discharge of untreated effluent of domestic wastewater. Cabinda Bay and Namibe Bay are regarded comparatively normal judging from COD test although transparency is low because of turbidity of sedimentation inflowing from the Congo River.

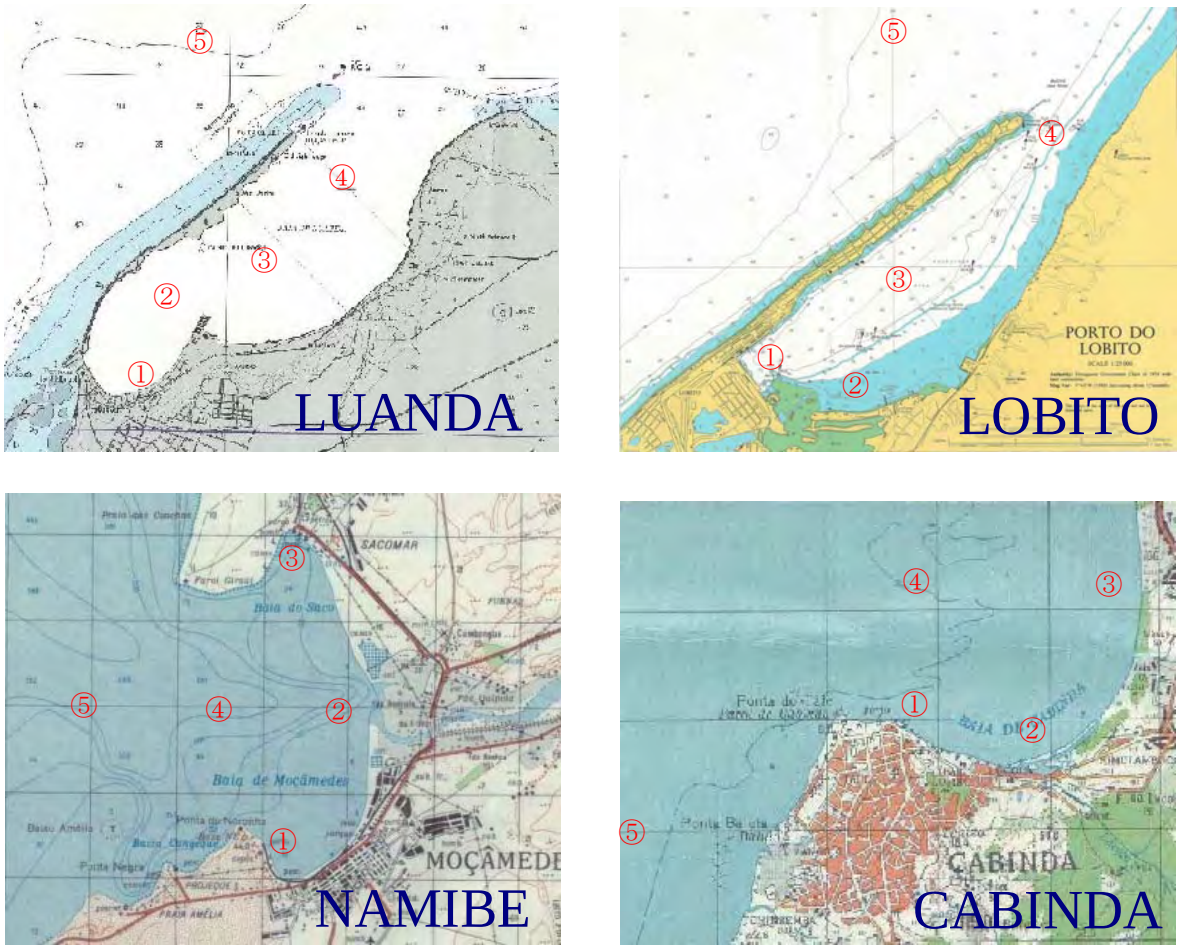


Figure 7-1 Location of Water Quality Survey

7.1.2 Highlights of environmental issues

The following environmental issues were pointed out by the Government of Angola, Emergency Multisector Recovery Project (EMRP) and the site hearings.

A myriad of land mine removal spread over the inland;

Separation of urban and rural areas by destruction of transportation infrastructure such as roads, bridges and railways;

Food Security for all;

Price increase by import dependency;

House shortage, shortage of Water and Sewage, Electricity, Health Facility, Sanitary Facility, Inadequate garbage control;

Lost fauna and flora;

Loss of habitat for animals by deforestation;

Concentration of population to urban area and high unemployment;

Thoroughness of environmental conservation management; and

Internal human training.

7.2 Environmental Social Conditions around Ports

7.2.1 Environmental Conditions of the Port of Luanda

Luanda bay is a closed water area by sand bar with the length about 8km. Wharf has been constructed at the west side of the bar for the prevention of accretion. There is a shallow water area of about 400ha (2km x 2km) at the back side of southern part of the bay and at the time of low water level grey herons, sea swallows, wagtails, sea gulls and other birds can be seen there. Luanda bay has sufficient water depth (20-30m) for vessel navigation. However, near the domestic trade wharf adjoining to the shallow area the water depth is 0.5-1m shallower than planned (-3.5m). The cause seems to be sedimentation of sand discharged from backside of the port together with rain water during the rainy season.

Water quality of Luanda bay is allegedly getting worse year by year due to human sewage from the hinter land, oil leakage from ships, gas emission from increasing vehicles and so on. Water pollution in the vicinity of shallow area is a special concern. Catching and eating of fish has been prohibited from December 2005 due to water pollution in Luanda Bay.

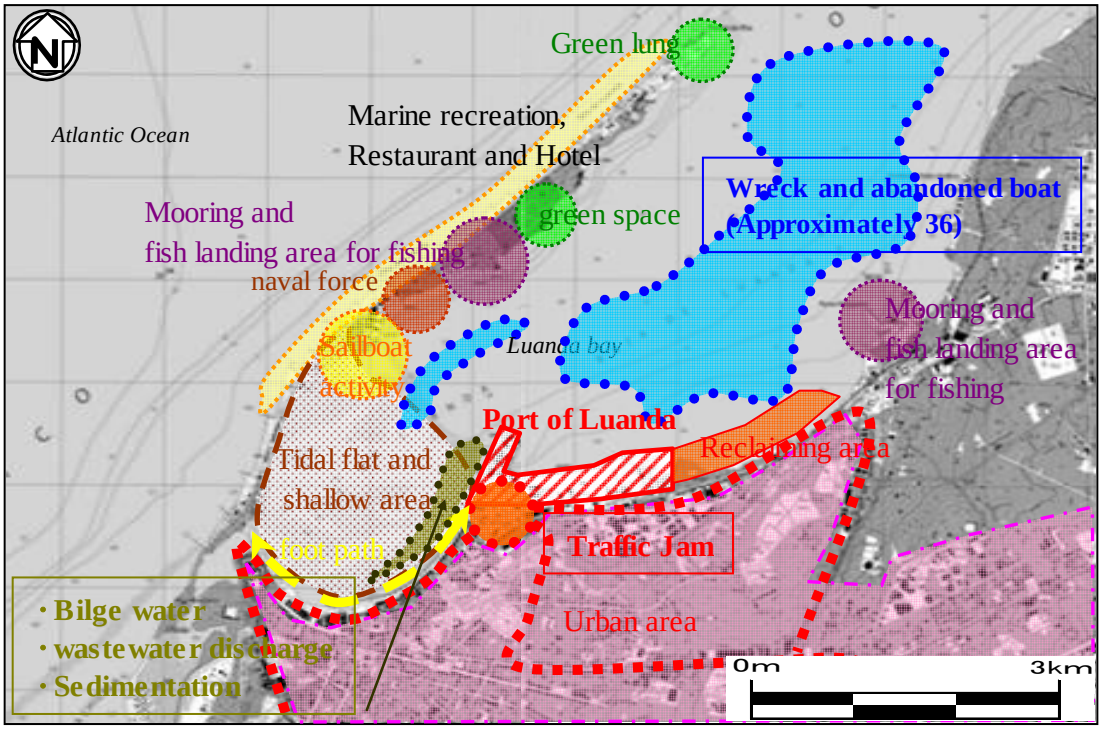


Figure 7-2 Environmental characteristics around Luanda Port

7.2.2 Environmental Conditions of the Port of Lobito

Lobito bay is a closed water area surrounded by sand bar with length of about 5km. The quay has been constructed in the west side of sand bar for anti-corrosion. Sedimentation has occurred at the top of quay, therefore, navigation aids are installed at the mouth of the port. This sedimentation is likely due to sand from the Catumbela River. Beach has formed on the west side of sand bar and is utilized by citizens as a recreational area. Lobito bay has deep bottom topography from the center to the mouth of the bay and sufficient water depth (10 to 30m) for ship navigation.

In the back side of Lobito bay, there is a huge wet land connected to Lobito bay by water channel. This wet land is a symbol of Lobito as many Pink Flamingo and Lesser Flamingo visit this area every year. Other than Flamingo, Pelican, Cormorant, Curlew, Plover, Sea Swallow, Sea Gull and so forth could be found during the study.

Fishing is prohibited within the bay area to protect fauna and flora. State government is to promoting green lands and tree plantations since deforestation occurred in the vicinity of Port of Lobito during the civil war.

City of Lobito constructed a Sewage Treatment Facility five years ago to treat discharged sanitation. This was for the protection of water quality of the wet land located at the backside of Lobito bay. However, according to water quality tests conducted in the study, COD and Coli form Count were found to be worst at the water channel connecting the wet land and Lobito bay. This is because the sewage treatment facility may not be functioning properly or untreated sanitary water drains.