10. Short-term Rehabilitation Plan

10.1 The Port of Luanda

10.1.1 Rehabilitation Needs

In the Port of Luanda, the general cargo terminal was conceded to the Multi Terminal Co. and the multi purpose terminal was conceded to UNICARGAS, a state owned company. The concession of the container terminal will be granted to a consortium consisting of the APM Terminal Co. subject to the approval of the Supreme Court. In this connection, it is the responsibility of concessionaires to repair, improve and develop port facilities. In addition, SONILS terminal was developed by an affiliate of SONANGOL, national oil company, and managed by themselves. The port authority of Luanda is therefore responsible for the control of ship entrance and departure, administration of port waters and land areas, and coordination of port development. The port authority will not intervene in the operation of each terminal. At the suggestion of the port authority, the Study excludes the rehabilitation of terminals and instead considers the problem of navigational aspects.

Table 10-1 shows navigational necessities envisaged in the Port of Luanda, in which items marked V have an urgent need for implementation in the short-term rehabilitation plan from the view point of safe, efficient and prompt operation. Appropriate measures for items not marked V shall be taken in the next phase of rehabilitation.

Table 10-1 Navigational Necessities in the Port of Luanda

Necessities	Appropriate Measures	Short-term Plan
Bathymetric survey; Revision of Chart	Survey area: 15.63 km^2	V
Removal of sunken ships and obstacles in port waters	Removal of 5-7 sunken/broken ships *1	
Maintenance dredging	Dredging sediments under water basin	
Oil and Garbage collection on the surface water	Deposition of an oil/garbage collection ship	
Navigational aids	Repair of two light buoys and a beacon tower	V
Water quality in the bay	Periodical monitoring of water pollution	

*1 "Study and Physical Project in the Port of Luanda" by the Ministry of Transport in 1996 identified 36 sunken and broken ships in the bay.

10.1.2 Rehabilitation of Port Facilities

1) Required Port Facilities in 2010

Due to the increase in cargo throughput and vessels, a wider basin will be needed. To calculate the basin area, simulation of waiting ships that reflects the expected improvement in loading and unloading productivities should be done. Bathymetric survey is necessary to clarify the basin area.

2) Rehabilitation of Anchorage, Basin and Buoys

The original bathymetric survey of the nautical chart No.3448 was made from 1967 to

1969 under the Portuguese administration and since then several small corrections have been made. Entering ships are required to collect new information by their own efforts. It will be necessary to revise the chart and provide recent information for calling ships. Information on water depth, sunken ships, obstacles and new reclamation is vital for safe navigation and anchorage.

There are two light buoys and one beacon tower in the Port of Luanda, all of which are deteriorated for lack of maintenance (see Appendix). It is recommendable to repair the two buoys and beacon tower.

The shallow water area in the port as shown in Figure 10-1 is a great hindrance to the maneuvering of ships to Berths No. 1F, 2F and Oil Berths. Together with the increase in ship calls, it will become indispensable to dredge the shallow water area of 203,000 m^2 up to a depth of 10.5 meters. However, the dredging is not so urgent and can be carried out in the mid-term or long-term development.

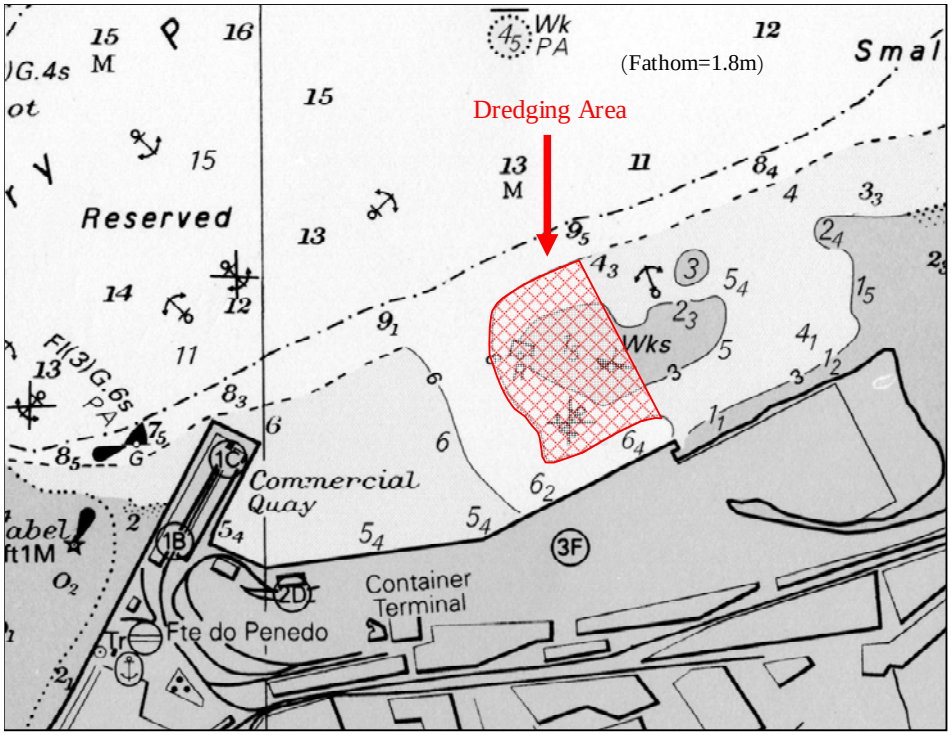

Figure 10-1 Proposed Dredging Area

3) Rehabilitation of Concessionaires' Terminals

The general cargo terminal and multi purpose terminal were already conceded to Multi Terminal Co., and UNICARGAS. However, it may be necessary for both companies to find financial resources to move forward with the rehabilitation of each terminal. If concessionaires find it difficult to raise sufficient funds, it may be necessary for the port authority of Luanda to find foreign official development assistance.

Table 10-2 shows problems identified in each terminal and measures to be taken immediately. All terminals require the rehabilitation of pavement, fenders and coping concrete of the quay wall. Some terminals require the removal of quay cranes and the procurement of cargo handling equipment.

Table 10-2 Rehabilitation to be implemented by Concessionaires

Problems/Measures	Terminal
To repair/improve the pavement of apron and yard	GT, MT, CT
To repair the coping concrete of quay wall and install car stoppers	GT, MT, CT
To install/replace fenders	GT, MT, CT
To demolish unused sheds or reform some sheds to refrigerator warehouses	GT
To build Container Freight Station	MT, CT
To install Gantry Cranes, to increase Reach Stackers and Forklifts	MT, CT
To remove unused quay cranes	GT: 17, MT: 8, CT: 3
To establish Electronic Data Interchange between Customs, Immigration, Shipping lines and Port authority	GT, MT, CT

GT: General Cargo Terminal No.1B, 2B, 1C, 2C
MT: Multi Purpose Terminal No.1D, 2D, 1E
CT: Container Terminal No. 2E, 1F/2F

10.1.3 Conceptual Design and Cost Estimate

Based on the result of field survey, the construction plan and approximate cost estimate will be compiled as follows.

Table 10-3 Port of Luanda Short-Term Rehabilitation Plan Construction Cost

Facility	Unit	Quantity	Unit Price US$	Construction Cost (1,000 US$)		
				Total	Foreign	Local
1.Bathymetric Survey	km^2	15.63	24,000	375	300	75
2.Repair Navi. Buoy	set	3	14,000	42	21	21
Total				417	321	96
3.Engineering Services	L.S	1		21	15	6
4.Physical Contingency	L.S	1		21	6	15
5.Tax	L.S	1		19	0	19
Grand Total				478	342	136

10.1.4 Draft Economic Analysis and Financial Analysis

1) Draft Economic Analysis

As the proposed short-term rehabilitation plan aims to improve the safety level of navigation in Luanda port. So it is difficult to calculate its economic impact. But the increase in navigation speed and reduction of accidents due to the improvement of the safety level will be positive economic impacts.

2) Draft Financial Analysis

The purpose of the economic analysis is to appraise the economic feasibility of the short-term rehabilitation plan of Luanda port. The revenue of Luanda port authority in 2004 is 3.1 billion AKZ while its expenses totaled 2.3 billion AKZ. According its profit before taxation is about 0.8billion AKZ. On the other hand, the cost of short-term rehabilitation plan will be US$478,000.

Therefore the plan is feasible because the cost of the plan is within the profit margin of a single year for the Luanda port authority.

3) Investment Plan

The general cargo terminal was conceded to a private company and the multi cargo terminal was conceded to a state owned company. The concession of the container terminal will be granted to a private company subject to the approval of the Supreme Court. The cost to repair, improve and develop port facilities of the land area will be borne by the concessionaires. It is estimated that a investment of US$ 19 million for the general cargo terminal and US$ 55million for the container terminal will be required. The investment plan of the multi purpose terminal is not clear but the investment between general cargo terminal and container terminal seems to be required. Those investments should be made by the concessionaires as soon as possible.

10.2 The Port of Lobito

10.2.1 Rehabilitation Needs

The Port of Lobito also suffers from the deterioration and degradation of port facilities. In view of increasing cargo throughput, it is urgently required to rehabilitate/improve port facilities. Table 10-4 shows problems of the Port of Lobito and measures to be taken in the near future, in which items marked V have an urgent need for implementation in the short-term rehabilitation plan. Rehabilitation of items not marked V shall be taken in the next phase of rehabilitation.

Table 10-4 Problems and Necessary Measures for the Port of Lobito

Problems	Appropriate Measures	Short-term Plan
Pavement in the apron and yard	To repair the apron and yard behind the Berths No.1 - No.8	V
Coping concrete of the quay wall and car stopper	To repair the coping concrete including car stopper; Berths No.1 - No.8	V
Rubber fenders	To install/replace rubber fenders on the quay front; Berths No.1 - No.8	V
Railroad in the port	Rehabilitation of railroad tracks in the port; about 20 km	
Warehouses	Repair work of warehouses is carried out by own efforts	
Reefer plugs and power supply	To install reefer plugs and power generator in the yard behind the Berths No.7、8	V
Gantry cranes Unused quay cranes	To install gantry cranes and foundations on a new berth next to the Berth No.8, and remove unused quay cranes	
Cargo handling equipment	To increase mobile cranes, reach stackers and forklifts	V
Water and fuel oil supply	To repair water pipes and fuel oil supply facilities laid in the apron and yard	V
Yard extension	To extend container yard behind the Berth No.9 to be built in the future	
Revision of nautical chart; Bathymetric survey	To make bathymetric survey for the revision of Chart No. 57282（Port of Lobito）	
Light buoys	To repair a light buoy on the channel	
Oil and Garbage collection on the surface water	Deposition of an oil/garbage collection ship	
Maintenance dredging	To dredge 1-2 meters in the front basin of the quay wall; and to deepen the entrance of channel to the bay	
Electronic Data Interchange	To establish EDI system between Customs, Immigration, Shipping lines and others	
New modern container terminal	To develop a new container terminal next to Berth No.8 and install gantry cranes	

10.2.2 Rehabilitation of Port Facilities

1) Required Port Facilities in 2010

Current and future cargo handling capacity and demand forecast are shown in Table 10-5. Future cargo throughput exceeds the present capacity. Rehabilitation is necessary to cope with future cargo throughput. Lobito port has a rather narrow yard, improvement of yard capacity will be a key factor exterminating the terminal capacity after the rehabilitation.

Table 10-5 Cargo Handling Capacity and Demand Forecast (Lobito Port)

	Conventional Cargo		Container Cargo	
Present Capacity	915,384	ton	61,000	TEU
Cargo Throughput (2004)	582,849	ton	28,950	TEU
Future Capacity	1,250,000	ton	92,000	TEU
Cargo Throughput (2010,high)	2,013,000	ton	120,000	TEU
Cargo Throughput (2010,low)	1,195,000	ton	92,000	TEU

2) Rehabilitation of Terminals

To meet the estimated demand in 2010, it will be necessary to utilize the North Wharf and South Wharf. As shown in Table 10-4, items marked V are proposed for the Short-term Rehabilitation Plan in terms of time and effectiveness. Urgent requirements to be completed by 2010 are 1) to repair the apron and yard behind the Berths No.1 - No.8; 2) to repair the coping concrete; 3) to install/replace rubber fenders; 4) to install reefer plugs and power generator; 5) to increase mobile cranes, reach stackers and forklifts; and 6) to repair water pipes and fuel oil supply facilities laid in the apron and yard. Figure 10-2 shows the proposed area for the Short-term Rehabilitation Plan.

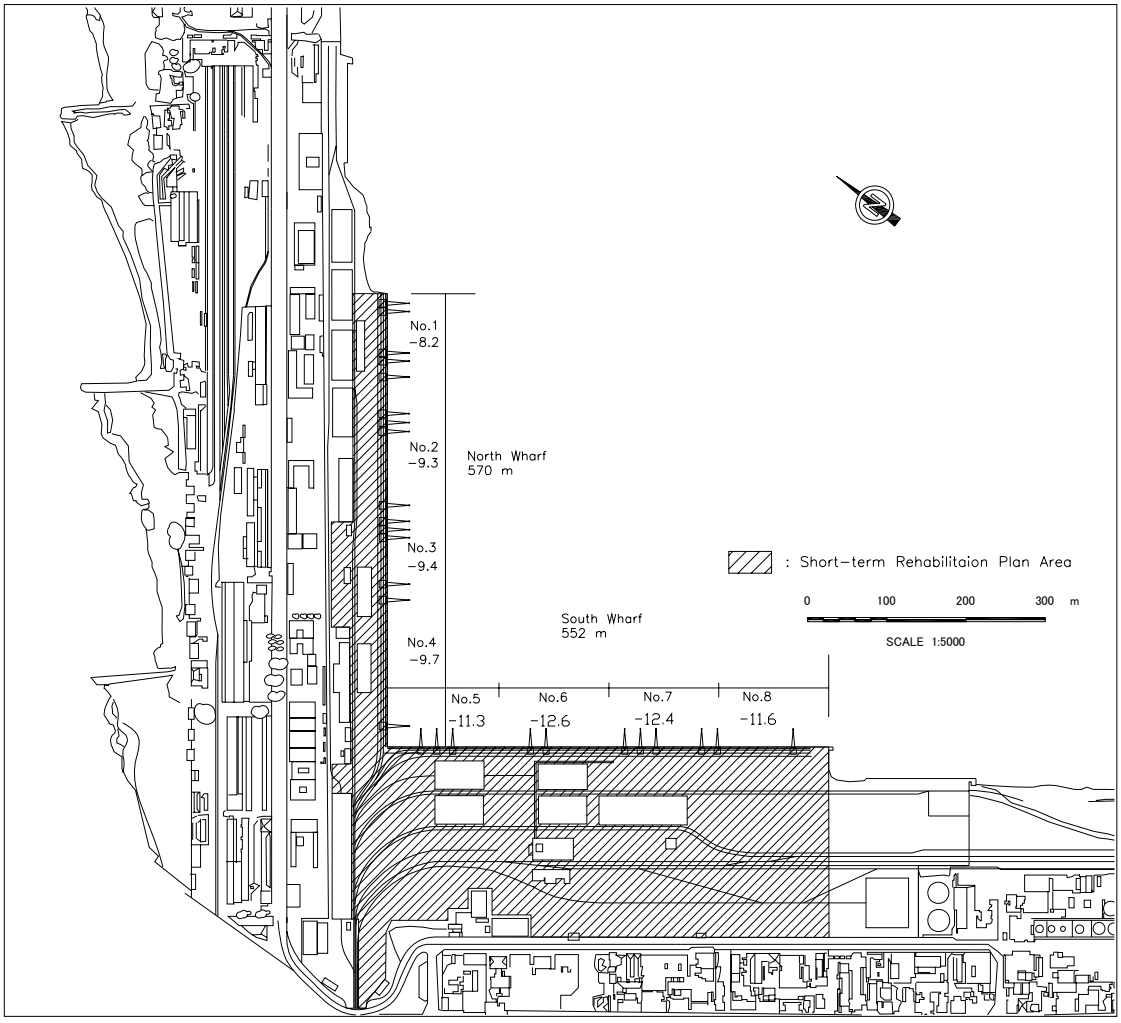

Figure 10-2 Short-term Rehabilitation Area in the Port of Lobito

3) Quay wall, Apron, Yard, Rubber fender and Mooring bollard

As for the quay, the following measures are proposed:

To repair coping concrete over the entire length of both North Quay (570m) and South Quay (552m) and installation of car stops

To repair the South quay where the concrete is spalling

As for the apron and yard pavement, the following measure is proposed:

To pave the apron and yard behind the North Quay (570m) and the South Quay (552m).

As for the rubber fenders, the following measure is proposed:

To install rubber fender appropriate for the incoming vessel along both the North Quay (570m) and the South Quay (552m).

As for the mooring bollards, the following measure is proposed:

To install mooring bollards appropriate for the incoming vessel along both the North Quay (570m) and the South Quay (552m).

4) Cargo Handling Equipment and Warehouse

i) Cargo Handling Equipment

We recommend the introduction of the following cargo handling equipment to enhance port service.

Mobile Crane (60t)	1
Reach Stacker (40t)	2
Top lifter (40t)	2

ii) Warehouse

There are many warehouses, and some are used partly for office space. It will be possible to cope with the increase in cargo in future using these warehouses.

5) Reefer Facilities

The study team recommends the installation of reefer plugs to cope with the increase of reefer containers at the Port of Lobito.

10.2.3 Conceptual Design and Cost Estimate

Based on the result of field survey, the construction plan and approximate cost estimate will be compiled as follows.

Table 10-6 Port of Lobito Short-Term Rehabilitation Plan Construction Cost

Facility	Unit	Quantity	Unit Price US$	Construction Cost(1,000US$)		
				Total	Foreign	Local
1.Apron,Yard Pavement	m^2	153,100	120	18,372	11,023	7,349
2.Repaire Wharf	m	1,122	680	763	382	381
3.Rubber Fender	set	93	82,000	7,626	6,863	763
4.Bollard	set	33	9,760	322	290	32
5.Repair Water, Oil supply pipes	L.S	1		138	69	69
5.Refer Facilities	L.S	1		384	346	38
Total				27,605	18,973	8,632
7.Cargo Equipment*	L.S	1		3,675	3,675	0
8.Engineering Services	L.S	1		1,380	966	414
9.Physical Contingency	L.S	1		1,380	414	966
10.Tax	L.S	1		1,242	0	1,242
Grand Total				35,282	24,028	11,254

* Mobile Crane: 1 unit, Reach Stacker: 2 units, Top Lifter: 2 units

10.2.4 Preliminary Economic Analysis and Financial Analysis

1) Preliminary Economic Analysis

The purpose of the economic analysis is to appraise the economic feasibility of the short-term rehabilitation plan for Lobito Port from the viewpoint of national economy. An economic analysis was carried out applying the following method. Short-term rehabilitation plan was defined and it was compared to the without case. All the benefits and costs accruing from the difference between 'with' and 'without' cases were calculated. The economic internal rate of return (EIRR) based on a cost-benefit analysis was used to appraise the feasibility of the project. The EIRR is a discount rate which makes equal the costs and the benefits of the project during the project lifel. Taking into consideration the depreciation period of the facilities of 30 years and the construction period of 5 years including detail design, the project life period of calculation in the economic analysis is assumed to be 35 years from the beginning of construction. The exchange rate adopted for this analysis is US$1=AKZ87.6. Low case of demand forecast is adopted for this analysis.

i) Costs of the Project

The items that should be considered as costs of the project are construction costs, maintenance costs, and renewal investment costs.

ii) Benefits of the Project

As benefits brought about by the short-term rehabilitation plan of Lobito port, saving in land transportation costs is identified. Cargo is assumed to deliver to Luanda port in case that Lobito port cannot afford to handle its cargo. Increased port capacity through the rehabilitation saves land transportation from Luanda to Lobito or its hinterland. Based on the land transport cost from Luanda to Lobito (US$ 110 per ton), the unit benefit is assumed as US$ 16.5 per ton. This is 15% of the land transport cost.

iii) Evaluation of the Project

EIRR of the project at Lobito Port is calculated as 28%. It is generally recognized that a project is feasible if the EIRR exceeds the opportunity cost of capital. Usually, the opportunity cost of capital is considered to range from 8% to 10% according to the degree of development in each country. It is acceptable that a project with an EIRR of more than 8% is economically feasible for infrastructure or social service projects. As for this project, even though the economic calculation only takes into account the items that are easily quantified, the EIRR is still 28%. Therefore, this short-term development project is feasible from the viewpoint of the national economy.

2) Preliminary Financial Analysis

The purpose of the financial analysis is to appraise the financial feasibility of the short-term rehabilitation plan for Lobito port from the viewpoint of the financial soundness of the port management body during the project life. A financial analysis was carried out applying the following method. Short-term rehabilitation plan was defined and compared to the without case. All the benefits and costs accruing from the difference between 'with' and 'without' cases were calculated. The financial internal return (FIRR) based on a cost-benefit analysis was used to appraise the feasibility of the project. The FIRR is a discount rate which makes the costs and the benefits of the project during the project life equal. Taking into consideration the depreciation period of the facilities of 30 years and the construction period of 5 years including detail design, the project life period of calculation in the financial analysis is assumed to be 35 years from the beginning of construction. The exchange rate adopted for this analysis is US$1=AKZ87.6. Low case of demand forecast is adopted for this analysis.

i) Costs of Project

The items that should be considered as costs of the project are construction costs, maintenance costs, renewal investment costs and operating costs including other port facilities.

ii) Benefits of the Project

Operating revenues are estimated from the difference in revenues between the 'with case' and the 'without case'. All revenues are calculated by multiplying cargo volume and unit revenue per ton which is calculated using the financial data of Lobito port in 2004. The unit revenue is assumed as US$ 28 per ton.

iii) Evaluation of the Project

FIRR of the short- term rehabilitation plan for Lobito port is 6.7%. In case of using Japanese ODA loan for infrastructure development in LDC, the interest rate is under 2% in 2005. Judging from the above, this project is regarded as financially feasible under the assumptions in this chapter.

10.3 The Port of Namibe

10.3.1 Rehabilitation Needs

Port facilities of the Port of Namibe are severely damaged and in the worst condition among the four ports. It is urgently required to rehabilitate/improve port facilities. Table 10-7 shows problems of the Port of Namibe and measures to be taken in the near future, in which items marked V have an urgent need for implementation in the Short-term Rehabilitation Plan. Rehabilitation of items not marked V shall be taken in the next phase of the rehabilitation.

Table 10-7 Problems and Necessary Measures for the Port of Namibe

Problems	Appropriate Measures	Short-term Plan
Pavement in the apron and yard	To repair the apron and yard behind the Berths No.1 - No.3	V
Coping concrete of the quay wall and car stopper	To repair the coping concrete including car stopper; Berths No.1 - No.3	V
Rubber fenders	To install/replace rubber fenders on the quay front; Berths No.1 - No.3	V
Internal road	To repair the internal road; 620 m	V
Railroad in the port	Rehabilitation of railroad tracks in the port	
Pavement in the marshalling yard	To pave the marshalling yard in the port; about 3.9 ha	V
Warehouses	To repair the warehouse No.2, and to remove No.1	V
Reefer plugs and power supply	To install reefer plugs and power generator in the yard behind Berth No.3	V
Container handling equipment	To increase reach stackers, top lifters, and forklifts	V
Unused quay cranes	Removal of six unused quay cranes	V
Water and fuel oil supply	To repair water pipes and fuel oil supply facilities laid in the apron and yard	V
Yard lighting	To install lighting towers in the yard behind Berths No.1 - No.3	V
Expansion of container yard	To extend container yard to the north of Terminal No.3	
RO/RO facilities	To improve the slope at the north of Terminal No.3	
Revision of chart; and Bathymetric survey	To make a bathymetric survey and prepare a detailed chart	
Maintenance dredging	Sedimentation in front of the quay wall was not identified	
Electronic Data Interchange	To establish EDI system between Customs, Immigration, Shipping lines and others	

10.3.2 Rehabilitation of Port Facilities

1) Required Capacity of Namibe Port in 2010

Current and future cargo handling capacity and demand forecast are shown in Table 10-8. Future cargo throughput exceeds the present capacity. Rehabilitation will be necessary to cope with future cargo throughput, even if No.3A terminal is used as a multi purpose terminal.

Table 10-8 Cargo Handling Capacity and Demand Forecast (Namibe Port)

	Conventional Cargo		Container Cargo	
Present Capacity	255,000	ton	31,000	TEU
Cargo Throughput (2004)	209,485	ton	7,428	TEU
Future Capacity	600,000	ton	46,000	TEU
Cargo Throughput (2010,high)	624,000	ton	24,000	TEU
Cargo Throughput (2010,low)	488,000	ton	19,000	TEU

2) Rehabilitation of Terminals

In order to meet the demand for import, export and coastal shipping, it will be necessary to utilize all wharves and facilities in the Port of Namibe. As shown in Table 10-7, items marked V are proposed for the Short-term Rehabilitation Plan to increase the capacity of cargo handling. Urgent requirements to be completed by 2010 are 1) to repair the apron and yard behind the Berths No.1 - No.3, 2) to repair the coping concrete; 3) to install/replace all rubber fenders; 4) to install reefer plugs and power generator; 5) to increase reach stackers, top lifters and forklifts; and 6) to repair water pipes and fuel oil supply facilities laid in the apron and yard. Figure 10-3 shows the proposed area for the Short-term Rehabilitation Plan.

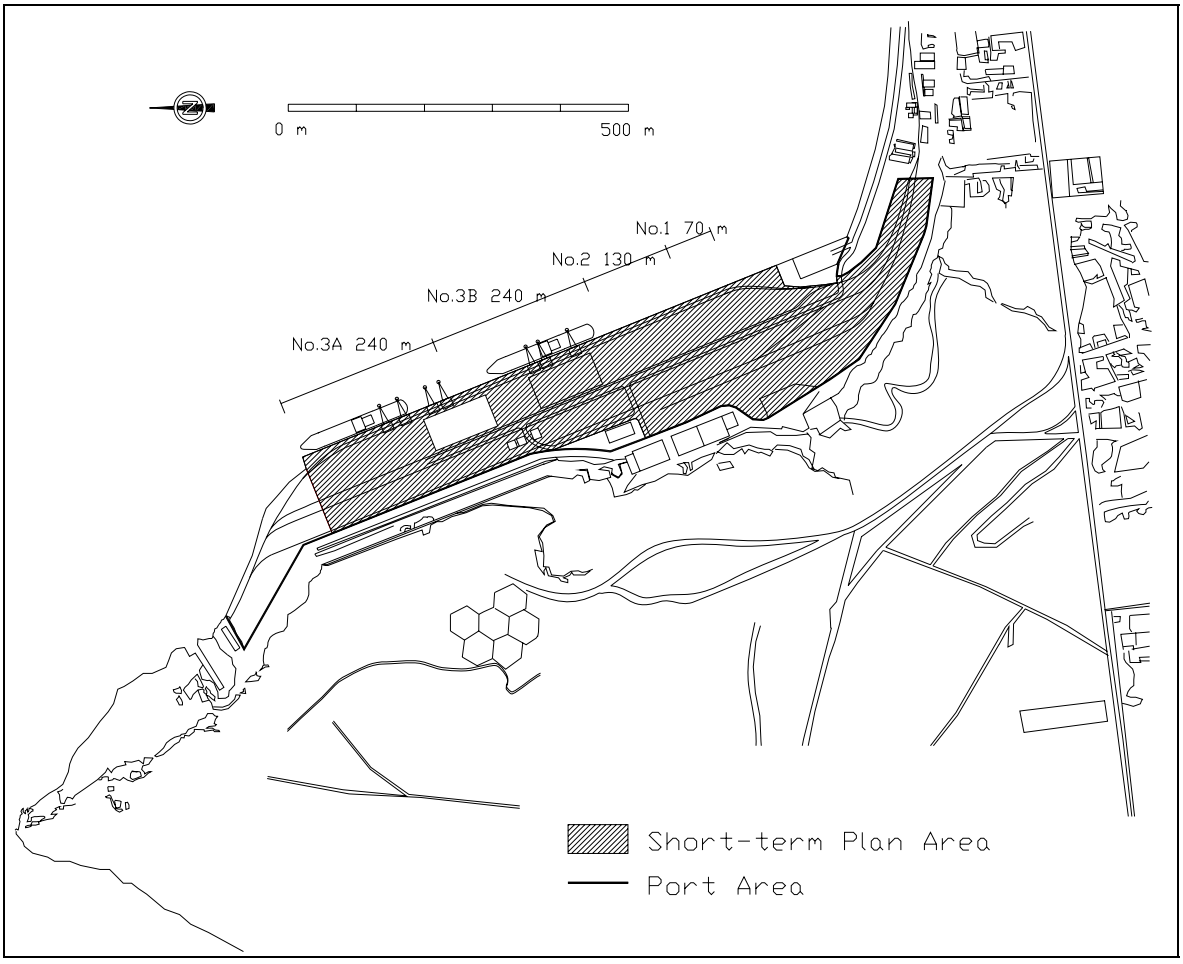

Figure 10-3 Short-term Rehabilitation Area of the Port of Namibe

3) Quay wall, Apron, Yard, Rubber fender and Mooring bollard

As for the quay, the following measures are proposed:

To repair coping concrete over the entire length of Berth No.1 (70m), Berth No.2 (130m) and Berth No.3 (480m) and installation of car stops.

To repair quay wall where cracks were observed.

As for the apron and yard pavement, the following measure is proposed:

To pave the apron and yard behind Berth No.1 (70m), Berth No.2 (130m) and Berth No.3 (480m).

As for the rubber fenders, the following measure is proposed:

To install rubber fender appropriate for the incoming vessel along Berth No.1 (70m), Berth No.2 (130m) and Berth No.3 (480m).

As for the mooring bollards, the following measure is proposed:

To install of mooring bollards appropriate for the incoming vessel along Berth No.1 (70m), Berth No.2 (130m) and Berth No.3 (480m).

4) Cargo Equipment and Warehouse

i) Cargo Equipment

We recommend the introduction of the following cargo equipment to enhance port service.

Mobil Crane (60t)	1
Forklift (45t)	1
Reach Stacker (40t)	2
Top lifter (40t)	1

ii) Warehouse and others

The Study team recommends the removal of warehouse No.1 to enhance port service at the port of Namibe.

5) Access Road

Unevenness and caving were observed on access road from the port entrance gate to the yard. Therefore, the following measure is proposed to pave the access road from the port entrance gate to the yard (620m).

6) Reefer Facilities

The study team recommends the introduction of the installation of reefer plugs to enhance port service at the port of Namibe.

10.3.3 Conceptual Design and Cost Estimate

Based on the result of field survey, the construction plan and approximate cost estimate will be compiled as follows.

Table 10-9 Port of Namibe Short-Term Rehabilitation Plan Construction Cost

Facility	Unit	Quantity	Unit Price US$	Construction Cost(1,000US$)		
				Total	Foreign	Local
1.Apron,Yard Pavement	m^2	111,750	120	13,410	8,046	5,364
2. Repair Wharf	m	680	680	462	231	231
3.Rubber Fender	set	79	90,494	7,149	6,434	715
4.Bollard	set	35	4,571	160	144	16
5.Repair Access Road	m^2	5,580	40	223	156	67
6.Remove South Warehouse	m^2	3,000	120	360	180	180
7.Reefer Facilities	L.S	1		384	346	38
8.Repaire Water, Oil supply Pipe	L.S	1		136	68	68
9.Lighting Tower	L.S	1		95	67	28
10. Remove Quay Crane	L.S	1		82	57	25
Total				22,461	15,729	6,732
11.Cargo Equipment*	L.S	1		3,675	3,675	0
12.Engineering Services	L.S	1		1,277	894	383
12.Physical Contingency	L.S	1		1,277	383	894
13.Tax	L.S	1		1.011	0	1,011
Grand Total				29,701	20,681	9,020

* Mobile Crane: 1 unit, Forklift:1 unit, Reach Stacker: 2 units, Top lifter:1 unit

10.3.4 Preliminary Economic Analysis and Financial Analysis

1) Preliminary Economic Analysis

The purpose of the economic analysis is to appraise the economic feasibility of the short-term rehabilitation plan for Namibe port from the viewpoint of national economy. An economic analysis was carried out applying the following method. Short-term rehabilitation plan was defined and it was compared to the without case. All the benefits and costs accruing from the difference between 'with' and 'without' cases were calculated. The economic internal return (EIRR) based on a cost-benefit analysis was used to appraise the feasibility of the project. The EIRR is a discount rate which makes the costs and the benefits of the project during the project life equal. Taking into consideration the depreciation period of the facilities of 30 years and the construction period of 5 years including detail design, the project life period of calculation in the economic analysis is assumed to be 35 years from the beginning of construction. The exchange rate adopted for this analysis is US$1=AKZ87.6. Low case of demand forecast is adopted for this analysis.

i) Costs of the Project

The items that should be considered as costs of the project are construction costs, maintenance costs, and renewal investment costs.

ii) Benefits of the Project

As benefits brought about by the short-term rehabilitation plan of Namibe port, saving in land transportation costs is identified. Cargo is assumed to divert to Lobito port in case that Namibe port cannot afford to handle its cargo. Increased port capacity through the rehabilitation saves land transportation from Lobito to Namibe or its hinterland. Based on the land transport cost from Lobito to Namibe (US$ 120 per ton), the unit benefit is assumed as US$ 18 per ton. This is 15% of the land transport cost.

iii) Evaluation of the Project

EIRR of the project at Namibe Port is calculated as 24%. It is generally recognized that a project is feasible if the EIRR exceeds the opportunity cost of capital. Usually, the opportunity cost of capital is considered to range from 8% to 10% according to the degree of development in each country. It is acceptable that a project with an EIRR of more than 8% is economically feasible for infrastructure or social service projects. As for this project, even though the economic calculation only takes into account the items that are easily quantified, the EIRR is still 24%. Therefore, this short-term development project is feasible from the viewpoint of the national economy.

2) Preliminary Financial Analysis

The purpose of the financial analysis is to appraise the financial feasibility of the short-term rehabilitation plan for Namibe port from the viewpoint of the financial soundness of the port management body during the project life. A financial analysis was carried out applying the following method. Short-term rehabilitation plan was defined it was compared to the without case. All the benefits and costs accruing from the difference between ‘with’ and ‘without’ cases were calculated. The financial internal return (FIRR) based on a cost-benefit analysis was used to appraise the feasibility of the project. The FIRR is a discount rate which makes the costs and the benefits of the project during the project life equal. Taking into consideration the depreciation period of the facilities of 30 years and the construction period of 5 years including detail design, the project life period of calculation in the financial analysis is assumed to be 35 years from the beginning of construction. The exchange rate adopted for this analysis is US$1=AKZ87.6. Low case of demand forecast is adopted for this analysis.

i) Costs of Project

The items that should be considered as costs of the project are construction costs, maintenance costs, renewal investment costs and operating costs including other port facilities.

ii) Benefits of Project

Operating revenues are estimated from the difference in revenues between the ‘with case’ and the ‘without case’. All revenues are calculated by multiplying the cargo volume and unit revenue per ton which is calculated using the financial data of Namibe port in 2004. The unit revenue is assumed as US$ 29 per ton.

iii) Evaluation of the Project

FIRR of the short- term rehabilitation plan for Namibe port is 5.1%. In case of using Japanese ODA loan for infrastructure development in LDC, the interest rate is under 2% in 2005. Judging from the above, this project is regarded as financially feasible under the assumptions in this chapter.

10.4 The Port of Cabinda

10.4.1 Rehabilitation Needs

Depth of the quay front basin was dredged to 3.4 meters, however, recent bathymetric survey showed that the east half of the 120 meter berth has a depth of about 3.0 m and the west half has a depth of 2-3 meters. Sedimentation is going on at a rapid pace and has resulted in a huge sand dune in the west of the quay. The sand dune may extend over an area of 20 ha and can be used for port expansion.

The wood deck of the quay was recently repaired and all wood sticks were replaced with new ones. It is necessary to extend the width of quay and the passage deck to the quay and to pave the surface with concrete in order to improve the productivity of cargo handing. While the foundation piles of the quay may not have enough strength to support the concrete surface, new structure will be necessary for the Port of Cabinda.

There is a quay in the Cacongo District but it is badly decayed and not serviceable. It may be necessary to build a new jetty if the export of wood products could be resumed. Having received approval from MINTRANS, the port authority of Cabinda intends to develop a new jetty along the west side of the present jetty, and build the quay on the top of the jetty with a depth of 5.5 m – 8.0 m. It will be necessary to make a detailed study on sand drifts, sedimentation and to design the quay with enough width for the turning of trucks.

Table 10-10 shows problems of the Port of Cabinda and measures to be taken in the near future to improve the productivity and reduce the cost of cargo handling operations. Since the port authority has already taken necessary action and requests no assistance, the Study proposes no item for the Short-term Rehabilitation Plan at the Port of Cabinda.

It will be crucial to develop a new deep water port to accommodate ocean vessels and to avoid the transshipment at the offshore anchorage and reduce the cost of coastal shipping. A study on the new port site shall be conducted in due course.

Table 10-10 Problems and Necessary Measures for the Port of Cabinda

Problems	Appropriate Measures	Short-term Plan
Pavement in the yard	To be finished in the near future	
Cargo handling equipment	To increase mobile cranes, reach stackers and forklifts	
Expansion of container yard	To construct new yard for empty containers on the sand dune	
Bathymetric survey	To make a detailed chart in addition to the Chart 3285 (Cabinda Enclave)	
Removal of sunken ships	To conduct a field study around the port and remove obstacles	
Maintenance dredging	To dredge the basin in front of the quay wall and the channel; and to procure a dredger	
Navigational aids	To repair buoys	
Jetty in Cacongo District	To build a new jetty if wood export is resumed	
Electronic Data Interchange	To establish EDI system between Customs, Immigration, Shipping lines and others	

10.4.2 Rehabilitation of Port Facilities

1) Required Port Facilities in 2010

New pier plan has received the central government's approval and the construction will begin in Cabinda port. After operation of the new pier, berthing capacity will increase. On the other hand, yard will be rather narrow and thus yard expansion seems to be required.

2) Rehabilitation and Yard Expansion

In order to improve the productivity of cargo handling, it is important to pave the container yard shown in Figure 10-4. Since an empty container yard is located 1,200 meters west of the port, wasteful transport by a reach stacker and chassis from the port to the empty container yard and back is required. New container yard can be developed in the sand dune adjacent to the port.

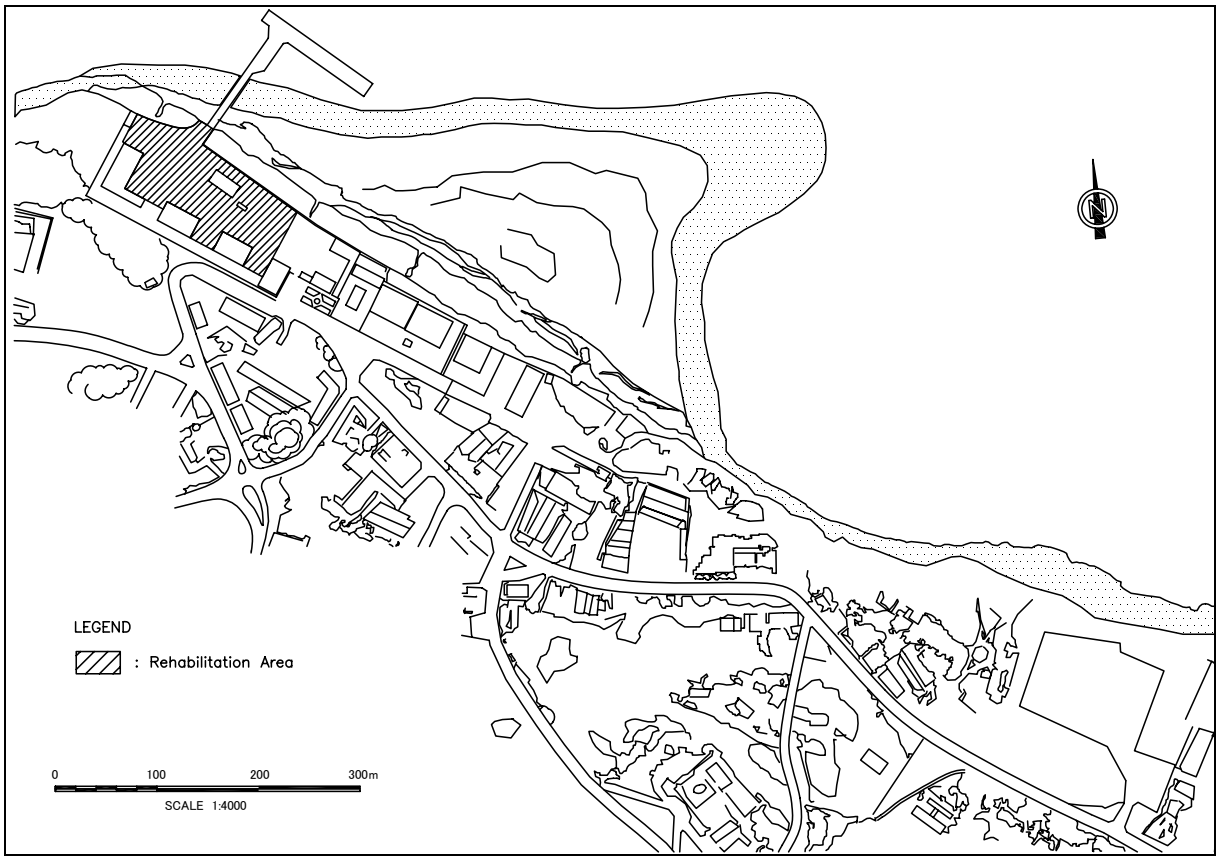

Figure 10-4 Rehabilitation Area in the Port of Cabinda

10.5 Summary of Short-term Rehabilitation Plan

10.5.1 Short-term Rehabilitation Plan of Four Ports

Among port facilities included in the Short-term Rehabilitation Plan, first priority shall be given to paving the yard and apron, and to repairing rubber fenders and coping concrete of the quay wall. Rehabilitation of these facilities is the responsibility of concessionaires at the Port of Luanda. Rehabilitation of the Port of Cabinda is now ongoing and will be completed in the near future. Therefore, no facility is included in the short-term rehabilitation plan of the Port of Cabinda.

From the viewpoint of productivity, next priority shall be given to cargo handling equipment such as reach stackers, forklifts, top lifters, mobile cranes and chassis. Procurement of this equipment is also the responsibility of concessionaires at the Port of Luanda. In view of food stuffs import and fish/agricultural products export, priority shall also be given to refrigerator warehouse and reefer facilities. It is necessary to increase/install reefer plugs and power generator at the Ports of Lobito and Namibe.

Angolan nautical charts were mostly made before 1970 and minor corrections were released several times. However, bathymetric survey for chart revision has not been carried out since the beginning of the civil war. In this connection, 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.

In addition, 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. Table 10-11 summarizes facilities included in the Short-term Rehabilitation Plan.

Table 10-11 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

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.

10.5.2 Priority for Rehabilitation

Taking into account the economic benefit of the implementation of the project, priority of rehabilitation shall be considered from the view points of 1) the promotion of economic reconstruction of Angola, 2) the development of damaged regions by the civil war, 3) the connection with Priority Phase Multisector Rehabilitation and Reconstruction Program, 4) the multiplier effect of railway and road rehabilitation projects, 5) the extent of deterioration of port facilities, 6) the safety and productivity of cargo handling operation, 7) requirements from port authorities, 8) the possibility of development of port facilities by the concession to private sectors, and 9) the preference of the government.

Among these prerequisites, there are a close connection between items 1) and 2), 3) and 4), and 5) and 6). Item 9) should be considered as part of a comprehensive evaluation of priority. Therefore, items listed in Table 10-12 were selected as factors to evaluate the priority of port rehabilitation projects for the ports of Luanda, Lobito, Namibe and Cabinda. Table 10-12 shows the assessment of priority of the rehabilitation of four ports.

Table 10-12 Priority of the rehabilitation of ports

Prerequisites	Luanda	Lobito	Namibe	Cabinda
Promotion of economic reconstruction	A	A	B	B
Close connection with relevant projects	B	A	B	C
Extent of deterioration of port facilities	B	B	A	C
Requirements from port authorities	C	A	A	C
Possibility of rehabilitation by a private sector	C	B	A	B
Total	1A(2B2C)	3A(2B)	3A(2B)	2B(3C)

Note: A: High priority in view of possibility, importance and effectiveness; B: Priority next to A; C: Priority next to B

As indicated in Table 10-12, the Ports of Lobito and Namibe have the same score of 3A, while the Ports of Luanda and Cabinda have 1A and 2B respectively. Comparing Lobito and Namibe, while both have the same score, priority shall be given to Lobito if emphasis is placed on the economic reconstruction of inland regions and landlocked countries. However, Namibe has priority if emphasis is placed on the deterioration of port facilities and the possibility of private enterprise participation. MINTRANS places priority on the rehabilitation of the Port of Namibe in consideration of the poor state of port facilities.

In order to increase the port capacity and productivity, it is indispensable to encourage the port development by means of financial assistance from the government or international donor agencies, particularly by means of low interest loan. Taking into account the financial situation of the Port of Namibe, it may be appropriate to give priority of grant aid assistance to Namibe. As the port of Lobito will need more funds for port rehabilitation and development than the port of Namibe, priority of loan assistance may be given to the port of Lobito.

While the port of Luanda has to be redeveloped by concessionaires, there are signs that some of them will not be able to raise enough funds to invest in their terminal. It is therefore necessary for the port authority of Luanda to encourage concessionaires to improve their terminal facilities to meet the increasing demand. Priority shall be given to the rehabilitation and improvement of the container terminal followed by the multi-purpose terminal.

In this regard, efforts are being made to propose a short-term rehabilitation plan for the ports of Lobito and Namibe.

11. Urgent Rehabilitation Program

11.1 The Port of Lobito

11.1.1 Facilities with Urgent Rehabilitation Needs

Among port facilities proposed in the Short-term Rehabilitation Plan for the Port of Lobito, Berths No.7 - 8 and their back yard have most urgent needs for repair work from the viewpoint of the demand, location and possibility of repair work. Figure 11-1 shows the area for Urgent Rehabilitation Program and Table 11-1 shows facilities and equipment required for the plan.

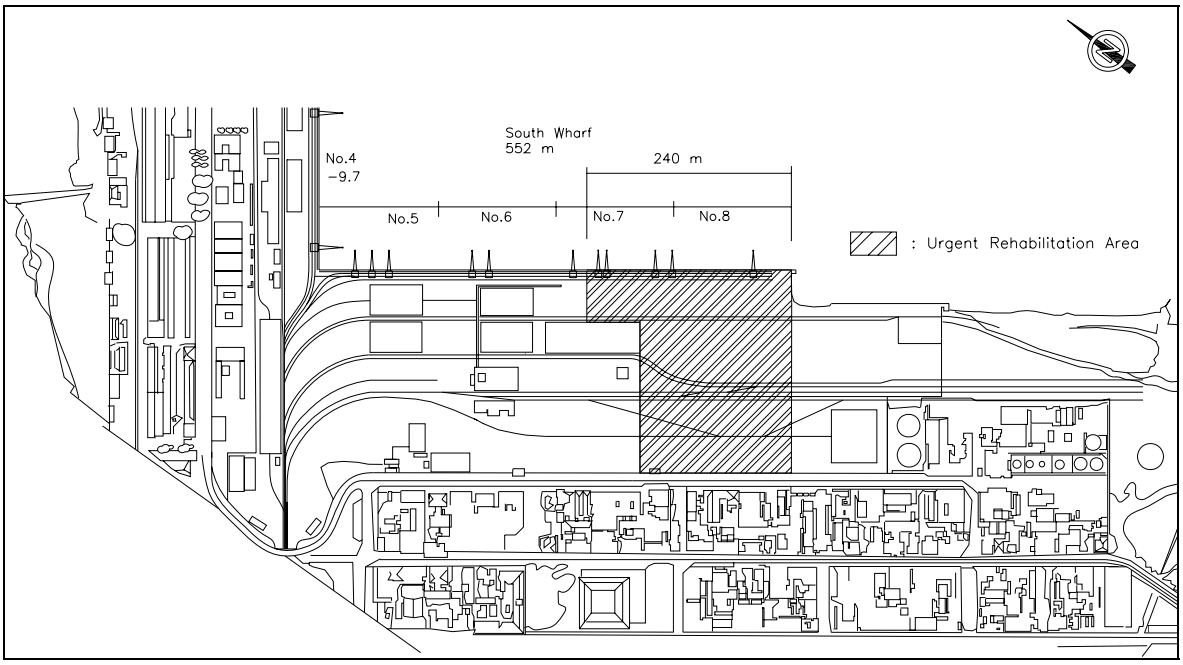

Figure 11-1 Urgent Rehabilitation Area in the Port of Lobito

Table 11-1 Urgent Rehabilitation Facilities and Equipment for the Port of Lobito

Facilities and Equipment	Location and Area
Pavement in the apron and yard	Apron behind the Berth No.8 and part of No.7; and yard with a total area of about46,000 m^2 (Urgent rehabilitation area has partially paved yard)
Quay wall and rubber fenders	Coping concrete and fenders on the quay wall of the Berth No.8 and part of No.7 with a length of 240 m
Reefer facilities and power supply	Reefer plugs and power generator in the container yard behind the Berth No.8 and part of No.7
Container handling equipment	One reach stacker and one top lifter for container operation
Water and fuel oil supply	Pipes and cables laid in the yard

11.1.2 Construction Plan and Cost Estimate

Based on the result of field survey, the construction plan and cost estimate will be compiled as follows.

Basic condition for cost estimate;

The construction cost has been estimated based on the result of material survey cost on October 2005 at Angola.

Exchange rate of currency is fixed as follows (Oct. 2005): US$1.0=Kz.87.6= ¥116

Construction period is estimated for 12 months.

Price escalation is not included for construction, and equipment.

Table 11-2 Port of Lobito Urgent Rehabilitation Plan Construction Cost

Facility	Unit	Quantity	Unit Price US$	Construction Cost (1,000US$)		
				Total	Foreign	Local
1.Apron,Yard Pavement	m^2	35,075	120	4,209	2,525	1,684
2.Repaire Wharf	m	240	680	163	82	81
3.Rubber Fender	set	20	82,000	1,640	1,476	164
4.Bollard	set	8	9,760	78	70	8
5.Remove Existing pavement	m^2	17,500	60	1,050	525	525
6.Repaire Water, Oile supply pipes	L.S	1		69	35	34
7.Reefer Facilities	L.S	1		384	346	38
Total				7,593	5,059	2,534
8.Cargo Equipment*	L.S	1		1,541	1,541	0
9.Engineering Services	L.S	1		759	531	228
Grand Total				9,893	7,131	2,762

* Reach Stacker: 1 unit, Top Lifter: 1 unit

Table 11-3 Port of Lobito Urgent Rehabilitation Plan Working Schedule (Month)

Work Item	1	2	3	4	5	6	7	8	9	10	11	12
1.Preparatory Works												
2.Apron, Yard Pavement												
3.Repaire Wharf, Car-stopper												
4.Rubber Fender, Bollard												
5.Remove Exist. Pavement												
6.Repair Water Pipe, Buoy												
7.Miscellaneous Works												

11.2 The Port of Namibe

11.2.1 Facilities of Urgent Rehabilitation Needs

Berths No.3A and its back yard have most urgent needs for repair work among port facilities proposed in the Short-term Rehabilitation Plan for the Port of Namibe from the viewpoint of the demand, location and possibility of repair work. Figure 11-2 shows the area for Urgent Rehabilitation Plan and Table 11-4 shows facilities and equipment required for the plan.

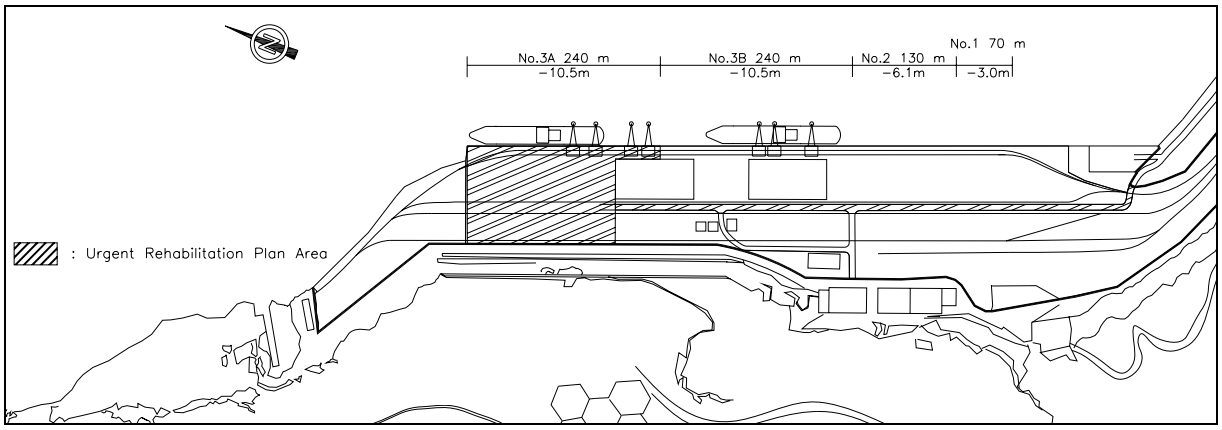

Figure 11-2 Urgent Rehabilitation Area in the Port of Namibe

Table 11-4 Urgent Rehabilitation Facilities and Equipment for the Port of Namibe

Facilities and Equipment	Location and Area
Pavement in the apron and yard	Apron and yard behind the Berth No.3A with a total area of 23,300 m^2
Quay wall and rubber fenders	Coping concrete and fenders on the quay wall of the Berth No.3A with a length of 240 m
Inner port road	Road from the gate to the Berth No.3A: 620 m
Reefer facilities and power supply	Reefer plugs and power generator in the container yard behind the Berth No.3A
Container handling equipment; Removal of unused quay cranes	One reach stacker for container, one forklift and one mobile crane for break bulk operations; and removal of four quay cranes
Water and fuel oil supply	Pipes and cables laid in the yard
Yard lighting	Lighting towers in the yard behind the Berth No.3A

11.2.2 Construction Plan and Cost Estimate

Based on the result of field survey, the construction plan and cost estimate will be compiled as follows.

Basic condition for cost estimate;

The construction cost has been estimated based on the result of material survey cost on October 2005 at Angola.

Exchange rate of currency is fixed as follows (Oct. 2005): US$1.0=Kz.87.6= ¥116

Construction period is estimated for 12 months.

Price escalation is not included for construction, and equipment.

Table 11-5 Port of Namibe Urgent Rehabilitation Plan Construction Cost

Facility	Unit	Quantity	Unit Price US$	Construction Cost （1,000US$）		
				Total	Foreign	Local
1.Epron,Yard Pavement	m^2	23,300	120	2,796	1,678	1,118
2.Repaire Wharf	m	240	680	163	82	81
3.Rubber Fender	set	20	105,000	2,100	1,890	210
4. Bollard	set	8	9,760	78	70	8
5.Repaire Access road	m^2	5,580	40	223	156	67
6.Remove Exist.pavement	m^2	5,000	60	300	150	150
7.Remove South Warehouse	m^2	3,600	100	360	180	180
8.Repaire Water, Oil supply pipes	L.S	1		31	16	15
9.Reefer Facilities	L.S	1		384	346	38
10.Lighting Tower	L.S.	1		95	67	28
11. Remove Quay Crane	L.S	1		82	57	25
Total				6,612	4,692	1,920
12.Cargo Equipment*	L.S	1		2,134	2,134	0
13.Engineering Services	L.S	1		661	463	198
Grand Total				9,407	7,289	2,118

* Mobile Crane: 1 unit, Reach Stacker: 1 unit, Folk lift: 1 unit

Table 11-6 Port of Namibe Urgent Rehabilitation Plan Working Schedule (Month)

Work Item	1	2	3	4	5	6	7	8	9	10	11	12
1.Preparatory Works	━	━	━									
2.Apron Yard Pavement					━	━	━	━	━			
3.Repaire Wharf, Car-stopper				━	━	━						
4.Rubber Fender, Bollard										━	━	━
5.Remove Exist. Pavement				━	━	━						
6.Repair Access Road								━	━	━		
7.Miscellaneous Works											━	━

11.3 Summary of Urgent Rehabilitation Program

11.3.1 Urgent Rehabilitation of the Ports of Lobito and Namibe

Previous Chapters 11.1 and 11.2 identify facilities and location with top priority for rehabilitation among facilities included in the Short-term Rehabilitation Plan. Table 11-7 summarizes facilities and equipment proposed for the Urgent Rehabilitation Program. Since the rehabilitation of the Port of Luanda will be carried out by concessionaires and that of Cabinda will be finished soon, the Study focused on the rehabilitation of the Ports of Lobito and Namibe.

In order to facilitate the rehabilitation, it is recommended to implement the Urgent Rehabilitation Program by grant aid from a donor country and to rehabilitate the other facilities included in the Short-term Rehabilitation Plan with a low-interest loan from a donor country and/or an international agency.

Table 11-7 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

11.3.2 Priority Package of Urgent Rehabilitation

Urgent rehabilitation program of the Ports of Lobito and Namibe consists of civil works, procurement of cargo handling equipment and installation of incidental facilities. Main part of the civil works is to restore the pavement of yard and apron to good condition, and to repair rubber fenders and coping concrete of the quay wall. Incidental facilities are reefer container storage, power supply, yard lighting, water and fuel supply, warehouses, silo and other facilities related to cargo handling.

Three areas, namely, civil works, procurement of cargo handling equipment and installation of incidental facilities, are so synergetic that they shall be carried out simultaneously. Cargo handling equipment cannot function effectively when the pavement is not in good condition. Rehabilitation of water pipe or fuel pipe and the pavement of yard and apron shall be implemented at the same time. Therefore, the three areas need simultaneous implementation.

If annual investment is limited due to budget constraints, first priority shall be given to civil works and second priority to the procurement of cargo handling equipment followed by the installation of incidental facilities such as reefer plugs, yard lighting and storage facilities.

It may be possible to carry out the rehabilitation in two stages; however, it is strongly recommended to implement each project of the urgent rehabilitation program simultaneously.

12. Emergency Port Rehabilitation Equipment

The objectives of this rehabilitation area are the ports of Cabinda, Luanda, Lobito and Namibe. Based on the field survey results and the list of each port rehabilitation, some rehabilitation equipments have been selected as emergency equipment.

12.1 Concept of Emergency Rehabilitation Equipment

12.1.1 Port of Luanda

The port plays an important role of cargo movement for three million people capital region in Angola. Most of port facilities belong to private companies by concession contracts of port operation, however some facilities are under direct control of port authority. Following emergency rehabilitation requirements can be found as candidate.

Rehabilitation of navigation aids

Removal of sunken ships and wrecks

Monitoring of sea depth inside port area periodically

The rehabilitation of buoys is proposed for the short-term rehabilitation plan and the removal of sunken/wrecked ships is for the mid or long-term development plan. Regarding the monitoring of water depth in port waters, it will be appropriate for the port to have a means of monitoring and implement periodical surveys by themselves. In this connection, echo sounder is selected as emergency rehabilitation equipment for the Port of Luanda.

12.1.2 Port of Lobito

The port is well known as the terminal of the Benguela railway and the port plays an important role of cargo movement for second largest city of Angola with population of eight hundred thousand. Most of port facilities are directly operated by Lobito port authority which has reputation of smooth operation. The port facilities look old but good working condition by preventive maintenance of workshop support system. Followings are candidate of emergency rehabilitation equipment.

Installation of steel plate to repair uneven ground condition at wharf

Floating fender system for container berth

Installation of steel plate putting on uneven ground at wharf will improve the cargo handling speed. Truck tires are used in stead of rubber fender system for entire existing wharf, floating fender will protect ship and wharf at the time of ship berthing for the time being, until installation of rubber fenders.

12.1.3 Port of Namibe

The port consists of two areas, namely the commercial port and Sacomar. The key role of cargo movement is transportation to southern part of Angola with population of three hundred thousand. Most of port facilities are directory operated by the Namibe port authority, however most of port facilities were constructed in 1958 and have remained without any maintenance after 1969. Followings are candidate of emergency rehabilitation equipment.

Installation of steel plate to repair uneven ground condition at wharf

Floating fender system for the commercial wharf

Installation of steel plate putting on uneven ground at commercial wharf will be

indispensable for smooth and safe cargo handling. Truck tires are used instead of rubber fenders for entire existing commercial wharf, installation of floating fender will protect ship and wharf at the time of ship berthing for the time being until the installation of rubber fenders.

12.1.4 Port of Cabinda

The port plays an important role as a logistic gate in the enclave province with population of two hundred thousand. Most of port facilities are directory operated by Cabinda port authority, it has a L-shaped jetty where general cargos used for daily life, however water depth is shallow in front of berth and ship cargo must be transferred by barge to 10km offshore.

The existing port needs maintenance dredging periodically due to sedimentation from river mouse, the long term new port plan is ongoing at another site recently. Monitoring of sea depth inside port area is selected as emergency necessity.

The sea depth monitoring by echo sounder in port is important for safety cargo handling, the technology transfer for monitoring system will be required.

12.2 Selection of Emergency Equipment

The detailed investigation have been performed during the field survey period to confirm the capability of acceptance of emergency equipment and we have confirmed that each port authority has enough manpower for implementation of civil/mechanical maintenance works and direct control by port authority will be most economical method. Regarding equipment material, reusable equipment/material in port will be prevailed. Items for selection criteria are shown below.

Equipment regarding high emergency component;

Equipment viable to be completed during study period;

Equipment cost less than fifty million yen each;

Equipment to contribute remarkable facilitate rehabilitation;

Equipment requiring procurement by foreign currency; and

Equipment capable of maintenance by each port authority

After selecting equipment, procurement method, procurement spec, appointed date of delivery and cost estimates are prepared. The criteria of candidate equipment is shown in Table 12-1.

Table 12-1 Criteria for Candidate Equipment

Item	Urgency	Period Delivery	Price	Rehabilitation Contribution	Foreign Currency	Maintenance Operation
Steel Plate	◎	◎	○	○	○	○
Floating fender	◎	○	○	○	○	○
Echo Sounder	○	○	○	△	○	○

12.3 List of Candidate Equipment

In accordance with the detailed site investigation and the result of hearing from each port authority, following list of candidate equipment will be decided (see Table 12-2).

Table 12-2 List of Candidate Equipment for Emergency Rehabilitation

Priority	Items	Period	Port of Luanda	Port of Lobito	Port of Namibe	Port of Cabinda	Approx Cost CIF Angola ¥
1	Steel Plate	5 Months		Container Berth	Container Berth		40 pieces ¥5,000,000
2	Floating Fender	5 Months		Container Berth	Container Berth		10 sets ¥40,000,000
2	Echo Sounder	4 Months	Depth Monitor			Depth Monitor	2 sets ¥2,600,000
Total							3 items ¥47,600,000

Selection Reason;

Priority 1: Commercial wharf of Lobito and Namibe ports have a lot of uneven ground condition at apron area, therefore installation of steel plate for smooth and safety cargo handling is recommended as emergency equipment.

Priority 2: 10,000 DWT class container ships are periodically visit to Lobito and Namibe container berths, however truck tires are using fender system in stead of international standard of rubber fender, installation of floating fender will be good countermeasure for the time being.

12.4 Additional Site Survey for Procurement

During the second field survey period, additional site confirmation survey has been performed at ports of Lobito and Namibe in collaboration with ports authority for steel plate procurement.

The study team explained the effective usage and storage of steel plate to ports authority and the detailed information, namely 20 pieces of 22mm thickness, 1.5m width, and 3.0m length covering space will be 90 m^2 in one 20 foot container for each port. JICA head office approved steel plate procurement during second field survey period and preparation of shipping for Angola has commenced promptly.

12.5 Delivery Schedule for Selected Equipment

12.5.1 Steel Plate

Two 20 foot containers have arranged for transportation and shipping Yokohama port addressed to ports of Lobito and Namibe on 24th November 2005. The original shipping documents already arrived each port authority in the first week of December 2005.

Twenty pieces of steel plates have arrived port of Namibe on 20th January 2006, the study team have visited the Port of Namibe on 8th February 2006 and the Port of Lobito on 14th February 2006 and confirmed the existence of steel plates at site and delivered it to the Ports of Namibe and Lobito with technical advice for practical usage of steel plate.

12.5.2 Echo-Sounder

Preparation of specification and instruction sheet have commenced in September 2005, procurement of echo-sounder has commenced in December 2005 in Tokyo Japan. Two sets of TDM-9000A Echo-Sounder are manufactured in Japan and transported to Angola by the study team on 2nd February 2006.

The demonstration and instruction of echo-sounder has been performed by the study team to the technical staff of the ports of Luanda and Cabinda on 3rd and 4th of March 2006 at the port of Luanda, namely equipment explanation by English and Portuguese technical instruction manual in the meeting room on 3rd, offshore training for bathymetric survey by echo-sounder on 4th respectively. The echo-sounder have been handed over to the ports of Luanda and Cabinda each one set.

13. Port Management

13.1 Laws and Regulations

13.1.1 Overviews

Until 1975, the National Directorate of Ports and Railways administrated Angolan seaports. But under the new regime, the ports were owned and managed by the National Government. In 1991/1992 National Constitution was reformed, and the Law for Economic Sectors (Law 13/94), which represents the first step towards liberalization of the economic sector, was approved by the National Assembly. In line with the new law, governmental organizations were separated into two categories: Organizations, which can be self-sustaining and thus subject to Market Mechanisms and those which are non-profitable or public in nature. After the year 2000, organizations in the former category were privatized. At this time, the port authority became a self-sustaining public enterprise. Presently, the self-sustainability of ports is in a trial stage. In 2003, the private investment law was modified and the Port Law was also modified (Law53/03).The modification was intended to simplify and modernize procedures so as to reap the benefits of private sector participation.

The privatization of the Luanda Port started in 2003. According to the privatization scheme, Luanda Port was divided into three administrative areas: The concession contracts for the two terminals were procured by direct negotiations with the operators. The third terminal, however, was opened to international bidding. The international bid was closed in March 2003. The result of the evaluation was announced in 2004. But there has been some debate concerning the fairness of the bidding procedure. Since the concessionaire of the third terminal has not been finalized, the Luanda Port Authority presently operates the third terminal. In the mean time, container throughput has increased steadily. Waiting time for vacant berths is also increasing. The early resolution of the concession issue is desired because the concessionaire will invest US$55 million in increasing handling capacity and this will go a long way towards alleviating congestion in the terminal.

13.1.2 Ministry of Transport and Port Authorities

1) MINTRANS (=Ministry of Transport)

MINTRANS presently controls Angolan ports. There are departments responsible for the land transport, maritime transport and ports, and civil aviation. The organization has been undergoing changes recently to better respond to the transport issues in light of privatization and globalization. The above three departments have recently converted into independent institutes. The institutes will have their own budget and the authority to make their own decisions.

Table 13-1 shows key indices of the Major Ports in Angola in 2004. Angolan ports are located at strategic places. Luanda, Lobito, and Namibe have a calm, wide, and deep basin sheltered by a peninsula that enables very big vessels to utilize the ports safely. In addition, natural resources are abundant in Angola. The restoration of the corridor will enable remarkable economic growth in Angola. Angolan Ports should be ready to cope with the cargo demand so as to contribute to the nation’s prosperity.

Table 13-1 Key Indices in Angolan Ports

	Cabinda	Soyo	Luanda	Lobito	Namibe
Nunmber of Personnel	150	63	1800	1200	720
Number of Berths	2	3	17	8	4
Yard Area (m^2)	9,000		450,000	153,000	112,000
Annual Ship Nos	307	100	2,863	742	422
Revenue('000 kz)	237,275	137,017	3,157,517*	1,832,801*	710,766
Expenditure('000 kz)	268,720	153,300	2,331,642*	1,787,950*	670,635
Balance('000Akz)	-31,445	-16,283	825,875*	44,851*	40,131

*Data in 2004

2) Port of Luanda

Luanda Port is managed and operated by the corporation of Luanda Port. The number of employees is 1800. Luanda Port has a consulate committee which advises or audits the activities of the Luanda Port. Recently Luanda Port started to turn over the cargo handling operation to the private sector. The personnel of the operation divisions in Luanda Port are also transferred to the newly formed private companies. Luanda Port has started concession contracts. According to the privatization plan, the port area is roughly divided into three parts. SONILS, which is the special logistics terminal for oil production, has started operation under a concession contract with the Port Authority. General cargo terminal is operated by newly formed private operators, which were the operation groups of the port authority. Multipurpose terminal area is reserved for the local companies, while use of the container terminal area will be decided through international competitive bidding. The progress of privatization has almost reached the final stage.

The Port of Luanda must play an important role in the nation's economic restoration. Since all of the problems will not be solved by privatization alone, the port authority and the Ministry of transportation must prepare multiple solutions.

3) Port of Lobito

Lobito Port is managed and operated by the corporation of Lobito Port. The number of employees is 1200. Lobito Port has an important role, as the center of the Lobito Corridor, in the transportation of the region. The port has conducted regular maintenance of its equipment to ensure that operations are not interrupted. However, current cargo volume is only 30% of the volume recorded in 1973. Since the rehabilitation of the Lobito Corridor is in progress, and it will start operation in the near future, port rehabilitation is urgently needed. As most of the facilities of the port are superannuated, they must be renewed and modernized.

4) Port of Namibe

The number of employees is 720. Namibe port handled six million tons of iron ore at the Saco Mar in the past. Presently the black granite stone for export is handled at Namibe Port. The repair of the pavement is urgently needed for safe operations as well as efficient cargo handling. Annual cargo volume reached 400,000 tons recently. But taking into account the resumption of railway service and production of mines in the hinterland, the port should be prepared to handle the envisaged demand as soon as possible.

5) Port of Cabinda

Cabinda Port is managed and operated by the Enterprise of Cabinda Port. The number of personnel of the enterprise is 150. Cabinda Port offers offshore midstream operation service and barge

transportation service from a place 10km offshore to the jetty at the port. The offshore operation is dangerous because there are no shelters from the long swell waves.

Cabinda Port has a jetty but it is not strong enough to support heavy containers. Cabinda Port is preparing for heavy log handling.

The balance sheet of Cabinda Port had shown a deficit because the container throughput was only 2,500TEUs in 2002, but a profit was registered when the container throughput became 4,000TEUs in 2004. Cabinda Port has to deal with sedimentation in the port basin and requires deepening of the access channel to accommodate regular-sized ships. It is difficult to solve the sedimentation problem using its own resources since the income is very limited. But Cabinda Port's hinterland is rich in natural resources. The port development of the Cabinda should be coordinated with the development of the hinterland with the assistance of government funds.

13.1.3 Problems of the Major Ports in Angola

1) Cargo Handling

Angolan Ports are currently old and ill-equipped due to the war. Common problems observed in Angolan ports are:

Damaged wharves have not been sufficiently repaired. Fenders for big ships are lost. The damaged mooring bits have not been repaired. Ships are obliged to suffer damage when they moor, or during cargo-handling operations.

Pavements are in poor condition. Vehicles and cargo are often damaged and lost. Accidents involving people sometimes occur.

Unused railways hinder the smooth movement of vehicles. The operational productivities are adversely affected by the railway crossings at the wharves.

Time is consumed because of ineffective mechanical equipment, such as old fashioned and insufficient heavy-duty quay cranes.

2) Financial Condition

The financial condition of Luanda, Lobito, and Namibe is improving because the cargo volume is increasing and the number of workers is decreasing. But Cabinda and Soyo Port do not have sufficient cargo volumes to enjoy the scale merit. The operation costs are high due to the long and shallow water basin of these ports. Ports must also try to decrease the cost at the port, since the ratio of the port charge in the price of the consumer goods is very high.

3) Port Tariff

Port Tariff has a direct influence on the financial condition of the public corporation. Each port does not decide the tariff by itself; the government decides it. Each port applies the decided rate based on the government regulations.

Note: The port tariff is provided by Decreto executive conjunto no.17/02 de 3 de Maio "Regulamento de tarifas Portiarias de Angola".

4) ISPS (International Ships & Ports Security Code)

ISPS code of the security measures of the sea route and the port comes into effect on July 1, 2004. Implementation of the ISPS has already been realized in Angola both for the security in navigation channels and the security of the port. The beacons are restored in some portions of the channel. The ports in Angola implemented the Port Security Plan, equipment, the personnel

assignment, and the check system, to satisfy regulations of ISPS code, though the original level of security was very high.

5) Customs Issues

The customs house in Luanda port has a very poor reputation because processing is very slow. A consignor has to wait a long time without reliable information on the expected date and progress of the clearance. Long waiting time causes a lot of economic loss for the nation, and hinders economic development. Angola government is tackling this problem seriously. The Crown Agent, the British consultant, is assisting with customs reform. One of the results is the abolition of the system of prior customs clearance. The prior customs clearance, on the one hand, is good for the port authority because it prevents port congestion. But on the other hand, it is irrational that the lack of documentation results in a penalty. The documents of prior customs clearance are not ready especially when the importation is done from a nearby country like South Africa. Crown Agent also encourages the introduction of the EDI system to streamline customs procedures.

13.2 Recommendations on Improving Port Management

13.2.1 Governmental Level

Angola started restructuring the Ministry of Transport in 1997 with the assistance of the World Bank. The objective of the reform is to strengthen the ability to implement the following:

Integration of ports in the national and regional logistics transport network;

Privatization of port operations;

Strategic port positioning on a regional scale, favorable to the development of a transshipment port; and

Amendments to the legal and institutional framing.

The purpose of the reform is to heighten the ability of creation of the laws. The lead-time of decisions will be shortened. The Port Law was renewed in 2003 to cope with the privatization of the ports (Law 53º/03).

But Angola is in the process of recovering from a long civil war. Telephone lines are not yet available throughout the entire country. The public transportation is not reliable. Employees generally return home from work at three in the afternoon.

Under these circumstances, a lot of work remains to be done. A Special Institution with its own source of funds is planned to expedite the implementation of the ports policy. However, this Institution has not yet been realized. Focusing on urgent needs, the following functions of the public sector should be strengthened.

Function of authorization of the Master Plan of the port;

Function of provision of the technical information which are useful for the ports to establish the future plan or to preserve the environment of the ports;

Function of the sponsorship of the port development; and

Function to remove the confusion or excessive competition among port operators.

13.2.2 Port Authority Level

For improvement of the port management, it is recommended that the following issues be addressed

Master Plan

Safety and Hygiene Regulations at the Port

Easy Access to Port Regulations and Tariffs

Strengthening of Organization

Acquisition of Knowledge

Open Discussions on Efficiency Enhancement

13.2.3 Enhancement of Efficiency in Terminal Operation

For enhancement of efficiency in terminal operation, it is recommended that the following issues be addressed.

Upgrading of Infrastructure

Implementation of Mechanization

EDP (Electronic Data Processing)

13.2.4 Palliative Measures for Port Congestion

Eventually the expansion of Luanda port is required to cope with congestion. In the short term, the following steps can be taken.

As the terminal operator has not introduced a computerized system, it can not find the stowed place of container and can not give precise instructions to the truck driver. Tally man has to look for containers each time. Therefore it takes a long time for container delivery. Such an inefficient system should be improved for smooth and rapid works in the terminal. Traffic jam on roads to/from Luanda port should be improved.

Consignee do not receive containers immediately because there are not sufficient warehouses for imported cargoes. A lot of containers are stowed at the terminal for many days (maximum 4 weeks) until being delivered. Furthermore storage fee at the terminal is very cheap in Luanda port compared with other ports, where high storage fees have been set to prevent port congestion caused by container's long staying. On establishment of port tariff including storage fee, the Ministry of Transportation contacts the Ministry of Finance. Such low storage fee should be increased for the sake of quick receipt of imported cargoes.

By utilizing inland depot for stuffed and empty containers, usable space of the terminal should be enlarged. By introduction of night work (discharging/loading and delivery/receipt of containers at night), operation efficiency of the terminal should be improved.

Together with the introduction of the Emergency Terminal Congestion Surcharge on 30th June 2005, Port of Luanda prohibited return of empty containers to the terminal. They have to be returned to the yard for empty vans located a long way from Luanda port. They are kept there and taken to Luanda port at night when there is no traffic congestion at the cost of shipping lines.

13.2.5 Introduction of Efficiency of Private Company

A lot of private companies are participating in the operation of container terminals throughout the world. The main purpose is to improve the efficiency of port operation, to advance the service level of the port and to stabilize the port management. Also in Luanda port, private companies are requested to participate in port operation for the sake of advancing the service level and decreasing the charges concerned.

1) Advancement of Port Service

Port is a very important trade infrastructure both for the nation and the region. Due to the globalization of economic activities, efficiency and costs of port operation have a greater impact on Angola's economy than before. For example, if Luanda Port suffers from port congestion, ocean freight and charges to Luanda become higher than that to neighboring ports around Luanda.

By introducing the skill and energy of the private sector, efficient port operation can be expected. Charges should also be decreased.

2) Efficient Management of the Port

In case the public sector operates and manages a port by itself, it sometimes can not take prompt decisions due to its bureaucratic nature. When a private company participates in port management, however, quick responses can be expected. Private companies are also more willing to take risks which can lead to large profits provided the port is well-managed. Therefore a private company would have a strong incentive to alleviate port congestion and cope with sudden changes in the economy and trade conditions.

3) Promotion of the Port

Because of 30 years civil war in Angola, there are few persons with the necessary skills to carry out development and port management. By introducing international terminal operators, Luanda port will be able to offer world-class port service. Prompt development of the port can be also expected due to the terminal operator's ability of canvassing a lot of containers.

4) Reduction of Financial Burden

The Angolan government is suffering from financial constraints. It can not supply the funds required for port development by itself. On the other hand, the realization of an efficient port is earnestly required. The introduction of private funds can free Luanda Port Authority from its financial problems. Furthermore it can obtain profit, or concession fee fixed by the concession agreement.

However, at this stage, UNICARGAS (one of the private companies with a fixed concession agreement with Luanda Port Authority) lacks the experience of a world-wide terminal operator. It is not a private company but a state-operated company. AP Moller Terminals under the Maersk group equipped with sufficient experience in world-wide terminal business made a successful bid for the concession agreement. However it has not been able to start construction of its terminal for more than two years due to a dispute with SGEP, who is contesting the result of the bid.

Therefore Luanda port has not benefited from the concession agreement in spite of its eagerness. Following measures can be taken to promote effective privatization.

5) Establishment of Council for Observation of Port Privatization

It is desirable to establish a council to oversee privatization of Luanda port. The council should be independent from both the private terminal companies and Luanda Port Authority. It should consist of persons with expertise and experience working in important posts of the Angolan government, Luanda local government, shipping lines and shippers. It should monitor the progress of the concession agreement and should give parties concerned instruction on terminal construction and ways to improve terminal management if required.

With reference to the Container Terminal, the Angolan high court has been deliberating on the bid dispute between AP Moller Terminals and SGEP for more than two years. This unresolved issue is one of main reasons for the severe port congestion because nobody can invest in

the Container Terminal and improve it. It is hard to predict which one will win in the high court. An early settlement is required.

6) Support of Angolan Government for Financing of Private Company

Neither Multi Terminal nor UNICARGAS has sufficiently invested in its terminal. One of reasons is a lack of financial resources. Considering the financial situation of Angola, it is difficult to use budget of the national government and the local government. A loan supplied by foreign country and guaranteed by the government should be considered.

7) Incentive for Private Company

Concession fee should be settled so that private companies can increase their profit by handling more cargoes. If concession fee is increased according to the increase in cargo, some discount rule (for example: discount rate for cargoes exceeding settled line fixed by private company and Luanda Port Authority) should be introduced.

13.2.6 Improvement of Maintenance and Repair Engineering

It is recommended that an appropriate maintenance plan of port facilities be established and implemented taking into account the following items:

Facility inspection should be divided into two main categories, regular inspection and irregular inspection in the event of a natural disaster. Each inspection is comprised of primary inspection and secondary inspection.

Primary inspection represents a simple and economical way of checking the apparent condition of the port facilities by visual survey and by some portable equipment.

Secondary inspection is conducted by using some special equipment and/or locally-demolishing the facility when the physical deterioration degree and cause of the degradation of the facility do not become clear in the course of the primary inspection.

Inspection method is recommended 1) to have enough degree of accuracy to measure allowable limits of the deterioration, 2) to employ portable equipment, and 3) to be workable and secure enough.

Inspection data is necessary to be collected and kept under certain rules. Systematically-collected maintenance data is background information to assist in appropriate deterioration assessments and formulation of maintenance and repair plan of the relevant facilities. In addition, it is useful in drafting a comprehensive repair plan and studying the life cycle cost of the relevant port.

In general, repair works include 1) countermeasures for restoring the deterioration, 2) countermeasures to arrest the progression of deterioration, 3) countermeasures for reinforcing the impaired function, 4) countermeasure against the cause of deterioration, and 5)countermeasure for reducing external forces.

Repair method should be determined in consideration of utilization of the facility, degree of deterioration, economic efficiency and workability of repair works as well as expected lifetime of the existing facility.

When conducting the repairing or strengthening works, it is necessary to draft the repairing or the strengthening plan defining the target restoration level of the facility. When conducting demolishing or scrapping works, it is necessary to select the optimum work method in view of the environmental condition, safety of the works, waste disposal and work period.

When the deterioration of the facility may have an impact on third persons, some kind of emergency measures should be taken.

In case that the degree of functional loss is not serious at present but is anticipated to worsen, it is necessary to increase the frequency of inspection and add the inspection items.

13.2.7 Improvement of Port Security Measures

The Study team recommends the introduction of the following measures to enhance port service at Angolan ports.

Improvement of port security awareness;

Clarification of responsibility;

Enlightenment of inhabitants / persons concerned;

Introduction of the most suitable security system;

Cooperation with related organizations;

Appropriate training;

Sharing latest information;

Compilation of international freight statistics; and

Drafting of the enforcement plan for port security improvement.

13.2.8 Funds for Port Rehabilitation

The following measures are recommended.

Practical Use of Existing Facilities and Formation of Cost-Saving Project

Expansion of National Government's Infrastructure Budget

Foreign ODA Loan Appropriation

Measures to Attract Private Sector Participation

13.2.9 Fostering Talented Personnel

For fostering of human resources, it is recommended that the following issues be addressed.

Open Hiring Policy

Wages Based on Merit

In-House Training System

13.2.10 Summary of Recommendations

Nothing is more important for Angolan Ports than to solve the problem of ship waiting time. In Luanda Port, 5 days on average are consumed in waiting. Around 700 foreign vessels call per year. The loss for waiting per ship is US$15,000 per day. As a result, the nation of Angola loses at least US$ 30 million per year. Since the cost for the waiting ships is borne by the Angolan people, this problem must be solved urgently.

14. Capacity Development

14.1 Capacity Gap Assessment

Capacity gap is assessed in combination of the Infrastructure, Institution, and Personnel. The tasks of each port were taken into consideration to formulate the Capacity Development. Since there is not much difference between ports in terms of problems and countermeasures, the result of the assessment is summarized as a whole and shown in Table 14-1.

Table 14-1 Summery of Capacity Gap Assessment

Problem Area	Capacity Gap			Action Needed	
	Capacity Gap	Priority	Time span needed	Tasks	Necessity of Training
Insufficient Capacity to cope with the Cargo Demand	Large	A	Medium	Strengthen of Planning Division	Yes
				Strengthen of Technical Division	Yes
Inferior service for the customers comparing to International Standard	Large	AA	Medium	Introduction of EDP & EDI	Yes
				Procurement of Equipment for EDP & EDI	Yes
High Operation Cost	Large	AA	Medium	Containerization	Yes
				High efficiency with EDP	Yes
Shortage of Technology	Large	B	Medium	Participation in seminars	Yes
Domestic Marine Transportation Service is not available	Large	C	Medium	Test operation	Yes
				Promotion of the Domestic Marine Lines	Yes
Insufficient countermeasures for Safety & Hygiene	Small	B	Short	Publication of the Regulations on Safety & Hygiene issues	Yes
Congestion of the port, Delay of delivery of cargo	Large	AA	Medium	Introduction of EDP & Bar Code	Yes
Low productivity at yard operation, as well as business documentation.	Large	AA	Short	Ability to simulate the yard operation	Yes
				Introduction of EDP & Bar Code	Yes
Lack of know-how for avoiding trouble in case of business crises.	Small	A	Short	To acquire the know-how for avoiding trouble	Yes
				To have the manual in case of trouble	Yes
Lack of maintenance	Medium	B	Short	To have the maintenance manual	Yes
				To allocate the budget for the maintenance	Yes
High Price of Port Charges	Large	AA	Medium	To promote efficiency	Yes
Lack of Investment Funds	Medium	B	Long	Institutional Reform	Yes
				Privatization	Yes
				Application for Funds	Yes

14.2 Plan for Capacity Enhancement

The congestion at the Port of Luanda causes tremendous losses to the nation, and thus urgent Capacity Development is required to enhance the efficiency of the terminal operation. Accordingly, the following subjects are selected for technical transfer.

Ministry of Transport

Guidance on implementation of the project, from planning phase to commission phase;

Examples of terminals constructed with Japanese assistance; and

Port Policy, and experiences of Port Development in Japan (Through counter part training).

Port of Luanda

Financial loss caused by waiting ships;

Enhancement of efficiency in terminal operation by EDP; and

The history of Japanese Port Policy in relation to economic growth.

World shipping lines

Port of Lobito

Financial loss caused by waiting ships;

Enhancement of efficiency in terminal operation by EDP;

The history of Japanese Port Policy in relation to economic growth; and

World shipping lines.

Namibe Port

Financial loss caused by waiting ships;

Enhancement of efficiency in terminal operation by EDP; and

On the Job training of EDP.

Other than the seminars, the lectures and workshops, the counterpart training was also carried out during the Study Period. Under the JICA scheme, counterpart training is carried out for the two Angolan officials who play very important roles in drafting the port policy in Angola. These official made site visits and held fruitful discussions with Japanese officials from the Ministry of Land Infrastructure and Transport, Tokyo Port, Yokohama Port, and Hakata Port.

Since EDP is very useful to enhance efficiency in terminal operation and office documentation, the team made a presentation on EDP during its second visit in Angola. EDP will surely improve the following problems:

Productivity in the quay as well as the yard will be improved;

The reduction of port charges and increased profitability will become possible;

The wage level can be improved by the enhancement of productivity;

The issue of bills, receipts, and the disbursements of clerical work will be streamlined;

Prompt use of the statistical data will become possible;

The analysis of financial matters will become easier; and

The quality of the service can be improved to the international level. The customer's waiting time can be reduced.

The inefficiency that is caused handwritten documents can be avoided with the barcode handy terminals and the personal computers. The barcode handy terminal can read the barcode and record the characters through pushing the buttons like a mobile phone. One can easily record things in a form of electronic data at the site of operation. Fifteen years ago, the cost to introduce a computer system for container operations was about US 500 million dollars. However due to the progress in computer technology, the computer and supporting software has become cheaper and more widely available. Now, it is possible for the staff of a port authority to create the software for controlling containers if he has enough knowledge to utilize the Micro-soft Excel Program with Visual Basic.

However employees of the port have had little experience in using the current personal computers. The development of the system also needs a trial and error period. The assistance of the experts will be useful for avoiding confusion. Capacity development for the EDP is described in detail in 14.4.

14.3 Workshops and Seminars

14.3.1 Outline of Workshops

Workshop (lecture on the latest news of shipping and ports) was held mainly for staff of the Luanda Port Authority so as to support construction of Luanda Port under the concession agreement.

Participants (staff of Luanda Port Authority)

Mr. Antonio Domingos G.Paz (Audit Cabinet),
Mr. Augusto das Necessidades Francisco (Maintenance Dept.),
Mr. Conceicao Sibo (Marketing Dept.),
Mr. Diamantino Joaquim (Chief of Fiscalization/ Finance Section),
Mr. Euralio da Rosa (Chief of Technical Dept.),
Mr. Inacio Avelino (Inspector of Fiscalization),
Mr. Iracema Carvalho (Research, Planning and Statistics Dept.),
Mr. Mafundamene Manuel Antonio (Medium Technician of Civil Construction),
Ms. Maria Angela da C.Lafayette (Chief of Juridical Cabinet),
Ms. Maria Candida Gaspar Cohen (Chief of Study Cabinet),
Mr. Nicolau Diavunda (Civil Engineer of Technical Department),
Mr. Paulo Pereira Nunes (Chief of Electricity Sector),
Mr. Pedro Doria (Infrastructure Dept.),
Mr. Roberto Martins (Commercial Dept.),
Mr. Rodrigues Alberto (Auditor/ Superior Technician of Audit Cabinet),
Mr. Rosa Palmira (Commercial Dept.),
Mr. Rui Mendonca da Silva (Commercial Director),
Mr. Sansao Pitra (Technical Director),
Mr. Sebastiao Celio Faustino Baltazar (Medium Technician of Electric System)

Significance of container transportation in the day of globalization (Yoshimoto)

Role of ports in Japan for economic growth (Kunita)

Condition of advancement of container port (Yoshimoto)

The latest situation of shipping and ports in West Africa (Yoshimoto)

The latest situation of Chinese port (Yoshimoto)

The latest situation of Luanda Container Terminal (Yoshimoto)

The way to attract shipping lines to container ports and privatization (Yoshimoto)

The biggest container shipping company in the world (Yoshimoto)

Cost concerned in container terminal (Yoshimoto)

Congestion in container terminal and measures to solve it (Yoshimoto)

Role and function of vessels 1 (Yoshimoto)

Role and function of vessels 2 (Yoshimoto)

Plan of port construction in Japan (Takemura)

Operation in container terminal (Yoshimoto)

Economic affection of development of container port in Colombo under support of Japan (Suzuki)

Significance of public works and privatization (Yoshimoto)

Maintenance of port facilities (Kiyosue)

Modern railway terminal in port (Nakano)

Role of port authority in concession agreement (Kunita)

Project to modernize Douala Container Terminal in Cameroon (Hoshino)

14.3.2 Technical Transfer through OJT

For the purpose of technology transfer, the following events and seminars were held.

Seminar for bathymetric survey at the port of Luanda (Aoyama)

Workshop for heavy cargo at the port of Namibe (Kunita)

Workshop for the deterioration survey at the port of Namibe (Kiyosue)

How to plan and manage a bulk terminal (Kunita)

Seminar for bathymetric survey at the port of Cabinda (Aoyama)

Workshop for the deterioration survey at the port of Lobito (Kiyosue)

Workshop for the deterioration survey at the port of Namibe (Kiyosue)

14.3.3 Outline of Seminars

JICA Study Team held a seminar for staff of the Ministry of Transportation and the Luanda Port Authority in Oct. 2005 and for staff of the Lobito Port Authority in Mar. 2006, so as to explain the latest situation of shipping and ports and to discuss the ideal port.

1) Seminar on Management of Port and Growth of Container Vessels

Place and Date

Seminar room of the Port of Luanda, 26th October 2005

Management of ports and types of port authorities (Suzuki)

Growth of container vessels (Yoshimoto)

2) Seminar on the Latest Situation of World Ports

Place and Date
Meeting Room of the Port of Lobito, 3rd March 2006

Recovery of ports in Japan (Okada)

The latest situation of container shipping (Yoshimoto)

Information or indispensable factor for improvement of efficiency in ports (Kunita)

3) Seminar on Rehabilitation and Modernization of Angolan Ports

Place and Date
Conference room of Presidente Hotel, Luanda, 15th June 2006

Japan's experience on port reconstruction following World War II (Okada)

Short-term rehabilitation plan and future development of Angolan ports (Suzuki)

International cooperation by Japan's ODA (Takahashi)

14.3.4 Monitoring of Capacity Development

1) Post Evaluation of Workshop

All participants highly appreciated the new knowledge acquired through the workshop, which would be useful for improvement of their daily work.

Participants were interested in port management and concession agreement, operation of the port, establishment of the port development plan and construction work. Requests were made for lectures on information systems in ports, security policy and protecting the port environment. They also understood following factors are required for development of Luanda Port.

Role of concessionaires and port authority is required to define. The construction practice of concessionaires is also required to observe;

Training including OJT (on the job training) is necessary for port management; and

A long term plan of port operation is required.

2) Feedback from the Seminar Participants

All participants highly appreciated the new knowledge they acquired through the workshop, which would be useful for improvement of their daily work.

Participants were particularly interested in port management and concession agreement, operation of the port, establishment of the port development plan, the latest situation of shipping in the world, construction work and Japanese experience in the restoration of ports. Requests were made for lectures on information systems in port and port management. They also understood following factors are required for the development of Lobito port.

Continued cooperation with JICA;

Solid personal training;

Efforts should be made to increase skill level of each section;

Latest knowledge of cargo handling needs to be acquired;

Knowledge on the operation of port, terminal and containers is acquired;

Personnel should participate in workshops or in-house training including those offered abroad;

Temporary transfer/exchange system with staff of other ports should be established; and

Awareness of international developments is important.

14.4 Capacity Development Concerning the EDP (Electronic Data Processing)

14.4.1 On the Job Training in Namibe Port

The position of container is recorded using pen and paper in the Port of Namibe. When the loading operation is carried out, time is consumed for seeking the boxes. Fortunately, because of the small volume of handling, such as 5,000TEUs per year, there are no big losses. However, in the event that the cargo increases due to the restoration of Mocamedes railway, the tremendous losses in time will occur if EDP is not available. Since the port of Namibe is very eager to introduce EDP, the team carried out the Capacity Development on the EDP, i.e. applying to the check-in and check-out work at the gate, and tracing the container location in the container terminal.

The port prepared a new operation room for the above equipment. The port will attempt to make the maximum use of this new equipment.

Table 14-2 EDP utilization training at Namibe Port

Applied Item	Description
Check in/ Check out	Recording of container number and date/time at the gate or the wharf (Processing with computer program: Excel+VBA) Duration time (days) at container terminal, sorted by company
Container location	Recording of location of container, container number, and date (Processing with computer program: Exel+VBA) Listing of container location according to the loading sequence

Table 14-3 List of the equipment for the enhancement of the efficiency in Namibe Port

Commodity	Unit	Nos	Remarks
Bar Code Handy Terminal		4	With Cradle
Bar Code Reader (USB)		3	
Scanner Printer		2	
Personal Computer		3	With Office Soft
Ruminator		2	With Transformer
Projector		1	
Camera		1	
Consumables	Sum	1	

14.4.2 Assessment of Technology Transfer of EDP

Inquiry was made in order to clarify the effectiveness of the technology transfer. Following answers were obtained from the participants.

Do you understand how to read bar code using handy-terminal?

Yes=83%, No=0%, Gray=17%

Do you understand how to transmit the data from handy terminal to PC?

Yes=100%, No=0%, Gray=0%

Do you understand how to use the search function for location of container?

Yes=17%, No=0%, Gray=83%

Do you understand how to use the function for listing locations of containers?

Yes=0%, No=0%, Gray=100%

Do you understand how to make the bar code?

Yes=66%, No=34%, Gray=0%

Do you understand how to decide the addresses of container bays?

Yes=50%, No=50%, Gray=0%

Do you understand that EDP is useful to trace the location of container, and useful to enhancing the efficiency of container handling?

Yes=100%, No=0%, Gray=0%

How would you summarize the technical transfer on EDP?

I am interested in this subject and need more time=100%
It is enough. I fully understand it=0%
No more training. I am not interested=0%

All the trainees realized that the EDP is useful for the enhancement of the efficiency of container handling, and all the trainees felt the time for training was too short. The Port of Namibe also stated that it would welcome additional technical transfer on EDP from JICA.

14.5 Summary of the Capacity Development and the Feedback

The JICA study team carried out technical transfer to the employees of Luanda Port in order to realize efficient container operation. However the knowledge gained may not have a practical application because the responsible bodies for the cargo handling operation are mainly the cargo-handling operators.

For the Luanda Port Authority to solve the problem of losses caused by ship waiting etc., a Master Plan that will lead to private sector investment is vital. JICA is willing to offer its assistance if the Angolan Government requests the Master Plan Study for the Luanda Port.

JICA study team also conducted technical transfer at the Port of Lobito. The annual throughput of the port of Lobito is around 50,000 TEUs. The volume is not much now, but it is useful to apply the EDP even today. Lobito Port has just introduced a LAN network. However there are no trials to carry out the EDP. The development of the EDP system requires a trial and error period and the assistance of experts. If a major shipping line can provide the EDP system, it would be very useful for the progress of container handling in Lobito Port. In the near future, the container throughput at the port of Lobito will increase remarkably. JICA is willing to conduct the Master Plan Study if requested by the Angolan Government.

For the Port of Namibe, JICA Study Team conducted “on the job training” for the EDP in the container yard. The barcode readers and computers have been installed in the port. The responsible persons in real container handling operations in Namibe Port experienced the computer controlling of the container in a preliminary manner. But the development of the EDP system requires a trial and error period and the assistance of the experts. JICA is willing to continue its technical transfer if requested by the Angolan Government. If a major shipping line can provide the control system in the form of a grant, the lead-time for the delivery of containers could be greatly reduced.

15. Future Development of Angolan Ports

15.1 Requirements for Future Development

Angolan economic development has just turned the first corner and its growth will continue for a considerable period of time. International trade grows together with economic development and ports enjoy increasing cargoes. However, ships suffer from long waiting queue; the average waiting time has reached 5-7 days in the first quarter of 2006 at the Port of Luanda. Without a dramatic improvement in cargo handling capacity, ship waiting time will increase rapidly. At the early stage of economic development in China, ship waiting time once reached 30 days and caused serious problems for economic activities. Since Angola imports almost all commodities necessary for daily life, construction, agriculture and manufacturing, it is most important to have capable ports and eliminate ship congestion. Port development is therefore essential to continue economic development and stabilize people's daily life. Requirements for Angolan ports are as follow:

(Full Scale Container Terminal)

Immediately after the rehabilitation of ports, it will become essential to develop a full scale container terminal. Due to port congestion in the Port of Luanda, surcharges are levied and the freight rates to Angola become much higher than the rates to nearby countries. To reduce the port congestion, development of a new full size modern container terminal is indispensable at the Port of Luanda. The Port of Lobito will also need a full scale container terminal as a gateway to Benguela Railway. These terminals can be utilized for the economic development of the inland countries in Sub-Sahara Africa. If the terminals are used for container transshipment, the ports will become a hub for the west coast of Africa.

(Bulk Cargo Terminal)

Bulk cargoes, such as ore, coal, grain, fertilizer, timber, gravel, petroleum and other masses, are basic materials for industrial activities. Since industrial and agricultural development is heavily dependent on bulk cargo transportation, ports shall have facilities to handle these bulk cargoes. Methods of bulk cargo handling have been changed due to large bulk ships built for a special purpose. Angolan ports have remained unchanged for 30 years, so bulk cargo facilities have deteriorated or become out of order. It is urgently required to build modern bulk cargo facilities including ship loaders, cranes, silos, conveyors and other equipment.

(Multi-modal Transport)

Multi-modal transport will soon become popular in Angola like in many other countries. To cope with this system, container marshalling yard shall be built adjacent to/in the ports. The yard shall have facilities to transfer containers from truck to railway wagon or vice versa. The Ports of Luanda, Lobito and Namibe have railway tracks in the ports, so it is important to rehabilitate the railway and utilize them for container transportation. If coastal shipping service becomes available, it will be beneficial not only for domestic cargoes but also for transshipment cargoes.

(Access Road/Railroad to Ports)

Access road/railroad to ports plays a vital role in improving the capacity of ports through ensuring smooth traffic and reducing the dwelling time of cargoes. Port related traffic shall be separated from the city traffic as much as possible and go through the outskirts of the city. Location of the inland container depots shall be planned in view of smooth access to ports.

(Practical Use of Information Technology)

Electronic data processing in port documentation, such as ship arrival and departure, cargo inventory, customs declaration, immigration documents and others, will bring smooth cargo handling operations and reduce the dwelling time of cargoes and the turnaround time of ships. One stop service of port procedures will be brought to users by Information Technology. It is strongly recommended that Angola ratify the International Convention on Facilitation of International Maritime Traffic, 1965, and make efforts to introduce the standard documentation in port procedures. In order to improve the productivity and facilitate the use of Angolan ports, EDP and practical use of IT are indispensable for port authorities, terminal operators, shipping agents, customs, immigration and other port related business.

(Channel and Basin)

To secure safe navigation, it is required to clear wrecked/broken ships and obstacles in the port waters, to rehabilitate/set buoys and beacons, and to expand the capacity of anchorage sheltered from waves. It is also important to implement periodical maintenance dredging and revise navigational charts through conducting water depth surveys. Ship disposal and long-term anchorage in the port waters shall be forbidden in view of the increasing ship traffic.

(Hazardous/Flammable Cargo Area)

Taking into account the worst scenario, facilities for handling hazardous/flammable cargoes shall be located in an area separated from other busy areas such as general cargo terminals and container terminals. In addition, special attention shall be paid to the navigation of tankers and ships carrying other hazardous materials. Floating oil fence and other disaster prevention goods shall be equipped with ports.

(Protection of the Environment)

In a sheltered bay like Luanda and Lobito, organic matters will easily accumulate in the port waters and an explosive increase of plankton will take place and cause a red tide. Port authorities and environment department of the government shall jointly monitor the discharge of water into the bay and take necessary action to regulate the discharge. It is also necessary to collect floating garbage, oil and wastes on the surface of port waters. To prevent water/air pollution, port authorities shall monitor the discharge from ships and the emission of gas.

Angola has already ratified the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78), and its Annex VI (Prevention of Air Pollution from Ships) which became effective in 2005. In this connection, it is required to take necessary measures to reduce gas emission from ships. Since ships generate electricity for their cranes, refrigerators and other devices, ports are requested to supply electricity to ships at berth in order to stop the use of ships' generators. While the power supply in Angola is severely limited at present, it shall be considered at the earliest stage.

(Port Security)

Port security recently became a critical issue in port operation. Special measures to enhance maritime security were adopted in 2002 as an amendment to the International Convention for the Safety of Life at Sea. Since Angola has ratified the convention, port security measures shall be taken in accordance with this convention. Access control at Angolan commercial ports is very strict for people but less so for cargo. It will be necessary to install X-Ray inspection devices and check the inside of containers at the Ports of Luanda and Lobito. In addition, security cameras and closed circuit television will be needed to enhance the security in the future.

15.2 Future Development of Four Ports

15.2.1 Future Development of the Port of Luanda

As described in Chapter 8.3, the Port of Luanda granted a concession to private operators and concessionaires are responsible for the rehabilitation of facilities and the reform of terminals. General cargo terminal and multi-purpose terminal have already been leased out for 20 years in 2005. Concessionaires of both terminals plan to implement part of their rehabilitation plan including the procurement of cargo handling equipment. A concession of the container terminal has not yet granted to a private operator, so the terminal remains without any rehabilitation.

Since the average ship waiting time at the Port of Luanda became 5-7 days in the first quarter of 2006, it is urgently required to improve the productivity and expand the capacity of the port. Assuming the general cargo terminal and multi-purpose terminal were fully developed and equipped with modern cargo handling facilities, container handling capacity will be 400,000-500,000 TEUs judging from the size of terminals. Container throughput was about 300,000 TEUs in 2004 and remained at the same volume in the first half of 2005. Without improvement to the infrastructure and equipment of the present terminals, container handling capacity will not increase beyond the present volume. Table 15-1 shows the size of present terminals and envisaged terminal.

Table 15-1 Present Terminals and Possible New Terminal at the Port of Luanda

Terminal	Depth	Berth, Length		Area (m^2)	Type of Cargo
General Cargo	10-10.5 m	5B	800 m	100,000	General Cargo
UNICARGAS	10.5 m	3B	580 m	190,000	General 30%, Container 70%
Container	10.5 m	3B	520 m	140,000	Container
New Terminal	13-14 m	2B	600 m or more	35-40 ha	Container

Demand for container throughput at the Port of Luanda is estimated at about 700,000-900,000 TEUs in 2010 as described in Chapter 9.3. Since the total capacity of container handling is estimated at about 400,000-500,000 TEUs at the Port of Luanda, there will be a large gap between the demand and the capacity in the near future. Consequently, heavy congestion will take place in the port and that may bring further surcharges on ocean freight rates and finally the cancellation of services. In this scenario, Angola faces a huge economic loss due to the soaring cost of imports.

Since the quay wall of the present terminals has a depth of about 10.5 m, large container ships have difficulty in berthing at wharves. Typical size of container ships deployed in Angola services is 20,000 DWT with a carrying capacity of 1,600-1,800 TEUs and a maximum draft of 10-11 m. These container ships carefully berth at wharves in Port of Luanda checking its operating draft, therefore, the wharves are requested to have a depth of 12 m or more. Container ships deployed in a service between Europe and Cape Town are 50,000-60,000 DWT with a carrying capacity of 4,000 TEUs. For the Port of Luanda to accommodate this size of container ship, new terminal shall have two berths or more with a total length of 600 m or more and a depth of 13-14 m or deeper.

Container terminals shall have quay cranes with a loading capacity of 40-45 tons or more, so the cranes need strong foundations under the crane rails, which are usually built by steel pile structure. In this connection, the front foundation is usually built in front of the existing quay wall, so the wharf needs to refurbish a new quay in front of the front foundation. The rear foundation is built in the middle of the apron, so it will be necessary to close a berth temporarily during the construction.

Figure 15-1 Future Development Site in the Port of Luanda

Best location for a new container terminal is next to the existing container terminal where both could be operated as one terminal. However, the east area of the existing container terminal has already been leased out and SONILS operates a terminal for oil rig related service. SONILS was also granted a concession for 20 years to reclaim and develop the waters in the east area shown in Figure 15-1. Therefore, the only possibility is to develop a new terminal between the SONILS reclaimed land and the fishery harbor. The site has a width of 700 m, which allows only two berths that can accommodate 50,000-60,000 DWT container ships; it will be possible to reclaim land of 35-40 ha or more. Possible capacity of the new container terminal will be 600,000 TEUs. Taking into account that demand for container throughput will dramatically increase in the near future, it is recommended to make a plan for future development of the port, to study the feasibility of the plan and financial resources and to examine the possibility of private operator's participation in building a new terminal. Port Authority of Luanda shall begin a feasibility study on the new container terminal and a procedure of environmental assessment. If the port will invite private operators to develop the new terminal, its procedure shall be commenced as soon as possible. A conceptual plan for the new container terminal is shown in Appendix Drawings.

Besides the container terminal, general cargoes, such as vehicles, machinery, fertilizer, grains and others, will also increase at a rapid pace. In this connection, it will become necessary to expand the open yard for automobiles, other machinery, grain silos and others in the general cargo terminal. Coping with this foreseen situation, the multi-purpose terminal, which is now used for containers (70%) and general cargoes (30%), shall be changed to the dedicated use of Ro/Ro vessels, car carriers and general cargo ships after completion of the new container terminal.

Regarding a plan to develop a new port in the north of Luanda Province, a jetty has recently been developed for oil rig related services. If a new container terminal is developed in the east of SONILS, it will be able to meet the demand for a considerable period of time. There is no urgent need for a new container port in the north of Luanda. If a new port becomes necessary owing to

environmental requirements or redevelopment strategy of the Port of Luanda, its possibility shall be examined from points of view of technical and financial feasibility, cargo demand, environmental aspects, and hinterland transportation.

15.2.2 Future Development of the Port of Lobito

Cargo throughput of the Port of Lobito has increased steadily since 1999, it is therefore urgently required to modernize port facilities and rehabilitate infrastructure. Since ship waiting rarely takes place at the Port of Lobito, ship congestion will appear at the port together with the future cargo increase. Economic development in the hinterland will bring a rapid increase in cargo throughput, and the current capacity will be inadequate in the near future. In particular, following the rehabilitation and reopening of Benguela Railway, cargo throughput will increase at a rapid pace. Container cargo throughput is estimated at about 90,000-120,000 TEUs in 2010, the port will be able to deal with that amount if the short-term rehabilitation plan will have been completed by 2010. However, as the yard area will become insufficient in the near future, it is necessary to find areas for future expansion.

The port leased SONAMET the area east of the South Wharf for 25 years in 1999, and the place is used as a storage yard for oil rig related materials. The area shown as Plan 1 in Figure 15-2 is the most suitable place for the expansion of container yard adjacent to the existing South Wharf. The place shall be returned to the port as earlier as possible and be developed as a container yard. If the return of the area from SONAMET proves difficult, the port shall investigate Plan 2 in Figure 15-2 as a possible area for the expansion of container terminal, though this is not the best place for developing a new container terminal.

The quay wall of the North Wharf, located along the sandbar, has a depth of 8.2-9.7 m and a narrow yard between sheds and the quay wall. The wharf is not suitable for container handling due to the narrow width of the yard, so it is appropriate to accommodate conventional cargo vessels, Ro/Ro vessels and passenger ships. The South Wharf has a depth of 11-12 m and a yard area of 12.7 ha, and is suitable for container and bulk cargoes. Table 15-2 shows the present situation of the North and South Wharves. Assuming that the rehabilitation of the South Wharf will be completed and cargo handling equipment installed, the capacity of container handling will increase to 50,000-60,000 TEUs.

Table 15-2 Present Terminals and Possible Expansion in the Port of Lobito

Wharf	Depth (m)	Length (m)	Area (m^2)	Vessels
North	8.2 – 9.7	570	25,000	Conventional, Ro/Ro
South	11.3 – 12.6	550	127,000	Container, Bulk, Ro/Ro, Car Carrier
New Terminal	About 13	About 300	About 10 ha	Container

It is assumed that container loading and unloading operations will be implemented with ship cranes for a considerable period of time. Without gantry cranes on the quay, the Port of Lobito cannot cope with gearless full container ships, which will be deployed in West Africa services in the future. To install gantry cranes, it is necessary to lay rails and their foundations in the existing quay. Installation of gantry cranes requires a large investment and a considerable time for the construction of foundations. It may be necessary to handle 100,000 TEUs annually or more to redeem the initial investment in gantry cranes. In this connection, it is early to install gantry cranes on the existing wharf; instead it will be appropriate to install them in a new container terminal to be developed next to the South Wharf.

The possible area for the expansion shown as Plan 1 in Figure 15-2 has a width of only 140 meters, in which a width of 50 m is used for gantry crane rails and truck lanes. Therefore, the container yard shall be extended to the east open space in addition to the yard behind the new berth. It is also necessary to make a marshalling yard of container transshipment to rail, in particular, Benguela Railway to be reopened in the near future. Railway shall be rehabilitated to carry containers as well as

bulk cargoes.

Future cargo increase is estimated as described in Chapter 9.4, and thus the Port of Lobito needs to develop a full scale container terminal and operate all containers of the port. The existing wharves shall be used for dealing with general cargoes, vehicles, bulk cargoes and others except containers. New container terminal is expected to accommodate 40,000 DWT class full container ships with a quay length of 300 m or more, a depth of 13 meter or deeper, a yard area of 10 ha or more, two quay cranes and other cargo handling equipment. Size of container ships calling at the Port of Lobito will become the same as that of major ports in West Africa.

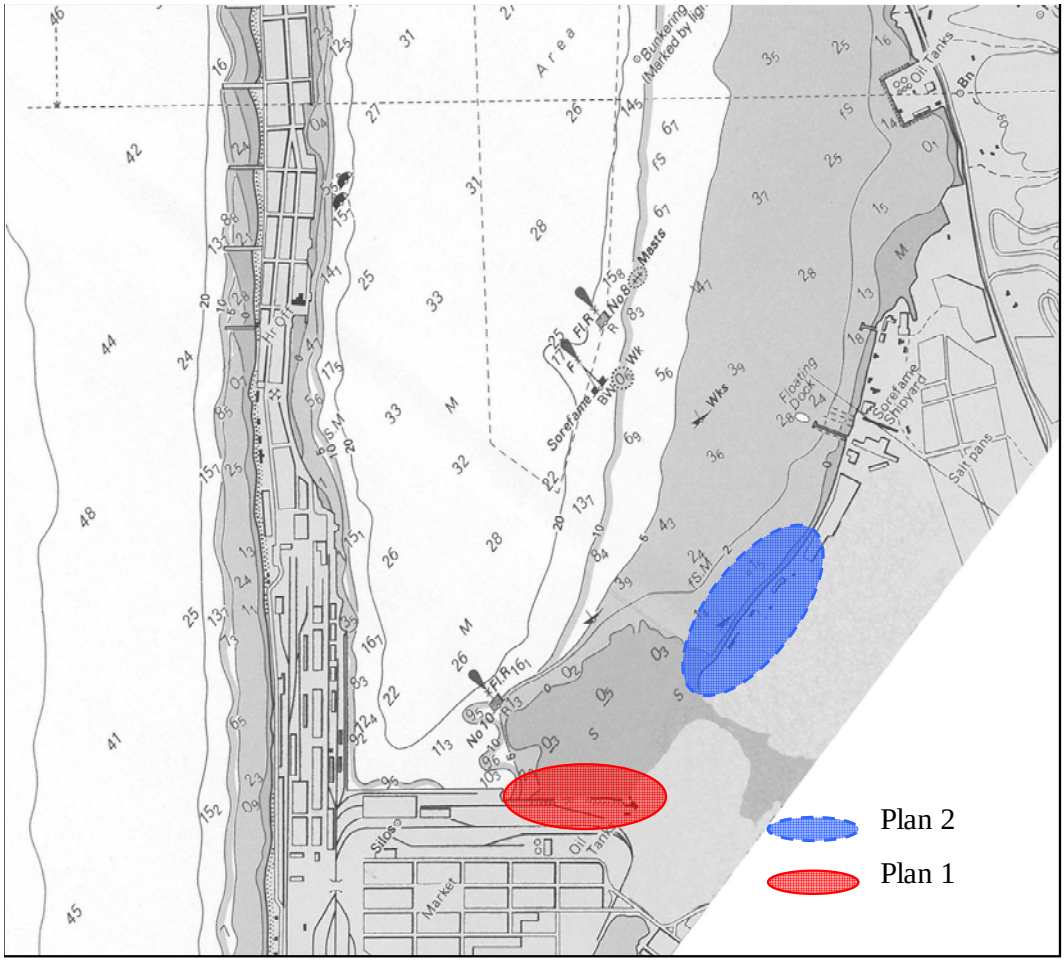

Figure 15-2 Future Development Sites in the Port of Lobito

The Port of Luanda will face a capacity shortage in the near future and it is probable that the port will have a long ship waiting queue, but the completion of the new terminal will take several years after the approval of its project. In this connection, the Port of Lobito may attract part of cargoes to be handled at the Port of Luanda. When the development of a logistics center or assembling factory of foreign products is discussed, the efficiency of port plays a vital role in making a decision. The Port of Lobito will gain an advantage over the Port of Luanda in view of ship waiting time and yard availability. A conceptual plan for the new container terminal is shown in Appendix Drawings. Feasibility study on the proposed new terminal requires a detailed survey on soil conditions, water depth in the development site, the design of port facilities, cost estimate and economic/financial analysis of the project, and the assessment of environmental impacts.

15.2.3 Future Development of the Port of Namibe

Cargo throughput of the Port of Namibe has also increased steadily since 1997 and its growth rate reached 26% in 2004. It is therefore crucial to rehabilitate and improve the port infrastructure and equipment. While there is no significant ship waiting at this moment, the cargo handling capacity will certainly be insufficient to meet the foreseen demand. Since the conventional cargo throughput is estimated at 600,000-790,000 tons and container cargo throughput is 19,000-24,000 TEUs in 2010, the port will be able to handle these amounts subject to the completion of the short-term rehabilitation plan described in Chapter 10.3.

Size of the present berths and terminals are summarized in Table 15-3 Wharf No.3 has a depth of 10.5 m and a yard area of 5.5 ha, which is not wide enough as a full size container yard. In this regard, the capacity of container handling is estimated at about 30,000-35,000 TEUs. Since the foreseen container throughput in 2010 is lower than the capacity estimated, it is deemed that there is no urgent requirement for new container berth, however, the container yard may face a shortage in the near future. Therefore, the expansion of the container yard will become necessary in the mid or long-term development plan of the port.

Table 15-3 Present Terminals and Possible Expansion in the Port of Namibe

Wharf	Depth (m)	Length (m)	Area (m^2)	Vessels
No.1, 2	3.0 – 6.1	200 m	18,200	Conventional small ships
No.3A, 3B	10.5	480 m	54,800	Container, Ro/Ro, Conventional
New Terminal	about 12	150-300 m	2-6 ha	Container

The open yard of the port is used not only for containers but also for bulk cargoes, construction materials, vehicles, machinery and other conventional cargoes, so the open yard may also face a shortage like the container yard. In this connection, it is necessary to have a site for the expansion of the open yard.

The port of Namibe is located under a cliff. The port was built by digging the cliff and reclaiming the land along the cliff using the gravel and soil from the cliff. In this regard, the expansion of the open yard shall be fulfilled by digging the cliff and reclaiming the land at the same time. To expand the open yard, it will be appropriate to reclaim an area north of the No.3 Wharf using the gravel and soil from the cliff behind the expansion area. This expansion of the open yard enables the development of a new berth next to the existing No.3 Berth.

Container throughput estimated at the Port of Namibe in 2010 is about 19,000-24,000 TEUs as shown in Chapter 9.5, which is not large enough to install quay cranes. While container cargo will increase every year at a steady pace, it will take a considerable time to reach 100,000 TEUs, the level at which investment in gantry cranes can be justified. Feeder ships will therefore be deployed in services to Namibe. There seem to be no urgent need for building a new container terminal, however, container yard and open yard will have need for expansion. The north area of No.3 Wharf shall be developed as the extension of the container and conventional cargo yard.

Figure 15-3 shows the future development site of the container terminal. There are two possibilities to extend the No.3 Berth. One plan is to extend the berth straight on the existing quay line, 340^o of the compass, and the other plan is to build the new berth along the coast line, 300^o of the compass, from the north corner of the existing No.3 Berth. While the future plan shall be decided based on a feasibility study, preference is given to the straight extension plan owing to the fact that the maximum extension will be a length of a berth, i.e. 300 m. Taking into consideration the depth of development site, which is 18 m at the far end of a possible new berth, straight extension will be limited within 300 m. Conceptual development plans are shown in Appendix Drawings. Feasibility study shall be conducted by the port authority after the completion of the short-term rehabilitation plan

for 2010.

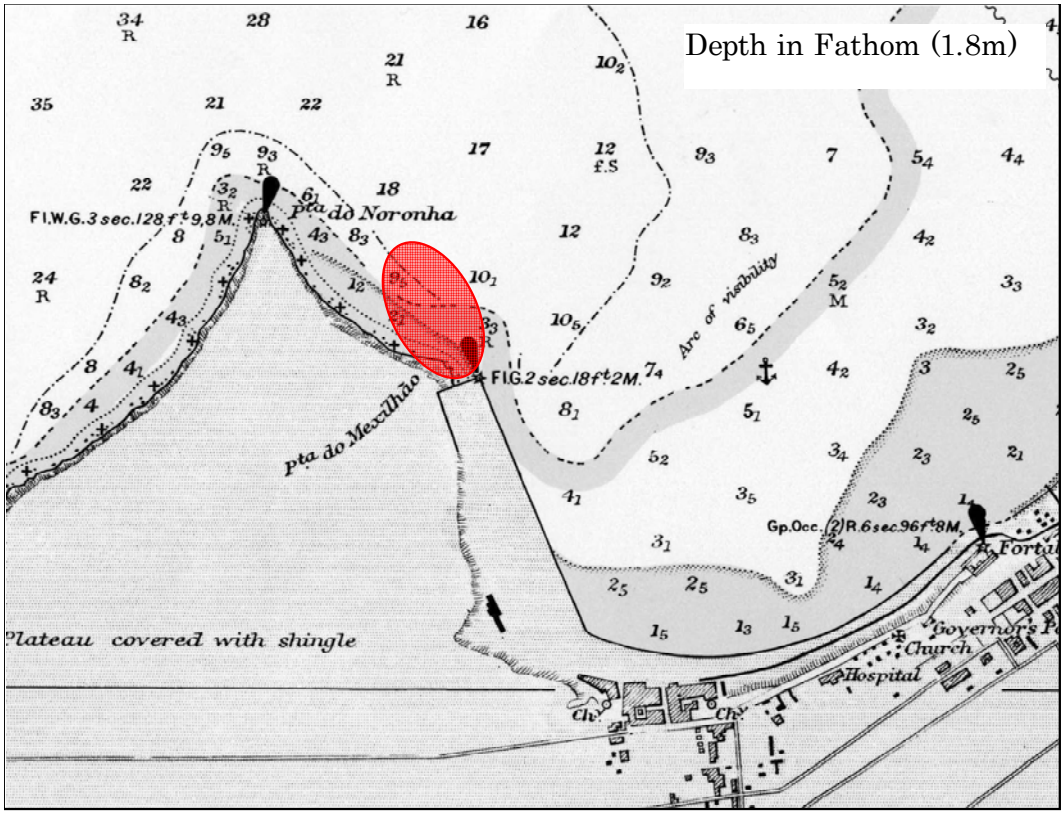

Figure 15-3 Future Development Site in the Port of Namibe

15.2.4 Future Development of the Port of Cabinda

Cargo throughput at the Port of Cabinda has gradually increased since 2000 and recorded a growth of 63 % in 2004. Container cargo throughput reached 4,500 TEUs in 2004 and it is estimated at about 12,000-15,000 TEUs in 2010. The port has only a 124 m berth with a depth of 2.4-3.0 m and an yard area of 9,000 m2, therefore, the handling capacity is insufficient to deal with the foreseen container cargo in 2010.

To cope with expected increase in cargo, the port has commenced the development of a new jetty with a total length of 335 m, in which 135 m is a berth and 200 m is the connection bridge to the land. Water depth of the berth is planned at 5.5 m at the minimum and 8.0 m if possible. The berth is expected to accommodate a feeder ship up to 125 m in length and 3.5-7.0 m in draft. The depth of water at the site is about 2.5 m, so it is necessary to dredge the channel over 500 m to reach the depth of 5.5 m.

The new berth will enable ocean going ships to berth directly at the jetty. Direct berthing will be able to eliminate double handling of containers caused by the transshipment from a mother vessel to a barge in the offshore anchorage. However, the difficulty lies in transporting containers from the berth to the container yard over a distance of 200 m. There is no slot on the jetty to place containers unloaded or to be loaded, so it will be difficult to improve the performance of cargo handling. More wider jetty will be necessary to allow two way traffic and ensure the safe turning of a truck, and temporary placement of containers.

In order to deal with the foreseen container throughput, the existing area of the container yard is insufficient. Figure 15-4 indicates the possible expansion site of the container yard with an area

of 2.6 ha. Following the expansion of the container yard and the completion of a new jetty, the capacity may increase to about 30,000 TEUs judging from the size of container terminal.

However, the new berth on the jetty will suffer from rough waves and sedimentation by drift sand, so the performance of cargo handling will not be improved as expected. Since the province of Cabinda is an enclave with a population of 360,000, transportation of consumer goods, foods, fuel, construction materials, and other necessities is wholly dependent on maritime transportation. To secure the maritime transportation, the province will need a sheltered port with high rate of operation and deep water berths. A study on the development of a new port should be carried out.

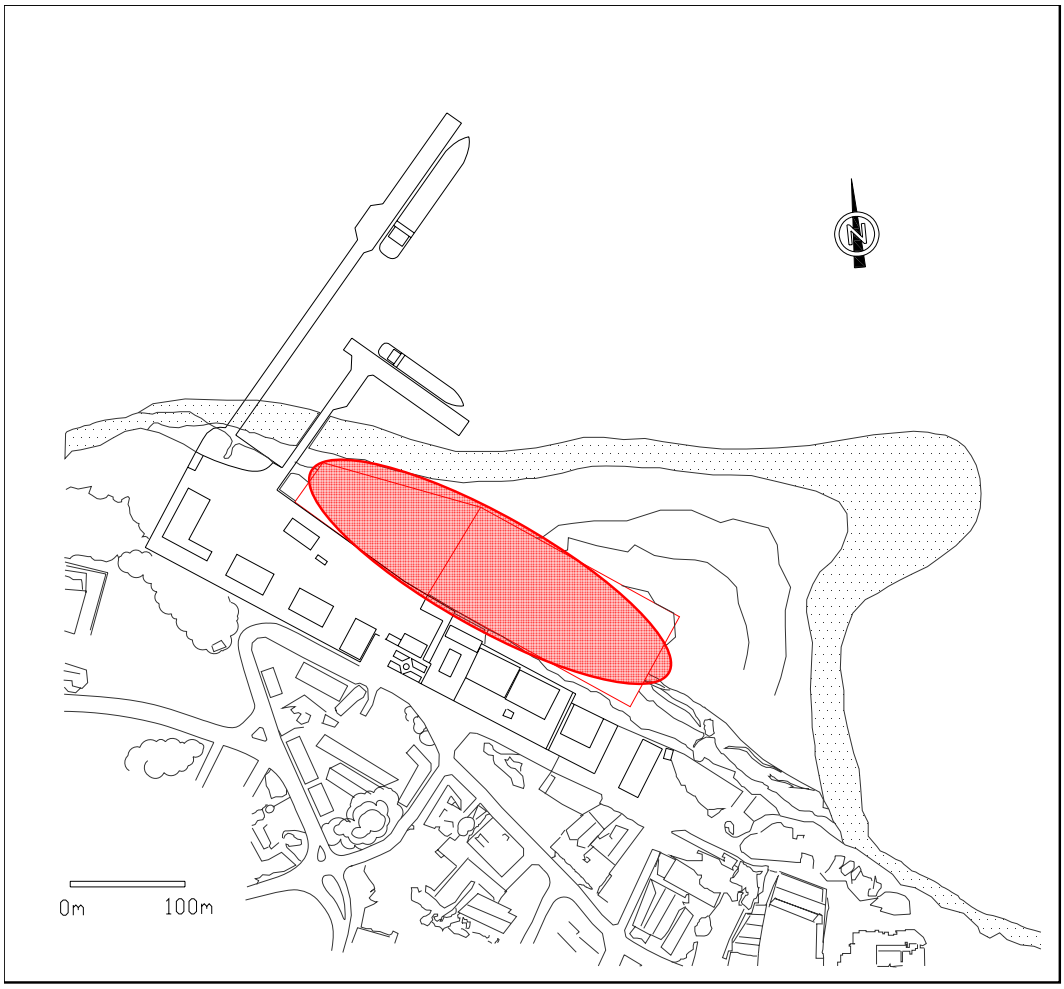

Figure 15-4 Future Development Site in the Port of Cabinda

Figure 15-5 shows the coast line of the province of Cabinda. A depth of 10 m is found about 5 km away from the coast line. A depth of 5 m is found about 2 km away from the coast line, however, that depth can be secured 1 km away in the north of Malongo, and about 200 m away between Malongo and Ponta Malembo, where the slope of the sea bed is the steepest in the province. Owing to the advantage of the steep coast, Malongo area is already used for the oil rig related service base with a jetty on the coast.

There is a jetty in Cacongo, however, it has deteriorated and is not in service. Cacongo area is not suitable for a deep water port as a depth of 5 m is found 1 km away. Coastal area between Ponta do Tafe and Cabinda may be better than other coastal areas from the viewpoint of the steepness of coast. A depth of 5 m is 400-500 m away from the coast in this area. However, rough waves may be a problem as the location is exposed to the ocean.

There is no sheltered bay from the outer sea on the coast of Cabinda Province, therefore, no place is suitable for a deep water port without a breakwater. Together with the economic development of Cabinda Province, a study on a new port development shall be conducted to cope with future cargo throughput.

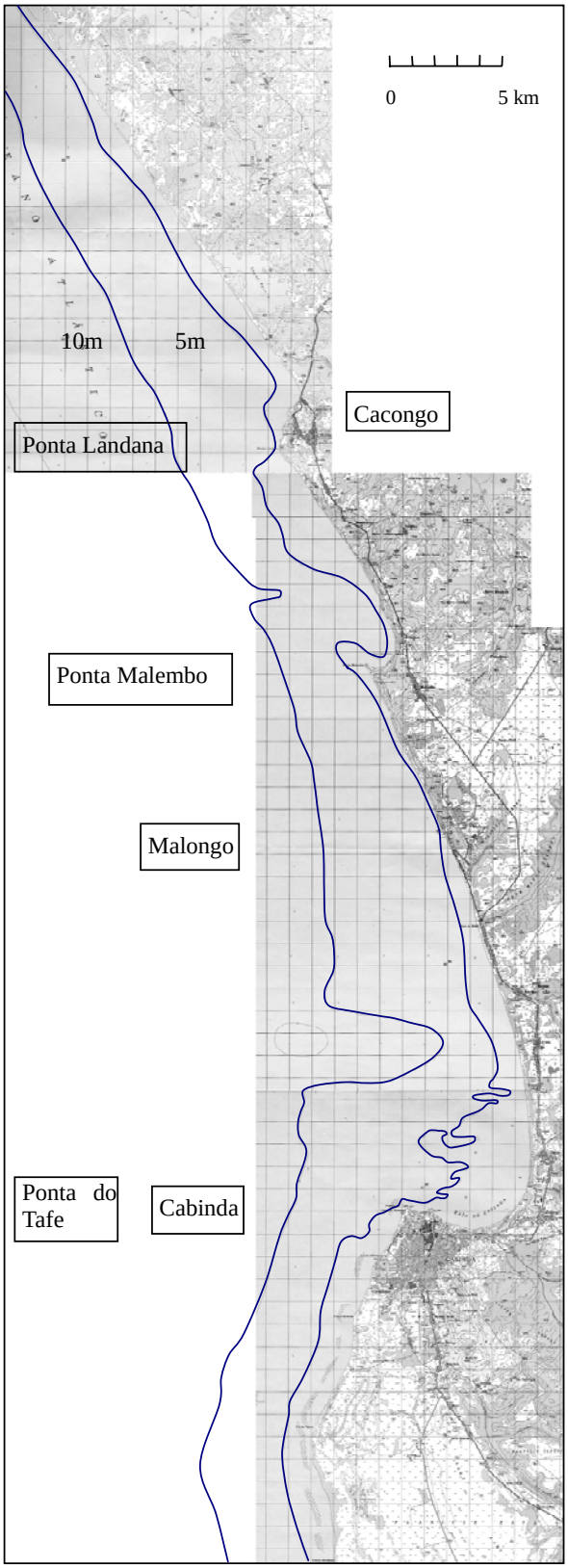

Figure 15-5 Coast Line of Cabinda Province

15.3 Measures for Capacity Development

Privatization may bring efficiency to a port. On the other hand, it may happen that Luanda Port Authority becomes a landlord who receives a concession fee from a concessionaire. To avoid such a situation, Luanda Port Authority should monitor the concessionaire to ensure that Luanda Port becomes an efficient port equipped with good service and facilities.

Therefore, as described in Chap. 13, each staff member of Luanda Port Authority should improve his ability and fully use it for the organization. At the same time, each staff should be interested not only in his job and post but also learn about other jobs and terminals. In this way, an employee can expand his/her knowledge and make a bigger contribution to the organization.

15.3.1 Improvement of Fundamental Capacity

Because of the long civil war, some staff members do not have sufficient knowledge about shipping and logistics. At first, it is important to improve their fundamental ability. Through reading various books, trade journals etc. , knowledge in the following areas should be improved.

1) Knowledge about Shipping

General Information on Main Ports in the World;

Situation of Sea Routes;

The Suez Canal and the Panama Canal;

General Information about Container Vessels;

General Information on General Cargo Vessel, Ro-Ro Vessel and Pure Car Carrier;

General Information on Main Shipping Lines in the World; and

The Latest Situation of the Freight Conference.

2) The Latest Situation of World Trade

General Information on Trade Partners;

Cargo Movement and Economy; and

Computer and English Language Skills.

3) The History and the Latest Situation of Main Ports in the World

15.3.2 Introduction of Comprehensive Training

A shipping line generally calls at the best port in a region. Therefore not only construction of port infrastructure but also improvement of efficiency is required. Terminal users (shipping lines) request a terminal operator to provide a quick turnaround time to maintain vessel's schedule. Improvement of software is required together with that of hardware.

Staff members of Luanda Port Authorities need the technological skill and knowledge to operate the port effectively. On the other hand they continuously acquire new knowledge and technology. Therefore a comprehensive training program (training for new employee, training for upgrading skills of present staff, studies for research and development) should be introduced to promote efficiency. It is also useful to invite persons in charge of foreign shipping lines and foreign container terminals to give lecturers on container operation.

Representatives from highly advanced automated terminals should not be invited. Lecturers should be familiar with terminals that operation on the same scale as Luanda port. Representatives from the Maersk Line, which is the largest container shipping line in the world and has terminal business under the same group, would be a good choice. Nile Dutch Africa Line, which has various sea routes from Europe to Africa and operate business in Luanda, would also be a good choice. Furthermore both of them have branch offices in Luanda with staff, who speak Portuguese and can easily visit the Luanda Port Authority.

OJT (On the Job Training) should also be introduced. Staff members of Port Authorities are recommended to receive a training in other departments so as to understand different works and improve his ability. Following knowledge can be gained through such training.

1) Knowledge of Terminal Operation

Efficient terminal operation can be realized only by a synergy of hardware (facilities and stevedoring machines), software (procedure of operation) and staff's capacity (officers and stevedores). Efficient operation can reduce vessel's staying time, which results in lower costs for shipping lines, abolition of port congestion charge for shippers and lower commodity prices for consumers.

Swift of Stevedoring Work;

Shortening of Container's Staying Time at the Terminal;

Efficient Operation of Containers;

Stowage Plan of Containers in Yard;

Way of Handling Special Container;

Handling of Dangerous Cargo; and

Handling of Animals and Plants

2) Knowledge of Incidental Facilities of Terminal

Establishment of Container Freight Station (CFS), or Receipt Point of General Cargoes in Small Lot;

Establishment of Storage Area for Empty Containers;

Establishment of Maintenance and Repair System of Stevedoring Machines;

Establishment of Maintenance and Repair Facility of Containers;

Establishment of Supply of Water;

Supply of Bunker Oil;

Establishment of Communication System for Vessel;

Lighting;

Drainage Facility; and

Security and Fire Prevention.

3) Knowledge of Port Administration

Fund Scheme;

Security in Terminal;

Inspection;

Welfare of Workers; and

Rights and Responsibilities in Concession Agreement.

4) Future Plan of Container Terminal

Expansion of Terminal in Future;

Establishment of Communication Network;

Market Research; and

Plan of Employment.

15.3.3 Training Program

Ports in Angola lay behind the international level in terms of number and quality of stevedoring machines and operation system. It may be necessary to dispatch trainees to terminals in Portugal or Brazil where trainees can learn about modern terminals in their own language. JICA training programs are also be utilized. Study through daily work is more important and fruitful knowledge and experience can be obtained. Exchange with staff of sister ports is also useful.

Training in the following areas is especially important.

Improvement of speed and efficiency of stevedoring to load and discharge containers

Measure to relieve severe port congestion by shortening container's staying time in the terminal

Full utilization of computer for terminal operation

In addition to the dispatch of trainees, foreign experts who have expertise on shipping business and ports management/operation should be invited to the Luanda Port Authority as a specialist or a manager. In this way, employees will gain knowledge by interacting with the expert in their daily work.

16. Conclusions and Recommendations

16.1 Scope of the Study

Rehabilitation of major Angolan ports plays a vital role in facilitating the reconstruction of national economy which was heavily damaged during the civil war. Among the transportation infrastructure, roads and railways are recovering by funds from international aid agencies and ODA from donor countries. However, ports remain without any prospects for rehabilitation. In light of this situation, the government of Angola requested the Japanese government to make a study on the urgent rehabilitation of Angolan ports and JICA, as an implementing agency of Japanese technical assistance, organized and assigned a study team for the Study on Urgent Rehabilitation Program of Ports in the Republic of Angola from March 2005 to June 2006.

JICA mission in 2004 and MINTRANS agreed that the Study should give high priority to formulating an urgent port rehabilitation program of four major ports, namely, the Ports of Luanda, Lobito, Namibe and Cabinda. The Ports of Porto do Amboim and Soyo are not included in the Study due to the fact that both ports are rather new and small, and their facilities are not so deteriorated.

The Study aims at formulating a short term port rehabilitation plan for 2010 and an urgent rehabilitation program of port facilities selected from the short-term rehabilitation plan, and implementing the emergency rehabilitation measures to improve the productivity of cargo handling or the safety of ship navigation. The study also makes a proposal for measures to improve port management and operation. In connection with the Study, it is requested to organize a series of seminars and workshops as part of capacity development of the Port of Luanda and other three ports.

16.2 Conclusions

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 examined past studies on the bathymetry, waves, tides, and other meteorological and topographical conditions in Angola. Besides collecting data from such sources, 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.

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.

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.

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).

16.3 Recommendations

(Rehabilitation of Ports)

Reduction of ship congestion and surcharges is indispensable for facilitating the economic development of Angola. In order to improve the performance of ports, the short-term rehabilitation plan shall be carried out by the year 2010 and the urgent rehabilitation program shall be finished by the year around 2008. It is important to enhance the productivity of cargo handling and improve the port operation.

(Modernization of Ports)

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.

(Promotion of Coastal Shipping)

Since Angola has a coastline over 1,600 km from north to south and major cities are located on the coast, transportation from north to south is critically important. However, railways mainly connect ports and inland cities and are not suitable for north to south transportation. Trunk roads from Luanda to Namibe are not suitable for cargo transportation at this moment but will become available after rehabilitation in several years. Liner coastal shipping is not available due to the lack of coastal vessels. In order to cope with the foreseen increase in domestic cargoes, coastal shipping is a possible solution as it may be more competitive than truck transportation for long distance services. Ports shall have a plan to accommodate Ro/Ro vessels and other coastal vessels.

(Role of the Government)

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.

(Future Development of the Port of Luanda)

The port will face a shortage of container handling capacity even if maximum capacity of the present container terminal and multi-purpose terminal can be utilized through improvement works. In addition, the present quay has a depth of only 10.5 m and cannot accommodate larger full container ships. The port shall have a full scale container terminal, which has berths with a total length of 600 m or more, a depth of 13-14 m or deeper, a yard area of 35-40 ha or more, two gantry cranes for each berth, and transfer cranes in the container yard.

(Future Development of the Port of Lobito)

The Port of Lobito may be able to cope with cargo throughput predicted in 2010 after the completion of the short-term rehabilitation plan. However, container yard area will face a shortage in the near future, so that the expansion of yard shall be studied in due course.

If gearless full container ships become popular in the West Africa services, the port needs gantry cranes on the shore. To install these cranes, it is necessary to build the foundation and crane rails, which is costly and require the temporary closure of present berths. Taking into account container throughput predicted in 2010, gantry cranes are not necessary for the present wharf, and they shall be installed in the future container terminal to be developed in the east of the present South Wharf.

Since the east area next to the present South Wharf is most suitable for the development of the new container terminal, the port authority and SONAMET shall discuss the time of restoration and usage of the area. However, the width of the area, i.e. about 140 m, is too narrow to develop a modern container yard, so the container yard shall be developed using the whole east area of the port.

(Future Development of the Port of Namibe)

While cargo throughput at the Port of Namibe will increase by a considerable growth rate, the capacity of the port will be sufficient to cope with the demand predicted in 2010 after the completion of the short-term rehabilitation plan. New berth will not be necessary in the near future. In case the yard area faces a shortage, it shall be expanded to the north of the present No.3 Wharf.

It will be necessary to develop a berth with a length of 300 m or to extend the present No.3 berth by about 150 m in the future to cope with gearless full container ships. Detailed plan shall be made based on water depth survey and boring survey in the site. Consideration shall be given to

calling ships in the future and alternative plans.

(Future Development of the Port of Cabinda)

The port is implementing a project to build a new jetty parallel to the present one. A feeder ship will be able to berth at the new jetty, eliminating the need for transshipment to a barge once it is completed. Besides the new jetty, it may be necessary to have a sheltered port to serve the whole population of Cabinda province. The port shall make a study on the location of a breakwater to shelter the basin from waves and sand drifts. A master plan for port development will be necessary for both the Port of Cabinda and the government of Cabinda.

(Port Management and Operation)

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.

(Master Plan of Angolan Ports)

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.