

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.

(Coastal Shipping)

Since road rehabilitation will take a considerable period of time, coastal shipping can serve as an effective means for domestic transportation, in particular, transportation along the coastline. It is therefore necessary to provide cabotage berths at each commercial port to accommodate Ro/Ro vessels, long-distance ferry boats, or conventional coastal ships.

(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.

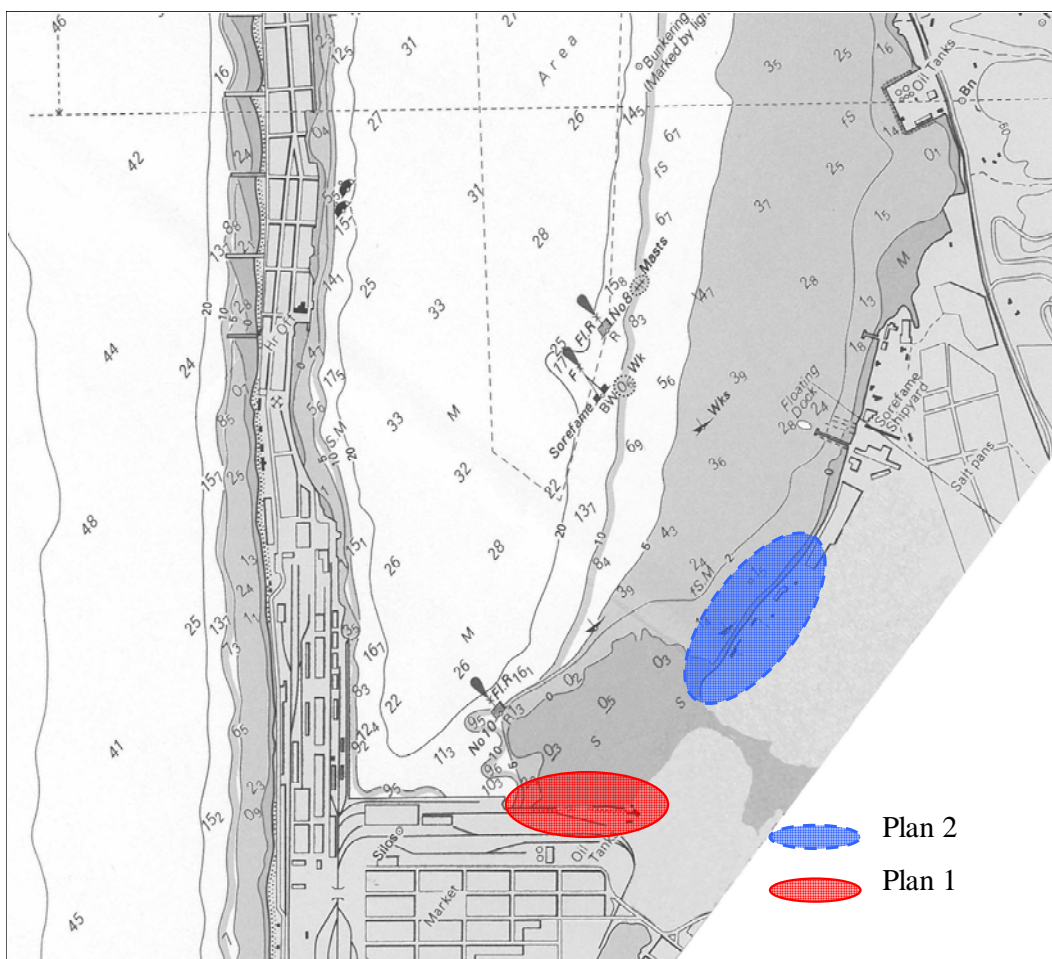


Figure 15-2 Future Development Sites in the Port of Lobito

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° of the compass, and the other plan is to build the new berth along the coast line, 300° 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

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.

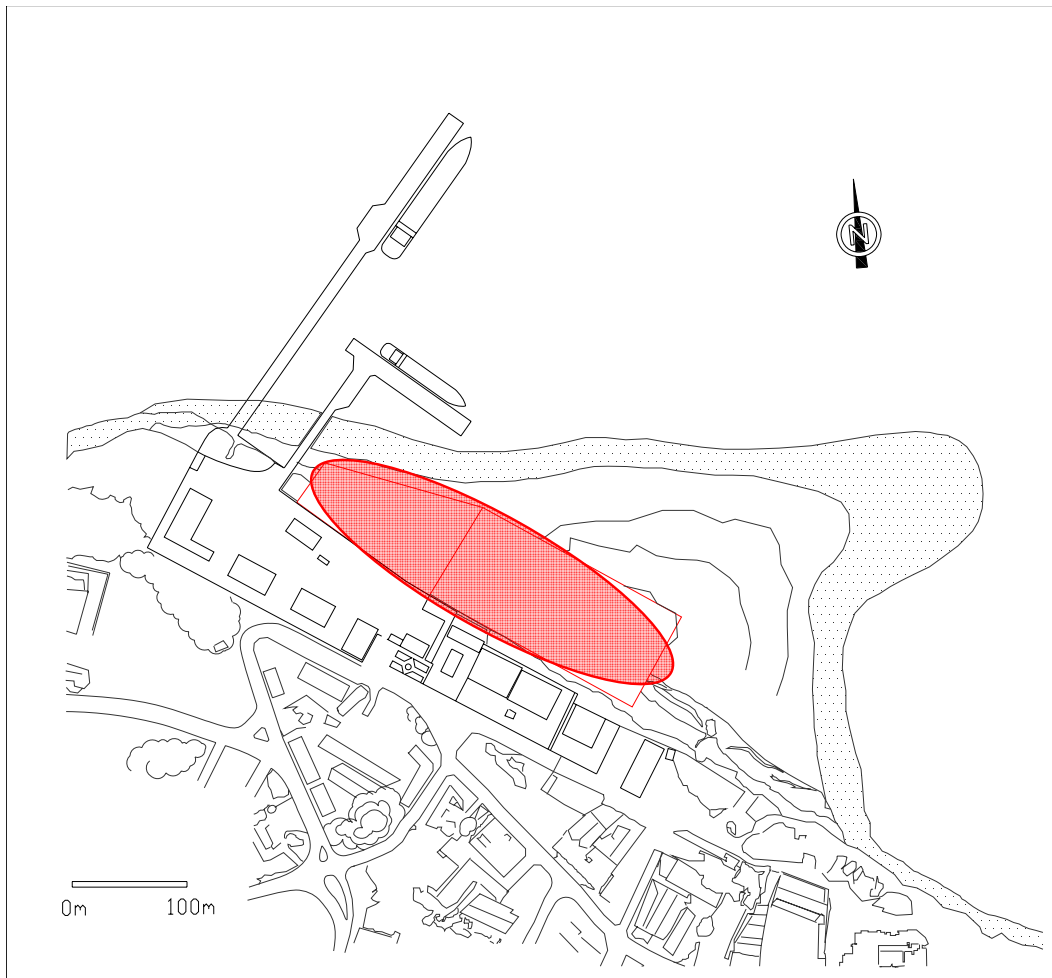


Figure 15-4 Future Development Site in the Port of Cabinda

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.

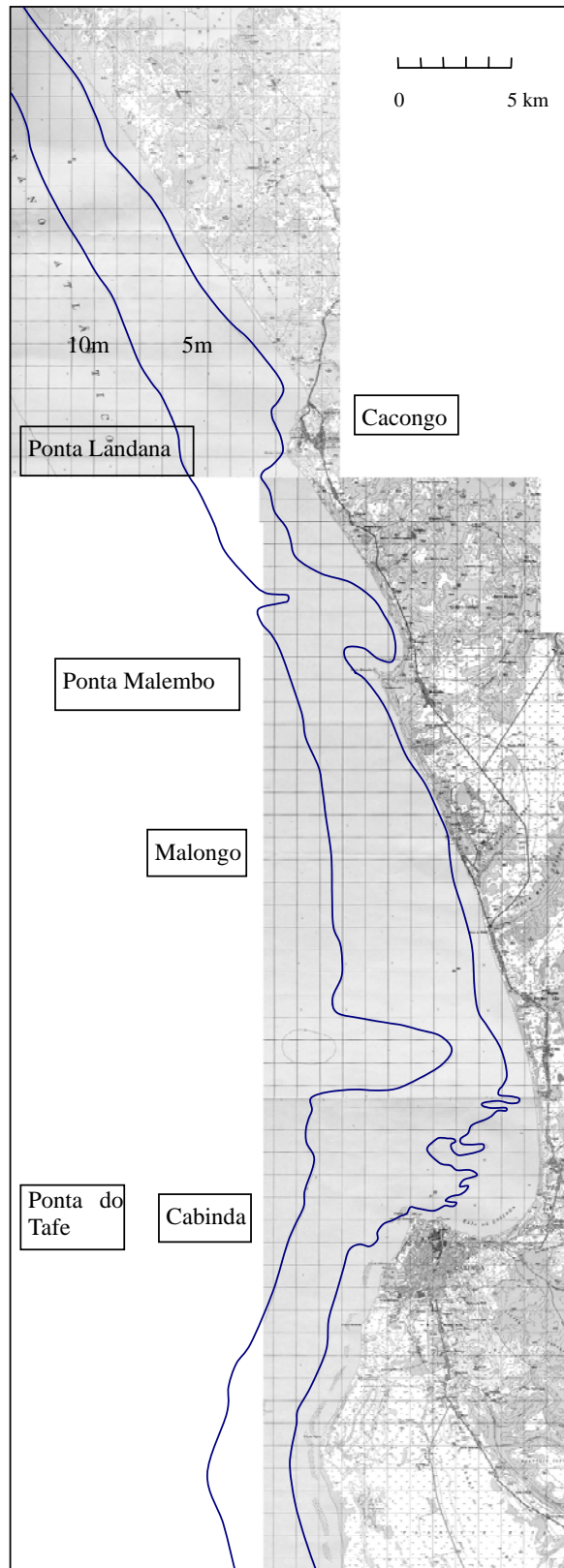


Figure 15-5 Coast Line of Cabinda Province

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

i) General Information on Main Ports in the World

It is necessary to attract foreign shipping lines to Angola to increase trade. Accordingly, staff members are recommended to receive a training and acquire a general knowledge of main ports in the world and the various sea routes to Angola.

ii) Situation of Sea Routes

It is necessary to attract foreign shipping lines to Angola while competing with surrounding ports. It is important to understand the latest situation of sea routes in West Africa.

iii) The Suez Canal and the Panama Canal

The Suez Canal and the Panama Canal have a big role in world trade and shipping. It is necessary to understand the history and the latest situation of two big canals.

iv) General Information about Container Vessels

Management of container terminal depends on size of container vessels. It is important to understand whole length, breadth, depth and loading capacity of containers of container vessels that are now calling or may call Angolan ports.

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

A lot of general cargo vessels, Ro-Ro vessels and pure car carriers are berthing at the General Cargo Terminal and UNICARGAS Terminal. Concessionaires need to repair broken cranes and stevedoring machines to alleviate the severe port congestion. It is necessary for staff to have general knowledge of these vessels.

vi) General Information on Main Shipping Lines in the World

Main shipping lines, named Maersk Line, MSC and Grimaldi are now calling Luanda. It is necessary to be familiar with these clients and other shipping lines which may call Luanda so as to attract them.

vii) The Latest Situation of the Freight Conference

Freight conference already lost control power of sea route. They, however, still fix an adjustment factor of charges concerned about change of currency, bunker and port congestion. Port congestion charge especially has much influence on Luanda. It is necessary to understand the latest situation of the freight conference covering West Africa.

2) The Latest Situation of World Trade**i) General Information on Trade Partners**

It is necessary to understand the situation of trade partners of Angola. Furthermore they should be interested not only in politics, economy and main trade items but also in customs and culture. Such efforts will make it easier to communicate with shipping lines, port authorities and terminals of trade partners.

ii) Cargo Movement and Economy

The end of the cold war brought about globalization, which has explosively increased the amount of cargoes exported from Asia, particularly China. We are still in this trend. It is important to understand the situation of world economy because such matters influence world logistics.

iii) Computer and English Language Skills

It is not possible to contact all foreign shipping lines or terminals only in Portuguese. It is necessary for staff to improve their ability in English. It is also necessary to upgrade computer skills.

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

Advancement of port depends not only on politics and economy but also on various factors including natural phenomenon. Some ports declined not due to a change in trade patterns but by changes in an ocean current and the resulting loss of water depth. It is important to study historical changes and the latest situation to understand what supports the prosperity of main ports in the world and how ports with a long history cope with the present conditions.

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 lectures 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.

i) Swift of Stevedoring Work

For the quick dispatch of vessels, number of loading/discharging units of container per hour should be increased. It is necessary to examine methods of increasing the productivity of ship cranes and gantry cranes.

ii) Shortening of Container's Staying Time at the Terminal

A container terminal is not a facility to keep containers but to pass containers to their next destination. Luanda port, however, is used as warehouse for containers because over-time storage fee is low. This is the reason for the severe port congestion in Luanda. It is necessary to examine ways to discourage long-staying containers.

iii) Efficient Operation of Containers

The choice of stevedoring system and deciding the number of stowed containers in the terminal are important factors in the efficiency of a terminal. It is necessary to study whether the current reach-stacker plus yard track system is optimum or straddle carrier system would be more efficient.

iv) Stowage Plan of Containers in Yard

In advance of a vessel's arrival, containers to be loaded onto vessels are taken to the terminal. It is necessary to make a proper yard plan and to facilitate container discharging from ships and loading onto ships. A storage plan of discharged containers is also important.

v) Way of Handling Special Containers

Luanda city depends on imported goods. It has suffered from a chronic shortage of electric power. Therefore there is a big problem in handling reefer containers. It is important to secure electric power, to secure power points to reefer containers, and to handle heavy cargoes and large cargoes as requested.

vi) Handling of Dangerous Cargo

Careful handling is required for explosives, chemical goods, pesticide and paints. It is necessary to establish a storage system in which inspectors can easily check the situation at any time.

vii) Handling of Animals and Plants

Quarantine is required for animals and plants. It is necessary to establish a storage system, in which the quarantine office can easily check the situation at any time.

2) Knowledge of Incidental Facilities of Terminal

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

CFS is established to receive small lot cargoes for stuffing into container with other small lot cargoes. Considering shipment situation of small lot cargoes in Luanda, the optimum location of the CFS should be examined.

ii) Establishment of Storage Area for Empty Containers

In a container terminal, large area should be used not for empty vans but for stuffed vans. Considering the situation surrounding the container terminal, the best location for empty containers should be examined.

iii) Establishment of Maintenance and Repair System of Stevedoring Machines

In the container terminal, there are a lot of stevedoring machines such as gantry cranes, yard cranes, fork lifts, tractor heads, yard chassis, lighting and plugs for reefer container. A maintenance and repair system to ensure that equipment is always available should be established.

iv) Establishment of Maintenance and Repair Facility of Containers

Containers are transported all over the world. They are apt to be damaged during transportation, delivery and receipt. It should be studied whether Luanda Port Authority could succeed in the business of maintenance and repair of containers.

v) Establishment of Supply of Water

There is a lack of water in Luanda. It is necessary to establish a stable water supply for calling vessels.

vi) Supply of Bunker Oil

An efficient system to supply bunker oil to vessels calling Luanda needs to be established.

vii) Establishment of Communication System for Vessel

There are a lot of problems with communications in Luanda. A system to supply telephone cables to vessels berthing Luanda needs to be established.

viii) Lighting

Power stoppages frequently occur in Luanda. Loading and discharging cargoes at night is required for vessel's quick dispatch. The optimum arrangement and number of lighting fixtures needs to be examined.

ix) Drainage Facility

Luanda Bay is much polluted. To prevent further deterioration, the terminal is required to establish a suitable drainage system. A method to treat disposed water used to wash containers etc. needs to be examined.

x) Security and Fire Prevention

Measures to prevent theft and fire in the terminal and to keep cargoes should be introduced.

3) Knowledge of Port Administration

i) Fund Scheme

A funding scheme for construction works needs to be established. In addition, terminal charges need to be set a level that will generate a sufficient profit to amortize any outstanding loans.

ii) Security in Terminal

Theft and fire are not the only security issues. In making construction program and operation program of terminal, various components related to security need to be considered. It is also important to be able to cope with unexpected trouble.

iii) Inspection

Safe operation in the terminal is jeopardized by over loaded containers. Such containers must be rejected. A procedure to check container's weight needs to be established. It is also important to check for drug, smuggling and stowaways.

iv) Welfare of Workers

It is important that employees maintain their health. Regulations on health and hygiene should be established.

v) Rights and Responsibilities in Concession Agreement

An outline of the concession agreement should be carefully studied in consideration of other examples. Rights and responsibilities of each party also need to be examined.

4) Future Plan of Container Terminal

i) Expansion of Terminal in Future

The area of a terminal space affects the service provided by the terminal. Since land is often expansive or limited, terminal operators take measures to maximize the utilization of space such as stacking containers vertically. Expansion of the terminal is also required to improve efficiency. Ways to improve efficiency of terminal operation such as expansion of the port and construction of a new port need to be examined.

ii) Establishment of Communication Network

It is important to establish a solid communication network for efficient operation. Furthermore shipping documents must be exchanged by electronic transmission in future.

The present state of the communication network in Angola is far from sufficient. Even a telephone or fax can not sometimes be used. A convenient communication network in the terminal should be examined and then a request to the government should be made.

iii) Market Research

A container terminal must handle a sufficient number of containers to be viable. Upon construction and operation of terminal, market research is important to determine how many cargoes can be expected. It is necessary to understand how to conduct market research and how to utilize the results.

iv) Plan of Employment

A terminal needs to forecast the required number of workers and make a plan of employment. An employment system based on equal opportunity and fairness needs to be established. Incentives for positive results and penalties for truancy etc. also need to be built in. A shift system will also have to be introduced.

5) 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 2010, 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.

