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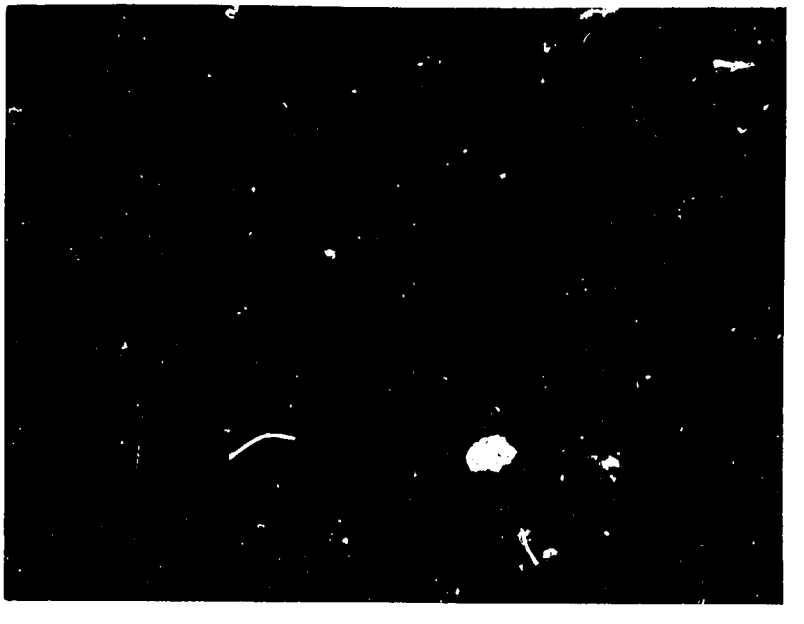

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REPORT ON A STUDY ANALYSIS

OF

UPGRADING PLANS/PROPOSALS FOR

FOUR ZAIRE PORTS UNDER AUTHORITY

OF

NATIONAL TRANSPORT OFFICE (ONATRA), ZAIRE

Project 660-T-026

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PREFACE

The assignment, which is the topic of this study report, was undertaken by the T-CAS Port Engineer, Mr. Gopal Pillai, in support of the USAID Project 660-T-026, which was part of assistance programs to the National Transport Office (ONATRA) in Zaire, Africa. The objective of the study was to analyze the progress that had been made in upgrading four ports in that country: Panu, Dibaya-Lubwe, and Mangai on the Kasai River, and Bulungu on the Kwilu River.

Visits to Panu and Bulungu were supplemented by interviews with the responsible authorities and by review of the proposals prepared by ONATRA as part of an upgrading plan for the specified port areas. The reviews of the proposals were directed at:

- Verification of cost estimates.
- Analysis of the suitability of the proposed upgrading of facilities (including their contribution to the overall plan and purpose of the project).
- Examination and evaluation of the proposed means of procurement for the requisite materials and services.

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SUMMARY

During the period of 3 April through 18 April 1981, Mr. Gopal Pillai visited certain of the port sites specified for investigation. He also obtained and analyzed the documentation proposing upgrading measures, including the latest amendments and sketches prepared by ONATRA. (The latter lacked essential detail for a conclusive analysis.) Additionally, he interviewed those in position to know the details and assessed conditions at the four locations as they impacted the overall upgrade planning.

This report discusses each of the four ports and makes specific conclusions and recommendations for each upgrading as it relates to that location.

The major recommendations/conclusions, and cost factors to be considered in the requirements to be met at the two major ports, can be summarized in two categories.

- The contractual vehicle for obtaining the necessary improvements should consider moving rapidly from a design/construction type of procurement to two separate bid solicitations if necessary--one for design and another for construction.

- Assignment of Port Construction Engineer with overall responsibility for the total program is essential.

S E C T I O N 1

STUDY PERSPECTIVE

1.1 Introduction

The Agricultural Marketing Development Project (Loan 660-T-026) proposed, among other things, improvements to three ports along the Kasai River: Panu, Dibaya-Lubwe and Mangai and one port on the Kwilu River: Bulungu. The upgrading plans within the overall development project, were being administered by the National Transport Office (ONATRA)

During the course of the project the scope of improvements originally proposed in the project paper were revised by ONATRA for the ports of Panu, Dibaya-Lubwe and Bulungu. The revised proposals were indicated in sketches prepared by ONATRA for these three ports. These sketches lack very much in technical detail which makes it impossible to make a full technical evaluation of these proposals.

1.2 Scope of Work

In accordance with the technical services requirements for a Port Engineer for Project 660-T-026, the scope of work has been defined as follows:

a. Examine suitability of facilities proposed including their contribution to project purpose.

b. Make verification of cost estimates to the extent possible.

c. Review the proposed means of procurement of requisite materials and services.

Each of these aspects is discussed in detail within Sections 2 through 5 of this report. These sections report on each port situation separately.

1.3 Objectives

The main objectives to be achieved by making improvements at these four ports are:

a. Remove deficiencies in storage so that materials can be stored, without getting spoiled, while awaiting the arrival of barges.

b. Improve efficiency in docking so that barges can be docked very close to the shore, even with full load during low water level.

c. Improve loading facilites.

d. Improve communications facilities so that barges can be dispatched promptly.

1.4 Sources of Information

For preparing this report, necessary information has been collected from the following sources:

a. Review of USAID files and sketches prepared by ONATRA showing proposed improvements at these ports.

b. Discussions with Cit. Ya Mutuale, Director of the Division des Voies Fluviales (ONATRA), Kinshasa.

c. Discussions with Mr. Verdurme Robert, Director/Technical, ONATRA, Kinshasa

d. Discussions with Cit. Botomwito Liyombe, Director/Exploitation, ONATRA, Kinshasa

e. Site visits to Panu and Bulungu.

1.5 Suitability of Facilities Proposed

The improvements proposed by ONATRA and its contribution to the project purpose are discussed in Sections 2 through 5 on a port by port basis. The suitability of the facilities proposed is evaluated in each case with particular reference to the contribution these facilities will make to the overall plan for upgrading the flow of products and the improvements in overall commerce through these port areas.

1.6 Scope of Reports

As stated Sections 2 through 5 analyze the situations in each of the four ports. Section 6 provides a plan for implementation of improvements. Section 7 provides the estimated costs projected for recommendations made in the prior sections. Section 8 summarizes the more general recommendations and emphasizes the need for their implementation along with the specific port-by-port improvments recommended.

S E C T I O N 2

ANALYSIS OF PANU CONDITIONS

2.1 General

Panu is an unimproved barge loading spot along Kasai river. There are five warehouses in Panu, all privately owned and permanent in nature. The barge docking area consists of an almost vertical bank which is about 3.5 meters above low water level. During low water season the barges are being berthed a few meters away from the shore because of insufficient draft. There are no mooring facilities on the shore and at present barges are moored by cables tied to palm trees located on the shore. Loading is done manually via planks from shore. There is no ONATRA agent at Panu, and no communication exists between Panu and Kinshasa. About 2850 tons of agricultural produce were exported through this port in 1980.

It is estimated that due to the proposed improvements of Bulungu - Panu road, which includes building of a Bailey bridge across the Kamtasha river, and due to the project impact, Panu will be called upon to evacuate 5600 tons more of produce per year. To cope up with this increased traffic, certain improvements have been proposed so that the loading time could be effectively reduced.

2.2 Improvements Recommended By the Project Paper

To meet the demand for the anticipated increased traffic, the following improvements were suggested by the Project Paper:

a. Installation of four heavy duty bollards.

b. Provision of a floating dock for holding fast docking barges.

c. An access ramp from shore which is hinged on shore and wheeled on dock.

d. Provision of communication equipment.

2.3 ONATRA'S Suggestions

ONATRA, in their plan No. 05/7, suggested the following improvements at Panu:

a. Construction of a loading platform 15 meters deep and 8 meters wide. At the water edge, the platform will be at two levels: one 4-meter wide portion to cater to barges at high water level

and to be level at the top, and another 4-meter wide portion to cater to barges at low water level and to slope towards water.

b. Installation of four heavy duty bollards.

c. Protective work for banks on either side of the loading platform; total length 180 meters.

d. Construction of a warehouse.

e. Construction of agents quarters.

f. Construction of public toilets.

g. Construction of a generator building.

h. Installation of fencing.

2.4 Recommendations

With the improvement of the road to Panu and construction of a Bailey bridge across Kamtasha river, the traffic through Panu port is bound to increase. With an estimated increase of 5600 tons of produce through this port due to the impact of the agricultural development project, certain of the planned improvements to this port are considered very essential. These improvements are discussed next:

a. Construction of a loading platform. ONATRA has proposed a loading platform 15 meters deep and 8 meters wide. Provision of this platform will enbale barges to dock close to the platform, thereby reducing the loading time considerably. This platform must be built on piles. The length of piles, depth of penetration, etc. cannot be ascertained due to lack of pertinent details such as HWL, LWL, contour of the river bottom, type of soil, etc. Cost projections are affected by this lack of information.

b. Installation of four heavy duty bollards.

c. Protective work for banks on either side of the loading platform (total length 180 m.) Here again, the height of protective works along the slope is not given, so that no estimated cost can be arrived at. But this work is considered essential to protect the shore line from erosion in the vicinity of the loading platform.

d. Construction of agents quarters.

e. Construction of a generator building. A 25 kva generator will be sufficient to provide power to the communications equipment, lighting of the jetty area and agents quarters.

f. Construction of an office for the agent.

g. Installation of fencing. ONATRA has proposed 405 meters of fencing. This may be reduced to 140 meters around office and generator building.

h. Installation of communication facilities. Construction of a warehouse is not recommended since there is adequate storage facilities available. The Project Paper also has strongly recommended against ONATRA getting involved in storage and stevedoring operations. Even though there will be increased traffic through the port, the storage time will be considerably reduced due to reduction in loading time because of better docking facilities and prompt dispatch of barges as a result of better communication.

Other facilities proposed such as public toilets and guard house are also not considered necessary.

SECTION 3

ANALYSIS OF DIBAYA-LUBWE CONDITIONS

3.1 General

Dibaya-Lubwe is an unimproved barge loading spot on the Kasai river. Site grade is approximately 17 meters over the river high water level and approaches the river bank in a steep slope. Because of the very unfavorable loading conditions, the rate of loading is very poor (approximately four sacks/hour/man as against 18 sacks/hour/man at Panu).

Warehousing is another major problem at Dibaya-Lubwe. There are at present 15 warehouses at Dibaya-Lubwe; but all are of temporary construction and many of the tin roofs are leaking.

In spite of all these disadvantages, Dibaya-Lubwe exported 6,500 tons during 1980. Due to the upgrade project impact, it is estimated that the export will increase by 1,400 tons/year. To carry this increased traffic and to alleviate the risk involved in the loading/unloading operations during rainy season, certain improvements have been proposed at this port.

3.2 Improvements Recommended by the Project Paper

To meet the demand for the anticipated increased traffic and to alleviate the problems of loading, the following improvements were suggested by the Project Paper:

a. Regrading of ramp.

b. Provision of two cast-in place mooring bollards.

c. Provision of a gangway for barge loading.

d. Supply and installation of communications equipment.

3.3 ONATRA'S Suggestions

ONATRA recommended the following:

a. Regrading the ramp so as to limit the slope to 10%. A contour of the area is necessary to assess the quantity of earthwork and this shall be supplied by ONATRA for estimating the cost of construction.

b. Construction of a quay wall 50 meters long and 5 meters wide, made out of sheet pile, filling up the back side and concreting the top.

For accurately estimating the cost of this structure, the depth of penetration and total height of sheet piling will have to be ascertained. For this, the LWL, HWL, the contour of the river bottom and the site and the type of soil are also necessary. These must be supplied by ONATRA.

c. Construction of a drainage ditch at the top of the ramp to prevent water from flowing along the ramp.

d. Installation of four heavy duty bollards.

e. Construction of a warehouse.

f. Construction of agent's quarters.

g. Construction of public toilets.

h. Construction of a generator building.

i. Construction of a guard post.

j. Installation of approximately 480 meters of fencing.

3.4 Recommendations

Two of the major problems facing this port are the extremely difficult loading conditions and the poor storage facilities. Both these problems can be solved by providing the facilities suggested by ONATRA. Considering the large quantity of cargo being loaded at this port and the very poor facilities presently available, it is recommended that ONATRA's suggestions be accepted intoto.

It is also necessary to improve the communications facilities at this port. Suitable equipments shall be installed to provide communication between the Dibaya-Lubwe port facility and Kinshasa for the prompt dispatch of barges.

The power requirement at this port can be met by a 25 KVA generator. This would supply power to the communications equipment, warehouse, wharf area and agent's quarters.

SECTION 4

ANALYSIS OF MANGAI CONDITIONS

4.1 General

Mangai is located on the Kasai river and is a well laid-out and equipped port, completely run by ONATRA. The quay is of stone and concrete construction with three loading levels--one at grade, one concrete ramp having a slope of 5% for manual loading at low water level and one concrete ramp having a 2% slope for loading at intermediate water levels. At grade, there is a mobile 28 ton crane. The ONATRA warehouse has a floor area of approximately 9,000 sq. ft. and there is sufficient outside storage space. The installation is equipped with one fork lift.

This port has loaded only 3,920 tons in 1980. Even though this is an increase from the 1979 figure of 3,320 tons, it is believed that the facilities at this port are underutilized.

4.2 Improvements Recommended by the Project Paper

The Project Paper recommended provision of two low mast fork lifts with drum handling gear.

4.3 ONATRA's Suggestions

ONATRA has not made any suggestion for improvements at this port.

4.4 Recommendations

In the absence of any suggestions from ONATRA, no additional improvement is recommended at this port.

SECTION 5

ANALYSIS OF BULUNGU CONDITIONS

5.1 General

Bulungu is located on the Kwilu river. There are loading points on both the east and west banks. The town of Bulungu is on the west bank. The west bank area is security fenced and an ONATRA agent is stationed on the west bank. Radio communication is available at this port. The power for the communication equipment is provided by means of a 5 KVA generator which has been in service at this port since 1973. This generator provides electric power for the agent's office also.

Two stationary barges are permanently moored on either bank to provide docking facilities for the barges. The barges, for loading, dock against these stationary barges where enough draft is available. The types of barges visitng this port are of J, H, M, C, and I class. The draft of type M barge when loaded with 500 MT of cargo is 1.50 meters which depth is available at these docking locations. The barges are loaded for a draft of only 1.1 meters during dry season due to navigational limitations.

There are several warehouses on both the banks, all owned by private parties. There are seven warehouses on the west bank and eight warehouses on the east bank. They are all of permanent construction and provide adequate warehouse space.

During 1980, 8048 tons of cargo were exported through this port as against 7190 MT during '79. Due to the project impact, it is estimated that the export of agricultural produce through this port will increase by 2800 tons. The present facilities which are available for docking and loading of barges are considered adequate enough.

5.2 Improvements Recommended by the Project Paper

The Project Paper has recommended suppy of two gangways (one for each river bank) to improve the loading rate.

5.3 ONATRA Suggestions

ONATRA has suggested in their plan No. 6418/002 to fill up an area of 120 meters X 80 meters at both the banks.

The extent of filling required could not be ascertained since necessary details such as LWL, HWL, contours of the river bottom and loading sites were not included in the plan. The type of material proposed for filling is also not specified. In the absence of these details, it is not possible to accurately estimate the cost of this improvement.

The site selected for this filling on the west bank is not considered suitable since there is a likelihood of this area getting silted up fast.

5.4 Recommendations

ONATRA's suggestion of filling up an area of 120 meters X 80 meters on either bank is not likely to improve the docking and loading facilities considerably. As far as the project objectives are concerned, it is not considered necessary to implement the improvements suggested by ONATRA. At the same time, the two gang-ways proposed to be supplied in the project paper may still be provided.

S E C T I O N 6

IMPLEMENTATION PLAN/SCHEDULE

6.1 Overall Contractual Approach

It is recommended that ONATRA revise plan No. 05/7 for Panu to correspond to the recommeded improvements in this report. Quotations shall, then, be invited from engineering firms engaged in both design and construction for the facilities recommeded in this report for Panu and Dibaya-Lubwe.

The designs received from these engineering firms shall be reviewed by a Port Engineer on behalf of USAID and the best design shall be accepted for implementation with necessary changes. These approved plans shall then be sent out for fresh quotations from different construction organizations for doing the job. This method has been suggested by ONATRA; but it is difficult to conceive how a design/construction organization can quote a fixed price for doing the job without spending a considerable amount of money for site investigation and detailed design which they cannot benefit from if they are not selected to do the job.

If the response to the above solicitation procedure is poor, quotations will have to be invited for doing the preliminary site investigation, design and preparation of drawings before the construction bid. From among the quotations received, one design firm shall be chosen to do the site investigation, design and preparation of drawings. These shall then be reviewed by a Port Enginer (Civil) on behalf of USAID. He shall also review the bid documents inviting bids for executing the job.

During the implementation phase of the contract, a U.S. type site supervisor shall be employed by USAID for planning, scheduling and supervising the construction. He will be responsible for the timely completion of the project in accordance with the approved plans and specifications.

6.2 Implementation Schedule

The time specified for construction in ONATRA's "Description of Works" document is as follows:

Panu	
Construction of loading platform	120 days
Construction of agent's quarters, generator building and fence	180 days
TOTAL	300 days
Dibaya-Lubwe	
Excavation of ramp and construction of quay	180 days

Construction of warehouse, agents quarters, generator building, guard house, public toilet and fencing	180 days
TOTAL	360 days

The time provided by this schedule is considered reasonable. This can even be reduced if construction of quay work and buidings are taken up simultaneously, since these are independent tasks. This time schedule will hold good only if the design phase is completed before the award of the contract.

If the design phase is to be contracted separately, the approximate schedule for completing the job is as follows:

Preparation of bid documents for site investigation, design and preparation of drawings:	15 days
Receipt of bids:	30 days
Review of bids and award of design contract:	15 days
Site investigation design and preparation of drawings:	45 days
Review of design and preparation of bid documents for job execution:	30 days
Receipt of bids for job execution	30 days
Review of bids and award of execution contract	15 days
TOTAL	180 days

Once the work is awarded, it is believed that the job can be completed in the time-frame cited in the ONATRA document.

S E C T I O N 7

ESTIMATED COSTS

The main contributing factor towards the cost of a port development project is the construction of the jetty or quay wall. This, to a great extent depends on the height of sheet piling and depth of penetration. These can be decided upon only with the following information:

a) Low water level

b) High water level

c) Contour of the river bottom

d) Contour of the loading site

e) Soil classification

None of these details is furnished with the ONATRA plan. Without these data, any attempt to arrive at an estimated cost will be an excercise in futility. With this information, it should be relatively easy to project cost accurately.

S E C T I O N 8

CONCLUSIONS AND RECOMMENDATIONS

Since the planned vehicle for improvements is a design/construction type of contract, any port progress is prone to delays until the design phase is completed. To counter this, once the details of improvement are decided upon at Panu and Dibaya-Lubwe, ONATRA should be consulted again on the advisability of going ahead with the Design/Construction contract. If there is no reasonable chance of getting a fair response on a combined design/contruction contract, it will be better to go ahead with two separate bids, one for design and one construction.

As reiterated throughout this report, it is considered essential for the USAID and ONATRA to have the services of an experienced Port Engineer continuously through the period of contractual planning, contract letting and construction monitoring. The qualifications of such a professional specialist are given in Attachment A to this report. His presence can assure continued progress, adherence to the schedule and satisfactory performance and utilization of the upgraded facility. He can, also assure control of budgets, within reason, to guarantee that funding will suffice as projected when sufficient data are available for accurate forecasts and estimates.

ATTACHMENT A

PORT CONSTRUCTION ENGINEER JOB DESCRIPTION

Duties:

The Port Construction Engineer will:

1. Plan, schedule and supervise the construction activities of the contractor to improve the port facilities at Panu and Dibaya-Lubwe which include construction of quay wall, loading platform, agent's quarters, warehouses, etc.

2. Report periodically to ONATRA and USAID on the progress of construction.

3. Coordinate with ONATRA Headquarters at Kinshasa to obtain drawings and specifications.

4. Ensure that the actual construction conforms to the approved plans and specifications.

5. Review and approve for ONATRA sign-off the "As Built" drawings prepared by the contractor.

Qualifications and Experience:

1. Minimum ten years construction experience in a responsible position as Construction Superintendent/Site Supervisor, of which five years shall be port-related civil construction activity.

2. Experience in pile foundation and sheet piling for bulkheads.

3. Overseas experience in developing countries, preferably in Central and West Africa.

4. Knowledge of French.

5. Citizen of USA or any country in the developing world mentioned in AID Geographic Code 941.

Preferred Qualifications

1. Has lived in the project area in Panu/Dibaya-Lubwe and has experienced Porta-Camp type facilities.

2. Has worked under the direction of ONATRA Director of Exploitation.

3. Will give signature acceptance of contemplated contract duration: 18 months.