1.12 Master Plan for the Port of Annaba

(1) Strategy of the Master Plan

The port planning strategy for accomplishing these goals is considered as follows:

1) Expansion of area for port development

An expanded site and creation of a new port area will be necessary for the increased port functions in the port of Annaba. For this purpose, the south east water areas of the port are being considered. In this area, the water is shallow and the sea bed soil is soft. Further, if the port is expanded to the south east side, the integrated use of existing and new port facilities would be highly feasible, and the developed site would have easy access to major roads. Therefore, future development space for the port of Annaba will be developed at the south eastern sea area by the northern and eastern breakwaters.

2) Promoting the development of cereals berths

At the port of Annaba, the specialization of cargo handling by berth, streamlining of loading and unloading, and the quick dispatch of ships are in practice even at present.

The forecasted increase in cargo volume will result in the construction of large ships and special carriers. This trend is expected to grow at the port of Annaba, particularly in regard to cereals. Therefore, it will be necessary to develop creaals berths and cargo-handling equipment from the economic point of view. Unloading efficiency will thus be increased and the overall functions of the port will be enhanced.

3) Promoting the development of container terminal

The volume of container handling at the port of Annaba is still on a small scale. No.1 and No.2 berth at the port of Annaba will be combined in order to cope with the increasing container transportation traffic. This berth has, however, a total quay length of 240 m and a water depth -10.0 m and it would still be insufficient to handle the full scale container traffic.

Therefore, it is desirable to acquire the container terminals of sufficient scale at the port of Annaba to facilitate the berthing of large container ships.

4) Coordination with industrial development planning

Industrial use of berths represent a significant part of activities for the port of Annaba.

The port plan shall be considered in conjunction with industrial development planning.

5) Reserving space for future development

The port plan must consider room for further development in the long term. As further expansion of port facilities may be necessary after the year 2010, space should be set aside for future development.

6) Optimization of investment size and time of investment

In port planning, consideration must be given not only to minimizing the total investment size, but also to the timing of each investment to maximize its effect at each stage.

(2) Present Capacity of the Port of Annaba

The present capacity of Annaba is estimated by analyzing the relationship between the volume of cargo handled at each berth, in terms of general cargoes, cereals and petroleum products.

The annual cargo-handling capacity is estimated at about 793 thousand tons. The volume of general cargo handled at the port of Annaba in 1990 was 668 thousand tons. This shows that the port of Annaba is being operated roughly at full capacity according to the berthing data analysis.

The capacity of cargo storage facilities is estimated at 1.1 million tons. In view of the present handling volume of 793 thousand tons, the accommodating capacities of transit sheds and the open storage area seem to be sufficient.

From the time a ship arrives outside the port to its final berthing, a minimum of 0.5 hours is required. As shown in time from arrival of a general cargo ship to final berthing, 43% of all ships are forced to wait outside the port for more than 24 hours.

The volume of cereals that can be handled in a year is estimated at about 547 thousand tons. The volume of cereals handled at the cereal berth in 1990 was 541 thousand tons. The mooring capacity at the cereal berth has already reached its limit, however, the cargo handling equipment is not operating at full capacity.

The storage capacity of the silo at the port of Annaba is 16,000 tons. The annual cereal handling volume in 1990 was 866 thousand tons, and the volume handled at the silo was 675 thousand tons. The annual silo turnover rate was 42.4 turns. The silo turnover rate at the port of Annaba is exceedingly high.

The volume of petroleum products that can be handled in a year is estimated at 432 thousand tons. The volume of petroleum handled at Berth No.26 in 1990 was 350 thousand tons. The number of ships which can moor at the petroleum berth per year is estimated at 107. The actual number of petroleum products carriers which moored at that berth in 1990 was 75. This indicates a berth occupancy ratio of 70%. The mooring capacity at the petroleum berth has already reached its limit. However, it will be possible to increase the handling capacity beyond the present level by improving the unloading capacity from 120 tons/hour to 190 tons/hour, and by increasing the storage capacity so as to shorten the number of staying days.

(3) Master Plan and Evaluation

The alternative master plans are designed as A, B and C as shown in Fig. 1.12.1.

Plan A shapes the development area so that the breakwater length is minimized. Plan B is similar to Plan A in regard to the early construction of the cereals terminal and the early commencement of services. The initial stage will be started from all parts of the port area. This plan will be able to flexibly cope with future demands. Plan C was selected as the most appropriate

of the alternative plans which were prepared in the previous study report in 1985. The breakwater in that plan was located along the south side of the existing channel, and the initial stage will be started behind the breakwater.

From the results of the evaluation (see Table 1.12.1), in selecting either plan, it is important to consider the conditions that will prevail when the construction is finally completed. In the case of port of Annaba, more importance should be attached to the future conditions. Plan A, which considers only the construction of the required berths, is clearly inferior to Plan B in view of such factors as connection with the future face line of container berth and industrial land use. Plan B is superior from the view-point of the effective use of initial investment, as stated already. Hence, Plan B is recommended to be adopted as the master plan (see Fig. 1.12.2).

Table 1.12.1 Evaluation of Alternative Plans

Items of evaluation		Evaluation		
		Plan A	Plan B	Plan C
Convenience	Maneuvability of ship	◎	○	△
	Land use	○	◎	○
Safety	Calmness waters of the port area	◎	◎	△
	Emergency measures	◎	○	○
Economy	Total construction cost	○	○	△
	Investment by stage	○	○	○
Flexibility	Changing conditions	○	◎	○
	Future development	◎	◎	○
Environment preservation	Effects on social environment	◎	◎	◎
	Effects on natural environment	○	○	○

Note: Ranking of evaluation ◎ Excellent
○ Ordinary
△ Some problems

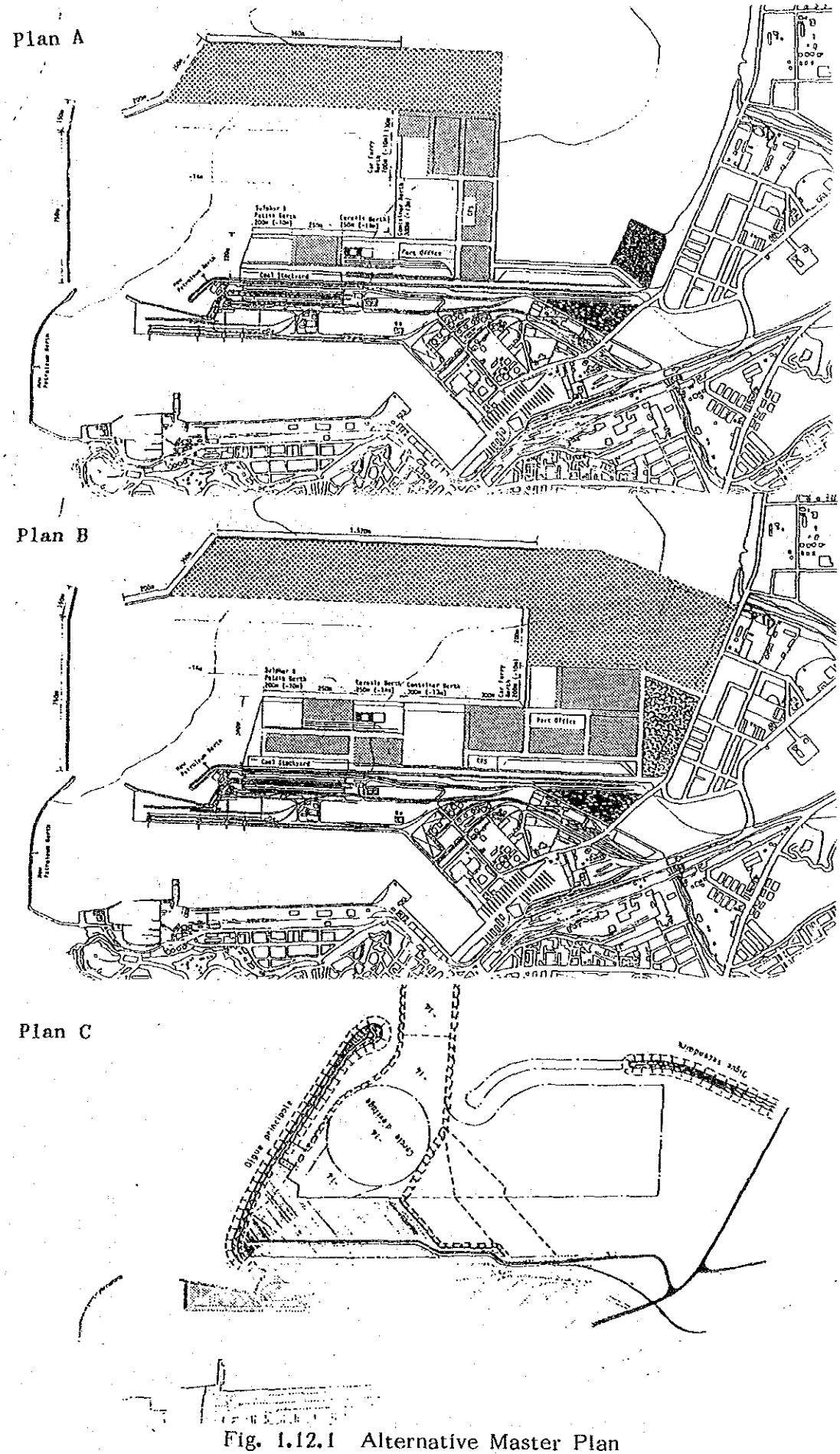

Fig. 1.12.1 Alternative Master Plan

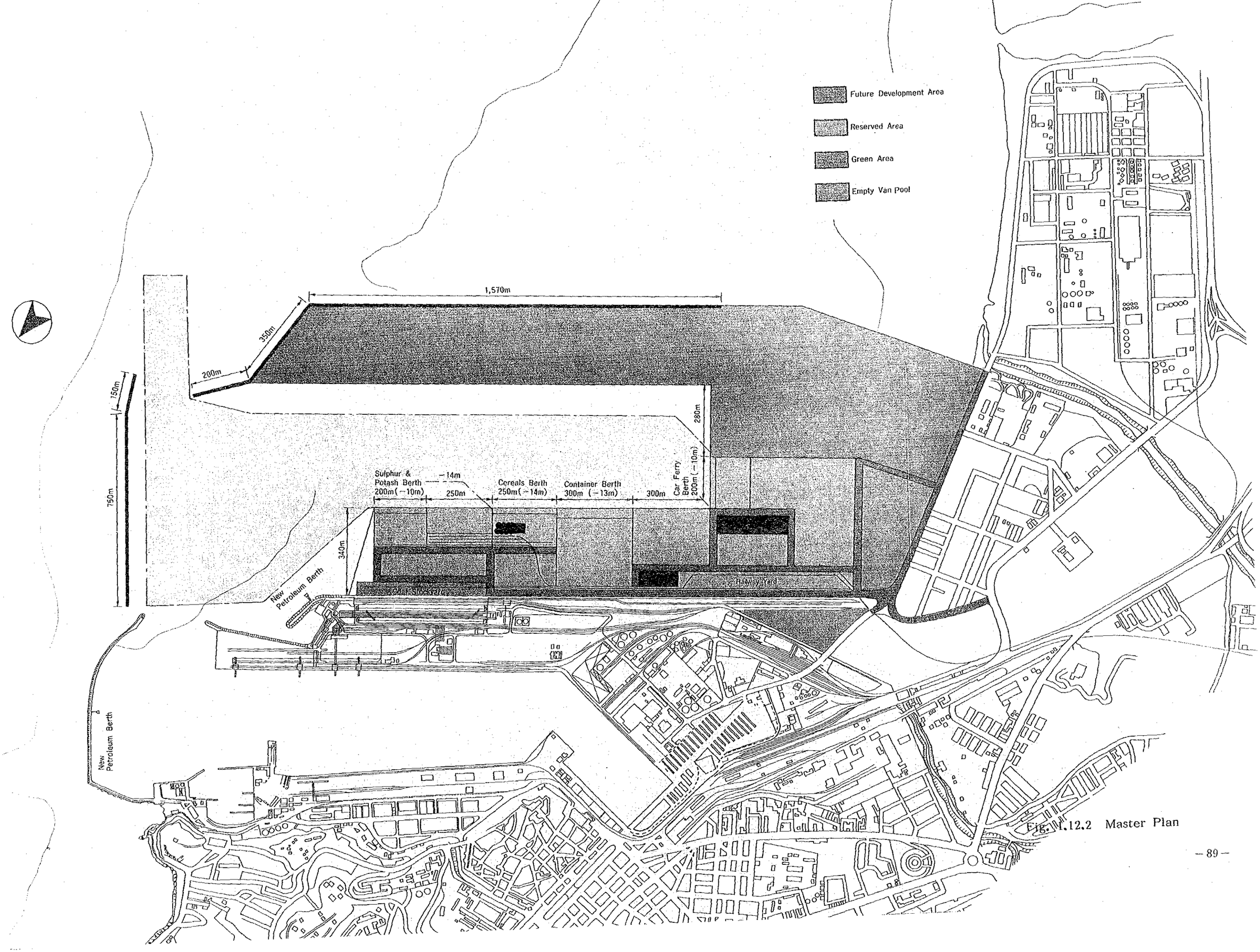

Fig. 1.12.2 Master Plan

(4) Required Scale Under the Master Plan

The port facilities necessary to handle cargoes in 2010 are summarized as follows:

1) Number of berths

The wharves necessary to handle cargoes in 2010 are shown in Table 1.12.2.

Table 1.12.2 Berths Proposed in the Master Plan

Type	Cargo Volume ('000 t)	Number of Berths	Water Depth (m)	Length (m)	Name of Berth
General Cargo Berths			7.00	130.0	Berth No. 3
			9.80	220.0	Berth No. 4
			6.20	160.0	Berth No. 6
			9.80	165.0	Berth No. 7
			9.80	145.0	Berth No. 8
			9.80	145.0	Berth No. 9
			7.50	130.0	Berth No.21
			7.00	90.0	Berth No.22
Sub-total	434	8 (8)		1,185.0	
Cereals Berths			11.00	155.0	Berth No.12
			14.00	250.0	New berth
Sub-total	1,400	2 (1)		405.0	
Vegetable Oil Berth	154	1 (1)	9.80	145.0	Berth No.10
Sugar Berth	100	1 (1)	11.00	145.0	Berth No.11
Coal & Coke Berth	2,246		12.50	320.0	Berth No.13
Metallic Prod. Berth	534		9.75	380.0	Berth No.14
			9.75	250.0	Berth No.15
Sub-total	2780.0	3 (3)		950.0	
Iron Ore			12.50	155.0	Berth No.16
			12.50	130.0	Berth No.17
Phosphat Berths			12.00	220.0	Deepening(No.19)
Sub-total	2,884	3 (3)		505.0	
Ammonia, Tar, Petroleum	267	1 (1)	12.50	125.0	Berth No.18
Carbnic Chemical, Fertil	123	1 (1)	8.00	135.0	Berth No.20
Petroleum Prod. Berths			12.00	240.0	Reconstructed(No.26)
			12.00	240.0	New berth
Sub-total	1,040	2		480.0	
Sulphur, Potash Berth	495	1	10.00	200.0	New berth
Car Ferry Berth		1	10.00	200.0	New berth
Container Berth			10.00	240.0	Berth No.1,2
			13.00	300.0	New berth
Sub-total	640	2 (1)		540.0	
Total	10,317	26 (20)		5,015	

Note: In "Number of berths" column, number of each parenthesis represents number of existing
: In numeral outside parentheses shows total number of berths

2) New Development Area

a) Main facilities

Total area: 87 hectares

Reserved area: 32 hectares

Water area: 142 hectares

Future development area: 101 hectares

Berths: total berths: 950 m (4 berths)
water depth: -10 m to -14 m

Breakwater (Main): length: 900 m
(Sub): length: 2,120 m

b) Other main facilities

Cereals silo: 25,000 ton capacity

Coal stockyard: 1.3 hectares

Container freight station: 2,600 m^2

Port office area: 2 hectares

Empty van pool: 4 hectares

Green area: 8.6 hectares

Railway yard: 4.7 hectares

Access road: 7.4 hectares

Cargo handling facilities : two (2) units of gantry cranes for containers (capacity of 400 tons each)

: two (2) units of rail-mounted pneumatic unloader for cereals (400tons/hour each)

3) Construction Plan of the Master Plan

The construction plan with a target year of 2010 must naturally be executed in gradual stages.

Fig. 1.12.3 shows the time period required for each stage and the main work being undertaken.

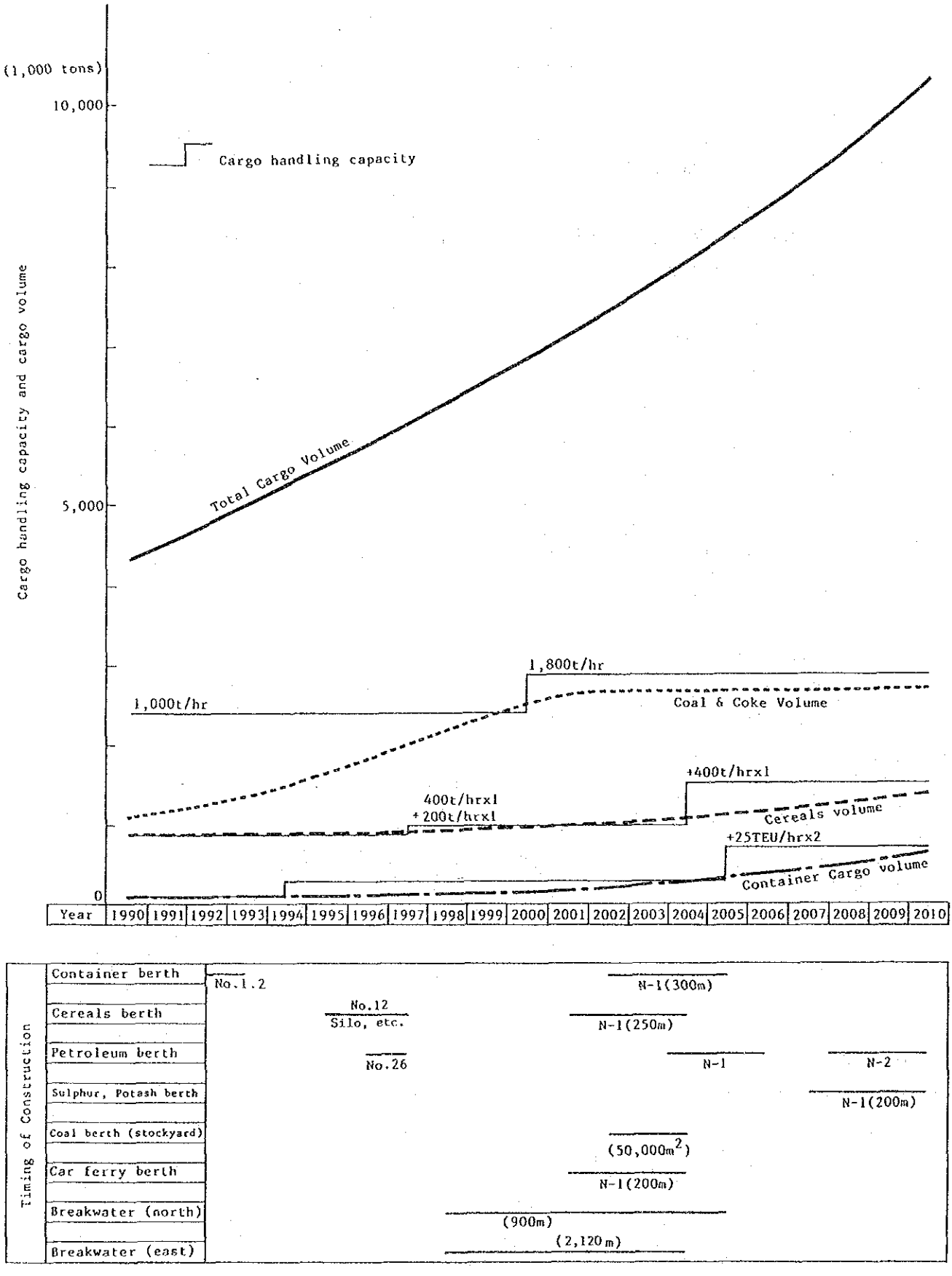

Fig. 1.12.3 Stage Plan for Construction of the Master Plan

(5) Examination of Cargo Handling System

1) Handling by EPAN

- General cargo vessel and Ro-Ro vessel

The basic idea of cargo handling within the port is the same as the port of Algiers.

- Cereals in bulk

Basically, all of cargo is directly put into the silos through conveyer systems and proposed cargo handling equipment for the cereals terminals are as follows.

	Unloading equipment
- New berth	Two rail-mounted pneumatic unloaders with an unloading capacity of 400 tons/hour
- Berth, No.12	one unit of the existing screw type unloader and one unit of new rail-mounted pneumatic unloader capacity of 400 tons/hour

- Raw sugar in bulk

It will be necessary to modernize the handling facilities or to examine new handling system.

- Tanker

Vegetable oil and animal fat are planned to be unloaded in a similar way to the current handling system.

- Car ferry

The unloading from and/or loading to vessels will be carried out by driving under own power through vessel's ramp way.

- Container vessel

Proposed cargo handling system for the container terminals are as follows.

	Terminal to be reconstructed	New terminal
Unloading/Loading :	Ship's gear and/or Forklifts	2 units of gantry cranes

Handling in yard : Forklift system Straddle carrier system

2) Handling of Concessionaires

- Coal in bulk at berth No.13

The nominal capacity and quantity of the handling equipment to be newly installed are assessed as follows.

	Nominal Capacity	No. of Units
Unloader	800 T/H	1 unit
Stacker/Reclaimer	2,000 T/H	1 unit
Conveyor to New Yard	2,000 T/H	1 unit
Evacuation Facility to Rail Wagon	1,000 T/H	1 unit

- Iron ore

The cargo is planned to be unloaded at the berths No.16 or 17 using the existing quay cranes and storage yard and a newly installed conveyer system with a transferring capacity 600 T/H.

- Phosphate

This cargo is planned to be loaded at berth No.19 as it is at present. Hence it is necessary to install another conveyer system with a nominal transferring capacity of 1,200 T/H.

- Sulfur and potash

These cargoes is planned to be handled at new berth with the following handling facilities.

Unloader : Traveling overhead trolley unloader grabbing crane. Nominal capacity 300 T/H x 2 units

Conveyer : Two lines of conveyer system
Capacity for sulfur ; 600 T/H
Capacity for Potash ; 300 T/H

Storage facility : Shed type per each cargo

- Liquefied ammonia

This cargo is planned to be handled at berth No.18 as it at present.

- Petroleum products

These cargoes are planned to be handled at berth No.26 and new berth. It is preferable to install a steel unloading arm with a quick coupler.

- Steel products

The cargo handling of steels goods in Nos.14 and 15 berths will be carried out as at the present. However in order to achieve smooth cargo handling, it is necessary to avoid long holding over of cargo in the storage yard.

- Other (Manufactured Fertilizer for export)

Unitization of the cargo is recommended with wooden pallets and/or flexible containers (big bags).

(6) Consideration of Environmental Aspects

The main components of environment to be affected by the port deelopment are as follows; Air pollution is a factor which has a strong relationship with the usage of automobiles. In the port, exhaust fumes from ships and automobiles in the port area are the main sources of air pollution, however, the port area creates little air pollution compared with the other plants.

The construction of the breakwater for protecting port facilities from waves will result in a closed water area in which it is not easy to exchange water with the outer sea.

The water pollution during the capital dredging and reclamation works can be easily prevented by the proper countermeasures commonly used.

At the container terminal, the operation of container handling causes some vibrations, however, it is only near the container terminal.

According to the report "Study on the pollution of dredging materials" of June, 1991, polluted sediment inside the port area was found which contained high concentrated heavy metals, and it was recommended that the polluted materials be discharged into an enclosed embankment which will be constructed at the existing neighboring port. The plan recommended above will be carried out by the DTP, after which a site will be developed for the green area planned in the Master Plan by the year 2010.

As for measures in the future, in conformity with MARPOL convention, the port was equipped with facilities to receive waste such as ballast, bilge and etc. from vessels at the port. However, in order to minimize the water pollution at the port, a monitoring system will have to be arranged for discharged water in advance. At the same time, sewage from the city and drainage water from the wharves need to be treated before being discharge into the basins of the port at the earliest possible time.

(7) Cost Estimation

The main conditions for the cost estimation are as follows;

(a) Construction costs have been estimated using the prices and rates obtained in October 1991 in principle

(b) The inflation factor has been excluded from the estimation.

(c) The exchange rates of the U.S.$ against the Algerian Dinar (DA) and the Japanese Yen (JY) are as follows;

1 US$ = 21.90 DA = JY 131.25

A summary of the estimation results is presented in Table 1.12.3

Table 1.12.3 Summary Construction Cost of the Port of Annaba

Unit; Million DA

Facilities		Alternative A			Alternative B			Alternative C		
Item	Sub Item	Foreign Portion	Local Portion	Total Cost	Foreign Portion	Local Portion	Total Cost	Foreign Portion	Local Portion	Total Cost
1.Main structures	1)Main BreakWater	1,084.2	568.1	1,652.3	1,084.2	568.1	1,652.3	1,537.8	849.1	2,386.9
	2)Sub BreakWater	1,047.8	435.9	1,483.7	1,325.0	554.0	1,879.0	271.5	153.6	425.1
	3)Basin & Channel	91.5	496.2	587.7	114.5	620.5	735.0	180.5	978.4	1,158.9
	4)Reclamation of Land	593.8	190.4	784.2	333.6	109.4	443.0	457.4	149.1	606.5
	Sub Total	2,817.3	1,690.6	4,507.9	2,857.3	1,852.0	4,709.3	2,447.2	2,130.2	4,577.4
2.New Sulphur & Patosh Both	1)Civil Works & Warehouses	291.0	168.2	459.2	309.3	178.5	487.8	291.0	168.2	459.2
	2)Unlooder & Conueyors	221.9	29.9	251.8	221.9	29.9	251.8	221.9	29.9	251.8
	Sub Total	512.9	198.1	711.0	531.2	208.4	739.6	512.9	198.1	711.0
3.New Cereal Berth	1)Silos & Buildings	253.3	113.1	366.4	253.3	113.1	366.4	253.3	113.1	366.4
	2)Civil Works	234.2	121.9	356.1	257.6	134.1	391.7	234.2	121.9	356.1
	3)Pneunatic Unlooders	309.1	28.1	337.2	309.1	28.1	337.2	309.1	28.1	337.2
	Sub Total	796.6	263.1	1,059.7	820.0	275.3	1,095.3	796.6	263.1	1,059.7
4.New Container Berth	1)Civil Works & Buildings	321.3	171.9	493.2	337.4	180.5	517.9	321.3	171.9	493.2
	2)Container Game etc	519.2	78.4	597.6	519.2	78.4	597.6	519.2	78.4	597.2
	Sub Total	840.5	250.3	1,090.8	856.6	258.9	1,115.5	840.5	250.3	1,090.8
5.New Car Ferry Berth		144.3	80.7	225.0	141.4	78.3	219.7	144.3	80.7	225.0
6.New Petroleam Berth	1)Civil Works	10.4	5.7	16.1	10.4	5.7	16.1	10.4	5.7	16.1
	2)Unlooding System	192.7	26.3	219.0	192.7	26.3	219.0	192.7	26.3	219.0
	Sub Total	203.1	32.0	235.1	203.1	32.0	235.1	203.1	32.0	235.1
7.Reinforcement Works of Existing Berthes	1)Cereal Silos	253.3	113.1	366.4	253.3	113.1	366.4	253.3	113.1	366.4
	2)Peteroleiun Berth	0.3	0.1	0.4	0.3	0.1	0.4	0.3	0.1	0.4
	3)Phosphate Berth	34.1	71.4	105.5	34.1	71.4	105.5	34.1	71.4	105.5
		287.7	184.6	472.3	287.7	184.6	472.3	287.7	184.6	472.3
	4)CargoHandling Equipments	872.6	150.0	1,022.6	872.6	150.0	1,022.6	872.6	150.0	1,022.6
	Sub Total	1,160.3	334.6	1,494.9	1,160.3	334.6	1,494.9	1,160.3	334.6	1,494.9
8.Misec llauies	1)Other Civil Works	245.3	161.1	406.4	245.3	161.1	406.4	245.3	161.1	406.4
10.Direct Cost		6,720.3	3,010.5	9,730.8	6,815.2	3,200.6	10,015.8	6,350.2	3,450.1	9,800.3
11.Indirect Cost	1)Physical Contingency	403.8	240.4	644.2	412.2	257.3	669.5	371.4	279.5	650.9
	2)Engineering Services	368.3	215.8	584.1	376.0	231.0	607.0	338.8	251.0	589.8
	Sub Total	772.1	456.2	1,228.3	788.2	488.3	1,276.5	710.2	530.5	1,240.7
12.Total Cost		7,492.4	3,466.7	10,959.1	7,603.4	3,688.9	11,292.3	7,060.4	3,980.6	11,041.0
13.Tax(VAT)		524.4	242.7	767.1	532.2	258.2	790.4	494.2	278.6	772.8
14.Proiect Cost		8,016.8	3,709.4	11,726.2	8,135.6	3,947.1	12,082.7	7,554.6	4,259.2	11,813.8

1.13 Port Management and Operations

(1) General Condition

Currently, EPs have a lot of problems to be solved in the areas of port management and operations. In this chapter section, considering those problems, future port management system will be studied from the long-term point of view. The main problems and factors to be considered are as follows.

First, Algerian public corporations have been reviewed in respect of efficiency and many faced with reformation process. The EPs are no exception to such process and should be also reformed if necessary. Second, the EPs do not have some of the principal authorities enjoyed by an independent port administration body. Third, there are problems concerning cargo handling and cargo storage operations, part of which could be solved by the reorganization of the EPs. Lastly, the largest problem facing the management is clearly its financial situation, deficit or decreasing profit, mainly caused by rapidly increasing personnel expenses.

(2) Analysis of Operational Performance and Cost

In order to know profitability of each port operation conducted by the departments of the EPs, profits of the operations are calculated respectively. The operations analyzed here are tug, pilot, mooring, cargo handling and cargo storage services in the three ports.

According to the result of calculation, tug, pilot and mooring services brought little profit or a deficit to the EPs. The profit from cargo handling operation is varied from EP to EP. Only the cargo storage operation generated substantial profits for the EPs.

(3) General Idea of the Port Management and Operations

There is great variety in the types of port administrations around the world, such as state controlled, municipal, autonomous and private. However, whatever the legal statute of a port may be, it should be based on the following essential principles: autonomy, authority, financial self-sufficiency and commercial management methods.

A major port of national importance should be managed by a separate autonomous body under the general overall supervision of the government. The port administration body should be in charge of the current administration and development of the port, within the framework of the national economic policy. The two requirements, autonomy and government's control, though contradictory, should be reconciled to realize efficient port management without deviating from the general economic policy of the government.

A port administration body should have authority over the whole port area and main port functions. Efficient port management cannot be expected unless the port management body owns all land and facilities, such as infrastructure, superstructure, quay cranes and so on, in the port area to control and coordinate all port activities on wharves and piers, land facilities and port waters.

Autonomy cannot be achieved by a port unless it has a wide measure of financial independence and self-sufficiency. Financial independence and self-sufficiency make the port administration body more sensitive to costs and benefits. Port charges and any other receipts of the port should be used exclusively for port administration, maintenance and improvement. Port tariffs should be kept at a reasonable level to cover normal current expenses, including amortization and repayment of loans. Only funds for investments to major port infrastructure and superstructure based on a port extension or improvement plan should in case of need be supplied by the government, either in the form of direct grant, subsidy or of low-interest loans.

For a successful port administration body, application of business management methods is required. In a port operation and management, new problems constantly arise and must be solved quickly. Port management is a kind of business so the administration body must always fight against rising costs. Therefore, ports cannot be managed in accordance with the bureaucratic systems prevailing in most governmental departments. The management must be flexible and be able to take decisions according to the merits of each case, rather than according to formalities and rigid regulations.

(4) Future Management System of the EPs

From the long-term point of view, future management system of the EPs is recommended as follows:

1) Organization

The establishment of new companies or organizations

- Privatization or to establish new companies or organizations for some specific port operations should be considered corresponding to the stage of national economic development and of the advancement of liberalization in Algeria. Companies or organizations to be built up for port operations in the future are stevedoring, tug and pilot companies for example.

2) Authority

Land

The EPs do not own the land in the port. It is the government who owns the entire land area in the port. In addition, the boundary between a variety of public corporations is not clear.

- The lands should be owned by the EPs. Also the port area should be defined including future extension area.

Infrastructure planning

The EPs do not have the authority to construct the infrastructure of the ports. This means that the quick response to the demands of port users, such as construction or improvement of port infrastructures, is almost impossible.

- Infrastructure of the ports should be planned, constructed and financed by the EPs themselves. The government should support infrastructure construction by means of fund donation or low interest rate loans.

3) Tariff

Tariff revision procedure

In the current procedure of tariff revision, Ministry of Economy has the authority to approve the tariff revision and its procedure is strict and severe. Such difficulty of tariff revision is one of the reasons for the financial deficit of the EPs in their operation accounts.

- The procedure should be improved so that it is quick and responsible to the financial situation of the EPs.

Storage charge

Transit tax and depot tax stipulated in the Law of Finance are imposed as a storage charge in a yard or in a transit shed. This means that one of the principal charges of port depends on the national tax system, although those taxes are transferred to EPs to constitute their revenue.

- From the view point of port finance, the storage charge has a large share in the revenue of the port administration body. It represents the most basic tariff of the port, and therefore should be included in the port tariff.

4) Port Related Businesses

Development of the warehouse business

In the port of Algiers, there is a lot of cargo which is stored a long time in transit sheds or yards instead of in an outer-port warehouse. This results in a shortage of storage space in the port. One of the reasons for this is the lack of storage facilities nation wide, such as warehouses.

- Development of a warehouse and warehouse business is required.

5) Terminal Operation

Container Terminal

- It should be considered that newly built container terminals are operated by a newly built specialized company for container handling or stevedoring.

Cereals Berth

- In the cereals berth, berth and apron should be managed by the port administration body as a public berth. The cereal facilities such as silos should be constructed and owned by the OAIC, and the area used by these facilities should be leased out to OAIC.

1.14 Maintenance for Cargo Handling Equipment

Maintenance of cargo handling equipment in the Algerian ports requires urgent attention by the top management. Almost all of the cargo handling equipment in the ports of Algeria have been in use over their economical working life.

The rate of breakdown is quite high at the study ports. The cargo handling equipment in workable condition has been reduced to about 70% on average, i.e. quay cranes 52%, grain unloaders 90%, mobile cranes 63% and forklifts 70%. They are mainly caused by overuse of equipment due to shortage of equipment. Insufficient supply of spare parts is also one of the main reasons for the high rate of breakdown. Routine maintenance and major repair works need to be improved greatly.

In order to cope with such a situation, the EPs have contemplated procuring substantial numbers of new equipment in their ports. At Algiers alone, 117 units of forklifts have already been ordered. Procurement of an additional 158 forklifts and other types of machines are under negotiation.

These new forces will certainly improve the present shortage of equipment. Distribution of size of equipment, however, seems to be still excessive compared to the average weight of cargoes to be handled. It must be noted that a 10 ton forklift may cost two or three times that of a 2 ton unit.

With regard to the management system of the cargo handling equipment, much is required to improve the present situation. Lack of budget, subsequent lack of spare parts, tools and accommodation are only superficial symptoms of deep rooted problems. Insufficient understanding of the cargo handling operations and equipment by the top and middle management is one thing which results in insufficient allocation of budget for such purpose. Extremely time consuming procurement procedures is another problem area. These problems are all more or less inevitable under the present budget control system.

In order to improve the situation, introduction of cost consciousness among operators and workers in the port operation and workshops including managers is the first thing to be recommended. If it is difficult to introduce, one of the alternative solutions may be the part or full participation of private sector(s) in

the cargo handling and maintenance. However such a drastic change in the system requires some time for preparation. Therefore, there must be certain provisional measures before the major reform is achieved. Required provisional measures are reform and reorganization of the routine maintenance practice by introducing strict but clear rules and a manual as well as creating a better working environment.

Along with the progress of the proposed reform in port operation system, a part of, or the entire maintenance system for the cargo handling equipment may be let out to the private sector(s).

(Part II)

2.1 Short-Term Plan for the Port of Algiers

(1) The Basic Concept of the Short-Term Plan

The Short-Term Plan is prepared as a first stage plan with a target year of 1997 for the development of the Port of Algiers. The Short-Term Plan is made within the framework of the Master Plan determined in Section 1.10.

(2) Usage Plan for the Port Facilities by Vessel Type

As mentioned previously in Section 1.10, vessels calling at the Port of Algiers in the stage of the Master Plan are divided into fifteen categories. In the stage of the Short-Term Plan, the same categories are adopted. The volume of cargoes estimated by the demand forecast(see Section 1.8) is distributed to vessels categorized in the above.

The volume of cargoes to be transported by the general cargo vessels in the year 1997 is expected to stay almost at the same level as at present, since degree of containerization will still be low at that stage. On the other hand, other cargoes which are unsuitable to be containerized such as cereals, iron and wood are expected to increase continuously. In order to meet the increasing demand of those cargoes, some of the existing berths which now handle general cargoes are planned to be converted to berths for handling these cargoes exclusively. Moreover, the existing seven berths presently being used for general cargoes will be eliminated after the reclamation to provide space for the yard of Terminal-1. Hence, it will be difficult to allocate enough berths for receiving general cargo vessels following the said reduction. For the general cargo vessels, in addition to the existing 13 berths, two berths are planned to be prepared at Terminal-2 which will be constructed east of the Brise-Lames Est. Taking account of the average vessel size of around 5,000 DWT, the berths with 300 meters long as a total is planned. The length is a half of the length proposed in the Master Plan.

The volume of cereals to be unloaded at the port in 1997 is estimated as 2 million tons, 1.5 times greater than the volume in 1990. In order to discharge the forecast volume, the present level of cargo-handling productivity needs to be considerably heightened. For that end, in addition to the existing rail-mounted pneumatic unloaders installed along Quay No.35-2, new unloaders are planned to

be installed along Quay No.35-1. A portion of cereals is planned to be unloaded at Quay No.33-1 by using mobile pneumatic unloaders. Three berths are allocated exclusively for cereals. Additionally, silos with sufficient storage capacities need to be prepared behind the berths so as to support efficient cargo-handling productivity at the berths.

The number of containers to be handled at the port is estimated as 123 thousand TEUs in 1997. In order to handle the forecast number of containers, two units of gantry cranes for container-handling are planned to be installed at Terminal-1.

The usage plan for the port facilities by vessel type including container vessels in 1997 is shown in Table 2.1.1.

Table 2.1.1 Usage Plan for the Port Facilities in 1997

Berth No.	Vessel type													
	General cargo							Ro-Ro	Container	Cereal carrier	Tanker			Car ferry
	Mixed	Cement	Foodstuffs	Wood	Steel	Sugar	Animal feed				Petroleum	Bitumen	Vegitable oil	
No.5			*											
No.6			*			*								
No.7								*						
No.8			*											
No.9-1			*			*								
No.9-2								*						
No.10			*			*								
No.11-1			*			*								
No.11-2														*
No.16														
No.17	*													
No.18-1				*	*									
No.18-2								*						
No.19				*	*									
No.20-1				*	*									
No.20-2								*						
No.21	*													
No.22-1	*													
No.22-2	*													
No.22-3	*													
No.22-4	*							*						
No.22-PC	*													
No.23-1	*													
No.23-2	*													
No.23-3	*							*						
No.23-PC	*													
No.24								*						
No.25								*						
No.26-1							*							
No.26-2												*		
No.31-2	*													
No.31-3	*							*						
No.32													*	
No.33-1										*				
No.33-3				*	*									
No.34		*												
No.35-1										*				
No.35-3										*				
No.36													*	
No.37-1											*			
No.37-2											*			
No.37-3											*			
Terminal-1									*					
Terminal-2														
(No.1-1)	*													
(No.1-2)	*													
Total	15	1	8	4	4	4	1	9	1	3	3	1	2	1
Cargo volume (tons)	880,000	877,000	136,000	267,000	338,000	151,000	151,000	430,000	649,000	2,000,000	1,154,000	79,000	368,000	98,000
Number of vessels	440	41	65	52	72	12	10	391	128	87	211	34	119	233

The required area for public sheds and open yards occupied by various cargoes excluding containers in 1997 is estimated as 24.3 ha with a peaking factor of 1.28. Regarding the required area of 24.3 ha, 18.9 ha will be available within the existing port limits in the same year, and the remaining 5.4 ha is planned to be prepared in Terminal-2.

The required storage capacity for containers in 1997 is estimated to be 5,800 TEUs. Containers will be stored at Terminal-1 whose planned storage capacity is 5,820 TEUs.

The required capacity of silos for cereals which will be prepared at the Skikda Wharf in the same year is estimated as 130 thousand tons. Subtracting the existing capacity of 30 thousand tons, silos of a total capacity of 100 thousand tons will be additionally required.

As mentioned previously, in peaking or congested conditions, the required storage area for cargoes unloaded from or loaded onto the vessels is expected to exceed the capacity of the existing storage areas. Not only the lack of the number of berths but also the shortage of the required storage areas will cause long ship waiting times offshore as they do at present.

The capacity of Terminal-1, which is the number of containers handled per annum is estimated as 169 thousand TEUs. According to the forecast demand, the capacity of Terminal-1 will be insufficient a few years after 1997. After the saturation of Terminal-1, Terminal-2 will also be usable together with terminal-1 to receive increasing number of container vessels, since the number of general cargo vessels will conversely be decreasing along with the progress of containerization. Thus, in the stage of the Short-Term Plan, Terminal-2 is planned to be a multipurpose terminal. The multipurpose terminal will serve mainly for general cargo vessels in the initial stage. Then, the terminal will gradually be converted to an all container terminal as called for in the Master Plan. Thus, in the stage of the Short-Term Plan, the multipurpose terminal, namely Terminal-2, is indispensable in handling the increasing volume of general cargoes whether they will be transported by conventional vessels or modernized fully-cellular container vessels.

(3) Modernization Plan of the Existing Facilities

1) Modernization of the Cereal Terminal

Modernization of the cereal terminal at the Wharf of Skikda is planned for in the target year 1997. The existing three berths are planned to be allocated for cereal-handling. Two units of rail-mounted pneumatic unloaders with nominal capacity of 400 tons per hour each will be additionally purchased. Furthermore, silos of storage capacity of 100 thousand tons will also be prepared. A layout plan of the above facilities is shown in Fig. 2.1.1.

2) Installation of Gantry Cranes for Containers at Terminal-1

In order to handle the forecast number of containers, two units of rail-mounted gantry cranes for container-handling are planned to be installed at Terminal-1 by the year 1997.

3) Preparation of Open yards for Steel Products and Wood

The area of the open yards required for storing iron and wood in 1997 is estimated to be 5.2 ha in total. Out of this area, 3.9 ha is allocated at the open yards on the Wharf of Ghara Djebilet and yards near the wharf. The remaining 1.3 ha is allocated at the open yard just behind the Quay No.33-3 on the Wharf of Skikda and the yards near the wharf. The existing shed behind the Quay No.20-1 on the Wharf of Ghara Djebilet is planned to be demolished to prepare an additional open yard to store steel products or wood.

4) Preparation of a Berth for Bitumen and Bunker Fuel

The berth for handling bitumen and bunker fuel, which currently exists at Quay No.27, is planned to be transferred to Quay No.26-2 which is presently used for buoy stocking.

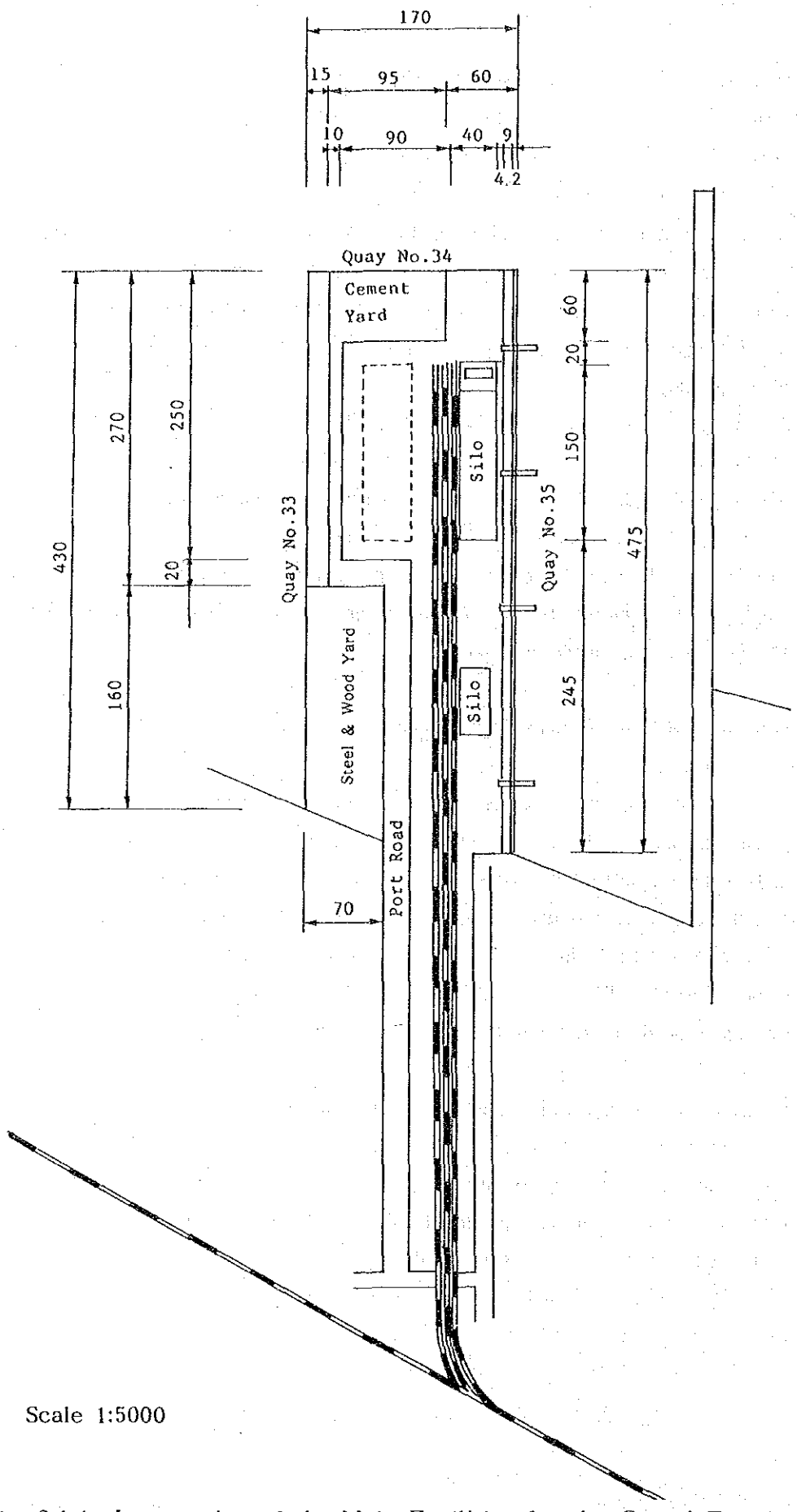

Fig. 2.1.1 Layout plan of the Main Facilities for the Cereal Terminal

(4) Establishment of Terminal-2 as a Multipurpose Terminal

In order to handle increasing volume of general cargoes which are transported by conventional vessels, fully-cellular container vessels, or part container vessels through the Port of Algiers, Terminal-2 as a multipurpose terminal is planned to be established in the stage of the Short-Term Plan. As mentioned previously, the multipurpose terminal will serve mainly for conventional vessels in the initial stage upto 2000. Then beyond 2000 along with the progress of containerization, the multipurpose terminal will be converted to an all container terminal as mentioned in the Master Plan.

After the start of operations in Terminal-2 in 1997, cargoes handled at the terminal are expected to increase continuously. Therefore, additional investment will be needed at some stage. The timing of the investment must be determined taking account of a saturated condition of the first phase project. The saturated condition is defined to be the point when the savings of transportation costs induced by the next phase project come to exceed the additional investment costs. The timing is examined to make phase plans between 1997 and 2010. The resulting phase plans of Terminal-2 are as follows:

	Year	Contents of project
Phase I-1 (Short-Term Plan)	1997	No.1 berth (300 m)
Phase I-2	2000	2 units of gantry cranes
Phase II	2006	No.2 berth (300 m) with 2 units of gantry cranes

A layout plan of the main facilities is shown in Fig. 2.1.2.

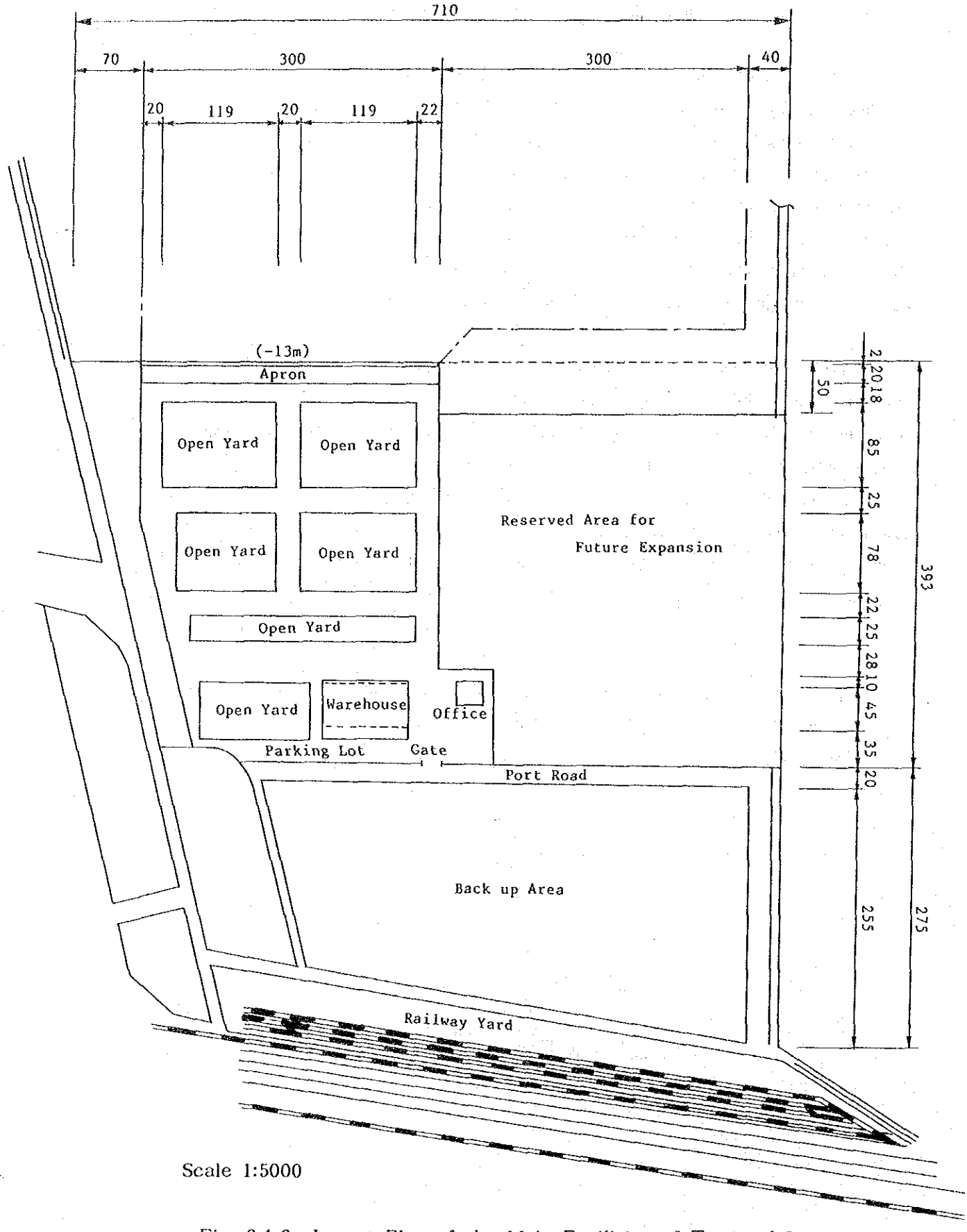

Fig. 2.1.2 Layout Plan of the Main Facilities of Terminal-2

(5) Cargo-Handling System

1) Steel Products and Timber

Marshaling of steel products and timber will be basically carried out in the manner mentioned in section 10.5.1,(3)-4) in Part I.

2) Multipurpose Terminal (Terminal-2)

- Utilization of open yard and CFS

Open yard: The open yard should be roughly zoned on the basis of the layout plan of the container stacking yards in the container terminal established for the target year 2010.

CFS: As a general rule, the CFS should be used only as temporary storage for a short period.

- Loading and unloading to and from vessels

Loading and unloading of cargoes is carried out by means of ship's gear.

- Marshaling of cargoes in the open yard and CFS

The standard method of transfer of cargoes from apron to storage areas is by horizontal handling equipment combinations, using forklifts, trailers, chassis, trucks, and tractors.

- Horizontal handling equipment

At the first stage, 4 units of heavy forklifts of lifting capacity of 35 tons and 8 units of forklifts with capacity of 3 tons are allotted for terminal operation.

3) Bulk Cereals

The cargo is to be first stored in the silos and the cargo handling system at each berth is planned as follows.

- Quay No.35 - 2

The cargo is to be handled using the existing facilities; "two units of pneumatic unloaders" and "the storage silos behind the berth".

- Quay No.35 - 1

The cargo handling is to be handled using two units of rail-mounted pneumatic unloaders with an unloading capacity of 400 tone/hour, and storage silos which are to be newly established at this berth.

- Quay No.33 - 1

Cargo is to be unloaded using the existing tire-mounted pneumatic unloaders, owned by the EPAL, and transferred to the new silos by shuttle trucks for storage.

(6) Access Channel and Basins

It is necessary to plan an access channel and basins so as to receive container vessels of the maximum size mentioned in Section 1.4.4 to approach Terminal-2. As the size of the vessels is the same as proposed in the Master Plan, the same dimensions of the access channel and basins as those in the plan are proposed.

(7) Breakwaters

It is necessary to prepare new breakwaters to protect vessels to be maneuvered at the above basins or to moor at the berths of Terminal-2 in the stage of the Short-Term Plan. For the purpose, a main breakwater of 480 m long and sub-breakwater of 320 m long are planed to be newly constructed (see Fig. 2.1.3).

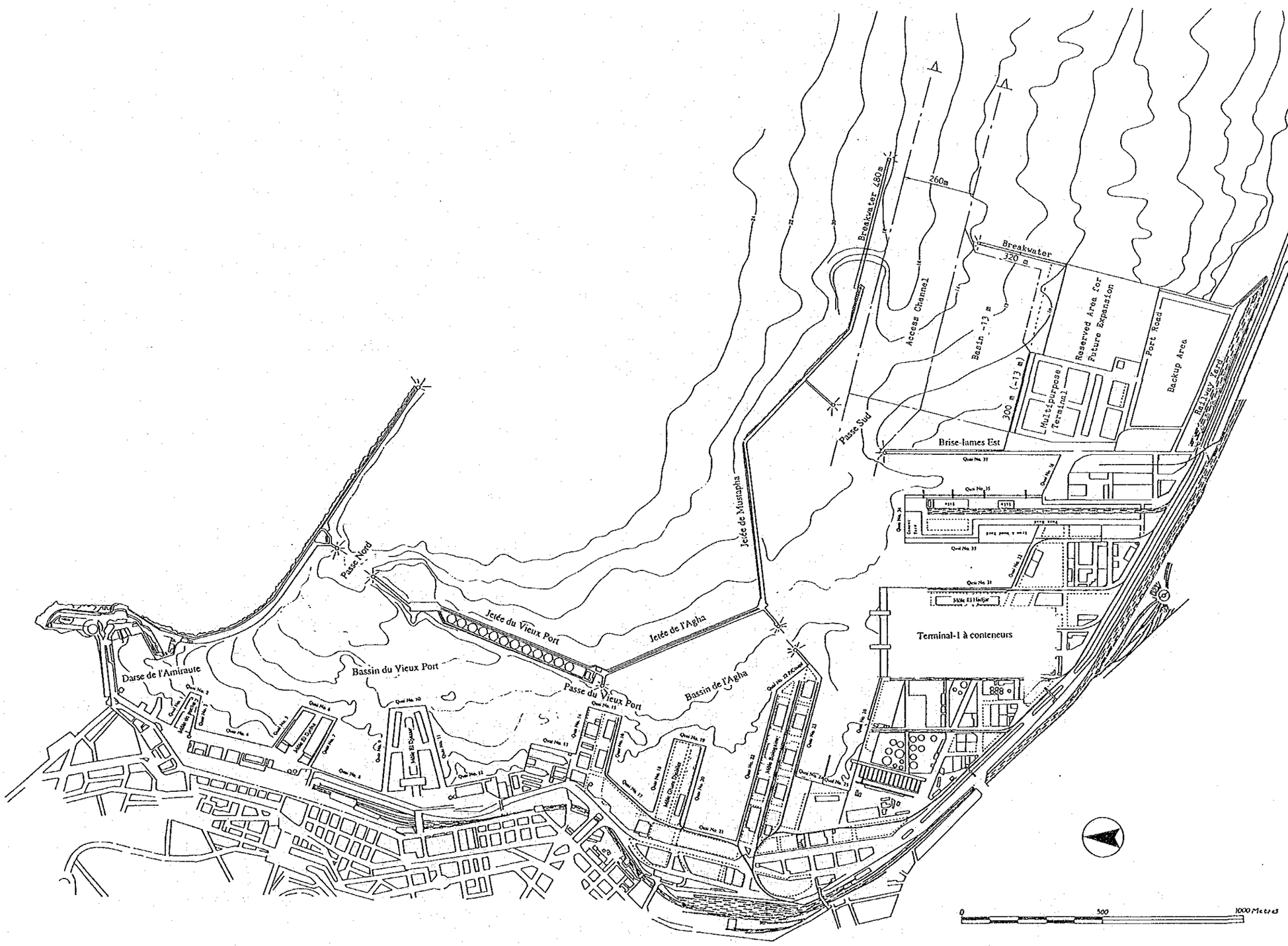

Fig. 2.1.3 Development Plan of Terminal-2

(8) Access Roads and Railways

The traffic volume of vehicles originating from or destined to the port in the year 1997 during peak time is estimated to be 4,540 vehicles per day each way in total. The hourly traffic corresponding to that daily traffic is also estimated to be 681 vehicles each way. As hourly capacity of traffic volume per road lane is estimated as 600 vehicles, one lane each way needs to be shared for the entire above traffic.

As for railway wagons, daily traffic is estimated to be 88 as a total. As for siding railway providing access to Terminal-2, a single track is planned to be newly installed. At the cereal terminal, it is necessary to install additional tracks to transport the forecast volume. When installing the siding railway, the existing express way running along the port will be modified to overpass the siding railway in order to avoid plane intersection.

(9) Environmental Consideration in the Port Activities

It is also necessary to consider the possibility of pollution induced by the development of Terminal-2 in the stage of the Short-Term Plan. In the Master Plan, the environmental impacts on the surrounding districts were examined in details and are considered to be very small. Since the scale of the development in the Short-Term Plan is approximately half of the Master Plan, the environmental impacts induced by the project of the Short-Term Plan is considered to be very small. When constructing required infrastructures, the proposed countermeasures in the Master Plan must be taken so as to minimize the environmental impacts.

As mentioned in Section 1.10, polluted water presently discharged from the city or industries needs to be treated before being discharged into the basins of the port regardless of the cost.

As mentioned in Section 1.10, according to the MARPOL Convention, it is necessary to provide facilities to receive waste such as ballast, bilge and tank cleaning waters from vessels at ports of the countries that ratified the convention. Presently, a simple oil and water separator exists at the port to receive petroleum tankers only. Therefore, it is advisable to provide full-scale facilities to receive the waste from not only petroleum tankers but also other

vessels as required in the stage of the Short-Term Plan. A site near the existing separator is proposed for installation of the above reception facilities. Quay No.36 is also proposed as a barge site to receive the waste from vessels on route to the reception facilities.

(10) Contents of the Project of the Short-Term Plan

The contents of the project of the Short-Term Plan are summarized as follows:

- Terminal-2

  - Project site: East of the Brise-Lames Est

  - Dimensions: Terminal area: 11.6 hectares
    Berth: Length: 300 meters
    Water depth: 13 meters
    Main breakwaters: length: 480 meters
    Sub-breakwaters: Length: 320 meters
    Access channel: Breadth: 260 meters
    Basin: Area: 18.9 hectares
    Water depth: 13 meters

  - Cargo-handling facilities: 4 Forklifts of 35 ton capacity
    8 Forklifts of 3 ton capacity

  - Other main facilities: Transit shed
    Terminal office
    Access road: 1.8 km

  - Required areas: Terminal area: 11.6 hectares
    (Open yard and warehouse: 5.4 hectares)
    Access road: 2.6 hectares
    Backup area: 10.0 hectares
    Area reserved for the next stage: 11.1 hectares
    Others: 1.5 hectares
    Railway yard: 3.6 hectares

    Total: 40.4 hectares

- Terminal-1

  - Cargo-handling facilities: 2 Units of gantry cranes of 40 ton capacity for containers

- Open Yard for Steel Products and Wood

  - Project site: Wharf of Ghara Djebilet
  - Demolishing the warehouse behind Quay No.20-1 to prepare an open yard

- Cereal Terminal

  - Project site: Wharf of Skikda
  - Cargo-handling facilities: 2 Units of rail-mounted pneumatic unloaders: nominal capacity of 400 tons per hour each
  - Silo of 100,000 ton capacity
  - Other main facilities: belt conveyors
    siding railway
    loaders for railway wagons

- Facilities for Reception of Waste Water from Vessels

  - Project site: near the existing facilities

- Siding railway overpassed by the existing express way

(11) Design of Major Structures

Design Conditions

The design conditions for the major structures, such as breakwaters, seawalls, and quaywalls, have been established on the basis of indepth analyses of waves, tides, earthquakes, soils and other natural conditions and evaluation of the strength requirements of locally available construction materials, and of the construction equipment needs.

Selection of Structural Types

Selection of the appropriate structural types for the major port facilities planned was based in careful analyses of such factors as the relative easiness of

procurement of construction materials and equipment from local sources, local contractor experience with similar projects, contractor's technical reliability, and time and cost requirements.

In consequence, the rubble block type has been selected for the breakwater and seawalls and the gravity concrete block type for the quaywalls at the part of Algiers where the soil conditions are favorable.

Determination of Structural Cross Section

The cross sections of the breakwaters, seawalls and quaywalls were determined in accordance with the relevant local design criteria, where these are established and pursuant to the Technical Standards for Port Facilities and Their Commentary in Japan, where pertinent local standards or codes are not available.

(12) Construction Planning of the Port of Algiers

1) General

The construction quantities for such facility in the Short Term Plan for the port of Algiers are shown as follow,

- Dredging	1,550,000 m^3
- Main Breakwater (-18.5 m)	480 m
- Reclamation of Land	304,000 m^2
- Quay (-13.0 m)	300 m
- Cereal Silos	100,000 ton
- and Cargo Handling Equipment	

To complete the project with in four years, the implementation of construction and supply of construction equipments and materials should be carefully planned.

2) Construction Schedule and Cost Estimation

The construction schedule and cost estimation of the project based on the foregoing the preliminary design and construction method are shown as follows,

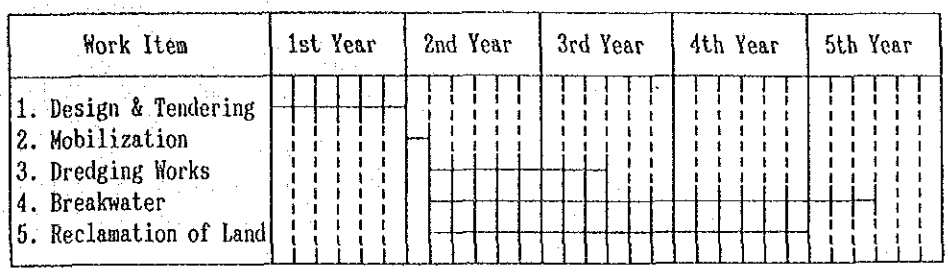

Fig. 2.1.4 Construction Schedule of Main Facilities

Table 2.1.2 Summary of Construction Cost

Unit: Million DA

No.		Construction cost		
		Foreign Portion	Local Portion	Total
1.	Container Terminal 2	1,652.6	853.0	2,505.6
2.	Cereal Terminal	804.8	367.9	1,172.7
3.	Container Terminal	11.3	7.2	18.5
4.	Metallic Material Berth	0.3	0.1	0.4
5.	Railway Yard	25.5	23.2	48.7
	Sub Total	2,494.5	1,251.4	3,745.9
6.	Cargo Handling Equipment	673.4	79.9	753.3
	Direct Cost Total	3,167.9	1,331.3	4,499.2
7.	Physical Contingency	26.3	113.3	339.6
8.	Engineering Service	199.6	100.1	299.7
	Indirect Cost Total	425.9	213.4	639.3
9.	Total Cost	3,593.8	1,544.8	5,138.6
10.	Tax(VAT)	251.6	108.1	359.7
11.	Project Cost	3,845.4	1,652.9	5.498.3

2.2 Short-Term Plan for the Port of Oran

(1) Target of Short-Term Plan

The major goals for the port of Oran by 1997 include augmentation of facilities and improvement of operations.

The redevelopment of cereals berth and completion of container berth financed by the World Bank is indispensable under the short-term plan. The location of container terminal is planned at existing Quays Nos. 21-23, where reconstruction has already started.

The annual handling volume of cereals at the port of Oran in 1990 was about 1.2 million tons, and the volume handled at Quay No.12 was about 600 thousand tons, the remaining was almost entirely handled at Quays Nos. 21-23.

As a result of reconstruction of the container terminal, the total handling capacity of cereals will be decreased. Therefore, it is necessary to acquire facilities including silos to adequately handle the increased volume of cereals.

Since installation of additional facilities can not be quickly expected, operational improvements should be promoted including the use of transit sheds and introduction of measures, for the time being, to prevent cargo damage during loading, unloading and storage.

A short-term policy aimed at increasing the actual handling productivity of certain key facilities will ensure smooth implementation of the master plan.

(2) Proposed Scale Under the Short-Term Plan

The port facilities necessary to handle cargoes in 1997 are summarized as follows:

1) New Berth

Location: new container berth planned in the Master Plan

Total area: 14.1 hectares

Berth: length: 200 m, water depth:-13m

Cargo storage facilities: one (1) new silo (holding capacity of 35,000 tons)

Cargo handling facilities: 1) two (2) new tire-mount pneumatic unloader (200 tons/hour each) and one (1) existing tire-mount pneumatic unloader (200 tons/hour)
2) belt conveyor system (600 tons /hour) between quay and new silo

Access road: 2.3 hectares

Railway yard: 1.4 hectares

2) Container Freight Station (CFS)

Location: immediately behind Quay No.21

Total area: 2000 m2 (50 m x 40 m)

3) Facilities for Reception of Ballast and Bilge from Vessels

Location: behind Quay No.7

The layout of the new berth in the short-term plan is shown in Fig. 2.2.1.

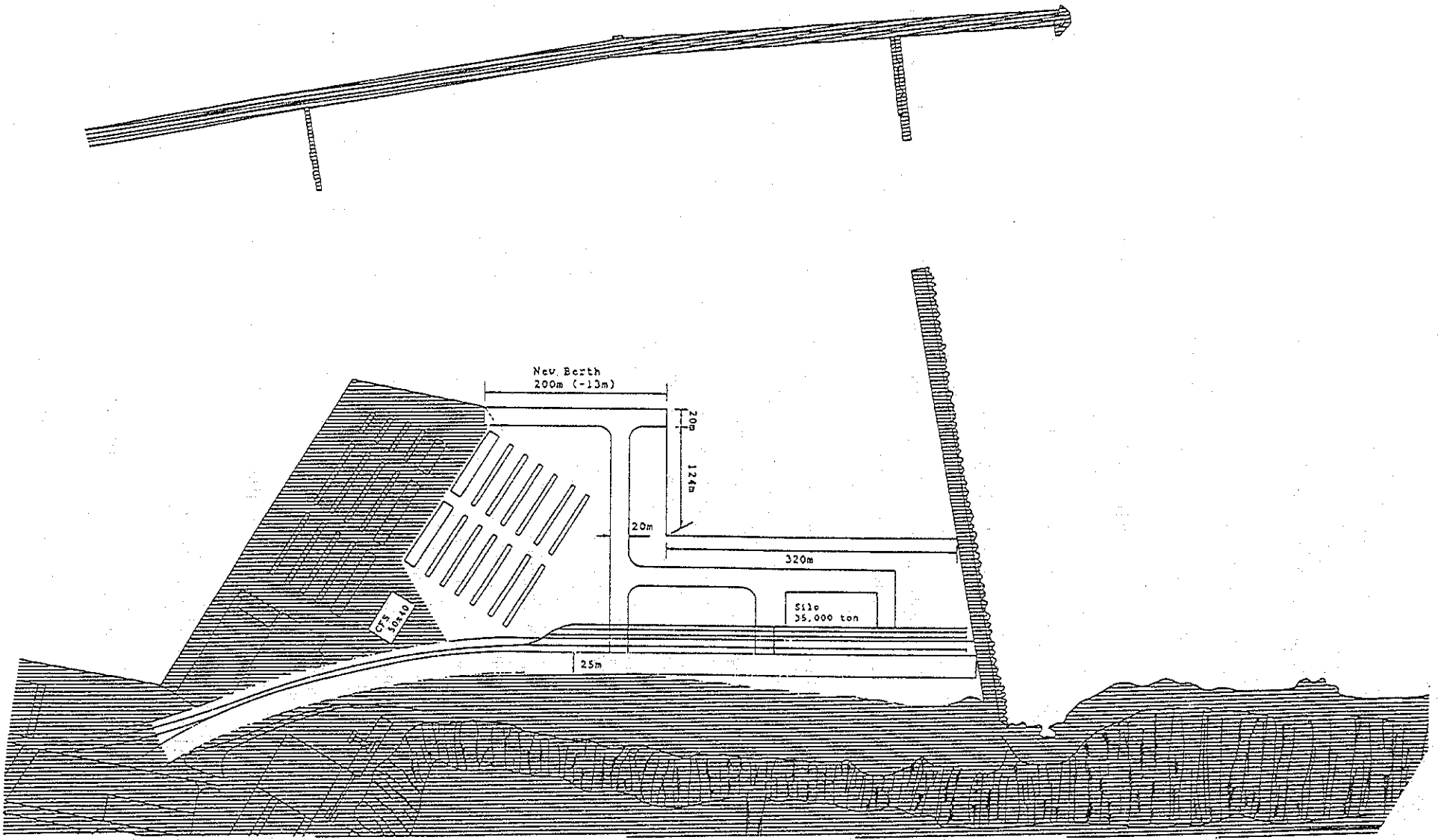

Fig. 2.2.1 The Layout of the New Facilities in the Short-Term Plan

(3) Cargo Handling System

- Animal Feed in Bulk

Unloading by means of ship's gear/cranes with grab buckets and transferring from berth to the shed by shuttle trucks are recommended from a economical point of view.

- Bulk Cereals

Basically, all of cargo is directly put into the silos through conveyor systems and the proposed cargo handling system for bulk cereals are as follows.

- Berth No.12	By the existing rail-mounted pneumatic unloaders and screw type unloader, and the existing conveyor.
- New berth	By two new tire-mounted pneumatic unloaders and the existing tire-mounted pneumatic unloader, and newly constructed conveyor system and silos.

(4) Construction Planning for the Port of Oran

General

The construction quantities for such facility in the short-term plan for the port of Oran are shown as follows,

- Reclamation of Land 141,000 m^2
- Quay (-13.0 m) 200 m
- Cereal Silos 35,000 ton
- One Tire Mound Pneumatic Unloader
  200 T capacity with Conveyor System

The implementation of construction and supply of construction equipments and materials should be carefully planned.

Construction Schedule and Cost Estimation

The construction schedule and cost estimation of the project based on the foregoing the preliminary design and construction method are shown as follow,

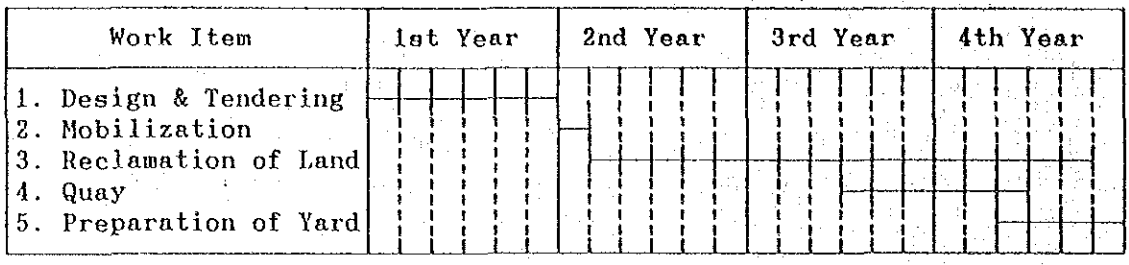

Fig. 2.2.2 Construction Schedule of Major Facilities

Table 2.2.1 Summary of Construction Cost

Unit: Million DA

No.	Item	Construction cost		
		Foreign Portion	Local Portion	Total
1.	New Cereal Berth	524.9	259.2	784.1
2.	Cargo Handling Equipment	143.6	9.6	153.2
	Direct Cost total	668.5	268.8	937.3
4.	Physical Contingency	43.1	20.8	63.9
5.	Engineering Service	42.0	20.7	62.7
	Indirect Cost Total	85.1	41.5	126.6
6.	Total Cost	753.6	310.3	1,063.9
7.	Tax(VAT)	52.8	21.7	74.5
8.	Project Cost	806.4	332.0	1,138.4

2.3 Short-Term Plan for the Port of Annaba

(1) Target of Short-Term Plan

The major goals for the port of Annaba by 1997 are the redevelopment of the cereals berth and the completion of the container berth financed by the World Bank, which is indispensable under the short-term plan including rehabilitation of facilities and improvement of operations.

With regard to the facilities, the notable problems include a shortage of handling equipment to adequately handle the large volume of cargo as well as superannuation of the facilities that do exist.

In particular, there is a pressing need to redevelop the cereals wharf; ship waiting time is excessively long because the capacity of unloading equipment and storage facilities is insufficient to handle cereals. Therefore, it is necessary to provide the necessary unloading equipment and storage facilities.

As for superannuation of the facilities, the problem is acute at the petroleum products berth (No.26) and the rail-mounted unloader at the sugar berth (No.11). An unloader at the sugar berth requires demolition, it will be necessary to consider alternative equipment to make up for this shortage; equipment should be evaluated in terms of handling and economical efficiency. And the present petroleum berth should be maintained with supplemental repair for the time being.

A short-term policy aimed at increasing the actual handling productivity of certain key facilities will ensure smooth implementation of the master plan.

(2) Proposed Scale Under the Short-Term Plan

The port facilities necessary to handle cargoes in 1997 are summarized as follows:

1) Cereals Wharf (Berth No.12)

Cargo storage facilities: one (1) new silo (holding capacity of 30,000 tons)

Cargo handling facilities: one (1) new pneumatic unloader (nominal capacity of 200 tons/hour)

2) Raw Sugar Wharf (Berth No.11)

Cargo handling facilities: two (2) new slant conveyors and two (2) movable hoppers

Purchase cost: 5.081 million DA

3) Petroleum Products Wharf (Berth No.26)

Scale: supplemental repair

Construction cost: 455 thousand DA

As for abovementioned facilities, it has already been decided that (1) will be implemented in the near future, and is being financed by the World Bank; in addition, (2) only involves the improvement of present handling system while (3) requires only small repair. As the total costs are small, they are not considered in this feasibility study.

However, the feasibilty study for realization of the necessary facilities planned in the Master Plan shall be started even before 1997, during the period of the short-term plan.

(3) Cargo Handling System

- Raw sugar in bulk

Unloading by means of ship's gear and forwarding to the existing transverse conveyor system by slant conveyor system are recommended from an

economic point of view.

- Bulk Cereals

The cargo handling system of cereals in bulk is basically similar to the present handling system. The cargo unloaded from vessels is first stored in the silos. The existing pneumatic unloader should be replaced with a rail-mount pneumatic unloader with an unloading capacity of 400 tons/hour.

- Coal in bulk at berth No.13

In order to achieve smooth handling of cargo using the existing complex handling facilities, it is necessary to increase the capacity of inland transport by rail from the port to the steel mill.

- Steel products at berths Nos.14 and 15

It is necessary to examine the shortening holding time of the cargoes in the storage yards and designed inland transport of the cargoes from/to the port. Besides it will be required to prepare an storage yard in the port area or near the port in addition to the existing storage yard.

(4) Construction Cost for Annaba port

A cost estimation for Annaba port is presented as follow,

Table 2.3.1 Summary of Construction Cost

Unit: Million DA

No.	Item	Construction cost		
		Foreign Portion	Local Portion	Total
1.	Repairs of Petroleum Berth	0.3	0.1	0.4
2.	Cereal Berth	246.5	115.9	362.4
	Sub Total	246.8	116.0	362.8
3.	Pneumatic Unloader 200 T/H	100.4	9.1	109.5
	Direct Cost total	347.2	125.1	472.3
4.	Physical Contingency	24.7	11.6	36.3
5.	Engineering Service	19.7	9.3	29.0
	Indirect Cost Total	44.4	20.9	65.3
6.	Total Cost	391.6	146.0	537.6
7.	Tax(VAT)	27.4	10.2	37.6
8.	Project Cost	419.0	156.2	575.2

2.4 Port Management and Operations

(1) Improvement of Operations in the Current Terminals

1) A Basic Problem to be Solved

Shortage of storage space in a port area in Algerian ports, especially in the port of Algiers, is a problem. Lack of enough space for cargo handling and storage does not enable EPs to perform port operations properly. Consequently various improvement plan for port operations might not be effective due to the existence of this problem.

2) Countermeasures to Shortage of Storage Space

From the view point of management, possible countermeasures to improve shortage of storage space are as follows:

-To raise the rate of the transit and the depot tax according to storage periods of time in order to discourage consignees from storing cargo for long.

-To provide stock yards and warehouses behind the port or in suburbs for consignees in order to store their cargo after customs clearance.

3) Specialization and Reorganization

In order to improve efficiency, it is effective to specialize wharves and reorganize operations of cargo handling and storage, realizing consistency of cargo administration from ship to consignee.

Currently, in the Algerian ports, quay is not fixed for ships' berthing except for some special type of ships and cargoes. In addition, cargo handling and cargo storage are operated by different divisions in EPs and both divisions are in charge of the operations in the entire port area respectively. (see Fig.2.4.1)

Basically, the same cargo should be handled at the same quay by the same workers using the same equipment and be stored at the same yards or shed behind the quay. It will produce efficient and reliable cargo handling, storage and delivery.

Therefore, wharves should be as specialized as possible in accordance with

the diversity of cargo. Also, cargo handling and storage operations should be performed by the same divisions which are established by each wharf. (see Fig.2.4.2)

(2) Computerization

Computer systems are currently widely adopted by the advanced ports in the world. They are used in the field of port administration, terminal operation and inter-industries data exchange.

For the first step in the computerization of EPs, introduction of the stand alone system should be promoted in order to realize effectiveness and quick disposition of the works. This system can be developed at a rather small cost and its performance is good. Personal computers should be provided to each workers engaged in jobs which include simple and repetitive calculation. In addition, a training program should be initiated to realize effective usage of package software corresponding to the needs of workers.

Also, in the container terminals, computers should be introduced to administrate location of containers in container yards when handling number of containers is forecast to exceed 50,000 TEU/year.

To use international trade data interchange systems being developed in European ports will be very beneficial to the Algerian ports which have a great deal of cargo traffic with them. However, the work on standardization for the system is still on going and most time and study will be required before its completion. Therefore, at this time, study for the usage of these networks should be started in order to prepare future connection to the networks.

In the second step, online system will be developed to improve service level of the port operation responding to advancement of containerization and other port industry's computerization.

(3) Container Terminal Operation

1) Operation Flow

Container movement and necessary jobs for handling in a typical container terminal are shown in Fig. 2.4.3 for import containers.

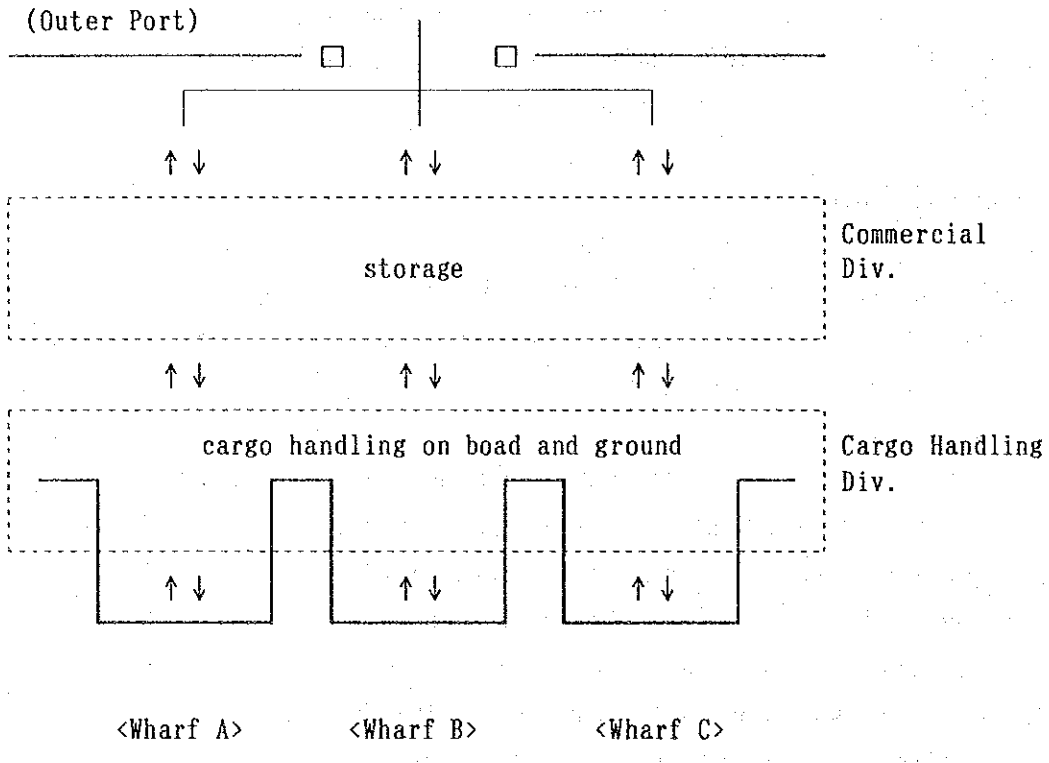

Fig. 2.4.1 Operation in the Wharves by the Current Organization

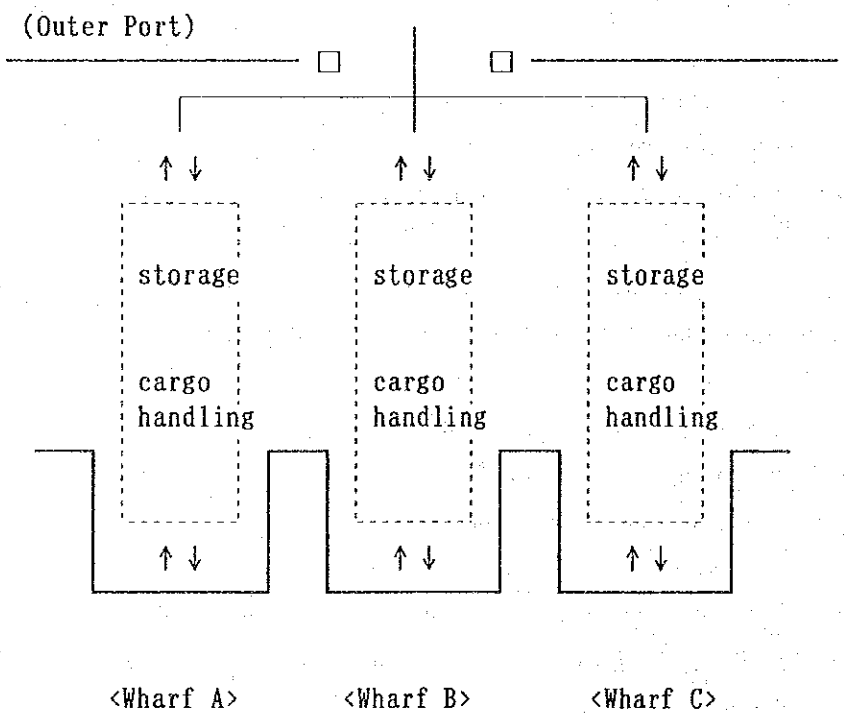

Fig. 2.4.2 Operation in the Wharves by a Reformed Organization

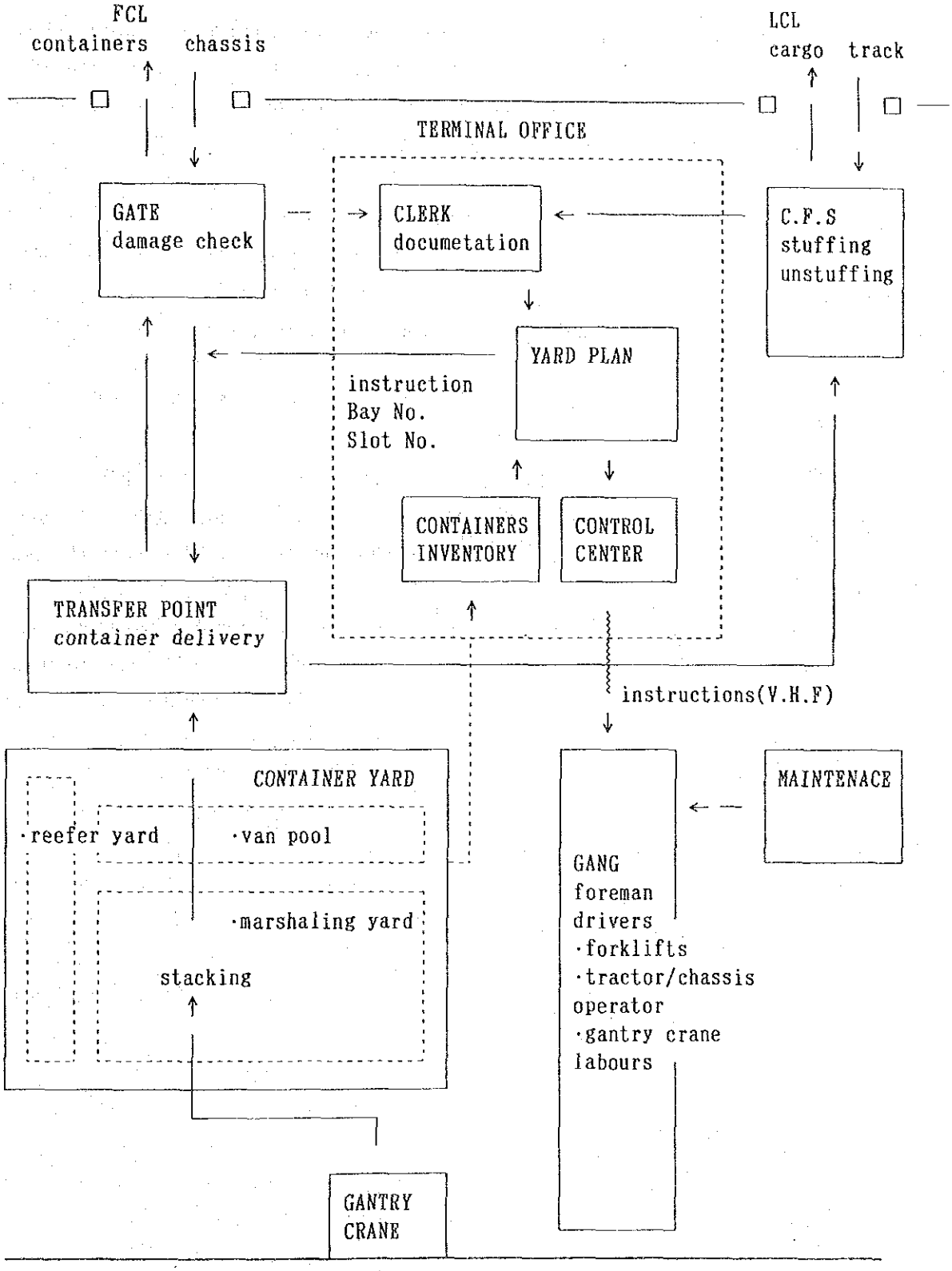

Fig. 2.4.3 Organization and Operation Flow in a Container Terminal (Import)

2) Terminal Operator

As described in 1.13, the port administration body should be simplified as a organization of the public sector of the port. Operations having a commercial character, such as tug service and cargo handling operation, should be separated from the port administration body.

Therefore, it is recommended that the new container terminal is operated by a professional organization such as stevedoring company, and the port administration body only permits usage of the facilities in the terminal and receive revenue from the operator in the form of a facility usage charge.

(4) Multi Purpose Terminal Operation

This terminal is planed to be used as a multi purpose terminal until the year of 1999. After 2000, when the volume of container handling in the port reaches a sufficient level, the terminal will be used as the Container Terminal-2.

Therefore, it will be temporarily used as a multi purpose terminal for three years and handles conventional cargo as same to the other berths. Therefore, the new company for cargo handling operation which is recommended in (1),3) should be considered as the operator of this terminal.

2.5 Economic Analysis

(1) Purpose and Methodology of Economic Analysis

The purpose of economic analysis is to evaluate whether the project is justifiable from the economic viewpoint by investigating the economic benefits as well as costs which will arise from the project and assessing its contribution to the national economy.

An economic internal rate of return (EIRR) based on a cost-benefit analysis is used to appraise the feasibility of the project.

(2) Benefits of the Projects

The following benefits are considered to be brought about by the Short-term Development Plan for the study ports.

A. Savings in marine transportation costs
B. Savings in land transportation costs
C. Contribution to the national economic development through modernization of the Port
D. Promotion of regional economic development through development of port related industries
E. Increased employment opportunities and incomes
F. Improvement of cargo handling safety and reduction of cargo damage

In the cost-benefit analysis, the benefits which can be evaluated monetary such as A and B is considered, and as for the other intangible benefits, only qualitative analysis is undertaken.

(3) Focus of the Analysis

The following projects are appraised.

A. Terminal-2 Project (The port of Algiers): Construction of Terminal-2 including installation of gantry cranes of Terminal-1
B. Cereal Terminal (The port of Algiers)
C. New Terminal (The port of Oran)

(4) Results of Economic Analysis

The results of the economic analysis are shown as followings, and we

conclude all of Short-term Development Plans for the study ports are unquestionably feasible from an economic view point.

	EIRR
A. Terminal-2 Project (The port of Algiers):	20.7%
B. Cereal Terminal (The port of Algiers):	16.7%
C. New Terminal (The port of Oran):	18.4%

2.6 Financial Analysis

(1) Purpose and Methodology of Financial Analysis

Purpose: to appraise the viability of the Short-Term Plan and the financial soundness of the port administration body.

Methodology: evaluation of the financial internal rate of return (FIRR) based upon the "Discount Cash Flow Method" and of the financial soundness of the EPs based upon its projected financial statements.

(2) General Prerequisites

1) Scope of the analysis

Construction of infrastructures, such as breakwater, quay, seawall, dredging and reclamation, conducted by the MOE is not a project directly generating revenue. Therefore the construction cost of the infrastructures is assumed to be paid by tax as it is at present, and this cost is excluded from the investment costs for the financial analysis. The costs for procurement of cargo handling equipment and construction of superstructures, such as transit sheds, conducted mainly by the EPs and the OAIC can be paid for with the generated revenues; therefore, such costs for superstructures are included in the investment costs and are calculated for the financial analysis. The projects and costs included in the financial analysis are as follows:

Port of Algiers

Container Terminal 2 ... pavement, CFS, cargo handling equipment, railway yard

Container Terminal 1 ... container gantry cranes

Cereal Terminal ... silos, pneumatic unloaders

Port of Oran

Container Yard ... pavement

Cereal Facilities ... silos, belt conveyer, pneumatic unloaders

2) Others

Project life: 30 years

Base year: 1991

Cargo handling volume: based on the demand forecast

(3) Financial Analysis of the Projects in the Port of Algiers

1) Revenue

Transit tax, Depot tax, Charge for cargo handling and usage of equipment and installation.

2) Costs

Initial investment, Administration costs (personnel costs, maintenance, repair costs, etc), renewal investment costs

3) Funds raising plan

Portion of the foreign currency: 69.94 % of the project cost

Portion of the local currency: 30.06 % of the project cost

Weighted average interest rate of funds: 8.11 %

In Algeria, interest rate of local funds is around 18 - 22 %. Under such circumstances, almost all projects are judged as being not feasible. Thus, low interest rates are required for implementation of the projects, so we assume 8.11 % as the weighted average interest rate of funds under the condition in which a loan with a 3% interest rate can be introduced to the projects.

4) FIRR

The results of the FIRR are shown in the following table including the sensitivity analysis:

Case A : The costs increase by 10 %

Case B : The revenues decrease by 10 %

Table 2.6.1 oc Results of FIRR Calculation

projects	original case	case A	case B
Container Terminal 2	12.51%	11.49%	10.33%
Container Terminal 1	5.80%	4.69%	4.23%
Cereal Terminal	11.81%	10.64%	10.42%
Total projects	11.14%	9.99%	9.64%

The project of Container Terminal 1 can be judged feasible because the FIRR of the project exceeds the weighted average interest rate of fund including the two cases of the sensitivity analysis.

The projects of Container Terminal 2 and Cereal Terminal can be judged feasible as an individual project for the same reason as above.

Thus, the total projects can be also judged feasible including the two cases of the sensitivity analysis.

5) Financial Soundness

Financial soundness of the port administration body is appraised based on its projected financial statements.

[Profitability]

The rate of return on net fixed assets, which shows the profitability of the investment, is expected to maintain favorable levels after 1998.

[Loan repayment capacity]

The debt service coverage ratio, which shows whether the operating income can cover the repayment of principal and interest of the long-term loans, is expected to maintain good levels throughout the project life, there will be no difficulty with the repayments of the long-term loans using the annual operating revenues.

[Operational efficiency]

The operating ratio shows the operational efficiency of the organization as an enterprise, and the working ratio shows the efficiency of the routine operations of the port. Both the operating ratio and the working ratio will maintain favorable levels.

(4) Financial Analysis of the Projects in the Port of Oran

1) Revenue

Transit tax, Depot tax, Charge for usage of equipments and installations.

2) Costs

Initial investment, Administration costs (personnel costs, maintenance,

repair costs, etc), renewal investment costs

3) Funds raising plan

Portion of the foreign currency: 71.4 % of the project cost

Portion of the local currency: 28.6 % of the project cost

Weighted average interest rate of funds: 7.86 %

4) FIRR

The results of the FIRR are shown in the following table including the sensitivity analysis:

Case A : The costs increase by 10 %

Case B : The revenues decrease by 10 %

Table 2.6.2 Results of FIRR Calculation

projects	original case	case A	case B
Container Yard	18.15%	16.51%	15.98%
Cereal Facility	12.41%	11.23%	10.95%
Total projects	12.59%	11.40%	11.11%

The project of Container Yard can be judged feasible because the FIRR of the project exceeds the weighted average interest rate of fund including the two cases of the sensitivity analysis.

The projects of Cereal Terminal can be judged feasible for the same reason as above.

Thus, the total projects can be also judged feasible including the two cases of the sensitivity analysis.

5) Financial Soundness

Financial soundness of the port administration body is appraised based on its projected financial statements.

[Profitability]

The rate of return on net fixed assets, which shows the profitability of the investment, is expected to maintain favorable levels after 2001.

[Loan repayment capacity]

The debt service coverage ratio, which shows whether the operating income can cover the repayment of principal and interest of the long-term loans, is expected to maintain good levels throughout the project life, there will be no difficulty with the repayment of the long-term loans using the annual operating revenues.

[Operational efficiency]

The operating ratio shows the operational efficiency of the organization as an enterprise, and the working ratio shows the efficiency of the routine operations of the port. Both the operating ratio and the working ratio will maintain favorable levels.

JICA