Chapter 7 Preliminary Design Arrangement by Project Component

7.1 General Description

Preliminary design elements for the possible project components are shown below. The proposed project components cover terminals and common facilities of the port.

Note: Common facility means the work which do not provide directly any cargo handling services, however it is essential to port activities. This includes access roads, breakwater construction and channel dredging.

Among these ten candidates, the Study Team proposed six project components as follows:

a) **Container Terminal (Phase 2 and Phase 3)**
b) **Grain Terminal (Phase 1 and Phase 2)**
c) **Steel Product Terminal (Multipurpose General Cargo Terminal)**
d) **Timber Terminal (Multipurpose General Cargo Terminal)**
e) **Barge Terminal**
f) **Inland Transport Facilities: Inner Road Access**

Other than these, the following components are items scheduled by MOT and others.

a) **Navigation channel and Turning basin**
b) **Breakwaters**
c) **Environmental related Facilities**
d) **Edible Oil Terminal (Supplemental)**
e) **Others**

7.2 Container Terminal (Phase 2 and 3)

Currently at the end of 2001, the Container Terminal (Phase 1) with capacity of 375,000 TEUs is under tender processing in preparation for construction.
According to this Master Plan, the Container Terminal (Phase 2 and 3) is planned adjacent to the on-going terminal (Phase 1) at Pier S2. This development aims to provide port users with an incremental annual terminal capacity to meet the future cargo demands.

The works will consist of civil works and provision of cargo handling equipment. The former will cover pavement work, railway laying, supplemental quay strengthening, and others. The latter will include the mounting of the quayside cranes (3 or 4) and transferring the cranes to the required yards.

Development Plan is shown in Figure:

Figure 7.1 Plan of Container Terminal (Phase 1, 2 & 3), Case 1

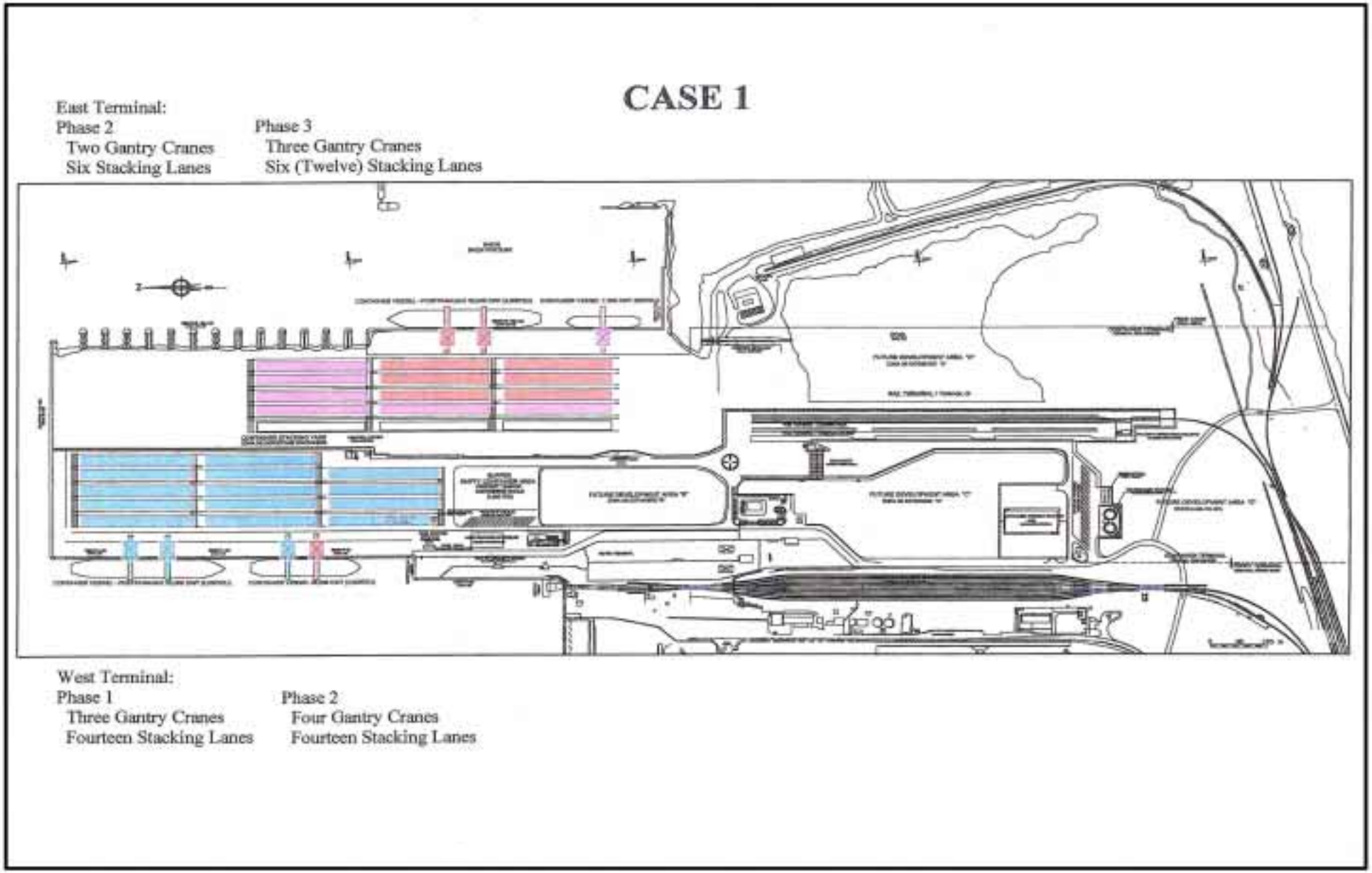

Figure 7.1 Plan of Container Terminal (Phase1, 2 and 3), Case 1

7.3 Grain Terminal (Phase 1 and Phase 2)

7.3.1 Traffic Demand and Basic Requirements to Grain Terminal

According to the traffic demand forecast for the bulk grain provided in Chapter 3, export traffic volume forecast in 2010 and 2020 for the Case 1 (High Scenario)is as follows:

(unit: Million tons)

	Net Traffic	Fluctuation	**Total**	Existing Total	**Balance**	
2010	4.41	1.99	**6.40**	3.70	**2.70**	**(Phase 1)**
2020	6.48	1.99	**8.47**	3.7 + 2.0	**2.77**	**(Phase 2)**

Note: Planning of the grain terminal facility is carried out for the total amount of Net traffic and Annual fluctuation by climatic variation and etc,.

The existing handling capacity of grain in the port is estimated to be about 3.0 million tons. Also, several private operators reportedly will install and/or increase present capacity by about 0.7 million tons. If this reported increase is taken into account, the total grain handling capacity before the grain terminal project will be 3.7 million tons allocation of which is given below.

✓ North Port	1.0 million tons
✓ South Port	2.0 million tons
✓ Additional	0.7 million tons
Total	3.7 million tons

It is proposed to provide the port with a grain terminal of 2.0 million tons export annual capacity during each phase. For imports, a half million tons of annual handling capacity at the port is supplementary provided.

- ✓ Phase 1 before 2010
- ✓ Phase 2 before 2020

There are three development alternatives in respect the location: namely, North Port B31/33, South Port S1, and South Port future S3. Among these, Pier S3 site is selected to be the site of the Phase 1 Grain Terminal construction area.

7.3.2 Required Works for Grain Terminal

Each grain terminal in the Pier S3 will consist of a 250 m long barge unloading berth and a 300 m long ocean-going vessel loading berth. These berths are partially built, however the land is not shaped yet.

The works consist of civil works and provision of cargo handling equipment. The former will provide the silo with handling equipment, then the pavement work, supplemental quay strengthening, and others. The silo capacity will be about 100,000 tons for each as recommended in Chapter 6.

7.3.3 Equipment

The equipment for the ship-loading/unloading, for truck receiving, railway wagon receiving and the transfer systems will also be provided. The major items are Ship Unloader: 2units x 400 ton/hour and Ship Loader: 2units x 800 ton/hour and others.

7.4 Steel Product Terminal (Multi-purpose General Cargo Terminal)

Similar to the timber terminal, the required works for renovation mainly consist of civil works with minor works for provision of cargo handling equipment. The former will cover pavement works and overlay works to the existing quay apron yards. As necessary, supplemental civil works for rehabilitation will be added. The latter will include only needed minor repair to the existing equipment.

Major civil work components are as follows:

a) Temporary works
b) Site preparation
c) Soil improvement
d) Railway track improvement
e) Apron pavement improvement
f) Yard pavement improvement, (overlaying-pavement)
g) Terminal office
h) Repair shop
i) Improvement of utilities

Note. Latest development of privatization of steel mill suggests to require careful watching on the steel export volume and investment environment in the future.

7.5 Timber Terminal (Multipurpose General Cargo Terminal)

Similar to the metal product terminal, the required works will mainly consist of civil works as well with minor works for providing the cargo handling equipment. Major civil work components are as follows:

a) Temporary works
b) Site preparation

c) Demolishing existing building and rebuilding in 1600m2
d) Railway track improvement
e) Apron pavement improvement
f) Yard pavement improvement, (overlaying)
g) Canopy type close transit sheds, if any
h) Improvement of utilities

Note. It is forecast that timber product export after 2010 will decrease. Latest development on this by environmental consideration suggests to require careful watching on this cargo as well.

7.6 Barge Terminal

The required physical works thereto will only consist of civil works. These will cover quay wall, pavement works and other minor utilities. It is also recommended to undertake necessary rehabilitation works to the existing civil structures.

Main Quay: Land Side. (West Side)

1) New West Barge Operation Main Quay, 700m –4.5m depth
2) New Supplemental Tugboat Basin : Quay wall 450m

River Basin: East Face and South Face : Island Side

1) New North Preparation Quay, 600m –4.5m depth
2) Improvement of Existing Mole : 600m
3) Improvement of Existing 18 Dolphins.

Island Basin: Island Side

1) New South Preparation Quay, 500m –4.5m depth
2) New South Dolphins. 11 units

7.7 Inland Transport Facilities

Preliminary design concepts of road access are: 1) Smooth connecting access over the Boundary, 2) Rearrangement of road alignment at the North Port, and 3) Connection between the North and South port areas.

Basic work quantities were roughly estimated in order to know the size of the required investment to improve the inner-port access.

1)	Roads (North Port Area)	C-A	25m	4,000m
2)	Roads (North Port Area)	C-B	20m	3,000m
3)	Roads (North Port Area)	C-C	15m	3,000m

4)	Bridges (North Port Area : Gate No.5)		
	Flyover bridge : 10m wide,		500m
5)	Roads (South Port Area) C-A	25m	5,000m
6)	Roads (South Port Area) C-B	20m	4,000m
7)	Bridges (South Port Area)		
	A long span bridge	20m	200m
8)	Bridges (South Port Area)	15m	300m

7.8 Breakwaters

The rehabilitation work for these dikes is being currently undertaken by CPA to repair the damaged sections. It is however reported that there is a plan to extend the existing north breakwater by 1000m further to the South, down to a –28m water depth.

It is recommended to rearrange the breakwater line and extend it to meet the Master Plan requirements. The best alternative thereto will be selected from the following:

a) To extend the existing north breakwater by 1000m further to the south down to a -28m water depth as planned, or
b) To extend the existing south breakwater by 1000m further to the north and down to a -20m water depth.

Chapter 8 Preliminary Cost Estimation for Master Plan

8.1 General Description

8.1.1 Classification of Project

The costs estimated here include the major cost for construction and operation of components of the Master Plan for the target year 2020. Construction cost (or initial investment cost) includes civil and building works, utilities, cargo handling equipment and facilities necessary for environmental protection. The major facilities included in this cost estimation are:

Group A
A1) Container Terminal (Phase 2 and Phase 3)
A2) Grain Terminal (Phase 1 and Phase 2)

Group B
B1) Steel Product Terminal (Multipurpose General Cargo Terminal)
B2) Timber Terminal (Multipurpose General Cargo Terminal)
B3) Barge Terminal
B4) Inland Transport Facilities (Phase 1 and Phase 2)

Group C
C1) Edible Oil Terminal (Supplemental)
C2) Breakwater and Wet Basins Dredging
C3) Environmental Related Facilities

Group A includes the project components which can generate the revenues for the financial feasibility. Works classified in Group B will collect moderate or average revenues which, however in some case, will not be enough large to get a high financial return. Group C covers projects which MOT has already scheduled to invest in and other supplemental projects such as Edible Oil Terminal.

As indicated in PART II Chapter 3, future cargo traffic demand is estimated for two cases: namely, Case 1: High Scenario and Case 2 : Medium Scenario. The required costs are provided for both cases. Case 1 is however selected for the future traffic by which the project is analyzed.

Among these, Case 1 in this Master Plan study is very similar to that of the Medium Case in the on-going S2 Container Terminal Project financed by JBIC.

The existing port facilities have more than enough excess cargo handling capacity except with regard to container cargoes. Most of facilities are required not by the future traffic increase

rather for improvement and integration of the existing port facilities for better management and higher efficiency.

Cost estimation for the grain terminal is rather complicated due to various possibilities to select the best location of the future grain terminal. To meet these requirements, the Study Team prepared three sites with cost alternatives: namely,

Alternative 1a: To construct a new terminal at the new South Pier S3.
(Proposed by the Study Team).
Alternative 1b: To construct a new terminal at the existing South Pier S1.
Alternative 1c: To construct a new terminal at the existing Berth Nos. 31 to 33.

Note: Alternative 1b was not technically feasible, since if was already occupied by a private operator as kindly informed by MOT. Finally Alternative 1a was selected due to mainly land availability although it is not reclaimed yet.

Phasing of project implementation was analyzed based on the future traffic demands and the capacity of existing cargo handling facilities.

Container Terminal:	Phase 1: On-going Project by JBIC finance.
	Phase 2: Item for cost estimation
	Phase 3: Item for cost estimation
Grain Terminal:	Phase 1: Item for cost estimation
	Phase 2: Item for cost estimation
Inland Transport Facilities:	Phase 1: Item for cost estimation
	Phase 2: Item for cost estimation

Among these, Phase 1 is included in the Master Plan and the Short Term Plan projects. Phase 2 and after are included in Master Plan; however, the works belong to the Long Term Plan.

8.1.2 Costing Criteria

The basic conditions and assumptions applied for the cost estimates are as follows:

(a) Cost estimates are based on the market prices in September 1999 for construction materials, labor rates and construction equipment rates prevailing in Constantza.
(b) In this cost estimate, the following average exchange rates are used:
December 2000: US$ 1.00 = 110 Yen = 26,000 lei
(c) The physical contingency is added rating 10% of the base cost.
(d) The cost is divided into Foreign Cost and Local Cost.
(e) Currency unit for estimation is US dollars.

8.2 Capital Costs

The capital costs consist of the required cost of civil works, equipment procurement, engineering service fee and contingency; however, tax is excluded from the economic analysis and included in the financial analysis.

8.2.1 Cost Estimation

(1) Required Capital Cost for Case 1

The summary of capital cost for Case 1 is shown in Tables 8.1 and 8.2.

Table 8.1 Summary of Capital Cost (1), Case 1

Unit: million USD

Terminal/Works	Phase	Capital Costs
Group A		
A1 Container Terminal	Phase 2*	56.6
	Phase 3*	22.0
	Subtotal	78.6
A2 Grain Terminal	Phase 1	78.3 /104.5
	Phase 2**	78.3 /104.5
	Subtotal	156.6 / 209.0
Group A Total		235.2 / 287.6
Group B		
B1 Steel Product Terminal		6.1
B2 Timber Terminal		6.1
B3 Barge Terminal		24.6
B4 Inland Transport Facilities: (Inner road access)		64.8
Group B Total		101.6
Group C		
C1 Edible Oil Terminal		9.3
C2 Breakwater and Wet Basin Dredging		176.1
C3 Environmental Related Facilities		18.3
Group C Total		203.7
Grand Total		540.5 / 592.9

Notes. 1. *Phasing of the container terminal starts from the on-going project at S2.
2. There are three alternatives regarding location of the new grain terminal.
3. Grain terminal phase 2 is only for Case 1.

According to the summary of capital costs, the required total cost for Case 1 will amount to between US$ 540.5 - 592.9 million as follows: Group A between US$ 235.2 - 287.6 million, Group B US$ 101.6 million, and Group C US$ 203.7million. The Group A includes the terminals and facilities which are directly related to future cargo demand. However, the

facilities categorized into Groups B and C are those for the required improvement and integration for better and more efficient port operation.

(2) Required Capital Cost for Demand Scenario Case 2

There is a little difference between Capital Cost of Case 1 and Case 2. Only the scale of both container and grain terminals will be affected by traffic demand.

According to the summary of capital costs, the required total cost for Case 2 will amount to between US$ 454.7 - 480.9 million as follows: Group A between US$ 149.4 - 175.5 million, Group B US$ 101.6 million, and Group C US$203.7million.

Table 8.2 Summary of Capital Cost (1), Case 2

Unit: million USD

Terminal/Works	Phase	Capital Costs
Group A		
A1 Container Terminal	Phase 2*	49.1
	Phase 3*	22.0
	Subtotal	71.1
A2 Grain Terminal	Only Phase 1	78.3 /104.5
Group A Total		149.4 / 175.6
Group B		
B1 Steel Product Terminal		6.1
B2 Timber Terminal		6.1
B3 Barge Terminal		24.6
B4 Inland Transport Facilities		64.8
Group B Total		101.6
Group C		
C1 Edible Oil Terminal		9.3
C2 Breakwater and Wet Basin Dredging		176.1
C3 Environmental Related Facilities		18.3
Group C Total		203.7
Grand Total		454.7 / 480.9

Chapter 9 Preliminary Economic Evaluation

9.1 Basic Methodology

9.1.1 Cost Benefit Analysis

The cost benefit analysis is the standard method for conducting economic evaluation.
Economic analysis was carried out in two steps, namely preliminary evaluation for the project components proposed in the Master Plan and detailed evaluation for the selected priority projects among those proposed in the Short Term Development Plan. Preliminary evaluation for the Master Plan is given below:

(1) Cost

The project cost is converted into the economic price by deduction of transfer items such as VAT for the local currency portion and customs and duties for the foreign currency portion. The local currency portion is priced by adopting the standard conversion factor (SCF) as 0.986 to exclude the distorted market prices of the project cost.

(2) Benefits

The benefits are estimated by comparing "with-the-project" and "without-the-project" cases. The following major benefits are quantifiable for cargoes and vessels at the Port of Constantza.

- Savings of the time value of cargoes generated from savings of waiting times of vessels.
- Savings of ship lease cost for saved waiting time of vessels.
- Savings of ship lease cost for navigation by ship size scales of economy
- Savings of the time value of the cargoes generated from savings of moving times especially of barges and pusher
- Savings of ship lease cost for saved moving time especially of barge and pusher

The major non-quantifiable benefits of the Port of Constantza project are

- Avoidance of traffic diversion to other ports and from this savings from higher transport cost
- Contribution to the national economic development through upgrading of industries to international standards.
- Improvement of cargo handling safety and reduction of cargo damage
- Project induced job-creation at the Industrial Zone and Export Processing Zone near the Port of Constantza.

These unquantified benefits are not taken into consideration as benefits in this Study.

9.1.2 Assumptions

(1) Period of Evaluation in the economic analysis is assumed to be 30 years after the implementation works of the projects.
(2) The exchange rate adopted for this analysis is US $ 1.00 = 26,000. Lei =110 Yen.
(3) The share of Romanian shipping companies in Romania's total sea transport is still comparatively low. Thus, most of the benefits will accrue to foreign shipping companies. However, in the end, Romania's producers and consumers will have to pay for longer waiting times at the Port of Constantza. Furthermore, after the Romania's EU membership is approved, Romania will be socially and economically more closely related to other EU member countries and the attributability of benefits to then Romanian economy will be strengthened. Hence, a hundred percent of the benefits are assumed to be attributed to the benefits of the projects in this Study.
(4) The Criteria of Project Evaluation are: (i) NPV (Net Present Value), (ii) EIRR (Economic Internal Rate of Return) and (iii) B/C ratio (Benefit Cost ratio)
(5) The opportunity cost of capital is adopted for the discount rate of cost and benefits to evaluate the present value and to function as the cut-off-ratio to judge the feasibility/viability of projects. In this Study, the opportunity cost of capital is assumed to be in the range of 12% to 15%.

9.2 Preliminary Economic Evaluation

Preliminary economic review has been taken into account in order to outlook the necessity of each project components. Preliminary economic evaluation is conducted by preparing the cash-flow streams of economic cost and benefit during the evaluation period for the alternative plans in the Mater Plan with regard to the scenarios of traffic demand forecast: Case-1 (High growth scenario) and Case-2 (Medium growth scenario).

9.2.1 Container Terminal Plan

The EIRRs of Case-1 and Case-2 are 23.6% and 25.6% respectively. Both of them are considerably higher than the cut-off-ratio of EIRR for judgment of feasibility. Thus the container terminal plan is considered to have high economic viability. It is recommended that the container terminal under construction for Phase-I (under financed by JBIC) be completed on schedule and the construction of new container terminal (Phases II and III) be implemented as required.

9.2.2 Grain Terminal Plan

(1) Alternative-1a; Plan, At S3 Pier

The EIRRs of Case-1 and Case-2 are 12.6% and 9.2% respectively. The EIRR of Case-1 is within the range of the cut-off-ratio (12%-15%) and higher than the minimum cut-off-ratio for

EIRR. Thus, Alternative-1a Plan is considered to have fair economic viability for both high growth scenarios of traffic demand forecast.

(2) Alternative-1b; Plan, At S1 Pier

The EIRRs of Case-1 and Case-2 are 15.7% and 11.4% respectively. Both are almost within the range of the cut-off-ratio (12%-15%). Thus, Alternative-1b Plan is considered to have fair economic viability for both low and high growth scenarios of traffic demand forecast.

(3) Alternative-1c: Plan, At Berth No. 31/33

The project cost of this alternative is the same as Alternative-1band the benefit and the result of economic evaluation are also the same. Thus, Alternative-1c Plan is also considered to have fair economic viability for both low and high growth scenarios of traffic demand forecast.

(4) Alternative-2; Conservative Plan, North Port

Alternative-2 is the case where all existing facilities for cargo handling of grain will remain in the North Port area. The EIRRs of Case-1 and Case-2 are 1.8% and 2.8% respectively. The higher EIRR value of Case-2 than that of the Case-1 is caused by the relatively earlier generation of benefit for the Case-2 after the completion terminal construction as shown in Tables 9.3.14 to 9.3.16. The considerably lower figure of EIRR is because there is no benefit from saved ship waiting time or saved cost of ship lease cost.

9.2.3 Steel Product Terminal Plan (Multi Purpose General Cargo Terminal)

Taking account of the facts that the Pier S1 in the South Port is utilized by ROMTRANS and that the Steel Company of Galati was privatized, it was concluded that the Steel Product Terminal Plan should be included not in the Short Term Development Plan but in the Master Plan. These situations clearly suggest that it is needed to carefully observe the possible changes in steel product exports taking account of the decision making by new private investor's management of the mill.

Thus it is also concluded that there is no need to conduct the economic analysis under the present situation.

9.2.4 Timber Terminal Plan (Multi Purpose General Cargo Terminal)

The traffic demand of timber exports is forecasted to decrease after the year of 2010 from the viewpoint of the access to EC by Romania and environment for forestry. It is wise to watch the improvement of situation carefully.

Thus it was concluded that the Timber Terminal Plan should be included not in the Short Term Development Plan but in the Master Plan. Similar to above, there is no need to conduct the economic evaluation under the present situation.

9.2.5 Barge Terminal Plan

Main purpose of barge terminal project is entirely to improve the existing terminal which consist primitive facilities. This port plays a large roles not only the sole gate port to Rumania but also transit point to the land-locked Central Europe countries from the Black Sea area. After the port, convoy of barges supported by pushers carries the cargoes, mainly bulk cargoes such as grains.

The EIRRs of Case-1 and Case-2 are 19.8% and 17.7% respectively. Both are considerably higher than the cut-off-ratio of EIRR for judgment of feasibility. Thus, the Barge Terminal Plan is considered to have high economic viability.
This terminal is not for improvement of cargo handling efficiency, however it is expected to provide a large contribution to economic benefit through the entire industries.

9.2.6 Conclusion

The Container Terminal Plan is the on-going plan and considered to be justified as the feasible project in this Study. The results of preliminary economic evaluation for the Master Plans are summarized in Table 9.2.1.

Table 9.1 Summary of Economic Evaluation by Terminal in the Master Plan

No.	**Project Components in the Master Plan**	**Alternatives**	Cargo Scenario Case No.	**EIRR (%)**	B/C	NPV (million US$)
1	**Container Terminal Plan**		1	**23.6**	2.38	75,397
			2	**25.6**	3.16	99,120
2	**Grain Terminal Plan**	**1a- Plan (S3 Pier)** Proposed by the Study Team	1	**12.6**	0.82	-13,103
			2	**9.2**	0.55	-33,455
		1b- Plan (S1 Pier) *	1	15.7	1.05	3,086
			2	11.4	0.70	-17,266
		1c- Plan (Berth No.31/33) *	1	15.7	1.05	3,086
			2	11.4	0.70	-17,266
		2-Conservative Plan (North Port)	1	1.8	0.17	-43,240
			2	2.8	0.24	-39,358
3	**Barge Terminal Plan**		1	**19.8**	1.46	7,414
			2	**17.7**	1.22	356

Note: 1. The discount rate of 15% is applied to calculation of the present value for the cost and benefit.
2. The indicators for the economic evaluation for plans marked with * are the same value between case 1 and case 2 because of the same traffic demand and cost.

As for the priority Short-Term Plans, **Alternative-1a for the Grain Terminal Plans and Barge Terminal Plan** should be selected.

Chapter 10 Initial Environmental Examination (IEE)

10.1 Overview of the Master Plan

The target year of master plan for the development of the Port of Constantza is 2020. The master plan aimed to enhance the overall operational efficiency and safety of the port with improved, efficient and safe cargo handling and improved and safe road transportation system inside the port area.

In particular, the Master Plan envisages the development of South Port for dedicated handling of containerised cargo, edible dry-bulk (grain) cargo, edible liquid bulk (oil) cargo and break-bulk cargo of steel products. The South Port is located favourably close to the entrance of the port and maintaining a deep water giving advantage to shipping by large size vessels including Containers. Also following the transfer of entire container handling to the South Port, it is planned to reallocate the function of the existing container terminal in the North Port to that of multi-purpose terminal to handle principally break-bulk cargo of timber.

Note: It is reported that Romanian government restricts timber from the list of exports. Future cargo forecast indicates decreasing its volume after 2010. This shows simply needs to watch carefully the demand and decide the terminal investment later. New investment to steel product terminal should be prudently decided also since exact orientation of steel sale plan scheduled by the new private investor which is nearly starting management of the national steel mils.

Moreover, in order to enhance both safety and efficiency of assembling the barges at the existing Barge Terminal linking Danube-Black Sea canal based river transport and sea transport, rehabilitation of the Barge Terminal is planned. The access road improvement plan, to enhance the safety and efficiency of vehicle road transport including cargo trucks inside the port, targets the improvement of port road access at Gate 5. The planned improvement will eliminate sharp turns of the sloped road in this area, thereby enhancing safety.

Accordingly, as per this master plan, significant new port facility development with new cargo terminals, including installation of new cargo handling equipment, will basically be confined to the South Port in the Agigea area only. The most significant new civil infrastructure development with installation/provision of cargo handling equipment projects planned are the provision of a new Modern Grain Terminal and Expansion of Container Terminal, both located in the South Port area.

10.2 Initial Environmental Examination

The potential long-term environmental impact of the implementation of this master plan is evaluated as beneficial in an overall sense as briefly described below.

10.2.1 Social Impacts

All the facilities of the proposed master plan are confined within the present administrative boundary of the Port. Accordingly, no acquisition and resettlement of population is involved and any potential adverse social effect by the implementation of this master plan is evaluated as irrelevant and insignificant.

10.2.2 Other Impacts

Since the baseline environmental condition is that of a functional port having a modern operational history of over 100 years, the proposed development of the port by this master plan, leading to improved port operational safety and efficiency, will probably result in overall long term environmental improvement of the port.

An important navigational safety enhancement common to the implementation of the 2 significant projects (namely, Development of Modern Grain Terminal and Expansion of Container Terminal), is the favourable location with easy and safe access in South Port compared to the North Port. Particularly, in order to access the inner areas of the North Port a vessel has to pass the Oil Terminal with protruding piers that restrict the free passage of vessels. This restriction by the protruding piers is an impediment to navigational safety.

(1) Development of Modern Grain Terminal

The Grain Terminal is the most significant project component of this master plan with the entire new terminal being developed with new land reclamation at Pier S3. This planned modern grain terminal will use a closed belt conveyor system (chain conveyor system) as the means of dry-bulk cargo (grain) handling thereby mitigating potential fugitive emission.

(2) Expansion of Container Terminal

Increased containerised cargo demand will automatically require the expansion of the container terminal which will lead to safer cargo handling with negligible cargo damage and hence reduce potential port environmental pollution due to spill of product (cargo). Hence, as far as the potential port environmental pollution due to cargo handling is concerned, increased containerisation in the port will result in decreased port environmental pollution due to cargo handling activity.

Still it is noted that increased containerised cargo handling will lead to increased exhaust gas emission due to the operation of condensed equipment/machinery at the terminals and hence potential increase in air pollutants. However, the potential air quality deterioration due to increased emission of air pollutants is evaluated as insignificant in consideration to the

favourable topographic condition of the terminal areas having open-air environment with active exchange of air between land and sea.

(3) Other Projects

Other projects of the master plan are basically small-scale ones and terminal rearrangement to rationalise cargo handling in dedicated terminals to enhance efficiency of cargo handling. Still, projects having some new construction and/or equipment/facility installation works are Rehabilitation of Barge Terminal, Road Access Improvement of Gate 5, Development of Steel Product Terminal and Development of Timber Terminal.

1) Rehabilitation of Barge Terminal

   The Barge Terminal serves as the link between river (via Danube-Black Sea canal) and sea transport mainly for bulk cargo. At present the terminal facility lacks quay-walls and dolphins, which are essential for safe berthing of barges and also for safe and efficient use of wet basin as temporary anchorage.

   Consequently, the ongoing barge handling at the Barge Terminal is conducted in a haphazard manner, causing a safety concern during the process. Uncontrolled barge management by uneconomical maundering and disorderly use of basin is in fact both economic loss and environmental pollution. Hence, the planned rehabilitation of the barge terminal with the provision of quay-walls and dolphins, though of small-scale, has very significant long-term safety improvement and environmental pollution mitigation elements.

2) Road Access Improvement of Gate 5

   This project component is aimed at improving access to the port terminals while eliminating sharp sloped turns at the existing port entrance of Gate No.5. This improvement to the existing hazardous and inefficient road access system is regarded as a long-term environmental improvement of the road transportation in the port.

3) Steel Product Terminal

   The new Steel Product Terminal planned to be provided in Pier S1 of South Port, will add to the existing steel product berths located at the inner area of the North Port. Enhanced overall navigational safety of the port due to its favourable location is the most significant long-term environmental benefit of this project implementation.

4) Timber Terminal

The new Timber Terminal planned to be provided at the present container terminal in North Port, will add to the existing berths of same function located at the inner area of the North Port. Enhanced concentrated management of the terminal is expected to contribute to the long-term environmental benefit.
Note: Since the future cargo demands of steel export and timber export are not promised yet, demands and activities by related industries should be observed closely. Selection of these terminals should be undertaken carefully.

10.3 Conclusion

The implementation of the proposed master plan will lead to overall enhancement of operational efficiency and safety as well as long-term environmental improvement of the Constantza Port in comparison to the baseline (present) environmental condition of the port.

Finally, concerning the overall environmental improvement of the port, prompt implementation of the planned waste management improvement project considered by MOT, targeting improved management of both liquid (ballast and bilge waste) and solid waste arising from shipping activity in the port, is emphasized.