12-2 Preliminarily Designed Facilities

12-2-1 General

(1) Plan A

A breakwater will be provided for reclamation works at offshore, and a part thereof, when completed, will function as seawall.
The breakwater will be of gravity type armored with dissipating box caissons to resist the direct wave actions.

Western side of the reclaimed area will be used as -12 m multi-purpose berth. Revetment adjacent to the berth will be of steel sheet pile type to secure the water depth of -12 m. The revetment at the eastern side of the reclaimed area will be of rubble mound type using stone materials which are abundant in Turkey.

(2) Plan B

Terminal area will be provided by offshore reclamation works and land excavation. A breakwater will be constructed for offshore reclamation and of the same gravity type as Plan A.

The eastern side of the reclaimed area will be used as -12m multi-purpose berth.

It is proposed under the master plan to expand the reclaimed area to both seaward and landward directions. Box caissons of the breakwater will be removed in future for use in retaining wall works for coal/ore berth. The revetment will be of rubble mound type.

12-2-2 Selection of Structural Type of Port Facilities

(1) Breakwater (Harbour Side)

1) Wave Conditions

Deepwater wave height	H_o=5.8m
Wave period (T1/3)	T=8.6sec
Deepwater wave length	L_o=115.4m
Equivalent deepwater wave height	H_o=5.8m
(K_D=Kr=1.0)	

Slope of sea bottom i=1/100

Design depth h=9.5m(H.W.L)

Significant wave height H1/3=5.0m

Maximum wave height Hmax=6.7m

(By example of calculation diagram)

2) Soil Conditions

Elevation	Soil layer
Ground level - 14.0m	Silty sand of $\phi 25°$
-14.0m - -41.0m	Silt $c=0.2Z^t/m^2$(Form existing ground)

3) Selection of Structural Type

i) Armoured with dissipating box caisson type

Reason of selection

Gravity composite type with caisson is conceivable for the proposed breakwater considering the sever wave conditions at the site.

ii) Selection of foundation improvement method

There are various methods for foundation improvement such as replacement, counterweight, sand drain, paper drain and sand compaction. Either the replacement or counterweight method will be selected because both methods are widely adopted in Turkey. However, the replacement method needs a great volume of good sand.

Improvement method ; Displacement method

Improvement depth ; -35.0m

(By Examination of circular failure)

iii) Coping of crown elevation

H=+5.5m(This crown elevation is transmitted wave zero m (0))

iv) Safety factors of box caisson

Against sliding F=1.3

Against overturning F=1.9

Subgrade reaction $P=33.89^t/m^2$

Width of subgrade reaction b=5.58m

(Width of Caisson determined by stability while buoyancy)

v) Weight of wave dissipating concrete blocks

Hudsons formula

$$W=\frac{\gamma_r \cdot H^3}{K_D(Sr-1)^3 \cot\alpha}=13.3^t \qquad (16^t \text{ Type})$$

vi) Weight of concrete blocks

$$W=\frac{\gamma_r \cdot H^3}{K_D(Sr-1)^3 \cot\alpha}=9.8^t$$

Shape ($1.5^B X 1.0^H X 3.0^L$)

(2) Multi - Purpose Berth

1) Design Conditions

Planned depth	-12.0
Planned crown height	+4.0
Ship to be berthed	30.000^{DWT}

2) Soil Conditions

Elevation	Soil Layer
Ground level to -20m	Sand of $\phi 33°$
-20m to -35m	Silt ($c=0.2Z\ ^t/m^2$)From the Existing GRound
Further depth	Good soil

Bedrock exists around the elevation of about -43.0m.

3) Selection of Structural Type

i) Open - type wharf with vertical piles

Reason of selection

Piled berth of steel pipe piles is preferable to secure the sufficient bearing capacity as the berth will be equipped with quay crane rails.

ii) Seletion of foundation improvement mettod

Improvement method ; Displacement method

Improvement depth ; -35.0

(By Examination of circular failure)

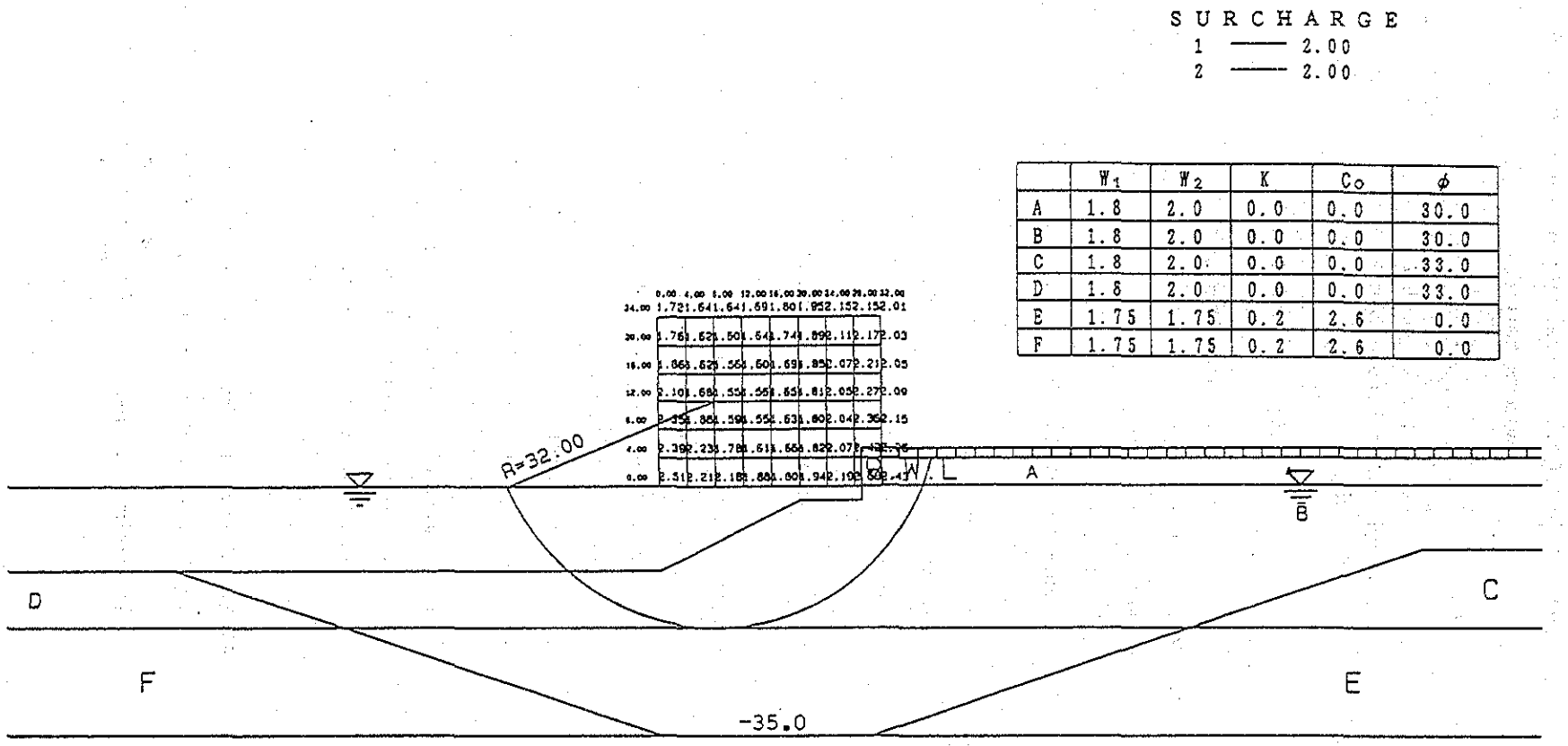
4) The Safty Factors of Steel Pipe Piles

i) Maximum Eexternal force; During an earthquake

ii) Maximum Stress $\quad \sigma=\frac{\sigma s}{\sigma ca}+\frac{\sigma bc}{\sigma ca}=0.95 < 1.0$

4) Circular failure (Fmin X= 8.0 Y=12.0 R=32.0 M_R=8945.480 M_D=5762.148 F=1.552 > Fs=1.3)

Fig. 12-2-1



	W_1	W_2	K	C_o	ϕ
A	1.8	2.0	0.0	0.0	30.0
B	1.8	2.0	0.0	0.0	30.0
C	1.8	2.0	0.0	0.0	33.0
D	1.8	2.0	0.0	0.0	33.0
E	1.75	1.75	0.2	2.6	0.0
F	1.75	1.75	0.2	2.6	0.0

iii) Examination of bearing capacity for foundation

Maximum axial force P

Bearing capacity R

$$F=\frac{R}{P}=3.1>1.5$$

iv) Horizontal deflection

=4.2cm<5cm(Allowable deflection)

(3) Revetment (1)

1) Wave conditions

Probability wave 50years

Significant wave $H^1/3=3.3m$

2) Selection of structural type

Rubble stone type

This type is selected with consideration of easy execution and abundant rubble stones in Turkey.

3) Weight of Armor Stone

Hudsons foumula

$$W=\frac{\gamma_r.H^3}{K_D(Sr-1)^3\cot\alpha}=5.50^t$$

(4) Revetment (2) (Steel sheet pipe pile)

1) Design Conditions

Planned depth -10.0

Crown height + 4.0

2) Selection of Structural Type

Steel Sheet pipe pile type

3) Examination of Safety Factor

i) Steel pipe pile

Embedded length -20m

Bending stress $\sigma=\frac{M}{Z}=1,212^{kgf}/cm^2<\sigma sa=1,400^{kgf}/cm^2$

ii) Tie rod (High - tension steel 45)

Stress $\sigma=\frac{T}{A}=1,558^{Kg}/cm^2<\sigma sa=1,800^{Kg}/cm^2$

iii) Wale (H-shaped steel H-250X250X9X14X16mm)

Stress $\sigma = \frac{M}{Z} = 1,034^{kg.f/cm^2} < \sigma sa = 1,400^{kg.f/cm^2}$

iv) Couled piles anchorage

Stress $\sigma = \frac{P}{A} = 317^{Kg} < \sigma sa = 1,400^{Kg/cm^2}$

Beareng capacity of foundation

Bearing capacity F=5.0>Fa=2.5

Pulling resistance F=3.003>Fa=3

(5) Groin and Training Dike

1) Wave Conditions

Probability wave 50years

Significant wave $H_{1/3}$=2.9m

2) Selection of Structural Type

Rubble stone Type

3) Weight of Armor Stone

Hudson's formula

$$W = \frac{\gamma_r . H^3}{K_D (Sr-1)^3 \cdot \cot\alpha} \div 4t$$

(6) Filyos River Improvement

1) Design conditions

i) Recurrent period 500years

ii) Peak discharge $4,260 m^3/sec$

iii) Slope of river bed i=1/1,000

iv) Roughness coefficient N=0.025

Reason of N=0.025

Roughness coefficient adopted of average following

(Stone masonry filling mortal N=0.017-0.03 Extension of cross section is straight line N=0.017-0.025)

2) Selection of River Profile

In determining the river profile, the river discharge volume both under normal and abnormal conditions should be considered. A double profile is adopted for this river to cope with the 500-years Recurrent Period.

The required river profile was determined based on the backwater calculations.

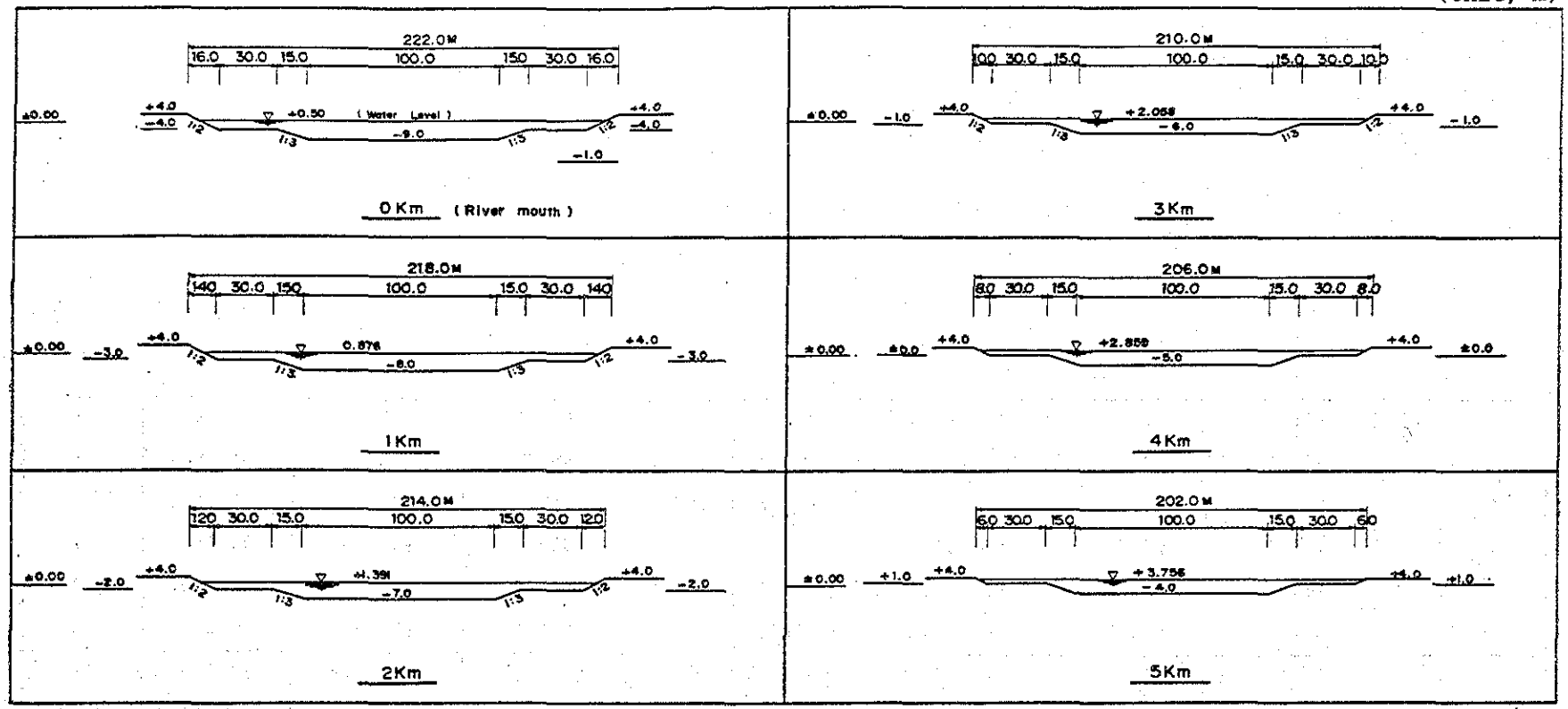
3) Calculation of Backwater in Open Channel

Peak Discharge (4260.000) m^3/sec　　River month Water Level (0.500)m　　α (1.000)

Section No	Length of Section(m)	Roughness Coefficient	River bed Level(m)	Water Depth(m)	Water Level(m)	Area of Cross Section(m^2)	Hydraulic Radius	Current Speed(m/sec)	The Froude Number
1	0.000	0.025	-9.000	9.500	0.500	1470.500	6.945	2.897	0.300
2	1000.000	0.025	-8.000	8.876	0.876	1341.430	6.420	3.176	0.341
3	1000.000	0.025	-7.000	8.391	1.391	1242.270	6.007	3.429	0.378
4	1000.000	0.025	-6.000	8.058	2.058	1174.720	5.772	3.626	0.408
5	1000.000	0.025	-5.000	7.859	2.859	1134.660	5.551	3.754	0.428
6	1000.000	0.025	-4.000	7.756	3.756	1113.800	5.461	3.825	0.439

4) Cross Section of Filyos River

(Unit; m)



12-2-3 Preliminarily Sections

Fig.12-2-3(a) BREAK WATER(2) (PLAN A AND B) (Unit;m)

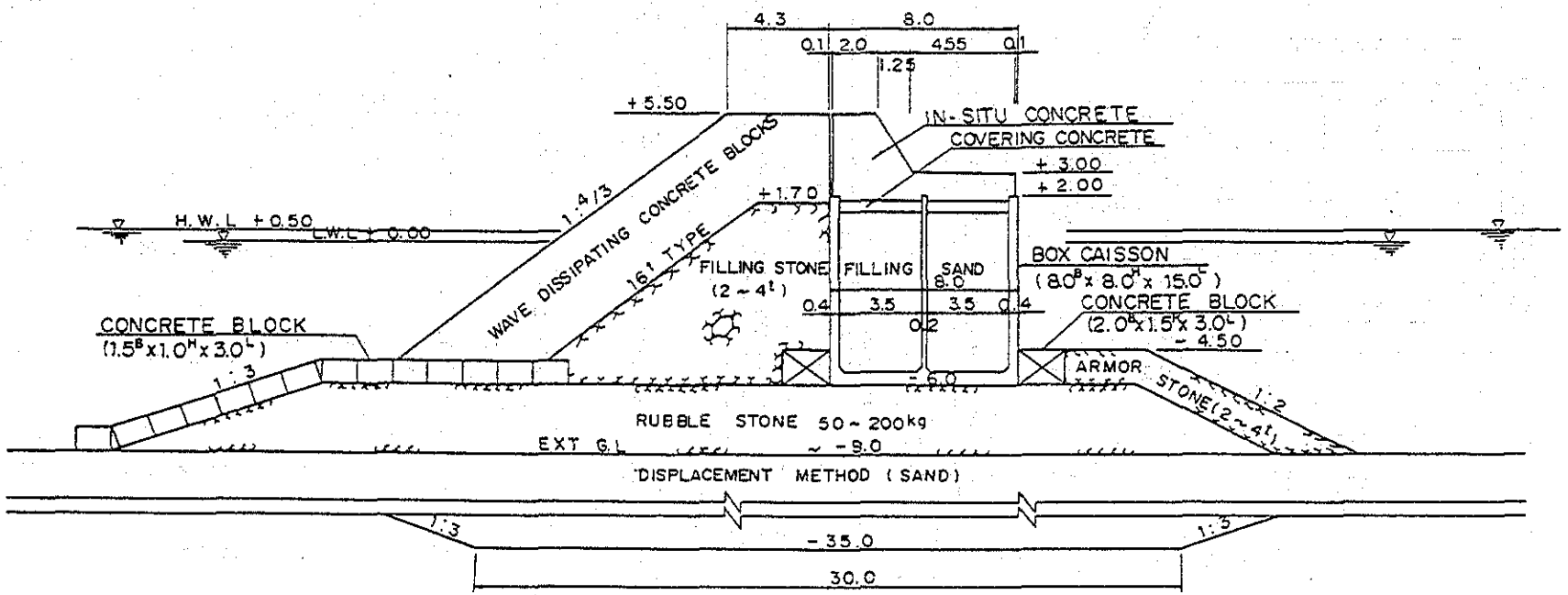


Fig.12-2-3(b) MULTI-PURPOSE BERTH (PLAN A AND B) (Unit;m)

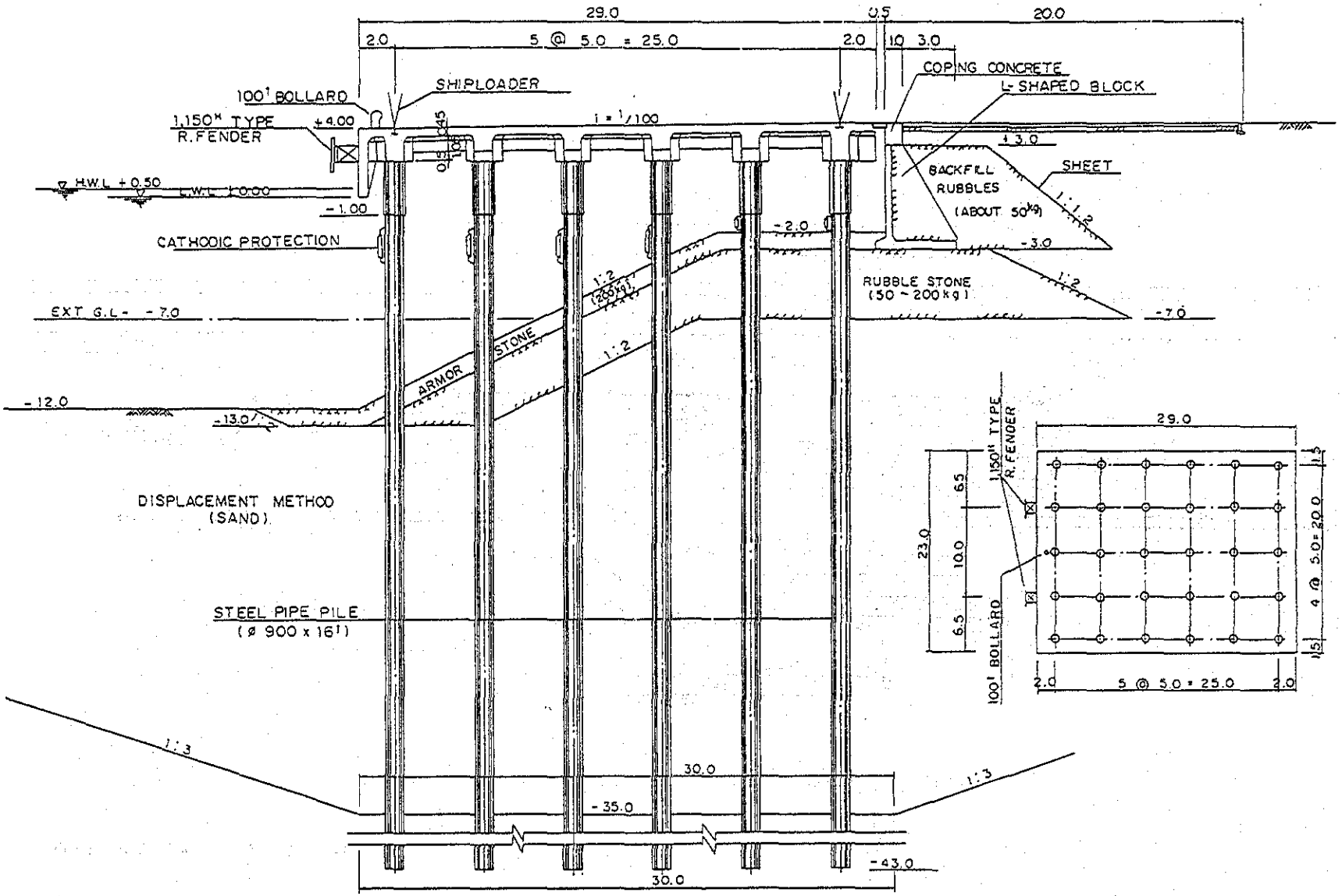


Fig.12-2-3(c) REVETMENT(1) (PLAN A AND B) (Unit;m)

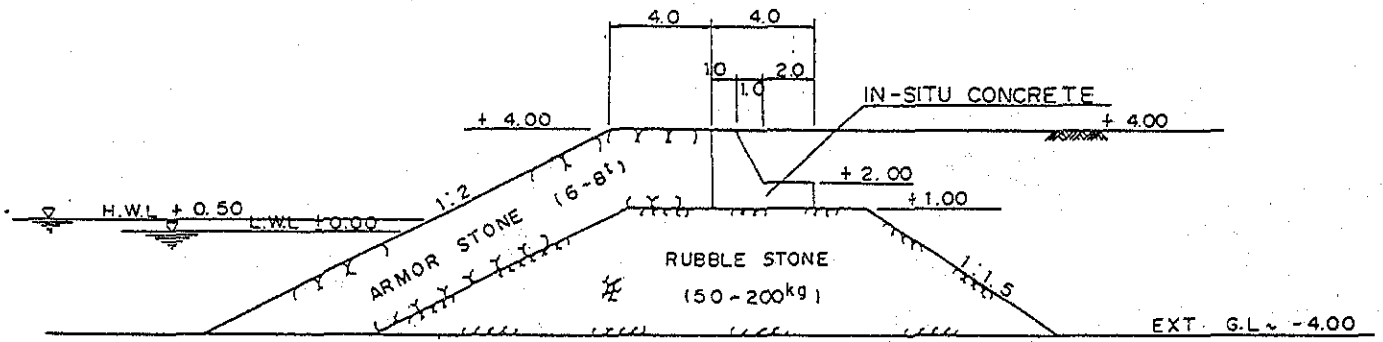


Fig. 12-2-3(d) GROIN AND TRAINING DIKE (PLAN A AND B)

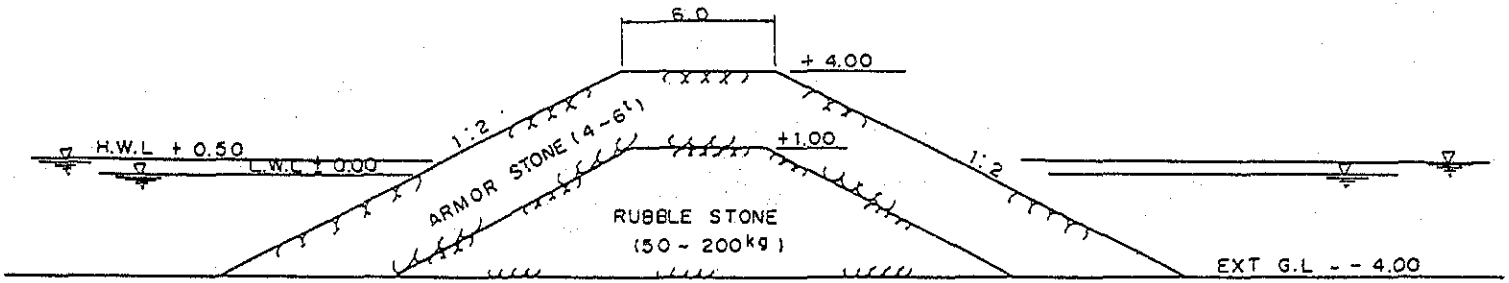


Fig. 12-2-3(e) Revetment (2)

(STEEL PIPE PILE WALL TYPE) (PLAN A) (Unit;m)

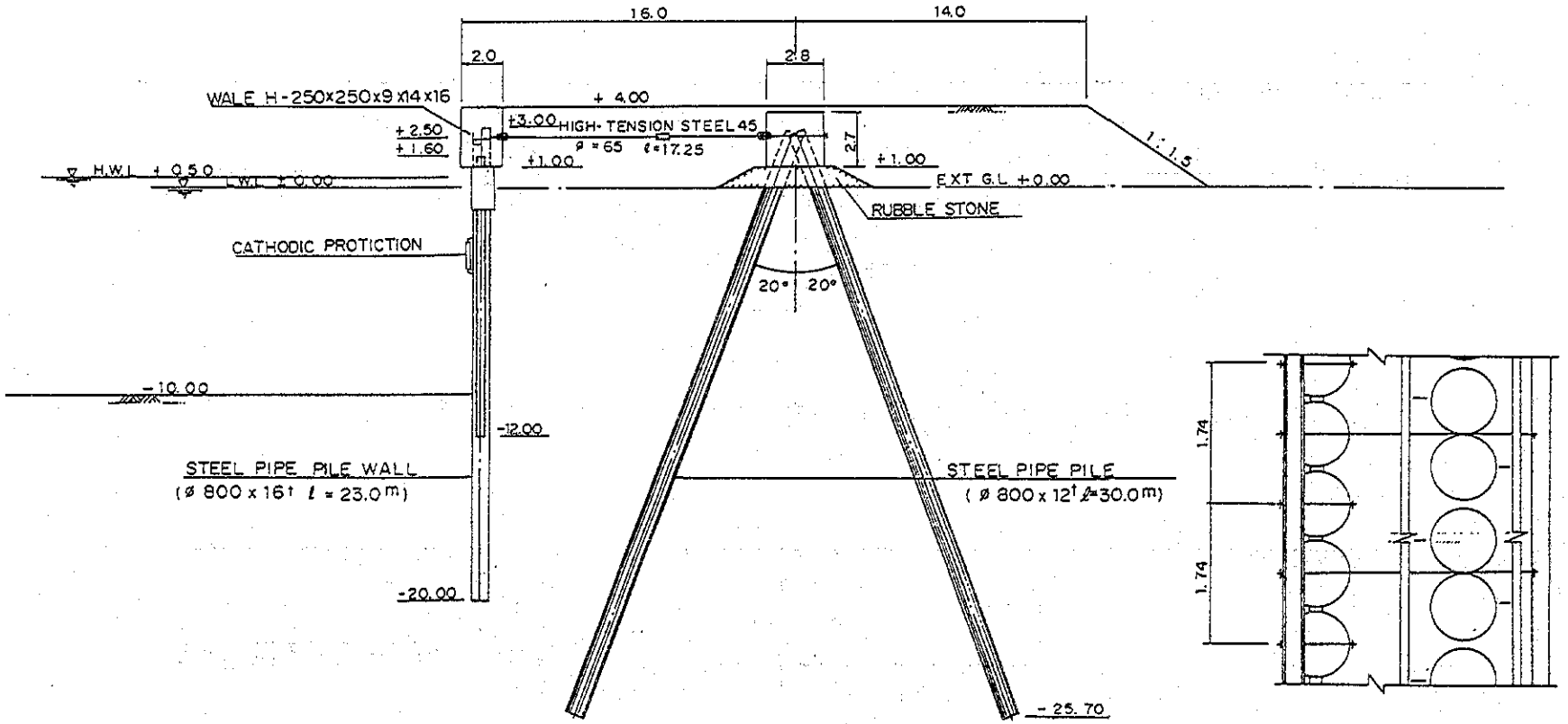


Fig. 12-2-3(f) REVETMENT (FOR ROAD) (PLAN B) (Unit;m)

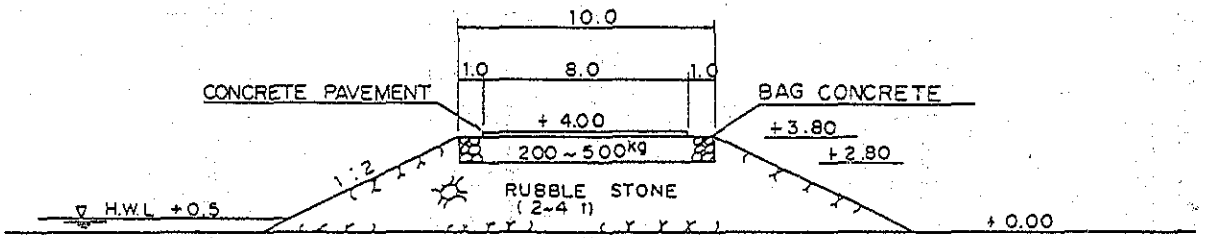


Fig. 12-2-3(g) FILYOS RIVER IMPROVEMENT PLAN (PLAN A AND B) (Unit)

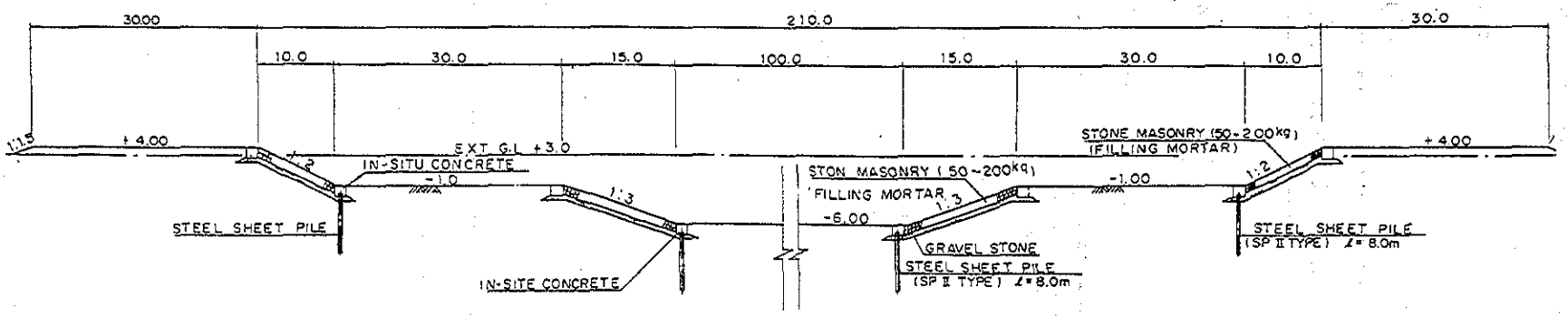
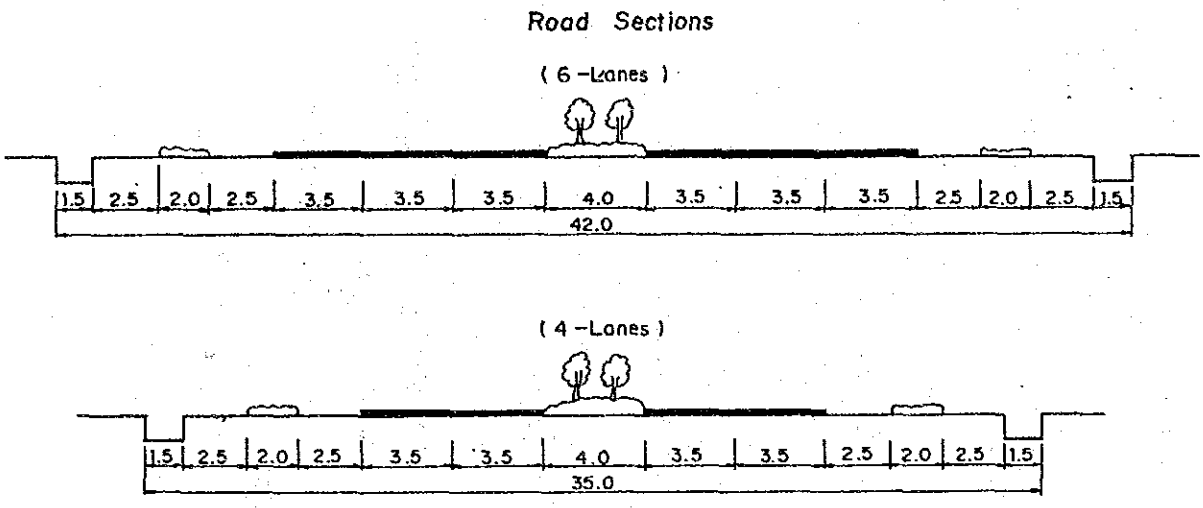
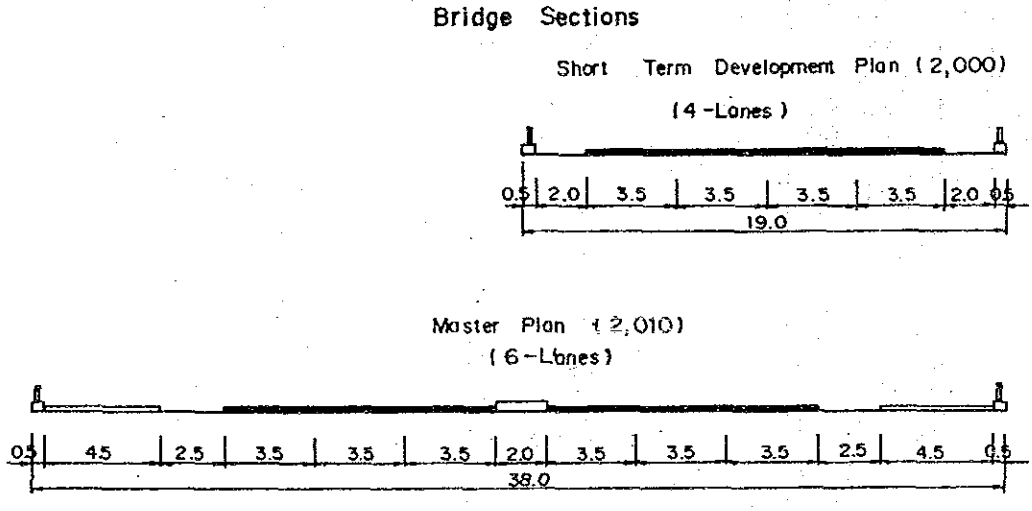


Fig. 12-2-3(h) Road and Bridge Sections (Unit; m)





CHAPTER XIII PORT MANAGEMENT PLAN FOR THE SHORT-TERM DEVELOPMENT PLAN

13-1 Funds for Constructing the New Port

In general, construction costs of fundamental facilities or infrastructures such as water facilities, protected facilities, mooring facilities and transport facilities are funded by the Turkish Government. After construction, port facilities will be transferred to the control of the actual operator, the TCDD or the TDI.

On the other hand, funds for construction of functional facilities such as cargo handling equipment are sometimes provided by the actual operator.

However, private companies would have to finance and construct facilities privately, if they use those facilities on an exclusive basis.

Recently, in the case of implementing the infrastructure project, the B.O.T. model must be considered at the stage of the feasibility study. The team will examine the possibility of applying this B.O.T. model to the project.

The principles of the B.O.T. model are summarized as follows:

> In the broadest terms, the build-operate-transfer model means that an international consortium bidding on a project shall design the project, raise and secure funding for the construction, construct, own, manage and maintain the project against the host government's guarantees to take the products of plan over a given period of say 10-15 years with a price paid for the product and/or services throughout the said period at a level sufficient to cover debt service, operation and maintenance costs and to provide a return on equity to attract investors. At the end of the term, when all the project's loans have been paid and equity capital (not less than 15% of total investment cost) has been repatriated, ownership of the project would transfer to the host government without charge. An appropriate entity of the host country will be willing to invest up to certain percentage of the equity of the joint venture to be formed to acquired and operate the project. The project must be completed under turnkey fixed price contract. Force majeure risks during the construction and during the operation are borne by the host government. Payment for the products and/or services will be made in foreign currency, using the same basket of currencies with which the project is financed.

We will examine the possibility of applying the B.O.T. model to this project, mainly from the viewpoint of the financial aspect.

For the time being, we will examine and formulate a port management plan without regard to the B.O.T. model.

13-2 Port Management Body of Filyos Port

13-2-1 Port Management Body

The Filyos development area can be classified roughly into three zones: the port zone, industrial zone and "other zone," including urban areas, etc.

We examine the organization responsible for operating the port zone, namely port facilities and some other relevant facilities. The industrial and other zones will be owned (or leased) and managed by different organizations. The port management body will manage only port and other relevant facilities.

The reasons for this are as follows:

(1) After completing the project, the industrial zone will be divided into several areas and be leased or sold to state or private companies. These companies manage themselves and openate their own facilities. Theses companies are considered self-sufficient.

(2) The most important aspect of this project is that the project is able to finance and manage itself.

Thus, we can exclude the financial problems of the industrial and other zones from the work of the financial analysis.

It has not yet been decided who will operate the Filyos Port. We can consider the two following alternatives:

(i) A new port management body

(ii) An existing organization, namely the TCDD or the TDI.

New port operations need practical knowledge and information concerning port management. It may thus be realistic to use an existing organization.

But in general, the body should be streamlined with a view to maintaining high efficiency.

From this point of view, the port management body may be a

separate organization from existing port authorities.

However, for the time being it does not matter which organization operates the new port. This will be considered and decided by the Turkish Government. We must formulate a tentative management plan mainly for the purpose of carrying out the financial analysis. The organizational chart of the new port management body is shown in Figure 13-2-1. This chart is an outline based on the existing port management body and is slightly modified.

The Administrative Department is responsible for managerial and administrative affairs. The Operating Department is responsible for actual port operation, and the Engineering Department is responsible for the maintenance of equipment.

The main tasks of the port management body will be as follows:

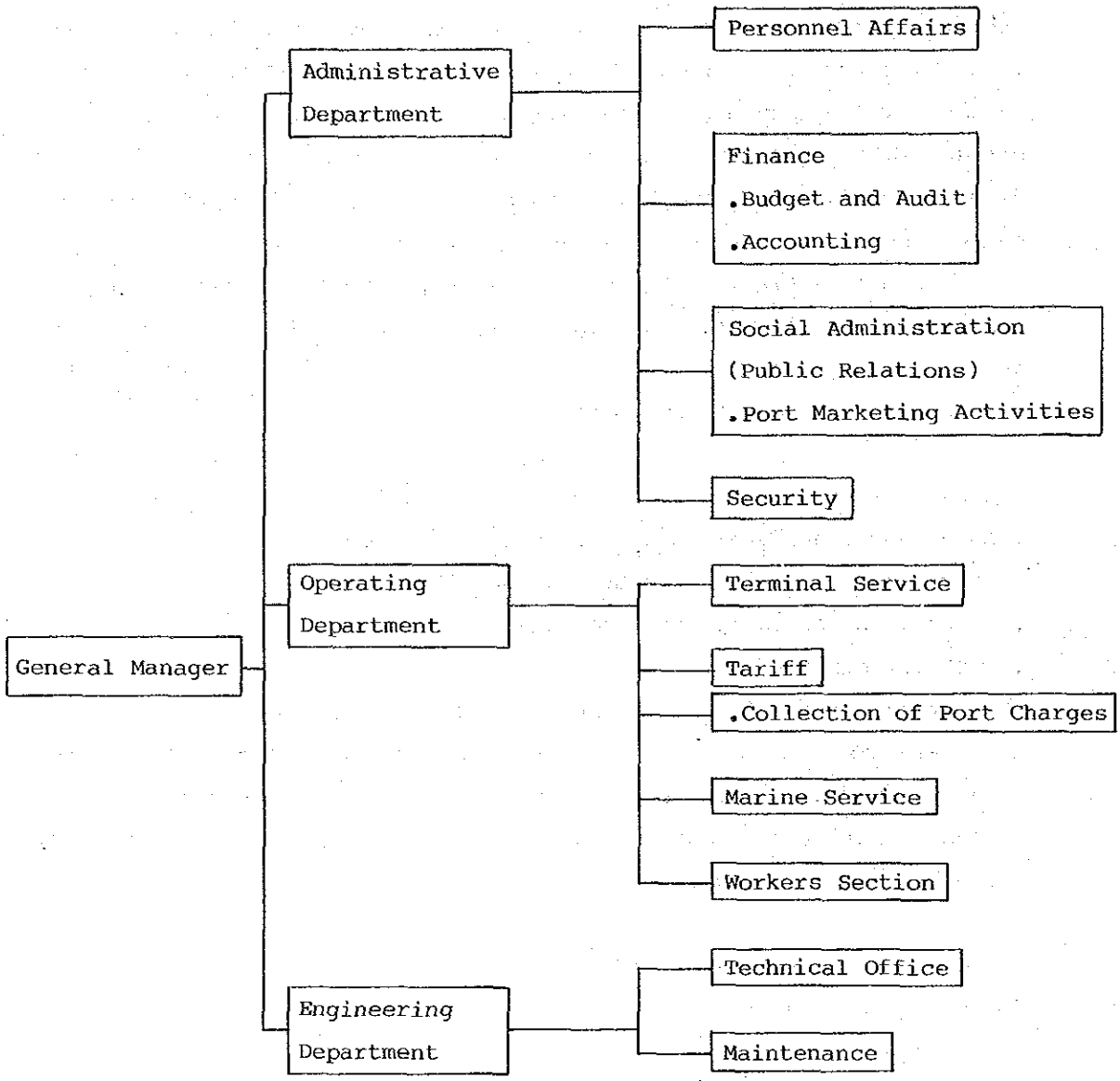
- Maintenance and utilization of port facilities
- Provision of service like the tug service, etc.
- Supervision of daily port activities
- Port marketing activities

In the case of a new port, port marketing activities will be necessary for the purpose of attracting users, particularly at the initial stage. Ports grow primarily from the efforts of private companies, but port marketing activities by the port management body are also very important.

Actual port management body, the TCDD or the TDI, provides the following main services:

- Pilotage
- Towage
- Berthing and deberthing
- Water supply
- Waste disposal
- Loading/unloading
- Terminal service
- Storage
- Weighing
- Rent of equipment

Fig 13-2-1 Organization Chart



Some of the port services could be privatized. At Filyos Port there are no private firms. Therefore it is difficult to advocate privatization of some of the port's main services.

For the time being, we will assume that these port services will be carried out by the port management body of Filyos Port.

Fig. 13-2-2 shows port activities at a port in Turkey. There are many organizations including the actual port operator as a port related business. Since the Filyos Port is a new port and there is no port-related organization at this moment, the Port management body will have to promote such port-related organization at Filyos site in cooperation with related Ministries and organizations. Otherwise, it is very difficult to launch a new port in good conditions.

There are no longshoring or stevedoring companies in Turkey. It is not efficient for the port management body to have it group of longshoremen and stevedores, and thus the privatization of such port services will have to be looked into in the future.

13-2-2 Estimation of Officials and Laborers

The numbers of officials and laborers required at Filyos Port are roughly estimated based on the actual data and information from some major port in Turkey.

Table 13-2-1 shows labor force statistics in major international ports.

From this table, we find that the cargo volume/official coefficient is 10,000 ton/official and quay length/laborer is 3 meter/labour taking into consideration cargo handling techniques and equipment at the new port.

According to the port short-term plan, total quay length will be around 600 meters and total handling cargo volume will be 2,500,000 tons, assuming that the average cargo volume per loaded 20ft. containers is 13 tons.

Hence, taking new port facilities into considration, the numbers of officials and laborers are roughly calculated as follows:

Officials: 2,500,000tons ÷ 10,000ton/official ≒ 250

Laborers : 600meter ÷ 3m/laborer ≒ 200

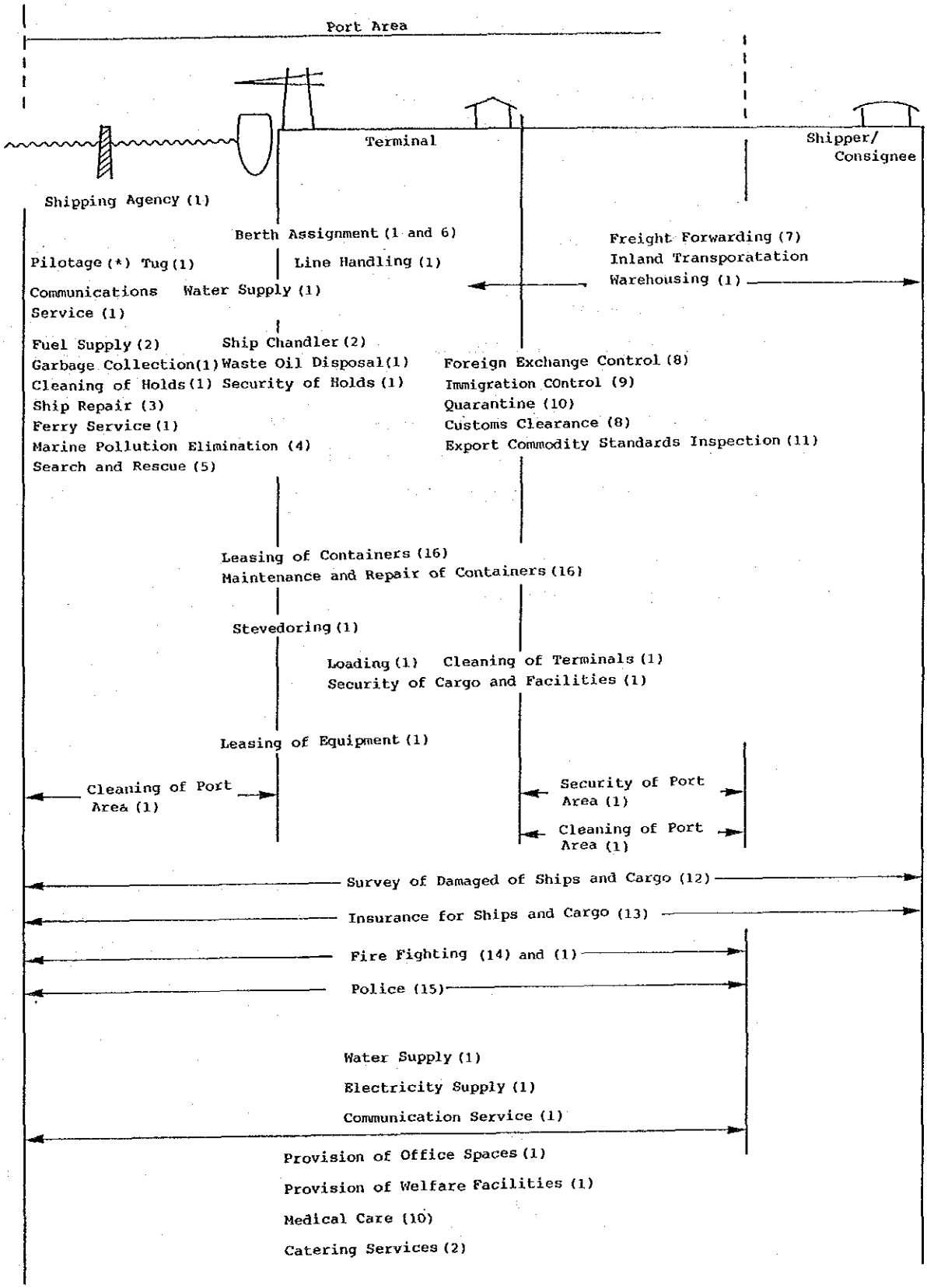
Total : 450

Table 13-2-1 Labor Force

	Unit	HAYDERPASA	DERINCE	BANDIRMA	SAMSUN	MERSIN	ISKENDERN	Total	Average
Personnel	Number	250	144	280	367	1,148	828	3,017	
Laborer	Number	875	350	405	519	1,457	1,058	4,664	
Total	Number	1,125	494	685	886	2,605	1,886	7,681	
Cargo Volume	'000Ton	3,511	598	2,618	2,102	10,096	3,166	22,091	
Quay Length	M	2,506	919	2,672	1,756	3,431	1,025	12,309	
Volume /Personnel	'000Ton/ Number	14.04	4.15	9.35	5.73	8.79	3.82	45.88	7.32
Quay Length /Laborer	M/ Number	2.86	2.63	6.60	3.38	2.34	0.97	18.79	2.64

(Source: TCDD)

Fig. 13-2-2 Activities at a Port



(*) For Haydarpasa Port, TDI

For other ports, TCDD

(1) TCDD

(2) Private Sector

(3) Turkish Shipbuilding Industry Inc.

(4) General Directorate of Environment

(5) TDI

(6) Harbour Master

(7) Forwarder

(8) Customs

(9) Passport Police-Ministry of Interior.

(10) Ministry of Health and Social Assistance

- Coastal Health Inspection Contre

(11) Undersecretariat of Treasury and Foreign Trade

(12) Ship Survey Committee - Harbour Master

(13) Private or State Owned Insurance Companies

(14) Municipality

(15) Ministry of Interior

(16) Not available for the present

13-3 Cargo Handling System

(1) Working Hours

In the initial stage, operations are conducted using three shifts based on cargo volume and handling efficiency.

(2) Berth Operation

The criterion of allotting berths for incoming vessels is the standard one of "First-come, First-served". General cargo berths should be operated using this criterion. Since Filyos Port has three multi-purpose berths, taking efficient operation of port facilities into consideration, a preferential-use type should also be examined. By introducing this criterion, berths, sheds and yards at the back of the berth could be used jointly, resulting in efficient cargo handling.

13-4 Operating System of The Container Terminal

13-4-1 Necessary Conditions of New Container Terminal

(i) One container terminal should be operated by a single operator who has enough skilled personnel and equipment to give good service to port users. Using a single operator is the most efficient and simple course.

(ii) The CFS operator in the container terminal is expected to be the same as the container terminal operator.

For Filyos Port, a single operator will operate container terminals as well as the CFS. Operations can thus be expected to be efficient and simple.

13-4-2 Container Flow

Fig 13-4-1 shows import and export container flows.

Import containers

All import containers are discharged from ships and then transferred to the container stacking yard for stacking. FCL containers (door-to-door service containers) are basically delivered from the container stacking yard directly to consignees through the gate office.

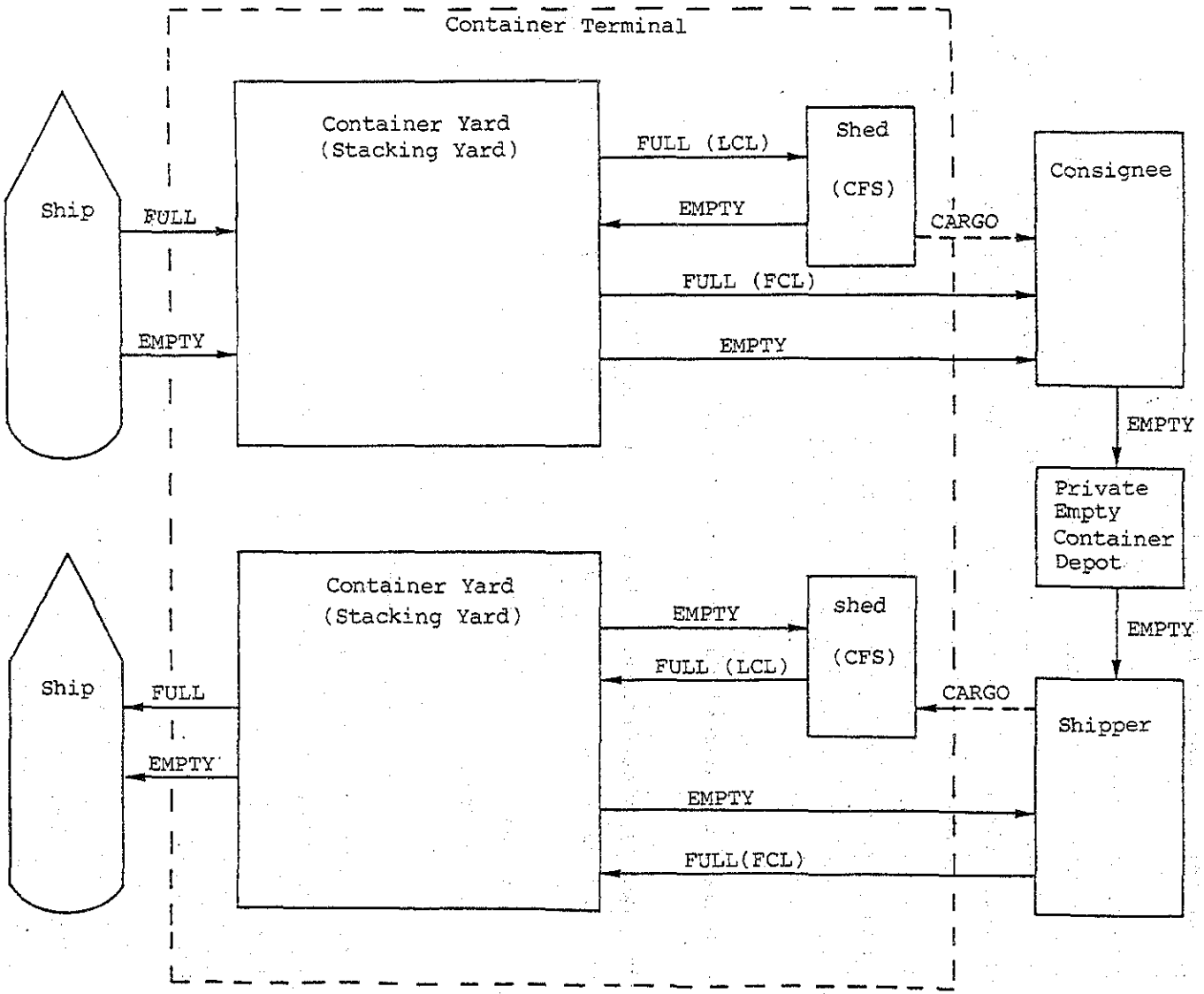


Fig 13-4-1 Container Flow

Containers with consolidated cargoes (LCL cargoes) are moved to the designated shed(CFS). Cargoes are unstuffed from the containers in the CFS, sorted, and then delivered. The empty containers are then stored at the stacking yard or transferred to the shipping companies' empty container depots. If space is available in the container terminal, empty containers are stacked in the stacking yard.

Export containers

Prior to a ship's arrival, export FCL containers are received at the gate office and stacked in the stacking yard. Export LCL cargoes are brought into the CFS by shippers, and then stuffed into the containers by the operator. All export(full and empty) containers are loaded onto a ship in accordance with the loading sequence plan.

13-4-3 Container Terminal Operation

Container terminal operation consists of the following aspects:

(i) Container ship operation

Container ship operations refer to loading and discharging work to and from container ship. These operations are performed by gantry cranes which are situated on the wharf. In order to minimize the staying time of a container ship at the wharf, an efficient operation plan should be prepared prior to the ship's arrival.

(ii) Container yard operation

The container yard, which is a junction between sea and land transport, has two functions: it serves as a location for the physical and legal transfer of cargoes and also as a storage space.

(iii) Gate operation

The work at the gate office, which is located at the entrance of the container terminal, is very important because the office is the location for the transfer of legal responsibility between shipper/consignees and shipping companies.

(iv) CFS Operation

The work of a CFS operation includes receiving, delivering, storing, stuffing and unstuffing container cargoes. Small lot (LCL) cargoes are handled at the CFS.

(v) Cargo documentation

In order to achieve the smooth flow of cargoes and containers in the container terminal, efficient cargo operation plans must be prepared. Cargo documentation is an important aspect of terminal operations.

(vi) Maintenance

As the container terminal is highly mechanized, any trouble with cargo handling equipment will directly influence the terminal's operations. Mechanical troubles with container cranes or transtainers block the flow of container operation and result in reduced efficiency, extending ship berthing time. To ensure safe and efficient cargo transportation, containers and handling equipment must always be well-maintained.

13-5 Recommendation of Port Management System

Launchig a port is an ambitious and very difficult project. While planning and design are both important factors, management and operation should also be emphasized to guarantee the success of a new port. This aspect will be examined in detail. In doing so, the Team has tried to take a realistic approach rather than drawing up a theoretically ideal scheme, since in determining institutuional aspects and operational practices, the existing social background of the nation is a more relevant factor than theory.

(1) *Port Management Organization*

Some of the points regarding management structure are indicated in 13-2 and here the work area of the port management body (hereinafter refereed to as "PMB") is considered.

Generally speaking, the body should be streamlined with a view to maintaining high efficiency.

From this point of view, the port management body of a new port may be an organization separate from existing port authorities.

In general, major European, North American and Japanese ports have their own port authorities. On the other hand, in some developing countries, a port authority or a government organization operates all or

some of the country's ports.

(2) Coordination

The new port should, when operating, cooperate with many kinds of related bodies. The relationship with other ports in Turkey should be taken up first. These ports should cooperate and coordinate their activities in many fields.

Coordination in the planning and construction stages is no doubt important, but in the operating stage it is equally indispensable. In order to ensure concerted action between project-related organizations, some mechanism may be municipalities, regional branches of central organizations dealing with another transportation sector, energy, customs, quarantine, immigration, and the industrial estate authority.

(3) Port Marketing Activities

The PMB of the new port should carry out intensive port marketing activities. For a new port, port marketing activities are more important than for advanced port. Without a positive approach, clients, who are essential for the port's survival, may not be attracted to the port. However, it should be noted that publicity does little on its own. A reputation for prompt, reliable, economical and efficient service is essential for attracting clients. In this context, quick customs, immigration and quarantine procedures are also vital in attracting potential clients.

(4) Recruitment and Training

The new port requires about 500 office personnel and mannual workers to be employed at the initial stage and at the same time. Hard work is envisaged in recruiting the many kinds of persons needed, from top management to laboureres, and training them will be even more difficult. The greatest attention should be paid to these matters, and through study of how to draft a comprehensive plan for recruitment and training is needed.

For the new port, it is envisaged that it will be difficult to hire a sufficient number of experts for high-ranking management. Even if the new port is managed by the present operators, experts with great experience of port management in existing port operations, preferably including a general

manager, might be recruited in order to assist in the port's smooth operation and to transfer port-management expertise in the inauguration period.

Besides, continuous training for port workers will be needed in order to catch up with new and advanced port operation technology.

There is only one training center for port workers in Istanbul, and the number of port workers admitted is limited compared to the numbers of workers needed.

Many excellent port workers will be needed to support cargo transportation.

It is envisaged that a training center for port workers and personnel will be needed at the Filyos site.

(5) Privatization

There is a large number of variations throughout the world as to the extent of the tasks that port management bodies actually conduct. The most important aspect of this is whether a PMB conducts cargo handling by itself.

The TCDD owns handling equipment and conducts loading and unloading by itself.

It is considered advisable that the organization for the new port follow the example of the existing port management system, at least in its initial stage, taking into account the advantage of learning from the experience of the existing port management system.

There are many examples in the world of independent companies undertaking cargo-handling activities, and in the future this possibility might be considered with a view to promoting streamlined organization and efficiency.

Privatization should be promoted, especially in the field of port workers, namely, stevedoring and longshoring.

(6) Port Pricing Policy

The fundamental principles of port pricing are that (1) the client should pay for what he uses, i.e., charges should be levied on each place of equipment or service; (2) charges should provide the required income; (3) the pricing structure should promote efficient utilization of port facilities. In reality, however, these principles tend not to be

implemented because of various circumstances or constraints. And in Turkey, unique port tariffs are applied at all public ports.

Even if the new PMB operates the port, competition with neighboring ports will inevitably affect its own pricing policy. Despite this, when making tariffs, due consideration should be given to the principles mentioned above.

(7) Container Handling

There are many empty container boxes in the port area, the container yards are full of empty boxes, and it takes a lot of time to recycle containers in the port area. It is also quite difficult to use container yards for marshalling. A smooth container recycling system will be needed for international container transportation.

Simple documentation and quick regulation procedures are also needed in order to handle containers efficiently, because container transportation requires time-saving procedures.

Of prime importance is a door-to-door transportation system. This is indispensable if the PMB wants to attract potential cargoes. A door-to-door transportation system should be promoted intensively in cooperation with Customs.

(8) Computer System

It is generally said that a computer-based container handling system should be introduced when the cargo volume of the container terminal exceeds 60,000 TEUs per year. According to the demand forecast, the cargo volume will reach over the amount of 60,000 TEUs soon after the port's completion. Therefore, installation of a computer-based container handling system is needed not only to efficiently utilize the terminal facilities but also to meet the port users' demand. Appropriate software for container handling should be created.

Taking such demand from port users into consideration, establishment of a data transmission office connected with the PMB by an on-line real-time computer system would be recommended provided that the necessary data communication system is developed in the near future.

Chapter XIV ECONOMIC ANALYSIS

14-1 Purpose and Methodology of the Economic Analysis

14-1-1 Purpose

The purpose of the economic analysis is to appraise the economic feasibility of the Short-term Development Plan for the New Port from the viewpoint of the national economy.

Therefore, the purpose of this chapter is to investigate the economic benefits as well as the economic costs that will arise from the project and to evaluate whether the net benefits of this project exceed those which could be obtained from other investment oppotunities (the oppotunity cost of capital) in the Republic of Turkey.

14-1-2 Methodology

The economic internal rate of return (EIRR) based upon cost-benefit analysis is used in order to appraise the feasibility of the project. In estimating the costs and benefits of the project,"economic pricing" is applied. Economic pricing here means the appraisal of costs and benefits in terms of international prices (border prices).

Fig.14-1-1 shows the flow chart of the economic analysis procedure.

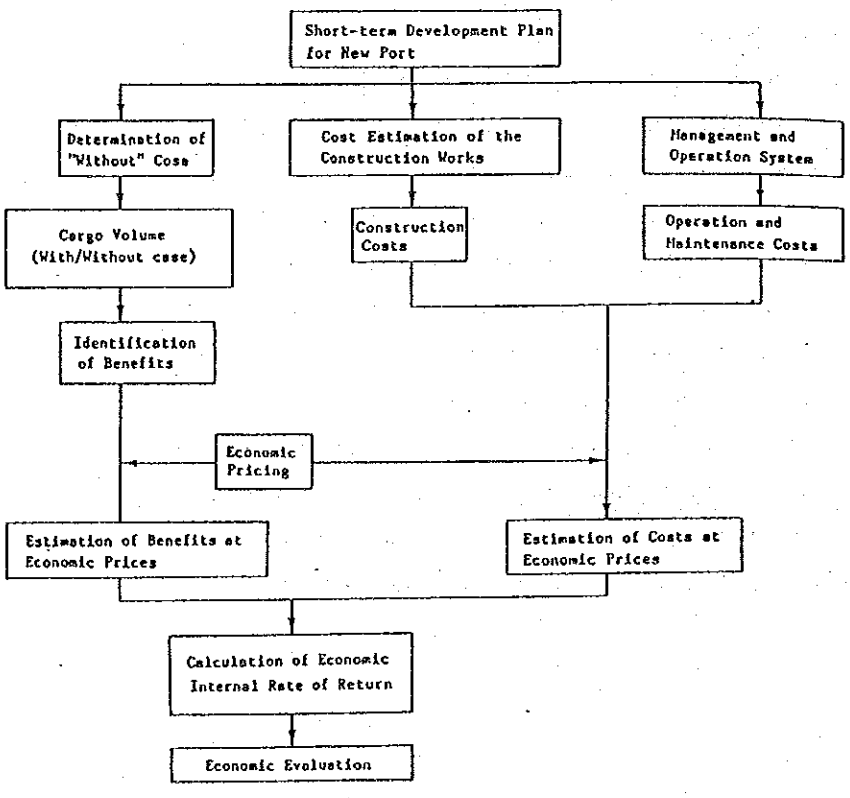


Fig. 14-1-1 Flow Chart of the Economic Analysis Procedure

14-2 Prerequisites of the Economic Analysis

14-2-1 Base Year

The "base year" here means the starting year of the economic analysis. Taking into consideration the depreciation period of the main facilities and the construction period of five years (including D/D), the period of calculation (project life) in the economic analysis is assumed to be thirty years from the beginning of construction(i.e., from 1991 to 2020)

14-2-3 Foreign Exchange Rate

The exchange rate adopted for this analysis is 1US$=2,693TL, that is, the same rate as used in the cost estimation.

14-2-4 "Without" Case

A cost-benefit analysis is conducted on the difference between the "With" and "Without" investment cases. In other words, incremental benefits and costs arising from the proposed investment are compared and it is examined whether or not the net benefits generated by the project exceed the opportunity cost of the Republic of Turkey. Therefore, determing the "Without" case is one of the key points of the economic analysis.

In this Study, the following conditions are adopted as the "Without" case after various possibilities are discussed:

1) No investment is made for the new port.
2) It is assumed that all the cargoes estimated for Filyos Port are to be handled at Samsun Port.
3) The distribution of ships and the working efficiency of cargo handling is the same as that assumed in the above plan.

*Note In the short-term development plan,there are only foreign trade cargoes related to the Ankara region.
Therefore it is not rational to handle them at Hyderpasa Port.
The reason why Istanbul and Izmit por were not used as the "Without Case" us as follows:

① According to the data provided by the TCDD, Istanbul port has been crowded with a lot of ships and cargoes.

In particular, the waiting times of container ships are incredibly long. Therefore if the cargoes forecasted to be will be more congestion. That is to say , in the way of economic analysis, the waiting time of ship will increase in the waiting cost of vessels between "With Case" and it will be a waste of time to handle the cargoes at Istanbul port if the project is not carried out.

Additionally, taking into consideration the present crowded conditions of the roads around Istanbul port, it is not national to handle them at Istanbul port.

② As for Izmit port, the port doesn't have enough facilities, e.g., quay length, and the distance from Ankara region is longer. Therefore the land transportation cost would be higher and this means the loss would be larger than in using Samsun port. Additionally, the cost should be counted as part of the cost of the "Without Case". So it is not reasonable to use Izmit port as the "Without Case"

③ In the economic analysis, if the proposed project is not carried out, alternatives as "Without Case" of cargoes. Therefore it is not rational to set Istanbul or Izmit port as the "Without Case".

For the above reasons, Samsun port was chosen as the "Without Case".

14-2-5 Cargo Throughput

The cargo volume under the "With case" is forecast in Chapter VII.

As mentioned before all the cargoes forecast in "With case" is assumed to be handled in the Samsun Port, because Samsun Port has enough quays to handle them.

The facilities in Filyos Port and Samsun Port are shown in Appendix.

Strictly speaking, there will be some difference in waiting time of ships between Filyos and Samsun, because Samsun Port does not have the same quay length, of -12m depth, as Filyos Port.

However, in the Short-term Plan, not many large ships will enter the port. Additionally, Samsun Port has -10m berths with a total length of 500m for Gen. Cargoes.

Therefore the difference in time can be neglected.

Table below shows the cargo volume under the "With" and "Without" cases in 2000.

Table 14-2-1 Cargo Volume under the "With" and "Without" Cases in 2000

(Unit : '000 tons TEU)

Cargo Type	"With" Case	"Without" Case
	Filyos	Samsun
Container	97	97
Steel 1	1,200	1,200
Gen. Cargo	240	240

14-3 Economic Pricing

14-3-1 Methodology

The purpose of the economic analysis is to examine the value of a project, that is, to see if it represents an efficient allocation of resources in the national economy. The local currency portion of the goods and materials at a market price often includes customs duties. The labour cost at market price is often influenced by a minimum wage system. Therefore,"economic pricing" should be conducted for the economic analysis.

There are several ways for "economic pricing" to be conducted. In this study, the prices of domestic goods and services are revised to border prices in an effort to determine a more rational valuation. In general, these border prices are intended to represent the international market value, or the world prices, of these goods and services.

The market prices are changed to border prices by various conversion factors such as "Standard Conversion Factor", "Conversion Factor for Consumption" and so forth.

14-3-2 Exclusion of Transfer Items

Import duties, other taxes and subsidies are merely transfer items which do not actually reflect any consumption of national resources. Therefore, these tranfer items should be excluded from the calculation of the costs and benefit of the project for the economic analysis.

14-3-3 Method of Applying Conversion Factors

In general, all the costs and benefits are divided into labour, traded goods, non-traded goods and transfer items. Labour is further divided into skilled labour and unskilled labour. In Turkey's case, the factor of foreign labour should be taken into account.

Traded goods are expressed at CIF for imports and at FOB for exports. Thereoticaliy speaking, non-traded goods should be divided repeatedly into labour, traded goods, non-traded goods and transfer items, which are the items required for the production of non-traded goods. However, because of the absence of an I/O table in Turkey, it is impossible to take these steps in this study. Hence the local currency portion after deducting labour

costs and transfer items is considered as non-traded goods, the economic price of which is calculted by multiplying its market price by the Conversion Factor for Consumption (CFC) and the economic cost of unskilled labour is calculated by multiplying its market price by a ratio of the shadow wage rate and the CFC.

(1) Standard Conversion Factor (SCF)

Import duties and subsidies cause a price differential between the domestic market and the international market. The Standard Conversion Factor (SCF) is used to determine the economic prices of certain non-traded goods and services that cannot be directly valued at border prices.

SCF is expressed by the following equation:

$$SCF = \frac{I + E}{(I + D_I) + (E + D_E)}$$

where, I : Total Amount of Imports
E : Total Amount of Exports
D_I : Total Amount of Import Duties
D_E : Total Amount of Export Subsides

There is no data available regarding export subsidies in Turkey,and thus only import duties are taken into account.

In this Study, the SFC in 1986, 0.964 is adopted.

(2) Conversion Factor for Consumption (CFC)

The CFC is used for converting the prices of consumer goods from domestic market prices to border prices. This is particularly required in converting domestic labour costs to the correspoding border prices. The CFC is usually calculated in the same manner as the SCF, replacing total imports and total exports and of cosumer goods only.

In this Study, the CFC in 1987, 0.883 is adopted.

(3) Shadow Wage Rate

For economic analysis, labour costs should be measured in terms of their opportunity costs, that is, the value of lost marginal production which the employment of the labourers for a given project would create for other purposes.

1) Conversion Factor for Skilled Labour

The cost of skilled labour is calculated based on actual market wages,assuming that the market mechanism is functioning properly. However, since these are domestic costs, they should be converted to border prices by multiplying the local wage by the CFC.

$$\boxed{\text{Conversion Factor for Skilled labour}} = \boxed{\text{Nominal Wage Rate}} \times \text{CFC} = 1 \times 0.883 = 0.883$$

2) Coversion Factor for Unskilled labour

Generally speaking, the market wages for unskilled labour should not be used in calculating the economic value of unskilled labour, since these wages are usually far above the opportunity cost of the labour because of a minimum wage system and other regulations.

On the other hand, it is practically impossible to figure out the opportunity cost of unskilled labour in Turkey.

When a project is conducted, the inflow of unskilled labour to the project mainly from the agricultural sector, which is relatively elastic in its use of labour.

Therefore, in a simplified manner it is often assumed that the economic cost of unskilled labour is equal to the per capita income of the agricultural sector.

In this Study, this figure in 1988 (204,300 TL per month) is used as the opportunity cost of unskilled labour.

The coversion factor for unskilled labour is calculated as follows;

$$\boxed{\text{Conversion Factor for Unskilled Labour}} = \frac{\boxed{\text{Opportunity Cost}}}{\boxed{\text{Nominal Wage}}} \times \text{CFS}$$

$$= 0.56 \times 0.883 = 0.494$$

3) Conversion Factor for Foreign Labour

Specific consideration should be given to forein labour, whether it is skilled or unskilled. Since foreign workers have a strong tendency to remit most of their earnings to their owen homes, the economic cost of foreign labour should be treated just like that of imported goods and services.

Therefore, in this Study it is assumed that the conversion factor for foreign labour is 1.00.

14-4 Benefits

14-4-1 Benefit Items

Considering the "With" and "Without" situations mentioned above, the following items are identified as the benefits of the Short-term Development Plan for the New Port :

1) Savings in the waiting costs of vessels
2) Savings in time costs
3) Savings in land transportation costs
4) Earnings of foreign currency in handling container cargoes
5) Promotion of regional development in Filyos as well as national development in Turkey.
6) Increase in employment opportunities incomes.
7) Multiplier effect from the investment in the New Port.

Generally speaking, benefits 1) and 2) are considered suitable for the cost-benefit analysis. But in this study, these benefits will not result because there is no difference between the two cases with regard to 1) and 2).

Therefore 3) is considered as a tangible benefit suitable for the cost-benefit analysis.

14-4-2 Savings in Land Transportation Costs

The volume of cargoes handled at Filyos is shown in chapter 14-4-1. If the new port were not constructed, the same volume would have to be handled at Samsun Port and would have to be transported by land.

The table below shows the distance and the method of transportation of these cargoes.

Table 14-4-2-(1) Distance and Method of Transportation

Cargo Type	Destination	Distance			Method of transportation
		from Filyos	from Samsun	Difference	
Container	Ankara	254 km	417 km	163 km	by trailer(70%) truck (30%)
Gen. Cargo		254	417	163	by truck
Billets	Karabuk	134	411	277	by trailer

The land transportation cost in the " Without" case can be considered as one of the benefits of the project.

The unit cost of land transportation is calculated based on actual operation performance in Turkey.

The unit cost is first estimated in the market prices which can be broken down into component costs such as depreciation, working expenses, fuel costs and so forth.

Then, economic pricing is applied to each of these factors in estimating the economic price of land transportation costs.

The unit cost of land transportation is listed below.

Vehicle	Unit Cost (¢/ton.km)
Trailer	23 ¢
Truck	27.5 ¢

The benefit from savings in land transportation costs can be obtained by multiplying the above unit costs by the volume of each cargo, which, it is assumed, will be transported by land.

The table below shows the results of land transportation costs.

Table 14-4-2-(2) Results of Land Transportation Cost

Cargo Type	Land transportation cost
Container	38,492 thousands $
Gen. Cargo	10,758
Billet	76,452
Total	≒ 125,700

14-4-3 Savings in Sea Transportation Costs

In the "Without" case, all cargoes should be transported by ship to Samsun Port. In this case, the transport costs can be counted as a benefit of this project.

The distance between Filyos and Samsun is around 350km. It takes

about a half of day to go to Samsun by ship. The Table below shows the shipping cost of each type.

Type of vessel	Shipping cost ('000 $)
Container (400 TEU)	1,048
Conventional (12,000 DWT)	288
Conventional (15,000 DWT)	1,681
Total	3,017 ≒ 3,000

14-4-4 Other Benefits

As mentioned in 14-1, there are other important benefits stemming from this project, even though they are not calculated as benefits in the cost-benefit analysis in this chapter.

(1) Effect of Port Construction

1) Increased demand for construction materials.

In the Short-term-development plan, materials with volume as listed below will be needed,for port construction.

Materials	Volume ('000 t)
Rock	2,681.3
Cement	59.4
Steel	9.5

This demand is not small, and stimulates the development of related industries.

It goes without saying that employment opportunities in these industries will increase according to this increase in demand for these materials.

2) Demand increasing in employment opportunities for port construction.

In the short-term development plan, construction of Filyos Port will be implemented from 1991 to 2000. During this period, many labourers will be needed for construction work.

Incidentally, the numbers of skilled and unskilled labourers are

listed below:

Type of labourer	No. of labourers
Skilled labourers	71,000
Unskilled labourers	215,000

Though the benefits of costruction work have already been taken into account to the cost-benefit analysis, the effect of employment should not be overlooked from the viewpoint of counteracting unemployment and underemployment.

14-5 Costs

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

14-5-1 Construction Costs

The construction costs are estimated in Chapter XI at market prices. As mentioned in Chapter XI, in the economic analysis these costs have to be divided into foreign currency portion, skilled labour, unskilled labour, foreign labour and other local currency portions.

Since the foreign currency portion is shown in CIF prices, there is no need of conversion to economic prices. The labour costs should be converted into economic prices by using the respective conversion factors mentioned in 14-3-3.

The rest of local currency portion, import of which are subject to high protective duty, should be converted into economic prices by multiplying by the SCF.

Tables 14-5-1 and 14-5-2 show the construction costs at economic prices

Table 14-5-1 Construction Cost at Economic Prices

Item	Construction Cost Foreign	Portion	Local Portion				Custom	Conversion Overall Factor	Economic prices
			Non traded goods	Skilled labour	Unskilled labour	Foreign labour			
	('000 US$)	1	0.964	0.883	0.494	1	0		
Dredging	20900	0.847	0.12	0.0157	0.0008	0.0165	0	0.9934383	20,763
Breakwater	31400	0.81	0.144	0.043	0.16	0.043	0	0.908825	28,537
Removal works	0	0	0	0	0	0	0	0	0
Quays	90800	0.193	0.12	0.057	0.082	0.012	0.536	0.411519	37,366
Revetment	13900	0.58	0.33	0.0243	0.0463	0.0194	0	0.9618491	13,370
Reclamation	20900	0.847	0.12	0.0157	0.0008	0.0165	0	0.9934383	20,763
Open Storage Yard & Sheds	21500	0.18	0.84	0.004	0.176	0	0	0.887436	19,080
Cargo Handling Equipment	53500	0.95	0	0.01	0.04	0	0	0.97859	52,355
Railway, Roads & Bridges	59000	0.44	0.4839	0.0021	0.024	0	0.05	0.9201899	54,291
Tug Boat & Navigational Aids	3500	0.44	0.4839	0.0021	0.024	0	0.05	0.9201899	3,221
Park & Green Belts	0	0	0	0	0	0	0	0	0
River Improvement	21800	0.39	0.496	0.043	0.071	0	0	0.941187	20,518
Engineering Services	16800	0.95	0	0.008	0	0.042	0	0.999064	16,784
Indirect Cost	53000	0.65	0.3	0.01	0.02	0.02		0.97791	51,829
Grand Total	407000							0	338,876

Table 14-5-2 Implementation Programme at Economic Prices

(Unit: '000US$)

Item	Economic prices	1991	1992	1993	1994	1995	1996	1997	1998
Dredging	20,763				3529.71		6851.79	6851.79	3529.71
Breakwater	28,537				2853.70	12841.65	12841.65		
Removal works	0								
Quays	37,366						12330.78	12704.44	12330.78
Revetment	13,370				6016.50	6016.50	1337.00		
Reclamation	20,763				2595.38	5190.75	5190.75	5190.75	2595.38
Open Storage Yard & Sheds	19,080							9540.00	9540.00
Cargo Handling Equipment	52,355					13088.75	13088.75	13088.75	13088.75
Railway, Roads & Bridges	54,291					10858.20	32574.60	10858.20	
Tug Boat & Navigational Aids	3,221								3221.00
Park & Green Belts	0								
River Improvement	20,518				6770.94	6976.12	6770.94		
Engineering Services	16,784	2098.00	2098.00	2098.00	2098.00	2098.00	2098.00	2098.00	2098.00
Indirect Cost	51,829	377.51	377.51	377.51	4294.13	10328.15	16788.19	10936.12	8349.87
Grand Total	338,877	2475.51	2475.51	2475.51	28158.35	67398.12	109872.45	71268.05	54753.48

14-5-2 Operating/Maintenance Costs

The operating/maintenance costs are also shown in the next Chapter. Since these costs contain various indefinite elements, the conversion factor is estimated as equal to the SCF.

Economic prices of these costs are calculated by multipling the respective overall conversion factors shown in Table 14-5-2.

14-6 Evaluation

14-6-1 Calculation of EIRR

The economic internal rate of return (EIRR) based upon a cost-benefit analysis is used in order to appraise the economic feasibilty of the project.

The EIRR is a discount ratio which makes the costs and benefits of a project during the project life equal. It is calculated by using the following formula:

$$\sum_{i=1}^{n} \frac{Bi-Ci}{(1+\gamma)^{i-1}}=0$$

n : Period of economic calculation

Bi : Benefit in i-th year

Ci : Cost in i-th year

γ : Discount rate

The EIRR of the Short-term Development of the New Port is calculated as 21%.

Calculatd results of the EIRR is shown in Appendix.

14-6-2 Sensitivity Analysis

(1) Identification of Cases

In order to see if the project is still feasible when some factors are varied,several cases are examined as follows.

Case A: The construction costs are increased by 10%.

Case B: The benefits are decreased by 10%.

Case C: The construction costs are increased by 10% and the benefits are decreased by 10%

(2) Results

The results of the sensitivity tests are shown below.

CASE	EIRR
Case A	20.0 %
Case B	19.6 %
Case C	18.1 %

14-6-3 Conclusion

There are various views concerning the appropriate EIRR level used to determine whether a project is feasible or not. The leading view is that the project is feasibleit the EIRR exceeds the opportunity cost of capital.

The opportunity cost of capital in Turkey is not known. However, the opportunity cost of capital in various countries is considered to range from 8% to 15%. It is generally considered that an EIRR of more than 10% is economically feasible for infrastructure or social service projects.

Compared with this, the result of the EIRR calculation 18%, is high enough to convince us that this project is feasible from the viewpoint of the national economy.

Additionally, as mentioned before, although other benefits such as increased demand for construction materials and increased employment opportunities have not been taken into account in the cost-benefit analysis, the effect of these benefits should not be overlooked from the viewpoint of the national economy.

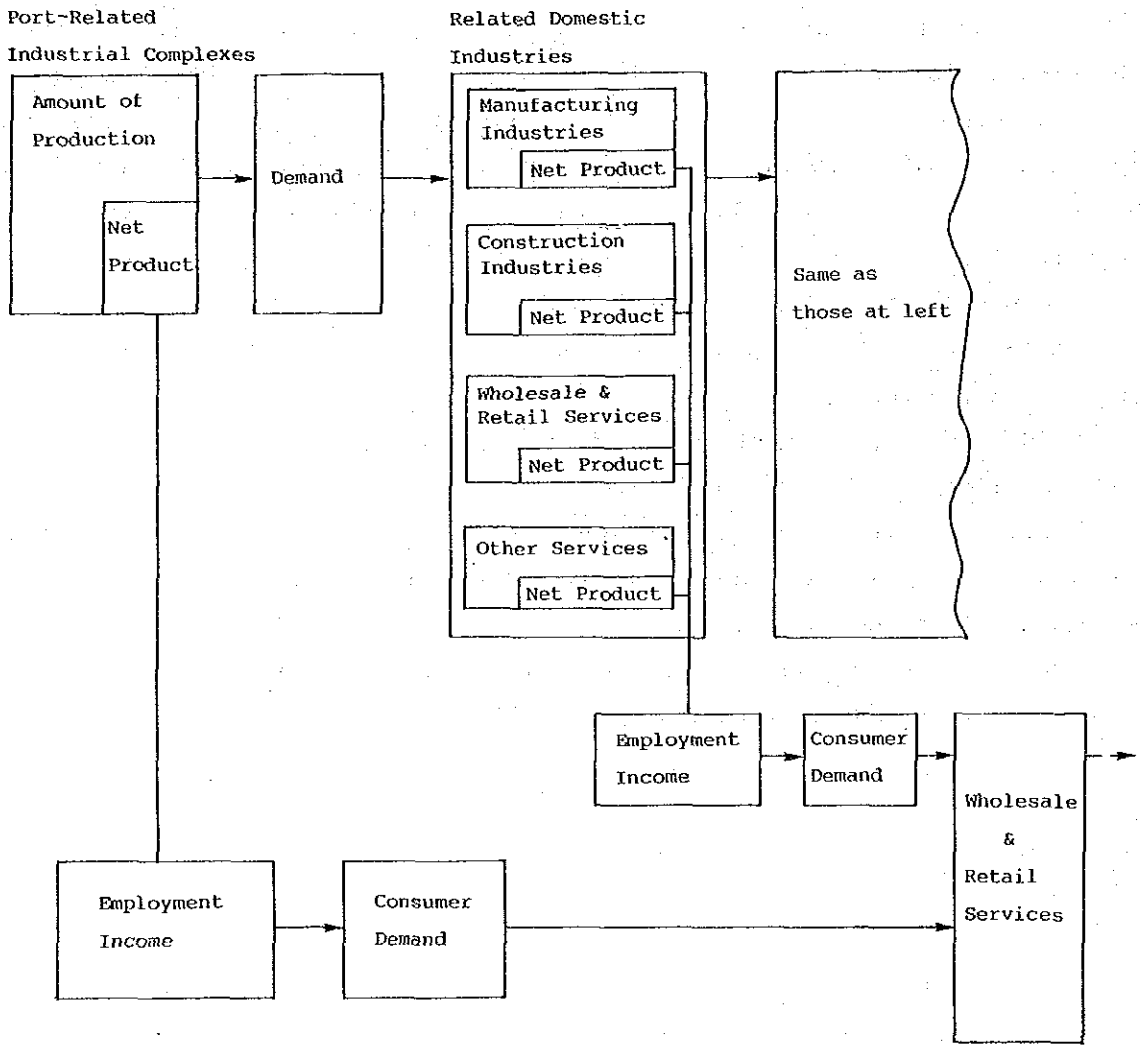
Judging from the above, it can be concluded that the short-term plan with the target year of 2000 is economically feasible.

14-7 Increasing Demand from Related Industries

In this study, some industrial complexes are proposed, as mentioned in Chapter VIII.

Very large demand and multiplier effects are caused by these industrial complexes, and those benefits are listed as table 14-7-1 shown below.

Table 14-7-1 Multiplier Effects of Port Related Industries



The table below shows the economic profile of the proposed industrial development plan.

Table 14-7-2 Economic Profile of Proposed Industrial Development Plan

ECONOMIC PROFILE OF PROPOSED INDUSTRIAL DEVELOPMENT PLAN					
PROJECT	CAPACITY	LAND AREA	AMOUNT OF : PRODUCTION (thousand yen)	INVESTMENT (thousand yen)	NUMBER OF EMPLOYEE (persons)
COMMON INDUSTRIES					
Grain Silo	240,000tons/y	4 ha	16,484,000	2,870,000	160
Sawmill	300,000m^3/m	5 ha	2,400,000	575,000	130
Ship building	16 ships/y	20 ha	15,140,000	4,516,000	520
Food Processing Complex		40 ha	77,268,000	12,986,500	3,080
Wood Processing Complex		40 ha	28,607,000	6,052,500	1,440
ALTERANTE (1)					
Integrated Iron & Steel	2 million tons/y	200 ha	98,800,000	80,000,000	2,000
Processing of Iron & Steel		50 ha	52,492,000	14,495,000	2,110

(1) Increased Employment Opportunities

As mentioned above, around 10,000 persons will be needed for these industrial complexes, so taking account of other related industries, we can conclude that employment opportunities will make a good influence in terms of counteracting unemployment in the region.

(2) Employment Income

In addition to (1), these employment opportunities will result in large employment income, which will stimulate consumer demand in the country. This demand in turn will stimulate wholesale and retail services and encourage the development of them in and around the hinterland.

(3) Added Value

The amount of production of these industrial complexes are shown in Table 14-7-2.

The added value caused by these industries are not related in detail,

but those values will have a large influence on the Gross Domestic Product.

(4) Tax Income

If the project is carried out, many port-related industries will set up, and many people will be employed in those industries as well as others in the region. These industries and their employees tax will provide tax income, which will help in the development of the region and country.

As mentioned from (1) - (4), the proposed industries will play a key role in lifting the economy out of current recession.

CHAPTER XV Financial Analysis

15-1 Purpose of the Financial Analysis

The purpose of the financial analysis is to examine the viability of the project itself and the financial soundness of the port management body during the project life. (The project means the short-term development plan.)

It has not yet been decided which organization will operate the new port. However, it does not matter which organization will operate the new port for the analysis of the viability of the project itself. But some specific organization must be set up to examine the financial soundness of the port management body (PMB). We assume the port management body, which has already been examined in Chapter XIII-2, will gauge the financial soundness of the port. The viability of the project itself is analyzed using the Financial Internal Rate of Return (FIRR) calculated by means of the Discount Cash Flow Method.

The financial soundness of the port management body is appraised using the projected financial statements and some indices calculated based on them.

15-2 Methodology

15-2-1 Viability of the Project Itself

The viability of the project itself is analyzed using the Financial Internal Rate of Return by means of the Discounted Cash Flow Method. Sensitivity analysis is conducted to measure the impact of changing conditions on the financial status of the project.

The FIRR is calculated using the following formula:

$$\sum_{i=1}^{n} \frac{Bi-Ci}{(1+r)^{i-1}} = 0$$

where n : Project life

Bi : Benefit in the i-th year

Ci : Cost in the i-th year

r : Discount rate

15-2-2 Financial Soundness of the Port Management Body

The financial soundness of the port management body is appraised using the following indices calculated based on the projected financial statements.

Financial analysis is used to understand creditworthiness, efficiency and profitability.

The financial analyses discussed here are those derived simply and directly from financial statements.

Innumerable additional ratio may be equally useful for certain types of project analysis.

Financial ratio are here divided into three broad categories.

(1) Profitability Ratio

The long-term success of a port management body depends upon the funds it can generate for reinvestment and growth, along with its ability to provide a satisfactory return on investments.

Return on Net Fixed Assets:

The earning power of a port management body's assets is vital to its success. The principal way of calculating this earning power is to compute the return on net fixed assets.

This return is normally calculated by dividing profit before interest and taxes by the total fixed assets shown on the balance sheet at year-end.

Of all the financial ratios, the return on total assets comes closest to the rate of return concepts used in the economic analysis of projects.

Rate of Return on Net Fixed Assets (%)

$$= \frac{\text{Net operating revenue}}{\text{Net fixed assets}} \times 100$$

(Satisfactory level: over 7%)

(2) Creditworthiness Ratio

The purpose of creditworthiness ratios is to determine the degree of financial risk inherent in an operating equity before and after undertaking a project.

Debt Service Coverage Ratio:

The most comprehensive single ratio dealing with creditworthiness is debt service coverage. This ratio shows the number of times the body's operating revenue (before interest and taxes) cover the annual repayment of principal and interest payments (debt service).

Debt Service Coverage (Times)

$$= \frac{\text{Net operating revenue + Depreciation cost}}{\text{Debt Service (=repayment and interest of long-term debt)}}$$

(Satisfactory level: over 1.75 times)

(3) Efficiency Ratio

Operating Ratio:

The operating ratio is the sum of operating expenses (including administrative expenses) divided by operating revenue. The ratio is also important as an indicator of how well management is also to control operating costs.

The ratio is most useful when comparing the operations of the same port management body from year to year.

Operating Ratio(%)

$$= \frac{\text{Operating expenses}}{\text{Operating revenues}} \times 100$$

(Satisfactory level:below 70-75%)

Working Ratio:

The operating ratio depends upon whether there are huge investment or not. Instead, the working ratio is preferable to compare the efficiency.

Working Ratio(%)

$$= \frac{\text{Operating expenses after depreciation}}{\text{Operating revenues}} \times 100$$

(Satisfactory level:below 50-60%)

15-3 Presuppositions

(1) Project Life

Project life means the period in which initial facility and equipment will deteriorate.

Taking the funds for port facilities and their life expectancy into consideration, the project life will be decided.

In general, the project life of a port project is 30 years.

The project life is determined as 30 years consisting of 8 years of detailed design and construction and 22 years of operation.

(2) Inflation

All costs, expenses and revenues are indicated in prices as of 1990 when the price survey was conducted. Neither inflation nor nominal increases in salaries are considered during the project life.

But it is desirable to consider the influence of inflation.

Instead, cost escalation is examined as one of the case of the sensitivity analysis.

(3) Revenue Projection

The revenue sources for this project are revenue from ships(port dues), revenue from cargo (stevedoring, shorehandling and storage charges) and other miscellaneous charges. These charges are calculated based upon the present tariffs used in Turkish ports.

Actual rates are summarized in Table 15-3-1.

The cargo handling volume is estimated based mostly on the demand forecast. The cargo volume that can be handled in the Filyos Port will reach the limit in 2001.

Projected Cargo Volume

Item	Volume (Ton) or (TEU)	Average (DWT) or (TEU)	Handling Volume (Ton) or (TEU)	Capacity (DWT) or (TEU)	Ratio of IN
General Cargo	240,000	12,000	8,400	900	0.50
Iron/steel(Billet)	1,200,000	15,000	12,000	9,000	1.00
Container(Stuffed)	64,990	-	-	-	0.50
Container(Empty)	32,010	-	-	-	0.50
Container(Total)	97,000	400	400	600	-

Table 15-3-1 Present Port Tariff

(Unit:us$)

Item	Unit		Rate	Remarks
Pilotage	GRT	Foreign	170+70*(GRT-1000)/1000	
		Domestic	70+30*(GRT-1000)/1000	
Towage	GRT	Foreign	280+50*(GRT-3000)/1000	
		Domestic	120+30*(GRT-3000)/1000	
Berthage	GRT/DAY	Foreign	0.01*GRT*DAY	Alongside and mooring by the sturn
		Domestic	0.002*GRT*DAY	
Cargo Handling				
1 Loading				
General Cargo	Ton		3.1*Ton	
Solid in Bulk	Ton		2.1*Ton	
Liquid in Bulk	Ton		-	
Container(stuffed)	Box		34*BOx	
Container(empty)	Box		9*Box	
2 Unloading				
General Cargo	Ton		7*Ton	
Solid in Bulk	Ton		10*Ton	
Liquid in Bulk	Ton		-	
Container(stuffed)	Box		85*Box	
Container(empty)	Box		9*Box	
3 Shifting				
General Cargo	Ton		5.5*Ton	
Solid in Bulk	Ton		4*Ton	
Liquid in Bulk	Ton		-	
Container(stuffed)	Box		50*Box	
Container(empty)	Box		7*Box	
4 Transhipment				
General Cargo	Ton		8*Ton	
Solid in Bulk	Ton		6*Ton	
Liquid in Bulk	Ton		1*Ton	
Container(stuffed)	Box		88*Box	
Container(empty)	Box		10*Box	
Terminal Service				
General Cargo	Ton		2*Ton	
Solid in Bulk	Ton		1.5*Ton	
Container(stuffed)	Box		30*Box	
Container(empty)	Box		2.5*Box	
Storage Service				
(Import Goods)				
General Cargo	Ton		0.55*Ton	
Solid in Bulk	Ton		0.6*Ton	
Container(stuffed)	Box/DAY		3*Box*DAY	3 Days : Free
Container(empty)	Box/DAY		3*Box*DAY	Up to 30days : 3$;From 30days on : 6$
(Other Goods)				
General Cargo	Ton		0.15*Ton	
Solid in Bulk	Ton		0.18*Ton	
Container(stuffed)	Box/DAY		3*Box*DAY	3 Day : Free
Container(empty)	Box/DAY		3*BOx*DAY	Up to 30days: 3$;From 30days on : 6$

(4) Expenditure Projection

The expenditures of the PMB consist of personnel cost maintenance/repair cost, administration cost, cost of the depreciation of fixed assets, interest on long-term loans and interest on short-term loans.

The bases for calculation are mainly derived from the statistical analysis of the financial data in Turkish ports.

1) Investment

The initial investment is estimated in the cost estimation.

2) Re-investment

The facilities and equipment will be renewed based on their service lives. The renewal expenditures are considered as re-investment to be financed by the PMB's internal resources.

3) Maintenance and Repair Expenses

The annual maintenance and repair costs for the facilities and equipment are calculated based on fixed proportions (1%) of the original construction or procurement costs.

4) Administration expenses

The administration expenses are estimated as of the total of the operation.

5) Depreciation

The annual depreciation costs of the proposed project are calculated by the straight-line method based on their service lives. Residual values after depreciation are neglected except for the residual values of the project-related items of the project lite .

(5) Fund Management

Annual deficit will be covered by short-term loans with 10% interest rate per annum.

On the other hand, the amount of cash on hand is assumed to be in banks with 1% interest rate per annum.

15-4 Fund-raising Plan

It has not yet been decided what kind of funds will be raised for this project.

In general, it is considered very difficult in actuality for PMB to adopt a self-sustaining financial system, because the construction of a

port requires a large amount of initial investment, and because the body will be obliged to bear a long-term financial burden for repayment of loans.

It is assumed that funds necessary for this project will consist of three different financial sources, namely government funds, soft loans and domestic funds.

Therefore, it would be necessary for the Government to subsidize the PMB, and it is considered reasonable for the Government to subsidize the cost of public-use port facilities, either totally or partly.

Port facilities can be divided into two groups: public-use facilities and other facilities, according to their service characteristics. Sharing of responsibilities and costs during construction should be set on a case-by-case basis.

But determining who will pay what share of construction costs basically depends on the extent to which they will benefit from the facility.

On the other hand, other facilities, or exclusive-use facilities, should be constructed by the PMB.

However, it is reasonable to consider the possibility that the Turkish Government will be responsible for the construction of some of the public-use facilities along with the PMB, which will be responsible for constructing all the exclusive-use facilities.

Various combinations of financial sources among Government funds and other funds are theoretically considered in carrying out financial analysis. For the time being, Table 15-4-1 shows some plausible examples of combinations, according to facility basis.

We assume that the following Government financial assistance is set up for this project.

(1) Base Case : A 50% Subsidy of Fundamental Facilities
(2) Alternative(1) : A 100% Subsidy of Fundamental Facilities
(3) Alternative(2) : No Subsidy

As for financial sources for this project, the following conditions are assumed.

Table 15-4-1 Rate of Financial Assistance

(Unit: %)

Facilities	Fundamental Facilities	Base Case	Alternative Case(1)	Alternative Case(2)
Dredging	*	50%	100%	0%
Breakwater	*	50%	100%	0%
Multi-Purpose Berth	*	50%	100%	0%
Revetment	*	50%	100%	0%
Reclamation	*	50%	100%	0%
Freight Handling				
Open Storage Yard		0%	0%	0%
Shed		0%	0%	0%
Cargo-Handling Yard				
Quay Crane		0%	0%	0%
Transfer Crane		0%	0%	0%
Gantry Crane		0%	0%	0%
Chasis		0%	0%	0%
Forklift		0%	0%	0%
Prime-mover		0%	0%	0%
Truck		0%	0%	0%
Truck-Trailer		0%	0%	0%
Truck-Crane		0%	0%	0%
Port Traffic	*			
Railway	*	50%	100%	0%
Road(6-lane)	*	50%	100%	0%
Road(4-lane)	*	50%	100%	0%
Bridge(1)	*	50%	100%	0%
Bridge(2)	*	50%	100%	0%
Tug Boat		0%	0%	0%
River Improvement	*	50%	100%	0%

Remark; * shows fundamental facility.

Government Funds

Funds necessary for construction of port facilities are assumed to be covered by the Government funds as investment in the project. These funds are assumed to be free from repayment and interest.

The rest of the necessary funds are assumed to be raised by soft loans from foreign governments and domestic funds from banks in Turkey.

Soft Loans

We assume that the foreign portions of construction costs after subsidy will be raised by soft loans. A soft loan for this project is assumed to be raised as follows:

Loan Period : 30 Years
Grace Period : 10 Years
Interest Rate : 3.5% per annum
Repayment : Fixed Amount Repayment of Principal

Other Portion(Domestic Funds)

The other portion of the funds for this project is assumed to be raised from banks in Turkey as follows:

Loan Period : 15 Years
Interest Rate : 10% per annum
Repayment : Fixed Amount Repayment of Principal

15-5 Appraisal of the Project

15-5-1 Financial Soundness of the PMB

Financial ratios of three cases are summarized in Table 15-5-1.

From these calculation results, we can comment on the financial soundnesses of these cases as follows:

Base Case

In this case, a satisfactory level of financial soundness can be achieved.

Return on net fixed assets can exceed the minimum level, i.e., the average borrowing rate(3.57%). Average borrowing interest rate is shown in Table 15-5-2.

The debt service coverage ratio can maintain a portion above 1.0 times.

Both efficiency ratios can maintain efficiency.

Alternative(1)

This case can achieve satisfactory financial soundness during the project's life. All financial ratio can exceed the satisfactory level. But compared to good financial value, this case will need a large amount of Government funds (subsidy).

Alternative(2)

This case can not achieve satisfactory financial value except for efficiency ratios. This case will remain at an unsatisfactory level through the project's life. This calculation result shows that it is very difficult to achieve financial soundness without any subsidy from the Government.

Therefore, based upon the calculation results, we can adopt the Base Case in conducting more detailed analysis, namely sensitivity analysis.

The Base Case can maintain at least satisfactory financial ratios from the financial point of view.

The sensitivity analysis is conducted in order to examine future

unexpected changes for the financial soundness of the PMB. The following cases are examined:

Case(1) : Impact of a 10% Decrease in Demand
Case(2) : Impact of a 10% Increase in Construction Costs
Case(3) : Impact of a 10% Increase in Expense Costs

Calculation results of each case are shown in Table 15-5-3. Comments on these results are summarized as follows:

Return on net fixed assets

All cases can manage to exceed the borrowing interest rate, which is 3.57% for this case.

Debt service coverage ratio

The debt service coverage ratio, which means the loan repayment ability, needs to be at least above 1.0. During the initial stage of the project life, Case(2) and Case(3) will remain under 1.0 times. But after this stage, the value can manage to maintain above 1.0 times during the remaining period.

Both efficiency ratios, either operating ratio and working ratio, can manage to maintain continuously satisfactory levels.

Table 15-5-1 Projected Financial Ratios

Year	1999	2001	2012	2014	2019	2020	2025
Base Case							
Return on net fixed assets	0.01%	5.02	7.90	6.92	5.69	5.91	7.34
Debt service coverage ratio	0.41	1.09	1.36	1.60	1.82	1.87	2.85
Operating ratio	99.67	54.96	54.96	54.96	54.96	54.96	54.96
Working ratio	25.16	25.16	25.16	25.16	25.16	25.16	25.16
(2013)							
Alternative(1)							
Return on net fixed assets	5.26%	21.17	42.36	42.36	21.73	22.79	30.18
Debt service coverage ratio	1.70	4.12	3.28	3.28	4.10	4.21	6.92
Operating ratio	54.73	33.21	33.21	33.21	33.21	33.21	33.21
Working ratio	18.87	18.87	18.87	18.87	18.87	18.87	18.87
(2004)							
Alternative(1)							
Return on net fixed assets	0.00	1.68	2.59	2.41	2.07	2.15	2.70
Debt service coverage ratio	0.24	0.63	0.82	0.96	1.09	1.13	1.72
Operating ratio	144.01	76.11	76.11	76.11	76.11	76.11	76.11
Working ratio	30.84	30.84	30.84	30.84	30.84	30.84	30.84
(-)							

Remarks : (*)means the year when funds will be returned in actuality using the internal reserve, if possible.

1999 : the year of port opening

2001 : the beginning year of soft loan repayment

2012, 2019 : reinvestment of facilities

2014 : the last year of domestic loan repayment

2020 : the last year of project life

2025 : reference

Table 15-5-2 Average borrowing Interest Rate

Soft Loan	3.50%
Bank Loan	10.00%

Case	G.O.T. Subsidy	Soft Loan	Domestic Bank Loan	Total	Borrowing Rate
Base Case	$148,768	$173,987	$84,337	$407,092	3.57%
	36.54%	42.74%	20.72%	100.00%	
Alternative	$313,286	$79,365	$14,441	$407,092	1.04%
(1)	76.96%	19.50%	3.55%	100.00%	
Alternative	$0	$268,609	$138,483	$407,092	5.71%
(2)	0.00%	65.8%	34.02%	100.00%	

Table 15-5-3 Sensitivity Analysis of the Financial Soundness (Base Case)

Year	1999	2001	2012	2014	2019	2020	2025
Base Case							
Return on net fixed assets	0.01%	5.02	7.90	6.92	5.69	5.91	7.34
Debt service coverage ratio	0.41	1.09	1.36	1.60	1.82	1.87	2.85
Operating ratio	99.67	54.96	54.96	54.96	54.96	54.96	54.96
Working ratio	25.16	25.16	25.16	25.16	25.16	25.16	25.16
(2013)							
10% Decrease in Demand							
Return on net fixed assets	0.00	3.90	6.15	5.39	4.42	4.60	5.71
Debt service coverage ratio	0.38	0.94	1.18	1.39	1.58	1.63	2.50
Operating ratio	110.74	61.07	61.07	61.07	61.07	61.07	61.07
Working ratio	27.95	27.95	27.95	27.95	27.95	27.95	27.95
(2017)							
10% Increase in Construction Costs							
Return on net fixed assets	0.00	3.89	6.13	5.37	4.10	4.59	5.70
Debt service coverage ratio	0.35	0.94	1.18	1.39	1.58	1.63	2.50
Operating ratio	110.72	61.54	61.54	61.54	61.54	61.54	61.54
Working ratio	28.76	28.76	28.76	28.76	28.76	28.76	28.76
(2017)							
10% Increase in Expense Costs							
Return on net fixed assets	0.00	4.74	7.46	6.54	5.37	5.58	6.93
Debt service coverage ratio	0.39	1.05	1.32	1.55	1.76	1.81	2.76
Operating ratio	102.18	57.48	57.48	57.48	57.48	57.48	57.48
Working ratio	27.67	27.67	27.67	27.67	27.67	27.67	27.67
(2013)							

Remarks : (*)means the year when funds will be returned in actuality using the internal reserve, if possible.

1999 : the year of port opening

2001 : the beginning year of soft loan repayment

2012, 2019 : reinvestment of facilities

2014 : the last year of domestic loan repayment

2020 : the last year of project life

2025 : reference

15-5-2 Viability of Project Itself

The costs and benefits that are taken into account for the calculation are summarized as follows:

Costs	Benefits
Initial investment	Operating revenue
Reinvestment for the renewal	Residual value of the fixed assets
Operating expenses	at the end of the project life

In addition to the Base Case, sensitivity analysis is conducted in order to examine the impact of unexpected future changes..

The following three cases are calculated.

Case(1) : Impact of a 10% Decrease in Demand

Case(2) : Impact of a 10% Increase in Construction Costs

Case(3) : Impact of a 10% Increase in Expenses

Table 15-5-4 shows the calculation results of each case.

Taking into account the fund-raising plan, the FIRR should exceed the lower limit. The lower limit means the average borrowing interest rate, which is the weighed average interest rate for all the project funds.

Three borrowing interest rates must be considered. These rates are shown in Table 15-5-2 according to the fund-raising plan.

In cases, except for 5.71% of alternative(2), no subsidy case exceeds these lower limits.

But 5.77% of a base case can exceed these three lower limits.

Table 15-5-4 Sensitivity Analysis

Item	Imternal Rate of Return (%)	Lower Limit
Base Case	5.77%	Average Borrowing Interest Rate(%)
Impact of a 10% Decrease in Demand	4.87%	Base Case : 3.57% Alternative(1): 1.04% Alternative(2): 5.71%
Impact of a 10% Increase in Construction Costs	5.18%	
Impact of a 10% Increase in a Expense Costs	5.54%	

15-6 Analysis for Applying the B.O.T. Model

Here we examine the possibility of applying the B.O.T model to this project from the financial point of view.

A simple B.O.T. model is shown in Fig.15-6-1. Whether this B.O.T. model will be feasible for this project depends on the financial analysis for the consortium. The same model, as previously mentioned, is used to estimate the port's projected financial performance.

We assume that a financial analysis of the consortium is carried out by the same analysis of the port management body's.

In doing the analysis, it is considered reasonable to take the example of alternative (2) case of the financial analysis for the financial soundness, which is almost the same structure as the B.O.T. model without any financial assistance from the Government. This case cannot be regarded as feasible under the same presuppositions, i.e., present tariff rates. We can consider setting new port tariff rates in order to recover the investment. Taking into consideration the competitive situation among ports in Turkey, much higher tariff rates than the present one cannot be applied from the financial point of view, because many cargoes handled by Filyos Port, which will be general cargo and containers, will have to

compete with ports in Turkey.

Therefore, the new port will have to set up a reasonable tariff system, which cannot recover the huge investment by itself. Generally speaking, this project cannot be regarded as feasible under conditions in which the consortium will have to raise the necessary funds for this project by itself without any assistance from the Government.

On the other hand, taking the foundation risks for the new port into consideration, financial assistance from the Government will be indispensable to apply the B.O.T. model to this project.

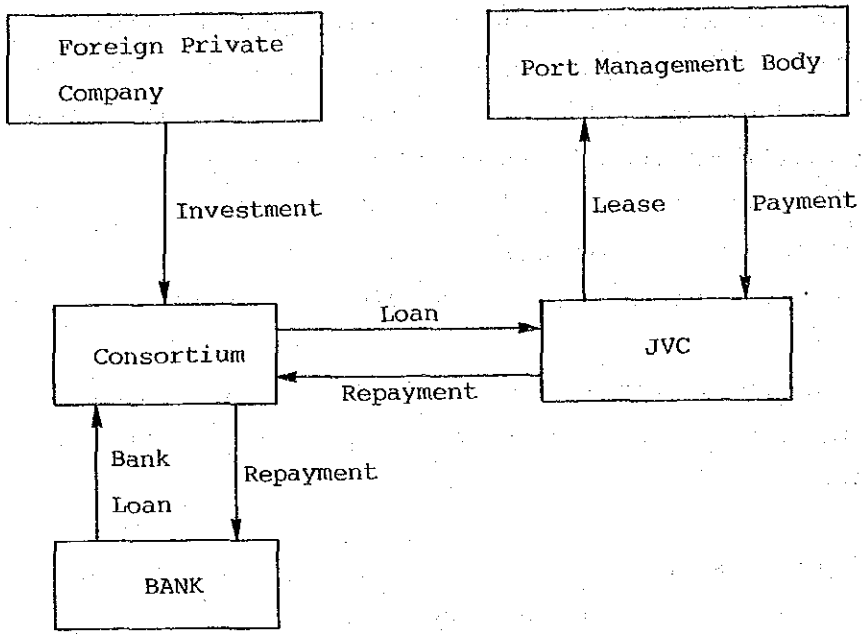
The following points should be taken into account in order to induce foreign companies or an international consortium to take an interest in this project.

(1) It would be reasonable to consider the possibility that the Turkish Government will be responsible for the construction of some of the public-use facilities along with the consortium, which will be responsible for constructing the private-use facilities.

(One example of classification of facilities is shown in Table 15-6-1.)

(2) It would be advisable for the Turkish Government to put the investment environment in a good situation. Moreover, the Government should make it's best efforts to reduce the foundation risks, both financially and legally.

Fig 15-6-1 Simple Outline of B.O.T. System



Remarks:

Consortium: Financial Institution for the Project

JVC: (Joint Venture Company) Local Corporation established by Consortium and local companies like the TCDD, the TDI and so forth. The JVC will construct and operate the project

BANK: Financial Institution composed of Commercial Banks in developed countries.

Foreign Private Company: Foreign Private Companies' Group, which invests in the consortium

Table 15-6-1 Classification of Port Facilities

Type	
Private-use facilities (Exclusive-use)	Mooring facility Pavement Terminal office Transit shed CFS (Water Supply & Sewage Facilities) Cargo-handling equipment
Public-use facilities (Open-use)	Dredging Breakwater Revetment Navigational aids Road Railway River construction Water Supply & Sewage Facilities Related infrastructure

Remark : This classification is tentative.
This is decided according to service characteristics.

15-7 Conclusion

Judging from the above analysis, this project can be regarded as feasible in that more than 50% of the funds necessary for construction of fundamental facilities will be raised as Government funds interest-free and with no repayment required.

As clearly indicated in the financial analysis, it will be very difficult for the PMB to recover the construction costs based upon the present tariff rates. This is mainly due to the fund-raising plan and huge investment in the initial stage.

Taking into consideration the fund-raising plan, a large amount of soft loans at a low interest rate from foreign Governments and

international organizations will be needed as much as possible in order to maintain the financial soundness of the PMB. Otherwise, this project cannot be regarded as feasible.

Table 15-7-1 Projected Financial Statements

come Statement Pilyos

		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
*Revenue	Operating Revenue	0	0	0	0	0	0	0	0	10408	18319	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170	28170
Expense	Personnel	0	0	0	0	0	0	0	0	30	53	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
	Depreciation	0	0	0	0	0	0	0	0	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800
	Maintenance	0	0	0	0	0	0	0	0	1033	1808	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583	2583
	Other	0	0	0	0	0	0	0	0	1570	2748	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926	3926
	*Total	0	0	0	0	0	0	0	0	10433	12408	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383	14383
Operating Profit		0	0	0	0	0	0	0	0	35	5911	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787	11787
Non-operating Profit & Loss(1)	*Retirement Allowance	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
*Gross Income		0	0	0	0	0	0	0	0	35	5910	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786
Non-operating Profit & Loss(2)	Interest Received	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Interest Paid	132	263	390	1445	3393	5803	10101	14537	14101	13547	12937	12259	11598	10920	10208	9442	8580	7651	6780	5843	5211	4657	4305	3935	3928	3554	3178	2795	2411	2783	2399	2016	1630	1252	900
	Principal& Interest on Long-term Loan	186	370	548	2085	4888	7994	14045	19858	18220	18582	18022	17458	16893	16820	17585	16713	20124	21305	19934	18412	16824	14358	12534	12230	11925	11621	11317	11012	10708	10403	10020	9841	9264	8305	6867
	*(Taxable Income)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	165	469	774	1078	1383	1766	2145	2522	3391	5098
	*Income Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	47	77	108	138	177	215	252	339	510
*Net Income (after Tax)		-132	-285	-390	-1445	-3393	-5803	-10101	-14537	-14088	-7637	-1151	-473	187	885	1580	2344	3206	4125	5006	5842	6574	7129	7451	7851	7858	8215	8562	8913	9267	8885	9210	9556	8903	10195	10375
	*(Internal Reserve)	-132	-395	-785	-2230	-5623	-11526	-21627	-36165	-50231	-57868	-59019	-59492	-59304	-58439	-56859	-54515	-51309	-47184	-42178	-36336	-29762	-22633	-15152	-7301	556	8772	17334	26247	35515	44379	53569	63145	73049	83243	93619
	Internal Reserve	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	214	568	165	590	1015	1442	2317	3955

sh Flow Pilyos

		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
(Cash Inflow)																																				
	Cash Beginning	0	-186	-558	-1112	-3188	-7888	-15981	-30166	-50326	-58788	-61678	-58160	-56815	-54488	-52267	-50789	-50424	-51467	-53701	-54587	-53959	-51737	-47027	-40446	-70198	-63239	-55924	-48281	-40247	-107911	-99946	-91557	-82742	-73501	-63384	-51829
	Net Income	0	0	0	0	0	0	0	0	35	5910	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786	11786
	Depreciation	0	0	0	0	0	0	0	0	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800	7800
	Increase in other Current Liabilities	0	0	0	0	0	0	0	0	3950	2963	2963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Subsidy	0	0	0	16286	19247	36208	45270	31758	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Long-term Loan	2404	2404	2404	18889	39287	51575	75500	60056	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	*Interest Receivable	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total Cash Inflow	2404	2217	1845	33883	55346	79895	104815	67648	-38541	-42115	-39130	-38575	-37029	-34903	-32682	-31203	-30839	-31882	-34115	-35091	-34374	-32151	-27441	-20860	-50612	-43654	-36338	-28575	-20682	-88328	-80361	-71971	-63157	-53915	-43796
(Cash Outflow)																																				
	Total Investment	2404	2404	2404	34975	58534	87783	120776	97814	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36703	0	0	0	0	76032	0	0	0	0	0	0	0
	Increase in other Current Assets	0	0	0	0	0	0	0	0	523	393	393	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	47	77	108	138	177	215	252	339	510
	Income Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Loan Repayment	55	109	184	831	1307	2170	4184	5622	5622	5622	5702	5781	5860	6444	7901	9779	12049	14158	13891	13015	12152	10218	8699	8699	8699	8699	8699	8699	8699	8699	8620	8541	8461	7878	8420
	Interest(Long-term Loan)	132	261	385	1434	3361	5824	9942	14236	13598	12959	12320	11677	11032	10376	9883	8934	8075	7148	6243	5398	4572	4140	3835	3531	3226	2922	2617	2313	2008	1704	1400	1100	803	517	267
	*Interest(Short-term Loan)	0	2	6	11	32	79	180	302	503	588	617	582	566	545	523	508	504	515	537	548	540	517	470	404	702	632	559	483	402	1079	998	916	827	735	634
	Total Cash Outflow	2590	2775	2957	37051	63234	95855	134981	117974	20247	19562	19031	18040	17459	17365	18107	19221	20629	21819	20471	18958	17363	14875	13005	49337	12827	12270	11923	11572	87250	11621	11198	10771	10344	9489	7831
Cash Inflow-Outflow																																				
	Fund Surplus	-186	-558	-1112	-3188	-7888	-15981	-30166	-50320	-58788	-61678	-58160	-56815	-54488	-52267	-50789	-50424	-51467	-53701	-54587	-53959	-51737	-47027	-40446	-70198	-63239	-55924	-48281	-40247	-107911	-99946	-91557	-82742	-73501	-63384	-51829
	*(Cash & Deposit)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	*(Short-term Loan)	186	558	1112	3188	7888	15981	30166	50326	58788	61678	58160	56815	54488	52267	50789	50424	51467	53701	54587	53959	51737	47027	40446	70198	63239	55924	48281	40247	107911	99946	91557	82742	73501	63384	51829
	Interest(Paid-Receivable)	132	263	390	1445	3393	5903	10101	14537	14101	13547	12937	12259	11598	10920	10208	9442	8580	7651	6780	5843	5211	4657	4305	3935	3928	3554	3178	2795	2411	2783	2399	2016	1630	1252	900
	Accumulation	132	395	785	2230	5623	11526	21627	36165	50265	63813	76749	89008	100607	111527	121733	131175	139754	147415	154196	160039	165351	170007	174313	178248	182176	185730	188908	191702	194112	196895	199294	201310	202940	204192	205093

lance Sheet Pilyos

		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
(Asset)																																				
Current Asset	Cash & Deposit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	*Other Current Asset	0	0	0	0	0	0	0	0	523	916	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309
	Sub-Total	0	0	0	0	0	0	0	0	523	916	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309	1309
Fixed Asset	Asset(F.A.B)	2404	4807	7211	25800	65127	116782	192268	258324	250524	242725	234925	227125	219326	211526	203726	195927	188127	180327	172526	164728	156928	149129	141329	170232	162432	154633	148833	139033	207285	199486	191686	183886	176087	168287	160487
	Asset(G.O.T)	0	0	0	16286	35533	71740	117011	148769	148769	148769	148789	148789	148789	148789	148769	148769	148769	148769	148769	148769	148769	148769	148789	148789	148769	148769	148769	148769	148769	148769	148769	148769	148769	148769	148789
	*Sub-Total	2404	4807	7211	42185	100719	188502	309279	407093	399293	391494	383694	375894	368095	360295	352495	344696	336896	329096	321297	313497	305697	297898	290098	319001	311202	303402	295602	287803	356035	348235	340435	332636	324836	317036	309237
Total Assets		2404	4807	7211	42185	100719	188502	309279	407093	399817	392410	385003	377203	369403	361604	353804	346004	338205	330405	322605	314806	307006	299206	291407	320310	312510	304710	296911	289111	357343	349543	341744	333944	326144	318345	310545
(Liabilities)																																				
Current Liabilities	Short-term Loan	186	558	1112	3188	7888	15981	30166	50326	54288	61678	58160	56815	54488	52267	50789	50424	51467	53701	54587	53959	51737	47027	40446	70198	63239	55924	48281	40247	107911	99946	91557	82742	73501	63384	51829
	Other Current Liabilities	0	0	0	0	0	0	0	0	3950	6913	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876	9876
	Sub-Total	186	558	1112	3188	7888	15981	30166	50326	58238	68591	68036	66691	64364	62143	60665	60300	61343	63577	64462	63835	61613	56902	50321	80073	73115	65799	58157	50123	117787	109822	101432	92618	83378	73259	61705
Fixed Liabilities	Long-term Loan	2349	4843	6863	24942	62021	112327	183728	244183	238540	232918	227216	221435	215575	209631	201229	191451	179401	165243	151552	138538	126386	116167	107468	98769	90089	81370	72671	63971	55272	46573	37953	29412	20550	13073	6852
(Equity)																																				
	Subsidy(G.O.T)	0	0	0	16286	35533	71740	117011	148769	148769	148769	148789	148789	148789	148789	148769	148769	148789	148789	148769	148769	148769	148769	148789	148769	148769	148769	148769	148769	148769	148769	148769	148769	148769	148769	148789
	Retained Earnings	-132	-395	-785	-2230	-5623	-11526	-21627	-36165	-50231	-57868	-59019	-59492	-59304	-58439	-56859	-54515	-51309	-47184	-42178	-36336	-29762	-22633	-15152	-7301	556	8772	17334	26247	35515	44379	53569	63145	73049	83243	93619
	Sub-Total	-132	-395	-785	14056	29910	60215	95383	112604	98538	90901	89750	89277	89465	90330	91910	94254	97460	101585	106591	112433	119006	126137	133817	141468	148928	157541	165103	175017	184288	193149	202359	211914	221816	232013	242388
Total Liabilities & Equity		2404	4807	7211	42185	100719	188502	309279	407093	399817	392410	385003	377203	369403	361604	353804	348004	338205	330405	322605	314806	307006	299206	291407	320310	312510	304710	298911	289111	357343	349543	341744	333944	326144	318345	310545

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