社会開発調査部報告書

No. [redacted]

FINAL REPORT

FOR THE STUDY ON THE DEVELOPMENT PROJECT OF FILYOS PORT IN THE REPUBLIC OF TURKEY

VOL.1 MAIN REPORT

MARCH 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

FINAL REPORT FOR THE STUDY ON THE DEVELOPMENT PROJECT OF FILYOS PORT IN THE REPUBLIC OF TURKEY VOL.1 MAIN REPORT MARCH 1991

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PREFACE

In response to a request from the Government of the Republic of Turkey, the Japanese Government decided to conduct a study on the Development Project of Filyos Port and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Turkey a survey team, headed by Mr. Jiro Kano, and composed of members from the Overseas Coastal Area Development Institute of Japan and Japan Port Consultants, Ltd., four times between November 1989 and December 1990.

The team held discussions with the officials concerned of the Government of the Republic of Turkey, and conducted field surveys. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Turkey for their close cooperation extended to the team.

March 1991

Kensuke Yanagiya
President
Japan International Cooperation Agency

LETTER OF TRANSMITTAL

March 1991

Mr. Kensuke Yanagiya
President
Japan International Cooperation Agency
Dear Mr. Yanagiya:

It is my great pleasure to submit herewith the Final Report for the Study on the Development Project of Filyos Port in the Republic of Turkey.

The report is the result of studies carried out by the Overseas Coastal Area Development Institute of Japan (OCDI) and Japan Port Consultants, Ltd. (JPC) at the request of the Japan International Cooperation Agency (JICA). The study team conducted five field surveys between November 1989 and December 1990.

Based on the findings of these surveys and on data and information collected and analyzed in Japan, the master plan for the possible new port was formulated with a target year of 2010. Moreover, the short-term development plan for the possible new port was formulated with a target year of 2000, including a feasibility study.

The study shows that the development project is extremely important. We, therefore, earnestly hope that measures will be taken to implement this project as soon as possible.

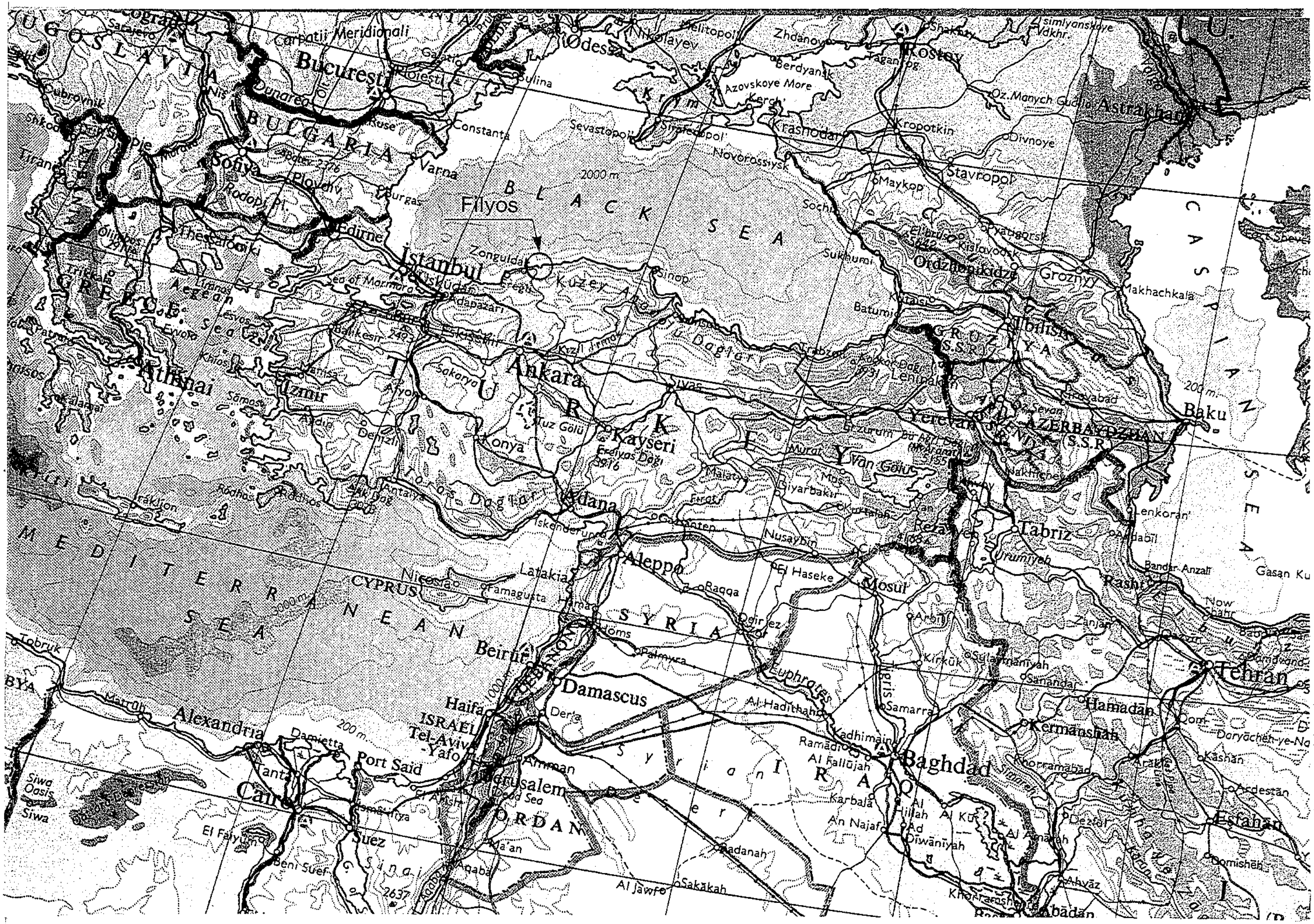
On behalf of the study team, let me express my heartfelt thanks for the generous cooperation, assistance and warm hospitality extended to the study team during their stay in Turkey.

Our thanks are also due to the Japan International Cooperation Agency, the Ministry of Foreign Affairs, the Ministry of Transport and the Japanese Embassy in Turkey for their valuable advice and support during the field survey and preparation of this report.

Yours Faithfully,

J. Kano

Jiro Kano
Head
Japanese Study Team for the Development
Project of Filyos Port
(Adviser, the Overseas Coastal Area
Development Institute of Japan)



BLACK SEA
CASPIAN SEA
MEDITERRANEAN SEA
Aegean Sea
Filyos
Zonguldak
İstanbul
Ankara
İzmir
Kayseri
Konya
Adana
Sinop
Trabzon
Erzurum
Van Gölü
Aleppo
SYRIA
Damascus
Beirut
Haifa
ISRAEL
Tel-Aviv-Yafo
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Sofiya
Edirne
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Athinai
GREECE
CYPRUS
Nicosia
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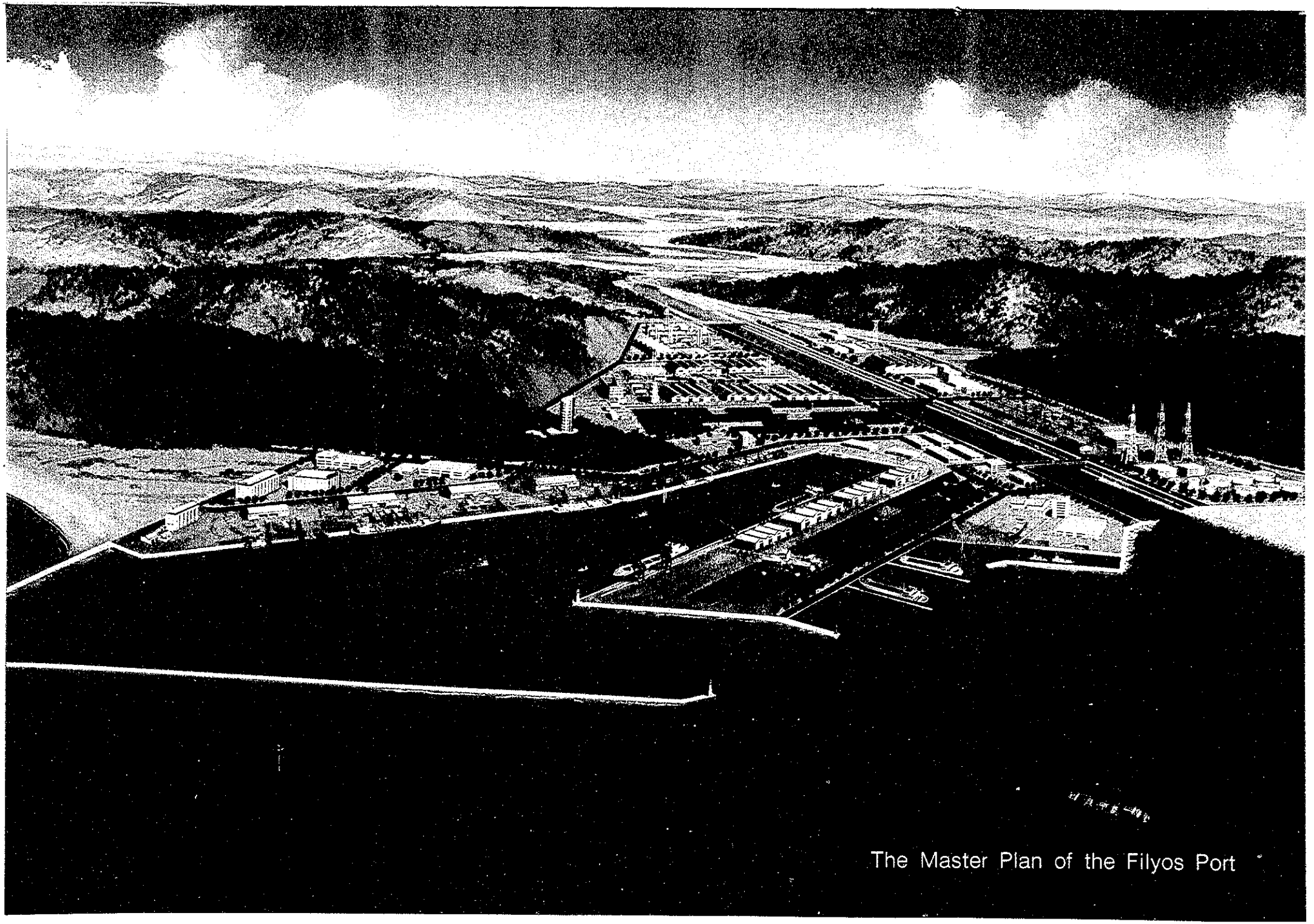
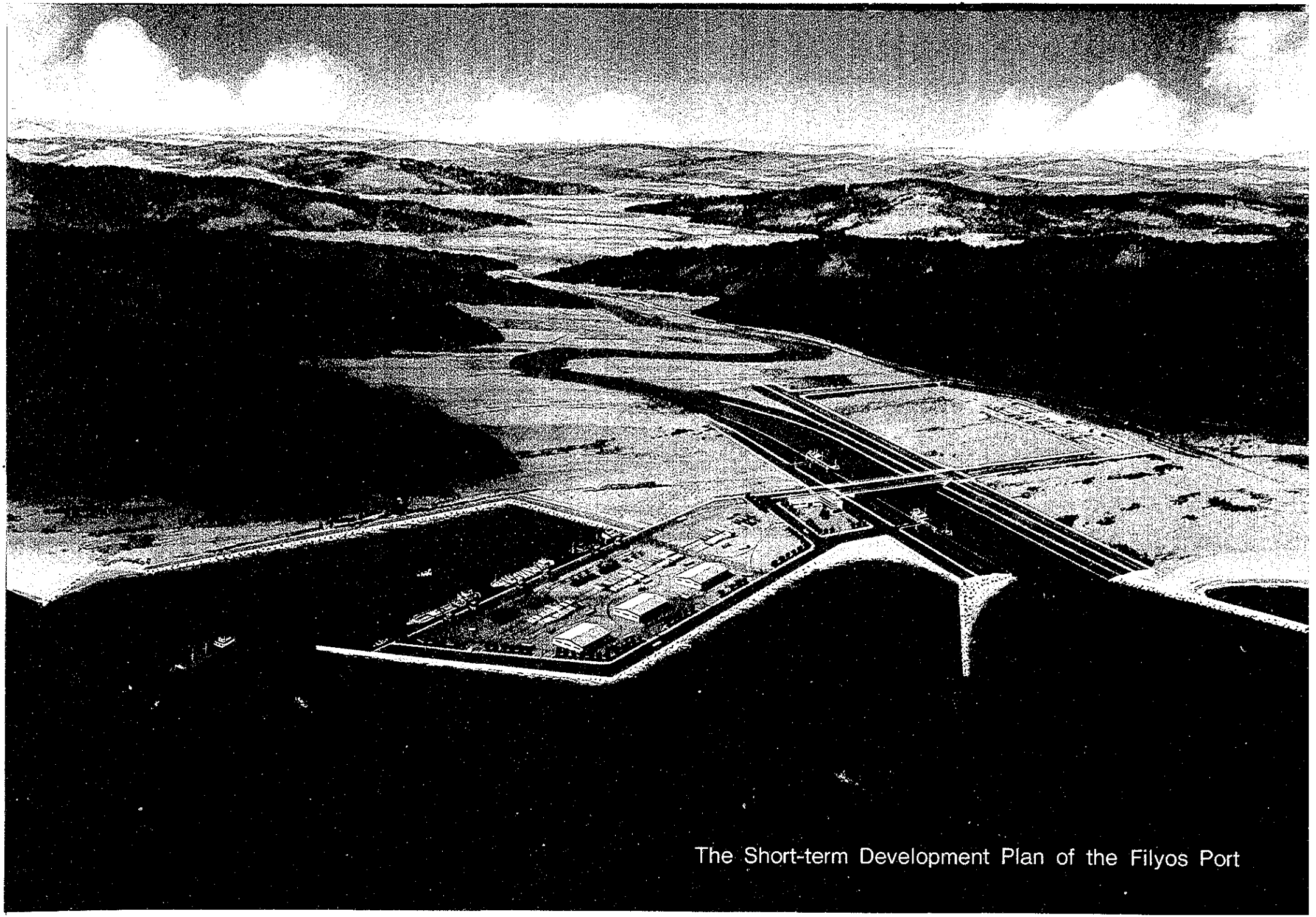
Cairo
Port Said
Suez
Euphrates
Syrian Desert



The Master Plan of the Filyos Port



The Short-term Development Plan of the Filyos Port

ABBREVIATIONS

A	AMA	Ankara Metropolitan Area
	Ave	Average
B	BOT	Build, Operate and Transfer System
	BPSD	Barrel Per Standard Day
C	CFS	Container Freight Station
	CONS	Consumption
D	D	Domestic
	D/W	Dead Weight
	DDB	Do Decyle Benzene
	DLH	The Directorate General for the Construction of Railways, Harbours and Airports
	DSI	The General Directorate of State Hydraulic Works
	DWT	Dead Weight Tonnage
E	E.P.Z	Export Processing Zone
	E05	National and International Highway Route 5
	EAF	Electric Arc Furnace
	EIRR	Economic Internal Rate of Return
	Exp	Export
F	F	Foreign
	F.T.Z	Free Trade Zone
	FCL	Full Container Load
	FIRR	Financial Internal Rate of Return
G	G.C	General Cargo
	G.D.P	Gross Domestic Product
	G.R.D.P	Gross Regional Domestic Product
	GNP	Gross National Product
H	H.W.L	High Water Level
	H1/3	Significant Wave Height

I	I&S	Iron and Steel
	IDT	Public Capital Autonomous Sector
	Imp	Import
J	JVC	Joint Venture Company
	J¥	Japanese Yen
K	KIT	Semi-public Sector
	KSS	Small Industrial Estates
L	L.W.L	Low Water Level
	LCL	Less Container Load
	LOA	Length Over All
	LPG	Liquid Petroleum Gass
O	OSB	Organized Industrial Estates
P	P.A	Per Annum
	P.OCL	Name of shipping company
	PCU	Passenger Car Units
	PMB	Port Management Body
	POL	Petroleum, Oil and Lubricant
	POP	Population
	PVC	Poly Vinyle Chloride
R	R.W.L	Residual Water Level
	Ro/Ro	Roll on Roll off system
S	SBR	Stylene Butadiene Rubber
	SPO(or DPT)	State Planning Organization
	Smax	A Parameter of Mixture in Wave Directional Element
T	T.I.R	Transport International Routier
	TCDD	Turkish State Railways
	TCK(KGM)	General Directorate of Highways
	TDCI	Turkish Iron and Steel Works
	TDI	Turkish Maritime Organization

T	TEU	Twenty Feet Equivalent Unit
	TKK	Turkish Coal Institute
	TL	Turkish Lira
U	UK	United Kingdom
	US$	Currency of United States of America
	USA	United States of America
	USSR	Union of Soviet Socialist Republics
V	V.A.M	Value Added in Manufacturing Industry

US$ 1.0 = J¥ 150 = TL 2,693

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CONCLUSIONS AND RECOMMENDATIONS

The objectives of the study are as follows:

(1) to prepare a port development strategy including a new port development to transport port-cargo efficiently to and from the Ankara Metropolitan Area (hereinafter referred to as the AMA) and its adjacent areas: and

(2) to formulate a master plan and to carry out a feasibility study on a short-term development plan for a possible new port (Filyos Port).

CONCLUSIONS

(1) The Filyos site is the most suitable for port cargo transportation to and from the AMA and its adjacent areas. It will greatly contribute to the rationalization of cargo movement in Turkey.

(2) The master plan is formulated with a target year of 2010.

1) The potential cargo is forecast as 26 million tons in 2010.

2) The number of berths necessary is estimated at 17, including an offshore oil berth.

The length of the berths reaches 3,800 meters and the deepest port basin is -20 meters.

3) The cost of the Master Plan is estimated as US$1,500 million.

(3) The new port project will offer an advantageous location for industries in the vicinity of the port as well as in the hinterland of the port.

The port project will stimulate industrial investment, and this will expedite the development of the regions.

The possible industrial complexes locatable at the port site in early stage are:

1) Food processing complex
2) Wood processing complex
3) Shipbuilding and reparing unit

The possible industrial complexes locatable in the vicinity of the port in later stage are:

1) Iron and steel complex
2) Processing of local resources depending on thermal electric power
3) Petroleum complex

(4) The short-term development plan is formulated with the target year of 2000.

1) The potential cargo is forecast as 7 million tons including coal & ore to be handled at the Hisaronu Jetty by the TDCI.
2) Considering that we are now in the period of the very beginning of the port's exploitation, implementation of smaller number of facilities compared to the potential demand is proposed for the short-term development plan.
3) The essential aim of the project is to supply a Multi-purpose Quay. The dimension of the quay is - 12 x 600 meters, such that it will be able to accommodate two or three 15,000 ~ 30,000 dwt vessels at a time.

   The quay will handle 100,000 TEUs of container cargo, 240,000 tons of general cargo and 1,200,000 tons of steel products.
4) The project cost for the short term development plan is US$407 million.
5) It will take 8 years from the preparation of the project until the opening of the port.

   The first three years will be spent in preparation of the project and the following 5 years will be spent in construction of and preparation for opening the port.
6) The proposed short-term development plan is economically feasible and financially viable.

   The economic internal rate of return for the short-term development plan is 21%, and the financial internal rate of return is 5.7%.

RECOMMENDATIONS

(1) Relief of the congestion at Hyderpasya Port will be necessary even after the commissioning of Filyos Port, because Filyos will handle only 10 ~ 15 % of the cargo handled presently in Hyderpasya.
Expansion of Derince Port and Eregli Port will be useful in terms of dealing with this problem.

(2) There is a possibility that the port may become saturated a short time after it is commissioned because the proposed short-term development plan will not be able to meet the forecast potential cargo demand.
If the amount of port cargo increases rapidly, expansion of the port in accordance with the master plan should be implemented in a timely manner.

(3) It is essential for the smooth implementation of the project that a port management body be formulated and to oversee the project from the managing point of view.

The board members may be delegated from MOT, DLH, MOF Municipal Government, TCDD, and TDI to solve difficulties in implementation of project.

Concerning the fund allocation of the project, the fundamental and common facilities of the port shall be constructed using public money or soft loans whenever possible.

(4) The soil conditions in the project site are not completely favourable for port structure, because there are some places where the soft clay layers are thick.

It will be useful and practical to employ consultants under the scope of soft loans, as well as to invite technical experts through the JICA scheme for introduction of new technology in port construction.

(5) The layout of the Short-term development plan is concluded given that the port will proceed to the next stage of the construction a short time after its completion.

But the problems resulting from wave agitation at the berths, the scoring of the opposite shore of the multi-purpose quay and sedimentation of the port basin should not be overlooked.

It is important to continue with more observations of wave occurrence and more examination of countermeasures against wave agitation scoring of the new shore and sedimentation of the port basin in the engineering phase.

(6) Among the related infrastructures to be improved, the road system, railway system and communications system are the major items urgently needed.

Large-scale water supply system and an electric power supply system will be necessary in the course of industrial development.

The possibilities of supply or exploitation of all of these items are all positive.

The port management body should ask concerned agencies to embark on these projects and oversee their projects.

(7) Land sites should be acquired properly before it becomes difficult to obtain them.

(8) Guidelines for prevention of environmental pollution shall be provided to all the parties participating in the Filyos Port Project.

The agreement between the factories and municipal government on prevention of pollution will contribute greatly to realizing this policy.

SUMMARY

SUMMARY

1. Turkey's Socio-Economic Prospects

(1) Turkey is located in a geographically important position bridging Europe and the Middle East and endowed with a great deal of development potential due to its affluent natural and human resources.

(2) The economic growth rate since the introduction of the Structural Adjustment Programme in 1980 was 5.2% p.a. on average, and the 6th Plan targets 7.0% p.a on average until 1994, with the per capita growth rate being 4.5%.

(3) The Turkish economy will likely grow at a rate of 5-7% p.a. on average in terms of GNP in the foreseeable future, i.e. through 2010, with per capita growth at a rate of 3-5% p.a. In this development process, the industrial sector will play an important role as an engine of growth,and its share of GDP will increase from the current 37% to 45% by the year 2010.

(4) In order to realise this growth, it is necessary to accomplish the following tasks, among others:

1) To stabilise the economy and to achieve the required structural adjustment.

2) To alleviate the disparities in development between provinces and disparities in income/wealth between people

3) To diversify the industrial structure from one that is labor-intensive to capital and intermediate goods industries and to improve efficiency and competitiveness

4) To rationalise the transport system to efficiently cope with the traffic demand to achieve the minimum possible level of transport costs.

(5) Globalisation of the world economy will likely proceed at an accelerating pace in future. With this trend as the background, trade between command and market economies may develop greatly although its magnitude depends on a variety of uncertain factors and is difficult to forecast. The Black Sea Rim Area may grow as one of the major foci of development when these trends materialise.

2. The Roles of Filyos Port in the Future Development of the Turkish Economy.

Filyos Port shall play the following roles in helping to realise the development of the Turkish economy and to accomplish the tasks of the economy as outlined above:

(1) To provide efficient maritime transport links for the provinces of Ankara, Zongludak, Kastamonu, Cankiri and Bolu, with which to cope with the increasing future traffic demand and to improve the international competitiveness of foreign-traded commodities through the minimisation of inland transport costs as illustrated below.

1) The total volume of foreign traded maritime cargoes (excluding transit traffic) is likely to increase at a 6.2% p.a. rate at the national level in future, reaching 120 million tons in 2000 and 200 million tons in 2010 as against the volume of 53 million tons recorded in 1988. Of this, the amount of containerised cargo is expected to accelerate to reach 45% in 2000 and 70% in 2010 as against 23% at present in terms of the rate of containerisation (the share of containerised cargoes out of the total amount of containerisable commodities), and 800 thousand TEUS in 2000 and 2530 thousand TEUS in 2010 at the national level.

It is essential to develop port facilities in Turkey to cope efficiently with the future traffic demand to avoid possible bottlenecks holding up economic development. Port capacities and inland transport access should basically be allocated in such a way as to rationalize the traffic flows of sea-borne cargoes, i.e., minimising transportation costs.

2) The provinces mentioned above are presently served by existing major ports including Hyderpasa, Derince, etc., using International Highway E5.

It is envisaged that if this situation continues in the future the following problems will become acute with the growth in traffic demand and thus detrimental to the development of Turkey:

① Transport of sea-borne cargoes via other ports will cause a huge amount of unnecessary inland transport costs as compared to transporting them via Filyos Port. For example, the distance by road between Filyos Port and Ankara is nearly half of the road

distance between Hyderpasa and Ankara (250 km and 450 km respectively).

② In addition, according to our estimate the ports in the Marmara Sea region would physically saturate due to future increasing traffic demand from the region.

③ External diseconomies such as environmental nuisances and traffic congestions in the Istanbul area would be aggravated to the prohibitive level due to the over-concentration of economic activities and traffic.

④ E5 would saturate due to the increase of truck transportation and the envisaged progress of overall motorisation of transport.

3) The development of Filyos Port would minimise the inland transport costs to/from the provinces mentioned above and be crucial for the rational allocation of nation-wide port capacities.
Furthermore, it would contribute to the alleviation of external diseconomies which would otherwise be exacerbated in future. It would also contribute to more efficient utilization of International Highway E5 by reducing unnecessarily excessive traffic burden caused by truck transportation.

(2) To provide space for industrialisation in the form of a port-industry complex in order to contribute to the development of Turkey's industries in such a way as to make them more diversified, efficient, outward-oriented and internationally competitive as illustrated below:

1) Turkey's industries are envisaged to move into the latter half of the Mature Stage in the coming decades through 2010 according to the path of industrialisation generally observed in industrialised countries. In this stage, industries can be diversified with strengthened linkages and adopt advanced technologies, enabling improved efficiency and competitiveness in the world market.

2) This stage requires the expansion of the production capacity of capital and intermediate goods such as iron/steel, non-ferrous

metals, chemicals and others in order to meet the requirements of various industries. The development of an industrial complex for such basic industries at Filyos seems to be advantageous due to the proximity of port facilities as well as direct access to the overseas market in general and the Black Sea Rim Economies in particular.

Industrialisation based on local resources in the hinterland of Filyos should be also enhanced and Filyos is expected to offer an advantageous location for such industries because of various agglomeration economies.

3) Industrialisation at Filyos is expected to stimulate the economic development of the surrounding provinces through various spreading effects and contribute to the alleviation of regional income/wealth discrepancies.

3. Major Elements of the Master Plan of Filyos Port

The master plan for Filyos Port shall be formulated in such a way as to achieve the expected roles of the Port as argued above taking into consideration various supply-side conditions at the port location such as available space and resources, natural conditions and inland infrastructure.

The following are major elements of the Master Plan which shall be formulated in successive reports:

(1) Hinterland of the Port

The hinterland provinces of the port shall be Ankara, Kastamonu, Cankiri, Zongldak and Bolu, according to the calculation based on the linear programming method to minimize national inland transportation costs. Filyos Port shall mainly function as a gateway port for the traffic demand to/from these provinces.

(2) Allocation of Functions between the Neighboring Ports

As regards the sites for port development to accommodate the future traffic demand as projected in following section, the following 2 (two) places are conceived as the possible alternative sites besides a new port development at Filyos:

(1) Expansion of the existing Samsun Port

(2) Expansion of the existing Eregli Port

The Port of Zongludak is mainly used for loading domestically produced coal and its existing harbour has limited space for expansion. Other ports or locations neighboring Filyos have also space limitations in expansion to meet the future traffic demand.

Filyos is likely the best option for port development among three alternatives (Eregli, Samsun and Filyos) to achieve the expected roles as analysed above. In identifying the best option, pros and cons of all the alternatives are examined and compared from various planning aspects such as 1) proximity to markets, 2) condition of landward access links, 3) conditions of maritime access, 4) availability of required space, 5) other obstacles to development and 6) development effects. The evaluation results are summarised as follows:

Table S-1

Item	Samsun		Eregli		Filyos	
Proximity to Market	420km by road to AMA	X	300km	O	250km	O
Road Access	Available but remote from AMA	X	Best	O	Good	O
Rail Access	Inconvenient	X	Available	O	Good	O
Maritime Access	360 miles from Istanbul	X	Good	O	160 miles	O
Space Availability	Available, but Insufficient for Industry Complex		Insufficient (2 container terminals)	X	Available	O
Obstacles to Development	None	O	Waterfront Land use		None	O
Conveniently Linked Area	Central part of the Black Sea Area, the Middle Anatolian Region		Western part of the Black Sea Coast AMA Eastern part of the Istanbul Area		Western part of the Black Sea Coast AMA	

As shown in the table, the Port of Samsun, like the ports in the Istanbul Area, is located far from the AMA, about 420 kilometers by road which nearly equals the distance between the AMA and the Istanbul ports. Therefore, as major cost saving in inland transport can be expected.

In addition, the length of sea crossing to the port is about 360 miles form Istanbul Ports (200 miles from Filyos) and much disadvantageous as compared to Filyos in terms of maritime access. Poor navigability in rough winter season would also disrupt the regular service that is one of the crucial pre-conditions of maritime container services. Because of these reasons, the Port of Samsun is not in a position to replace Filyos as a port to serve for the hinterland including the AMA. On the other hand, the port has good inland road and railway links to the central part of the Black Sea Coast and the Middle Anatolian Region, therefore it is expected to increase its role as a gateway port to promote the development of these regions.

The Port of Eregli is located near Filyos and it is composed of two different areas; one used by the Erdemir Steel Works, the other reserved for public use operated by the local entity. Because of its geographical proximity and existing infrastructure, the port has a good deal of competitiveness vis-a-vis Filyos.

The available space at the port is, however, too limited to accommodate the future traffic demand envisaged for Filyos. The available space here is limited to about 600m long of the coastline between the Erdemir and the existing fishing harbour from the viewpoint of achieving the harmonious land use with the existing public amenities such as walkways and parks.

Thus, the scale of port development achievable here is not large but only amount to 2 berths in terms of container terminals. As such, the Port of Eregli does not have enough space to accommodate the projected traffic demand for Filyos, much less the space demand for port-industry complex. Although the Port of Eregli is thus not in a position to replace Filyos as a port which is expected to play roles, it has a good deal of development potential as a port to meet the urgent traffic demand which might arise until the new port of Filyos is put into operation. Such "urgent" traffic demand for the Port of Eregli will arise with the suburbanisation of the industries of the

Istanbul Area to the eastward as well as location of new industries along the E5 and a new highway now under construction.

Thus, the Port of Eregli can also be considered as a port complementary to the ports in the Istanbul Area and to support the suburbanisation of industries of the Istanbul Area because of its good accessibility particularly to the westward.

(3) Supply Side Conditions

1) Available Space

The major physical characteristics of the project site of Filyos Port are as follows:

One is that the land area is a typical delta formed by flooding activity and is surrounded by small mountains on two sides.

The river seems still active, since the course of the river surveyed by the team is different from the previous map, made around 20 years ago.

The other characteristic is a steep valley in the sea near the shore.

From these characteristics and assuming that the direction of the strong waves is NW - NE, a preliminary image of the scale of development is outlined as described below:

① Land Area

i) For re-alignment of the river, about 1,500,000 m2 of area is needed. This space will also be utilized for roads, parks, or inner channels, etc.

ii) The remained flat areas total 4,000,000 m2.

The soil layer is thick at the center part of the delta, because it was once the bottom of the valley before forming the delta, and the rock surface has become shallower at the foot of the hills.

In case of the need to construct very heavy structures such as furnaces for a steel foundry, hilly places may well offer the type of hard-rock base needed to support the structure.

② Port Area

i) Since there is a steep valley in the sea at the project site, we need to locate the port facilities on either the easterm or western side of the valley.

But, considering the strong wave direction, assumed to be north, and the availability of appropriate water depth for marine structures, the eastern part of the sea seems best for port construction.

ii) In this case, considering the wave direction, the breakwater will be located on the north side.

By constructing a 2,000-meter breakwater, the Port will have one turning basin (Dia=700m), and 4,000-meter-long deep sea berths.

The coastal area, including reclaimed areas, will offer enough space for port operations. An area of around 1,250,000 m^2 can be obtained.

iii) For further development, the breakwater can be extended toward the north or east, using the unused part of the sea.

iv) To meet the urgent need for deep-sea berths, 150,000 dwt-class bulk berths for instance, pier-type berths along the eastern side of the valley would be suitable and save an construction costs while resulting in a small increase of unworkable days.

v) For small boats, we could utilize the river as a channel or a berthing place.

2) Natural conditions

Weather and marine conditions are generally mild.

The tidal level is small (0.5m) and the tidal current is negligible.

Most days in the year are workable days. Days with stormy weather are 7 - 14 days a year.

Regarding the storm conditions, the maximum wind velocity (according to 10 minute average value) is around 35 meters/second.

The maximum significant wave height is assumed to be around 6 meters (for 50 years return period).

Earthquakes occur in Turkey but they are not as severe as in Japan.

Soil conditions are neither too soft nor too hard in general and the thickness of the soil layer is deep at the center part of the plain and shallow at the foot of the hills.

Thus the Filyos project site is suitable for development from the viewpoint of both working conditions and construction costs.

3) Related Infrastructure

Transportation systems such as railways and roads are available.

The railway between Karabuk and Zonguldak has a single track and is in a good working condition.

The road from Ankara to Gerede is an excellent 4-lane type, while the road from Gerede to Filyos has only two lane at present.

The Bosporus Channel has no crucial restrictions for 150,000 dwt vessels.

The information & communication systems in this region, such as the telephone, water, gas and electricity systems, do not have enough reserve capacity at present. But these can be expanded in a course of development.

(4) Major Facilities to be provided at the Port

The major facilities to be provided at the port through the year 2010 are 1) port facilities to cater to sea-borne trade cargoes to and from the above hinterland such as general cargoes, containerised or not, and material inputs and production outputs of the industries located in the hinterland, 2) industrial estates for the coastal industrial complex to be formed at Filyos, and 3) auxiliary infrastructures such as inland access roadways, utilities, environmental protection facilities and others.

Lists of major facilities to be included in the Plan are as follows:

1) Container Terminals

Maritime containerisation in Turkey is still in its infancy, at a rate of 23%, and is served by feeder vessels from the Mediterranean hub-ports or direct calling vessels of small loading capacity, that is 600 TEUS at the maximum.

However, because of the marked trend toward containerisation prevalent in world sea-borne trade, which pursues the minimization of the total amount of transport costs, both sea-borne and inland, as well as the need to improve the service quality for

shippers/consignees, together with the envisaged growth of containerisable general cargoes of Turkey in future, it is expected that containerisation in and around Turkey will proceed at an accelerating rate in future, reaching rate of around 70% by 2010. As a result, the level of container throughputs to be catered to at Filyos Port in future are estimated at 97 thousand TEUs in 2000 and 270 thousand TEUs in 2010. The type of shippping service is, feeder or calling of mother vessels depends not only on transport economy, i.e. available cargoes, transport cost and others, but also on marketing strategies of shipping companies and other unforseeable factors, thus it is difficult to exactly predict. However, taking into account various factors connected with these issues, it is expected that Filyos will be mainly served by feeder vessels from the Mediterranean hub ports in the foreseeable future through 2010 with a size up to 800 TEUs per vessel, although some direct calling services may be realised and increase over time through 2010 depending on the amount of containers available on the routes. As for the possibility of Filyos as a transhipment (hub) base for Black Sea ports, this depends on a variety of uncertain factors, including the prospects for development of all the economies located on the Black Sea Rim as well as inland transport system connecting West Europe and Siberia, and is therefore unpredictable at the moment. However, the possibility of a transhipment port is likely very small.

2) General Cargo Berths

The volume of general cargoes (break-bulk) is expected to be around 0.8 million tons at Filyos in 2000 and stable onward because of the penetration of containers. Berths to accommodate this volume shall be provided at Filyos until 2000.

3) Dry Bulk Terminal for supporting the expansion of Karabuk Steel Works

The Karabuk Steel Works of the TDCI intends to expand its production capacity to 1.28 million tons by the year 2000 from the present 0.9 million tons. According to the information provided by the TDCI, the volume of cargoes related to this project will

amount to 5520 thousand tons in 2000 and 6320 thousand tons in 2010 and will be composed of iron ore, coal, scrap, steel products, other by-products and cargo related to private mills.
A terminal for handling these cargoes shall be provided at Filyos port and Hisaronu pier by the year 2000.

4) Port-Industry Complex

The industrial analyses on Turkey's trend toward industrialization, the development potential of industries in and around Filyos and others reveal that the following industrial components are possible candidates for the industrial complex to be formed at Filyos:

Food Processing Complex (Grain Silo 60,000 tons)
Wood Processing Complex (300,000 m^3/y)
Iron and Steel Complex (2 million tons capacity)
Petrochemical Complex (refinery: 100,000 BPSD, Ethylene: 200,000 tons/year)
Sodium Hydroxide Industry (100,000 tons/year)
Paper Board Industry (4,000,000m^2/month)
Ship Repairing Industry (16 ships/y)
Glass and Products Industry (500,000 cases/month)
Electric Arc Furnace (380,000 tons/y)
Thermal Power Plant (600,000kw)

However, the industries to be finally integrated at Filyos are selected taking into consideration a variety of related factors including natural conditions, available space, priority, industrial linkages and the views of the Turkish Government.
Based upon the above considerations, the Team recommends the following industries be located at Filyos.

Food Processing Complex (Silo: 60,000 tons)
Wood Processing Complex (Silo: 300,000m^3/y)
Ship Building and Repairing Complex (16 ships/y)
Integrated Iron and Steel Complex (2 million tons/y)

Since a loading/unloading and storage yard for iron ore and hard coal will be constructed in the early stage of port construction, it will be reasonable to develop an integrated

iron and steel plant in a larger scale with at least 2 million tons/year after the year of 2000.

Instead of "Integrated Iron and Steel Complex", the following complex are conceived as the alternatives of the descending priority if and when "Steel Complex" is not released for some reason or other.

Complex(II): Thermal Power, Electric Arc Furnace and Resource Based Industries

The port facility for iron ore and coal can be used for unloading of thermal coal for an electric power plant. The installation of a new power plant will make it possible to develop such resource based industries as electric arc furnace plant, sodium hydroxide plant, glass factory and paperboard plant.

Complex(III): Petroleum Refinery Plant and Petro-Chemical Industries

Turkey will require a deep sea port to increase and diversify the crude oil importation. Filyos port can be used for the development of an petroleum industrial complex consisted of a petroleum refinery, ethylene plant and other petrochemical industries. It will be possible to combine the ethylene plant with the sodium hydroxide plant to produce vinyl chloride monomer as a basic materials for a wide variety of chemical products.

Terminals for handling the commodities related to the located industrial complex shall be provided at Filyos Port in such a way as to minimize drayage costs.

5) Other Berthing Facilities

Coastal shipping tends to be advantageous from the point of view of energy consumption and transportation economy as a whole. This is why the National Transport Master Plan advocated the promotion of coastal shipping in future. Actually, the volume of freight coastal shipping has been steadily growing at a 12% p.a rate since 1984 after a period of decline previous to that. Future prospects for

coastal shipping depend on the development of the inland transport infrastructure, comparative advantages of shipping against road and rail transportation in terms of freight and service quality, the locationing of industrial production as indicated by the fact that over 80% of the coastal shipping volume is composed of bulk cargoes, transport policy incentives to the shipping and other factors.

Nevertheless, it seems that with the growth of foreign trade cargoes through Filyos Port, a couple of berthing facilities will be required in future.

6) Other Auxiliary Facilities

These include breakwaters, water basins, channels, access roads, utilities, river training facilities, environmental protection facilities, etc.

4. Staging of the Development

(1) The development of Filyos Port shall be divided into 2 main phases with the 1st stage set for completion by 2000 and the 2nd stage by 2010.

The contents of each stage shall be determined based on the following considerations:

1) Priority or urgency based on predicted future demand for each facility
2) Strategic importance of each facility
3) Smooth development from the 1st to the 2nd stage (i.e. without incurring duplicate investment or wasteful spending)

(2) The division of facilities to be developed at each stage seems to be as follows, although some necessary corrections would be made at the later stage of the study particularly for the 1st stage development:

Table S-2 Facilities By Stage

1st stage (by 2000)	2nd stage (by 2010)
Container Terminal for 97 thousand TEUs (feeder sevise)	for an additional 173 thousand TEUs (feeder + direct calling)
General Cargo Berth for 0.8 million tons	No addition
Dry Bulk Terminals and Product Berth 5.5 million tons for the Karabuk Steel Works	Terminals for Port-Industry Complex to handle 15 million tons
-	Estate for Industrial Complex
Supporting infrastructure	Supporting infrastructure

However, for the 1st stage development, the dry bulk will be handled at Hisaronu pier, and it is proper to minimise the investment cost as far as possible. From this consideration, one multi-purpose berth for handling containers, general cargoes and steel products shall be provided at Filyos site at this stage instead of full berths as indicated above.

(3) Cargo demand projections and vessel size forecast are summarised as follows.

Table S-3 Cargo Demand

Unit: 1000tons, 1000TEUs

Commodity	S/P (2000)	M/P (2010)	Remarks
Foreign Trade	97	270	x 1,000 TEUs
	3,470	11,280	x 1,000 Tons
Container	97 TEUs	270 TEUs	
Break Bulk	800	800	Export + Import
Iron Ore	700	3,700	Import
Coal	800	3,600	Import
Iron & Steel	1,170	2,570	Import (2000)
Grain	0	240	Export + Import
Logs/Wood Products	0	370	Export + Import
Domestic Trade	2,850 tonnes	4,450 tonnes	
Iron Ore	1,000	1,000	Inbound from Samuson
Iron & Steel	1,850	3,450	Outbound
Grand Total	97	270	x 1,000 TEUs
	6,320	15,730	x 1,000 Tons

Table S-4 Vessel Size

Vessel Type	Maximum Size	Remarks
Iron Ore Carriers	150,000 DWT	60,000 DWT up to 2000
Coal Carriers	100,000 DWT	60,000 DWT up to 2000
Other Bulk Carriers	50,000 DWT	
Conventional G.C.	15,000 DWT	
Container	800 TEUs	Full container (Feeder)
	25,000 DWT	Multi-purpose (Direct Call)
	1,500 TEUs	Full container (Direct Call)
Coaster	15,000 DWT	

5. The Master Plan

(1) Two alternative layouts were examined for the Master Plan of Filyos Port. They are indicated in Figs. S-1 and S-2.

(2) Plan-A is aimed at obtaining deep-water berths utilizing a natural valley in the sea. But the quay will remain semi-exposed to the open sea throughout the Master Plan period.

(3) Plan-B aims at locating most of the quays inside the port.

(4) The main aspects examined were: Safety, Workable ratio, Space, Cost, and ease of stage construction.

(5) The construction costs for the two alternative plans are almost the same.

(6) Two alternative plans were evaluated as equally competitive overall. But Plan-B has slight advantages in terms of maneuvering ships in the port basin and in calmness in the basin.

(7) Considering all the above, the study team recommends Plan-B as the Master Plan for Filyos Port.

(8) The layout plan of the final master plan is indicated in Fig. S-3.

(9) The cost of the master plan is indicated in Table S-5. The estimated project cost is 1,500 million US$.

(10) The implementation schedule for the master plan is indicated in Table S-6.

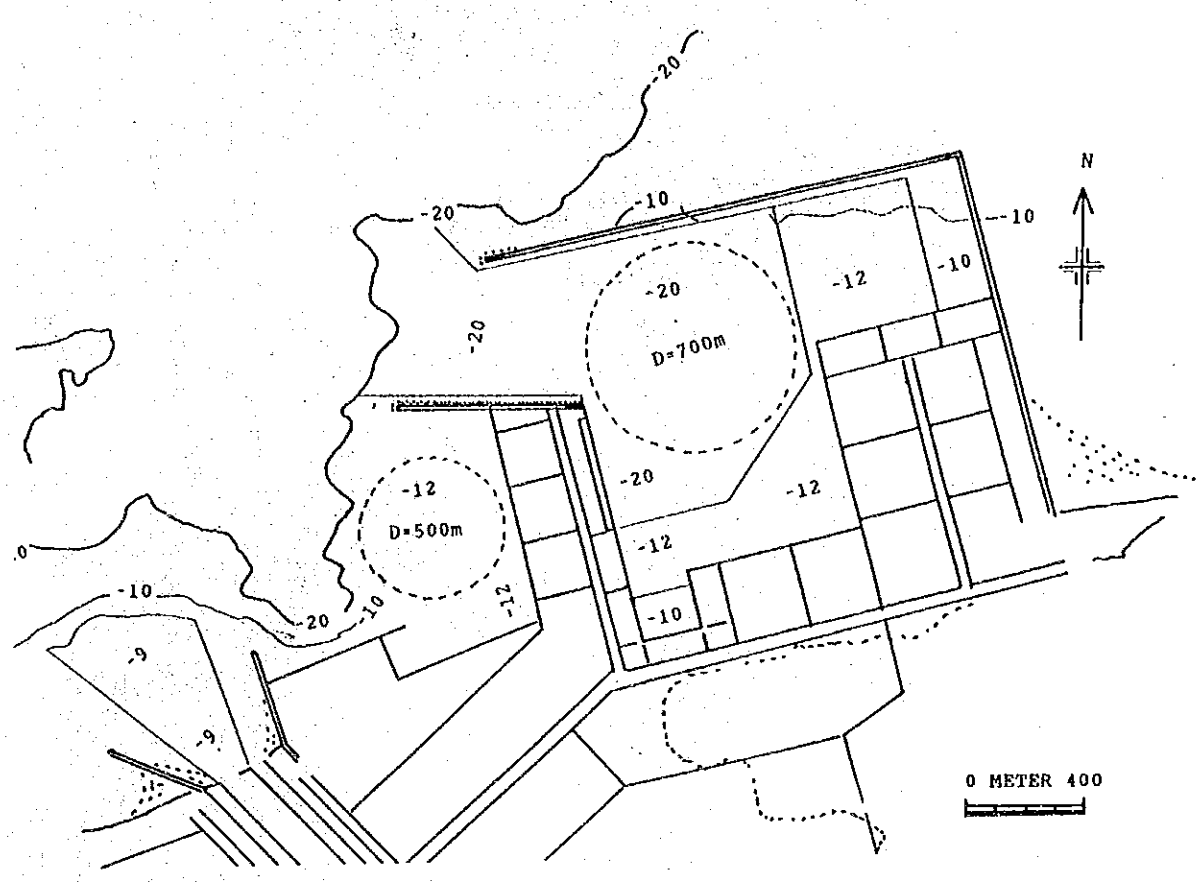


Fig. S-1 Plan A

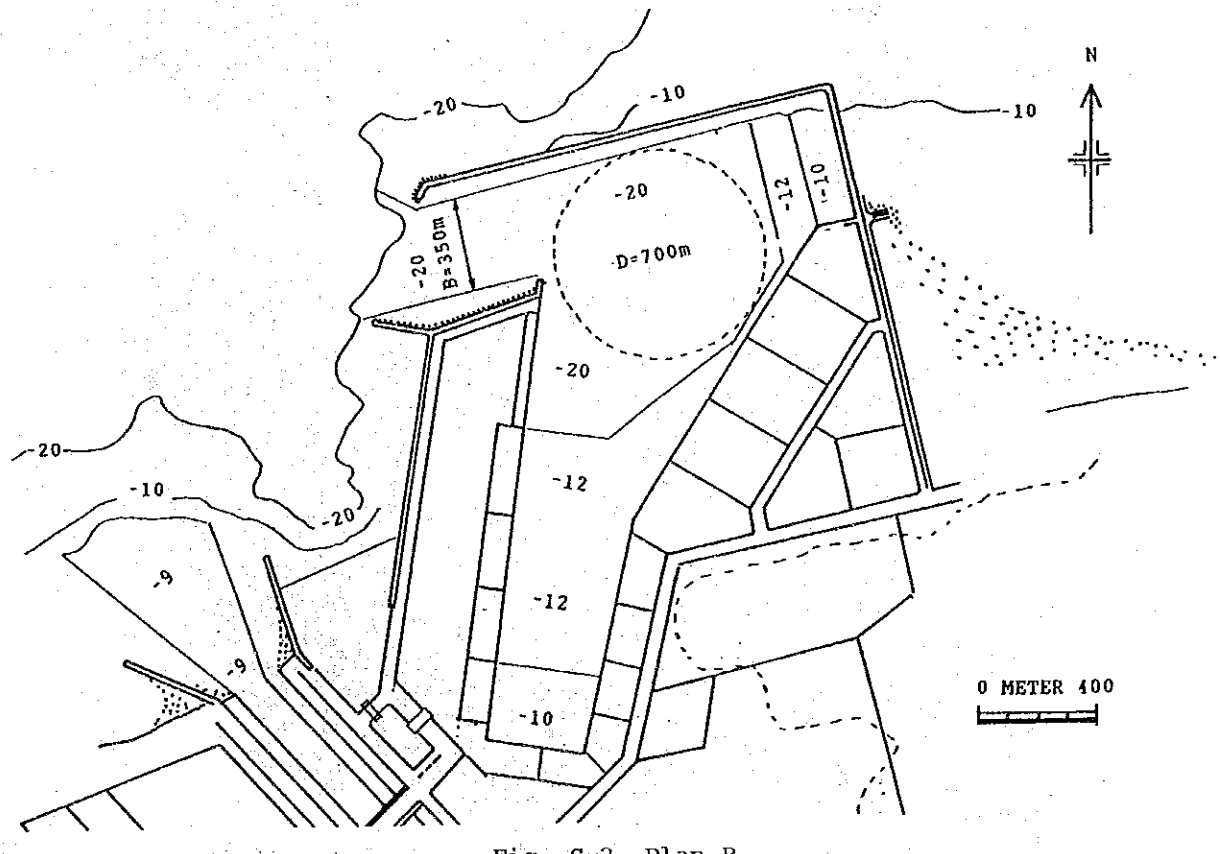


Fig. S-2 Plan B

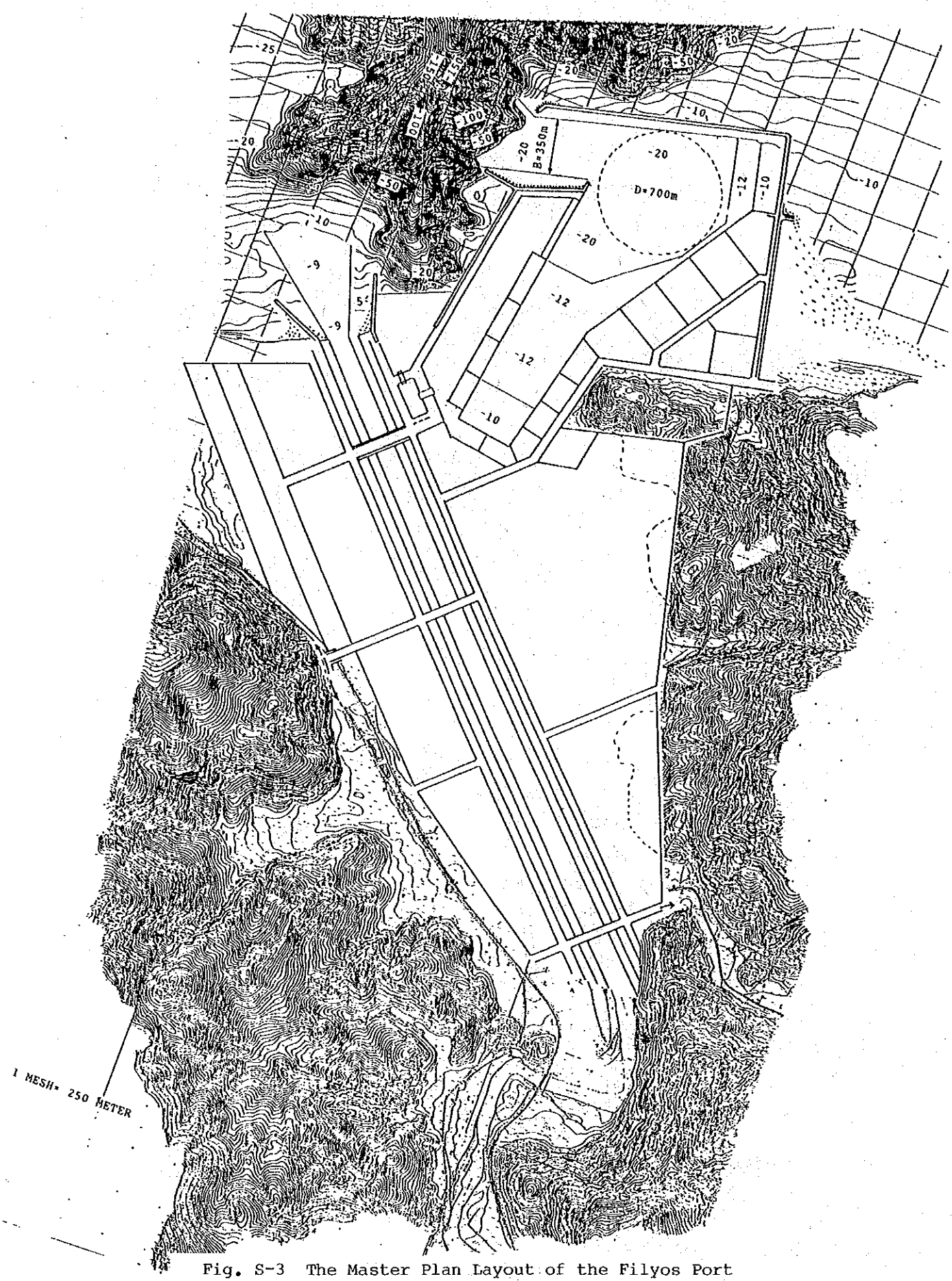


Fig. S-3 The Master Plan Layout of the Filyos Port

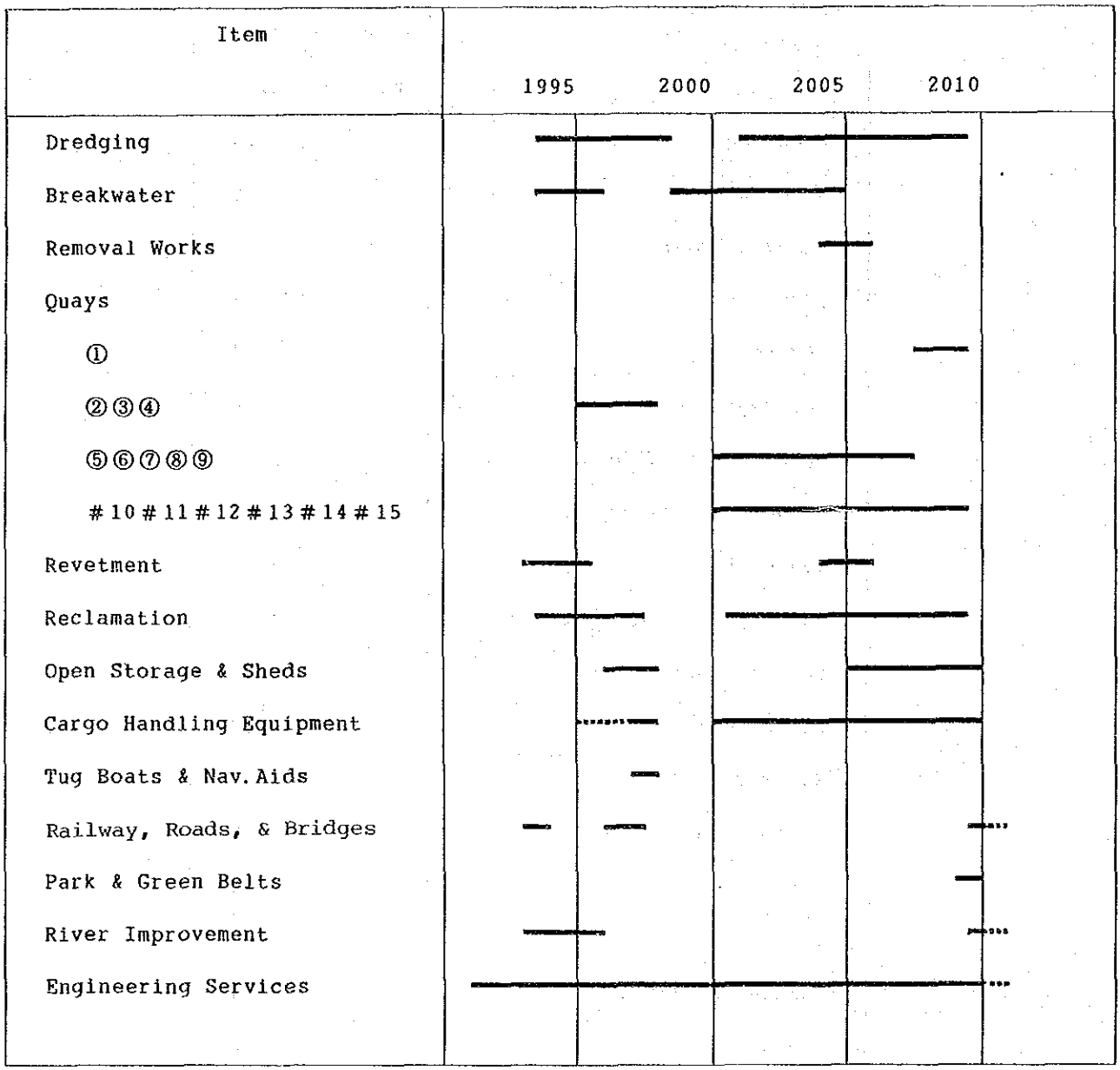
Table S-5 Project Cost for the Master Plan

Item	Master Plan million US$
Dredging	55.70
Breakwater	215.15
Removal Works	3.57
Quays	482.12
Revetment	24.24
Reclamation	55.70
Open Storage & Sheds	99.42
Cargo Handling Equipment	180.33
Tug Boats & Nav.Aids	3.73
Railway, Roads, & Bridges	74.51
Park & Green Belts	2.71
River Improvement	21.80
Sub Total(1)	1,218.98
Engineering Services	60.95
Sub Total(2)	1,279.93
Tax(10%)	127.99
Contingency(5%)	62.08
Grand Total	1,470.00

Based on 1990 price

US$ 1.0 = J¥ 150 = TL 2,693

Table S-6 Implementing Steps for The Master Plan



6 Effects of the Development of Filyos Port

Major socio-economic benefits arising from the development of Filyos Port are envisaged as follows:

(1) Transport Economy

1) To open up direct access to overseas markets from the provinces of Ankara, Kastamonu, Cankiri, Zongludak and Bolu incurring the minimum inland transport costs and amount of time, thereby contributing to the reorganisation and rational allocation of functions of Turkey's ports.

2) To enable other ports, those in the Sea of Marmara in particular, to accommodate future traffic demands to/from their own hinterlands.

3) To reduce unnecessary traffic burdens on International Highway E5, which otherwise might be paralyzed due to the increasing demand for and progress of motorisation as a whole.

4) To enable the exploitation of the benefits of maritime containerisation, thereby improving the service quality and cost conditions for the shippers/consignees in the Filyos hinterland in particular and also other areas, albeit indirectly.

(2) Regional Economy

1) To contribute to the alleviation of regional income/wealth discrepancies through the improvement of transport infrastructure and the development of the port-industry complex.

2) To provide a growth core on the Black Sea Coast and contribute to the revitalisation of the economies there through various spreading effects over space.

(3) National Economy

1) To contribute to the reorganisation of the functional allocation between ports, thereby contributing to the improvement of cost

competitiveness of industries in Turkey.

2) To provide an effective development core to exploit and utilize the underused resources of the Black Sea Area.

3) To prevent the possible emergence of transport bottlenecks impeding future growth of the economy.

7. The Short-term Development Plan

(1) The examined target year for the short term development plan is 2000.

(2) But, since Filyos is a new port, there is some risk that the full potential demand may not develop soon.

(3) For this reason, the Short-term plan is aimed at furnishing a multi-purpose quay which can handle a rather small volume as opposed to the port's full potential demand.

(4) The layout of the Short-term development plan is indicated in Fig. S-4.

(5) The quay will be able to accommodate two or three 15,000 - 30,000 dwt vessels at a time.

(6) The cargo volume to be handled at the quay annually will be : general cargo, 240,000 tons, container cargo 97,000 TEUs, and Steel/Iron, 1,200,000 tons.

(7) The cost of the Short-term development plan is estimated as US$ 407, million. (Table S-7)

(8) The implementation schedule for the Short-term development plan is indicated in Table S-8.

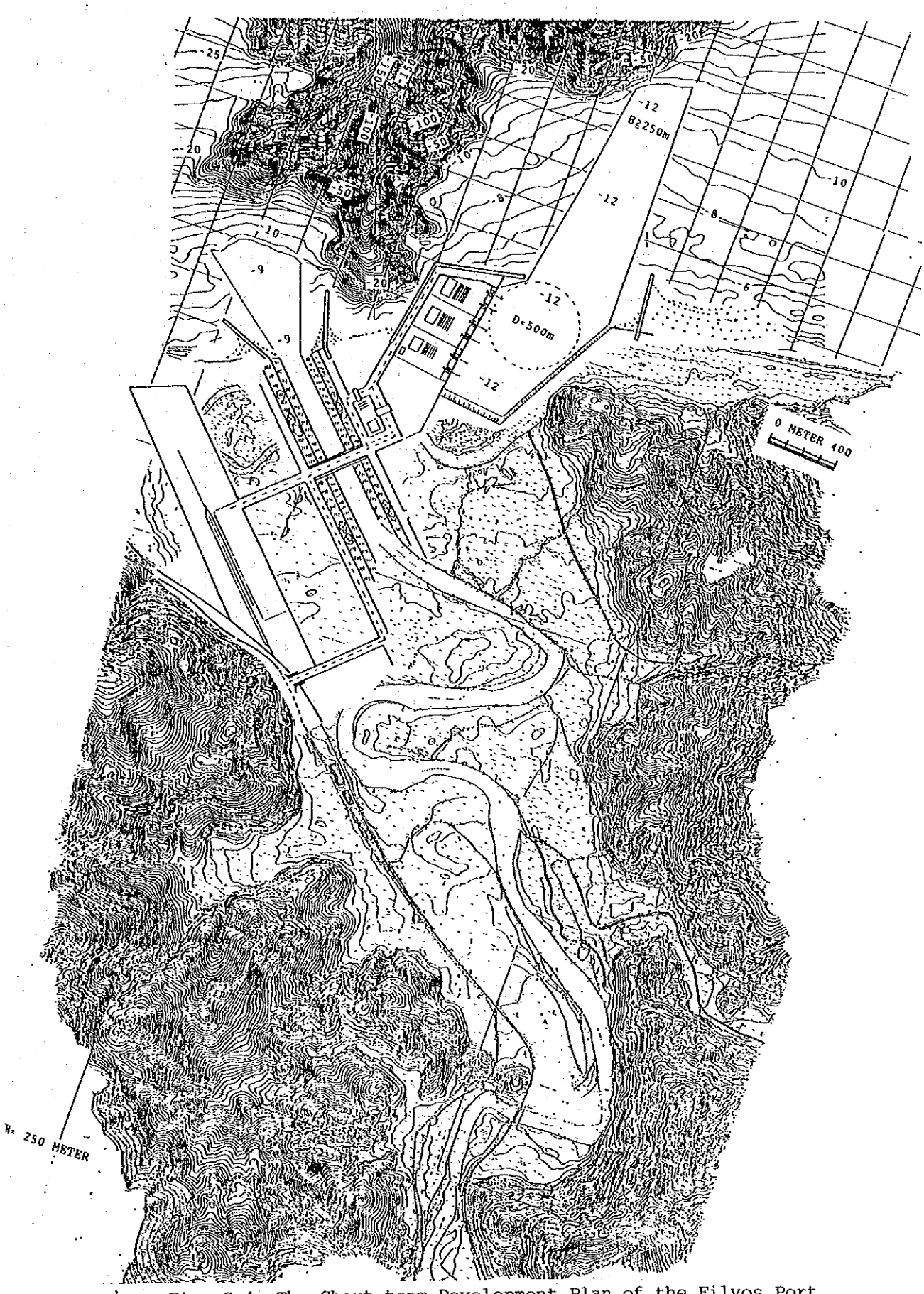


Fig. S-4 The Short-term Development Plan of the Filyos Port

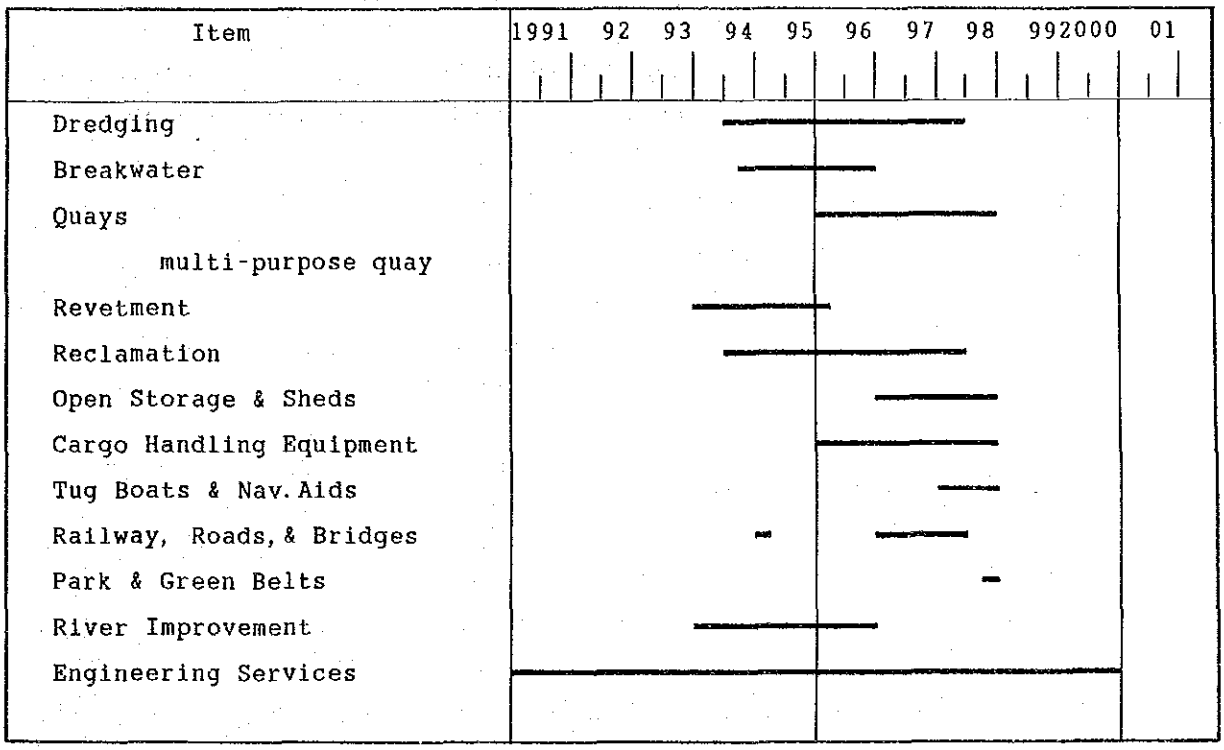
Table S-7 Cost of the Short-term Development Plan

Item	Short-term(2000) million US$
Dredging	20.90
Breakwater	31.40
Removal Works	-
Quays	90.80
Revetment	13.90
Reclamation	20.90
Open Storage & Sheds	21.50
Cargo Handling Equipment	53.30
Tug Boats & Nav.Aids	3.50
Railway, Roads, & Bridges	59.00
Park & Green Belts	-
River Improvement	21.80
Sub Total(1)	337.00
Engineering Services	16.85
Sub Total(2)	353.85
Tax(10%)	35.39
Contingency(5%)	17.76
Grand Total	407.00

Based on 1990 price

US$ 1.0 = J¥ 150 = TL 2,693

Table S-8 Implementation Schedule for the Short-term Development Plan



8. Evaluation of the Short-term Development Plan

(1) Economic Analysis

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

Benefits counted are:

1) Savings in land transportation
2) Savings in sea transportation

The obtained value of EIRR is 21%.

Thus the project can be judged as economically feasible.

(2) Operation and Management

1) Operational aspects

The port management body of a new port may be a separate organization from existing port authorities.

The port management body should carry out intensive port marketing activities.

Without a positive approach, clients who are essential for the port's survival, may not be attracted to the port.

A reputation for prompt, reliable, economical and efficient service is essential for attracting Clients.

2) Financial aspects

i) The financial internal rate of return (FIRR) is used in order to appraise the financial viability.

The obtained value of FIRR is 5.7%.

Thus the project can be evaluated viable in the presence of reliable and efficient services.

ii) The financial soundness of the port management body is appraised using some major financial indices.

The analysis revealed that the port needs continuous efforts to keep the balance.

Moreover, as for the B.O.T. model, it is quite difficult to apply to this project without the financial assistance, from the financial point of view.

CHAPTER I GENERAL INFORMATION

1-1 Geographical Position

Turkey is located between latitude 35°51'N - 42°06'N and longtitude 25°40'E - 44°48'E. The total area is 779,452km².

Geographically, Turkey is a land-bridge between Europe and the Middle East. In the west, Turkey has boundaries with Greece (212km) and Bulgaria (269km). In the east and southeast, Turkey has boundaries with four countries: The Soviet Union (610km), Iran (454km), Iraq (331km) and Syria (870km).

The European part of Turkey is a fertile hilly land. The Asian part of turkey consists of an inner high plateau (1,000m) with mountains ranges along the north and south coasts. The plateau extends from the west to the Aegean Sea Coast, with many river valleys.

The western part is the most fertile section of the country. In eastern Turkey, the northern Pontus Mountains meet with the southern Taurus Mountains and form the 1,800 metre high Anatolian Plateau.

From this plateau rise the particularly high Vulkan mountains, over 3,000m, while further south is the 5,165m high Mount Ararat, the highest mountain in the country.

1-2 Climate

Turkey lies in the Northern Hemisphere, midway between the North Pole and the Equator in the temperate zone.

Turkey is surrounded on three sides by sea. High mountains in the northern and southern parts of Turkey run parallel to the coastline. The mountains in the west, though not so high, are perpendicular to the coast line.

The country is so large that one cannot speak about a general overall climate. In Istanbul and around the Sea of Marmara the climate is moderate (winter 4C and summer 27C); in winter the temperature can drop below zero. In West Anatolia there is a mild Mediterranean climate with average temperatures of 9C in winter and 29C in summer.

On the south coast of Anatolia the same climate can be found. The climate on the Anatolian plateau is a steppe climate (there is a great temperature difference between day and night). Rainfall is low and there is more snow. The average temperature is 23C in summer and -2C in winter.

The climate in the Black Sea area is wet, warm and humid (summer 23C, winter 7C). In East Anatolia there is a long hard winter, where year after year snow lies on the ground from November until the end of April (the average temperature in winter is -13C and in summer 17C).

Table 1-2-1 Climates at Selected Points

Selected Cities	Regions	Altitude Above Sea (Meters)	Av.T. (Cent.)	Lowest (Cent.)	Height T. (Cent.)	Average Humidity (%)	Average Precipitation (Millimeters)
Istanbul	Mar.	39	14.0	-16.1	40.5	75	673.4
Ankara	Cent.A.	902	11.8	-24.9	40.0	60	367.0
Izmir	Aegean	25	17.6	- 8.2	42.7	65	700.2
Adana	Medit.	20	18.7	- 8.4	45.6	66	646.8
Edirne	Thrace	48	13.5	-22.2	41.5	70	599.3
Bursa	Marmara	100	14.4	-25.7	42.6	69	713.1
Antalya	Medit.	42	18.7	- 4.6	44.6	64	1,068.2
Urfa	S.East.A.	547	18.1	-12.4	46.5	48	473.1
Zonguldak	W.Black S	136	13.5	- 8.0	40.5	75	1,242.9
Rize	E.Black S.	4	14.2	- 7.0	37.9	78	2,357.0
Van	East.A.	1,725	8.8	-28.7	37.5	59	384.0
Agri	N.East.A	1,632	6.1	-43.2	38.0	67	528.5
Mugla	Aegean	646	15.0	-12.6	41.2	60	1,220.9

Source: General directorate of Meteorology; S.I.S. Monthly Bulletin of Statistics.

1-3 Socioeconomic Conditions

1-3-1 Administration

The Turkish Republic was established on the 29th of October 1923. At the head of the republic is the State President, who is elected for seven years by secret ballot. The Turkish government is made up of a prime minister, who is appointed by the state president, and his ministers. The country is divided into 67 provinces which are administered by governours appointed by the Ministry of Interior. Municipalities are administered by

mayors and municipal assemblies, all elected by the people. Villages are administered by village elders.

1-3-2 Population

The population of Turkey increased to 50,664 thousand in 1985 from 44,737 thousand is 1980, with an average annual 2.48 percent growth rate during that period, according to national census data. Turkey had a population density of 64 persons/km² in 1985 (58 persons/km² in 1980).

Urbanization has proceeded along with the progress of the industrialization of the Turkish economy. The ratio of urban population was 53.0 percent in 1985 (43.9 percent in 1980). The number of provinces with a population of over one million increased from seven to eleven.

1-3-3 Economy

Today, Turkey is still predominantly an agrarian country with about 58 percent of its working population engaged in and 18 percent of its GDP devided from agriculture.

Wheat, sugar beet, barley and various kinds of fruits and vegetables are primarily cultivated. The land is very rich in mineral resources. Large amounts of hard coal, vast amounts of lignite, iron ore, chrome ore, cooper ore, lead and zinc ore are all available.

Over the years, however, the industrial sector has been increasing its share of the GDP from 25 percent in 1965 to 36 percent in 1986. The most important branches of industry in Turkey are: cotton and wool-spinning mills, weaving mills, cement factories, carpet-knotting mills, coal and tobacco factories, potters' workshops, fertilizer factories, and assembly plants for vehicles, tractors, radio and TV sets.

On the other hand, the service sector has been also increasing its share, registering 46 percent in 1986 and an 8.0 percent average annual growth rate in 1980 - 86. (Table 1-3-1)

Turkey's most important export items are: Textiles, iron and steel, minerals like chrome and manganese ore, etc. Main export countries are: West Germany, Iraq and the U.S.A. Half-finished and finished products like machine parts, spare parts, iron ware and fuel are imported. West Germany, U.S.A., Iraq and Italy are the main import countries.

Table 1-3-1 Economic Indicators

1. GNP per capita (US Dollars)

1980	1,313
1985	974
1988	1,292

2. Average annual growth rate (percent)

GNP	1965-86	2.7	(1985 : 4.9, 1988 : 3.4)
GDP	1965-80	6.3	
	1980-86	4.9	

sectoral growth rate	1965-80	1980-86
Agriculture	3.2	3.1
Industry	7.2	6.4
Services	7.5	8.0

3. Distribution of GDP (percent)

	1965	1980	1985	1988
Agriculture	34	22.6	18.8	17.3
Industry	25	25.0	31.6	32.6
Services	41	52.4	49.6	50.1

4. Labor Force

	1965	1980	1985	1987
Unemployment rate (%)	-	11.6	11.7	9.5
Percent of labor force in				
Agriculture	75	54.8	52.7	50.9
Industry	11	13.8	14.8	15.3
Services	14	31.3	32.5	33.7

5. Balance of foreign trade (US dollars million)

	Total	Imports	Exports	Balance of foreign trade
1980	10,819	7,909	2,910	- 4,999
1985	19,301	11,343	7,958	- 3,386
1988	26,002	14,340	11,662	- 2,678

Source: S.P.O

International trade is vital to the Turkish economy. Turkish entry into foreign markets has enabled its economy to expand. Although there have been annual deficits in the balance of foreign trade, the balance has gradually improved.

In short, judging from the past performance as well as from the present economic outlook, it is clear that Turkey has the potential to greatly expand its economy.

1-4 Transportation in Turkey

In terms of domestic transportation, road plays the most important role. The share of the road system is 72% in terms of tonnage x km. The marine transportation system handles 15% and the railway system 10% of total domestic transportation. The pipeline system, having had a small share so far, will be developed rapidly in the near future. (See Table 1-4-1)

In foreign trade, marine transportation has the biggest share. 90% of import cargo and 70% of export cargo are transported by ships. The share of the highway and railway systems of foreign trade are around 15% and 1%, respectively. (See Table 1-4-2)

1-4-1 Marine Transportation

The foreign trade cargo handled by ships was 52 million tons in 1987. This equals 86% of the 60 million tons of total foreign trade cargo. Turkish flag ships' share of Turkish foreign trade cargo was 44% in 1987. The majority of trade goods are Oil/oil products, Ore/Mineral, Timber/others, etc. The major trading partners are located in the Gulf/Middle East, the Mediterranean Sea, Mespotamina/Red Sea, Continental Europe, and North America. The Black Sea region, where Filyos Port is located, handles 8% of total foreign trade cargo.

The domestic cargo transportation by ship was 46 million tons in 1987. The cargo volume handled has been increasing year by year. Major goods transported on coastal routes by ship are Oil, Ore, Coal, etc.

Table 1-4-1 Share of Transportation Systems in Domestic Transporation

Transportaton system	Distribution			
	Person-km (%)		Ton-km	
	1980	1994*	1980	1994*
Marine Transp.	1.18	0.18	15.87	53.69
Railway	4.12	3.14	10.41	6.28
Air	0.74	1.01		0.06
Highway	93.96	95.67	72.26	35.08
Pipeline			1.46	4.88
Total	100.00	100.00	100.00	100.00

* Planned

Source: SPO

Table 1-4-2 Share of Transport Systems in Total Volume of Export and Import Cargo

Year / Routes	1982 %	1983 %	1984 %	1985 %	1986 %	1987 %
(Import)						
Sea	97.92	96.18	95.72	93.34	94.50	90.71
Railway	0.64	0.77	0.71	0.92	0.56	0.59
Highway	1.42	3.02	3.51	5.69	4.88	8.54
Air	0.02	0.03	0.06	0.05	0.06	0.16
Total	100.00	100.00	100.00	100.00	100.00	100.00
(Export)						
Sea	64.98	65.74	61.65	57.95	72.14	71.17
Railway	0.94	0.80	0.86	2.69	2.21	3.55
Highway	33.95	33.34	37.34	39.16	25.44	25.07
Air	0.13	0.12	0.15	0.20	0.21	0.21
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table 1-4-3 Turkish Foreign Trade Cargo

		1985	1986	1987
Overall Cargo ('000 Ton)	Import	33,485	36,062	46,505
	Export	14,227	13,400	14,256
	Total (Ex+Im)	47,712	49,462	60,761
Maritime Cargo ('000 Ton)	Import	31,255	34,079	42,180
	Export	8,244	9,667	10,146
	Total (Ex+Im)	39,499	43,746	52,326
	By Turkish Flag	17,537	18,198	22,657
	(%)	44.40	41.60	43.30
Maritime Lines (billion:TonxMile)	Import	111,211	129,383	154,064
	Export	16,017	25,093	29,923
	Total (Ex+Im)	127,228	154,476	183,987
	By Turkish Flag	56,489	64,262	79,666
	(%)	44.40	41.60	43.30

Source: SPO

Table 1-4-4 Turkish Foreign Trade Cargo by Region (Unit:Thousand Tons)

Year / Voyage Region	1982		1985		1987	
	Import	Export	Import	Export	Import	Export
Black Sea	762	494	1,613	585	3,882	625
The Danube	82	62	248	69	412	186
North Mediterranean	1,104	1,835	2,479	2,238	3,633	2,832
South Mediterranean	3,908	1,713	3,826	581	3,794	635
Mesopotamia-Red Sea	2,360	1,864	1,802	2,418	1,791	1,244
East Africa	117	1	1,278	15	2,161	31
West Africa	202	255	202	12	137	45
Continenetal	1,414	865	1,815	836	2,898	1,094
Gulf Middle East	8,957	477	11,132	340	13,151	830
South Asia	65	223	199	202	167	466
Australia	1	8	638	8	1,276	13
Far East	168	229	515	242	1,118	972
North America	2,797	181	4,035	538	5,614	1,043
Central America	113	30	78	45	187	39
South America, East	616	11	1,331	8	1,561	31
South America, West	1	1	31	2	391	54
Total of Marine	22,667	8,249	31,222	8,139	42,173	10,140
General Total	23,147	12,704	33,485	14,227	46,504	14,256

Table 1-4-5 Turkish Foreign Trade Cargo by Commodity ('000 Tons)

Year / Groupe of Commodities	1982		1985		1987	
	Import	Export	Import	Export	Import	Export
Crude oil	13,862	1	15,200	1	17,487	1
Processed petrolium	413	1,342	545	1,561	471	1,905
Asphalt	40	12	27	92	292	99
LPG/LNG	431	1	344	1	440	1
Acid	504	1	893	4	1,354	20
Ammonia/Chemicals	702	269	1,095	423	1,633	866
Oil	160	20	276	40	259	65
Ore and Mineral	4,448	4,118	8,584	3,955	13,392	3,799
Grains and like	571	865	1,067	277	605	852
Timber and like	603	274	1,207	603	2,514	981
Mixed Goods	771	470	1,640	473	2,926	648
Vehicles	43	6	98	8	78	14
Container	83	274	127	233	382	305
Ventilated Dry Cargo	2	557	97	536	188	514
Live Animal	1	40	1	16	56	9
Cold Cargo	24	1	47	16	96	34
Total Marin('000 Ton)	22,658	8,251	31,248	8,239	42,173	10,113
General Total	23,147	12,794	33,485	14,227	46,504	14,256
Ton*Mile (mill) Marin	73,225	15,898	111,211	16,817	154,064	29,923

Table 1-4-6 Commodity composition of Exports in '000 Tons

	1974	1976	1978	1980	1982
Agriculture & Livestock	804	1,467	3,111	1,690	2,951
Cereals & pulses	62	357	2,116	736	1,267
Nuts, Fruits, & Vegitable	362	518	512	554	1,050
Industrial Crops	331	554	441	346	449
Livestock Products	37	32	34	45	172
Fishery Products	10	5	7	7	10
Mining & Quarrying	1,977	1,433	1,562	1,638	1,353
Industrial Products	1,765	1,522	1,894	1,568	8,399
Food & Beverages	420	319	344	256	779
Textiles	41	92	96	77	176
Forestry Products	9	5	1	11	31
Hides & Leather	2	2	1	1	2
Chemicals	147	292	67	222	473
Petroleum Products	721	133	1	112	1,470
Cement	292	566	1,240	736	4,124
Glass & Ceramics	28	50	67	60	294
Non-Ferrous Metal	36	9	6	6	19
Iron & Steel	39	40	51	57	899
Metal Products & Mach	7	8	6	9	39
Electrical Appliances	1	1	9	3	21
Motor Vehicles	2	2	1	11	29
Others	18	3	1	4	37
Total Exports('000 Ton)	4,546	4,422	6,567	4,896	12,703

Table 1-4-7 Commodity composition of Imports

	1974	1976	1978	1980	1982
Agriculture & Livestock	1,309	81	50	63	588
Cereals & pulses	1,263	28	37	20	565
Fruits & Vegitables	1	1	1	1	1
Industrial Crops	32	37	5	33	10
Livestock Products	12	15	5	8	12
Mining & Quarrying	11,637	13,164	12,393	14,327	17,018
Fuels	10,627	11,781	11,406	12,567	14,965
Others	1,009	1,382	987	1,759	2,052
Industrial Products	4,498	6,792	7,671	8,955	5,574
Food & Beverages	215	297	77	392	292
Textiles	27	34	30	27	39
Forestry Products	1	1	1	1	4
Hides & Leather	1	1	1	1	1
Chemicals	1,602	2,882	2,900	3,352	2,141
Petroleum Products	486	1,049	2,829	3,731	906
Cement	1	1	1	1	1
Glass & Ceramics	45	52	21	24	24
Non-Ferrous Metal	102	80	23	43	73
Iron & Steel	1,696	1,872	1,478	1,078	1,766
Metal Products & Machine	165	237	141	122	155
Electrical Appliances	41	47	36	38	35
Motor Vehicles	73	166	89	37	55
Others	30	68	41	106	77
Total Imports('000 Ton)	17,444	20,037	20,114	23,345	23,180

Table 1-4-8 Cargo Transportation by Domestic Lines ('000 ton)

Year	Load/ Unload	Petrolium & Products	Ore	Coal	Grain	Mixed Goods & others	Total
1977	Load.	7,314	967	1,832	395	726	11,234
	Unload.	9,352	1,059	1,822	396	1,565	14,194
1978	Load.	6,469	987	1,720	479	2,068	11,723
	Unload.	8,168	1,443	1,639	475	2,242	13,967
1979	Load.	9,819	976	1,898	506	2,403	15,602
	Unload.	8,861	989	1,854	548	3,652	15,904
1980	Load.	9,794	910	1,687	572	1,040	14,003
	Unload.	9,472	1,017	1,803	468	2,766	15,526
1981	Load.	8,234	901	1,629	524	958	12,246
	Unload.	7,181	1,065	1,474	418	2,878	13,016
1982	Load.	13,026	1,395	1,837	283	1,204	17,845
	Unload.	12,359	1,566	2,025	418	3,085	19,453
1983	Load.	11,408	1,089	1,840	533	1,567	16,437
	Unload.	11,419	1,588	1,624	474	3,858	18,963
1984	Load.	11,131	1,350	1,710	494	1,290	15,975
	Unload.	10,342	1,407	1,674	576	4,093	18,092
1985	Load.	13,831	919	1,807	320	2,129	19,006
	Unload.	10,459	1,259	1,735	323	5,082	18,858
1986	Load.	14,810	1,990	1,504	253	1,535	20,092
	Unload.	12,740	1,474	1,615	313	5,023	21,165
1987	Load.	16,485	1,234	1,538	186	1,907	21,350
	Unload.	15,503	1,208	1,527	337	6,817	25,392

1-4-2 Roads

The total length of Turkey's roads is 320,000km. The length of national highways and provincial highways is 59,000km. The ratios of paved roads are 90% for national highways, and 60% for provincial highways. Major roads are used for international transportation between Europe and the Middle East as well as for domestic use.

It is said that 95% of cargo transportation and 76% of passenger transportation in Turkey are by highway.

The responsible agencies for planning, construction, and maintenance of roads are the General Directorate of Highways (TCK, for national and provincial highways), the General Directorate of Road, Water, and Electricity (YSE, for village ways), and th General Directorate of Village Services (KHGM, for forest roads.)

Among the agencies, the TCK plays the most important and vital role in road policy.

Road traffic is generally smooth, except for the Istanbul area.

The present target of roads improvement are ① to reconstruct roads for heavy vehicles, ② to improve the physical set-up. (See Table 1-4-9)

In addition to the above, motorway construction has started employing a charge (Fee) road system.

The motorways under construction are Edirne-Istanbul-Bolu-Ankara, Izmir-Aydin, and Pozanti-Adana-Gaziantep. The total length of the motorways will be 3,000km by the year 2000. The motorway between Filyos-Gerede is included in the long-term concept of an 11,000km-long motorways plan.

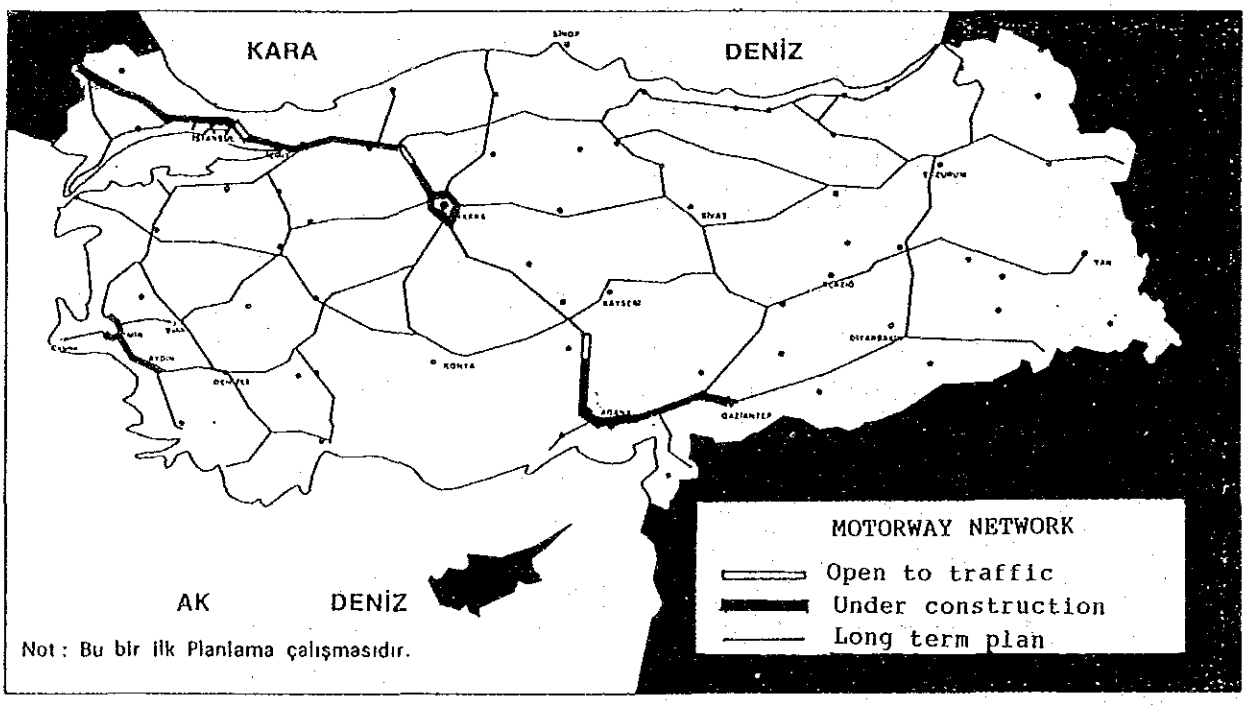
The Filios-Gerede motorway can be constructed earlier than scheduled.

Table 1-4-9 Conditon of Roads 1988

	National Highways Length	%	Provincial Highways Length	%	Total (km)	%
Asphalt	28,293	91	16,886	61	45,179	77
Stabilize	2,239	7	8,528	30	10,767	18
Other	530	2	2,439	9	2,969	5
Motorway					115	
Toplam	31,062		27,853		59,030	

Fig. 1-4-1 Highway Network

Fig. 1-4-2 Motorway Network



Source: TCK

1-4-3 Railway Network

Turkish railway system covers all of Turkey. The systems total length reaches 10,361km. Most of the lines are single-track, and only 266km is double lines. The railway network is divided into 6 regions. The first region includes Istanbul, Eskisrhir, Barikesir, and the second region covers Eregli, Zonguldak (Filyos), Karabuk, Cankiri, Irmak, Ankara, and Bogazkopru. The other regional units operate in the southwestern part, the northeastern part, the central eastern part, and the south eastern part of the country.

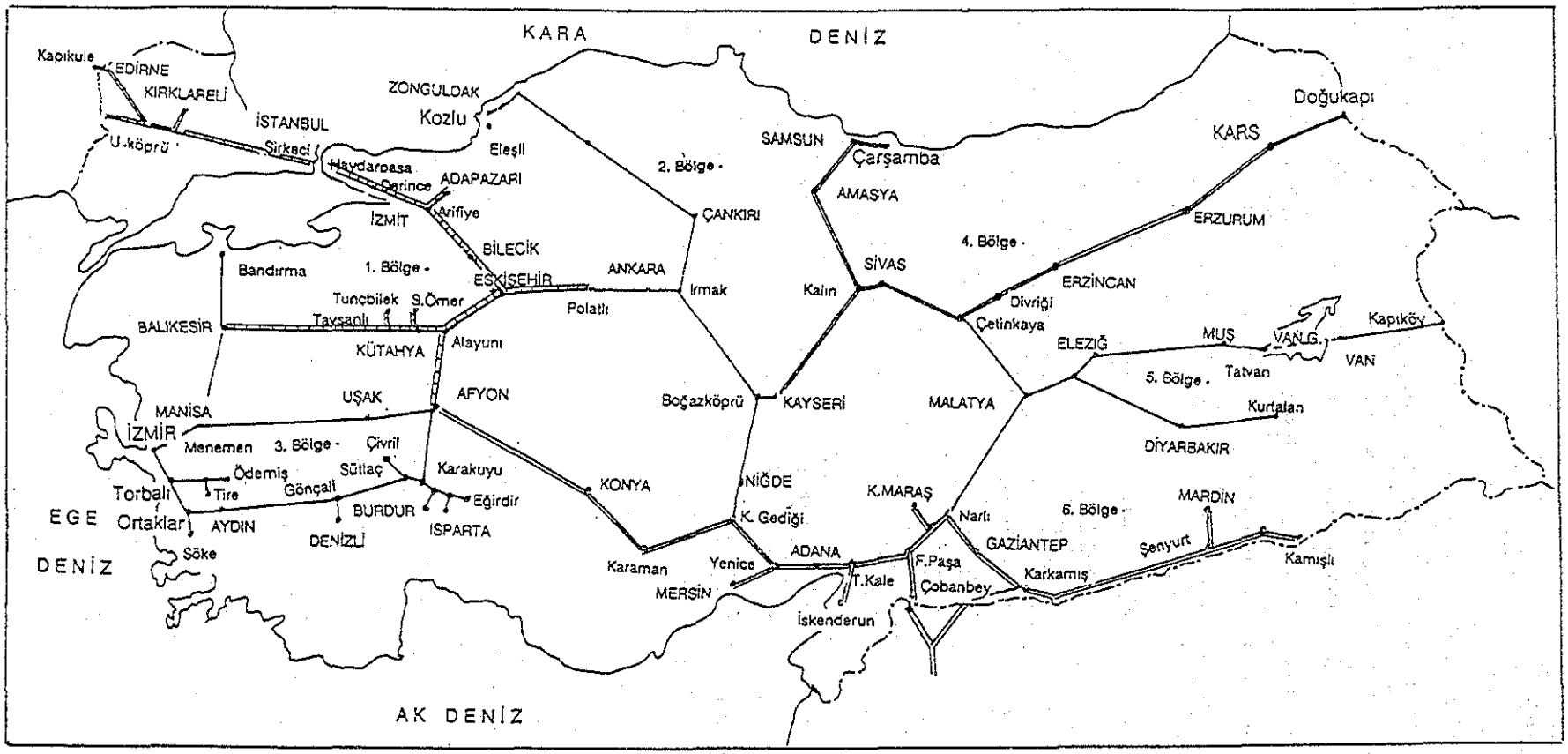
The map which indicates the railway network is shown in Fig. 1-4-3. The activity by railroad in total transportation became small. The share of railways in passenger transport was 5.1% and freight transport was 10% in 1988. The railway service could not maintain a positive image and TCDD has suffered from deficit in recent years.

In order to recover the reliability in railway system, TCDD is trying to improve productivity, technical innovation, and the quality of performance.

The main investment for short-term development are in upgrading of tracks and electrification.

For the period 1990-1994, 2,424km of track renewal, 465km reinforcement of existing tracks and 2,393km electrification are planned.

Fig. 1-4-3 Railway Network



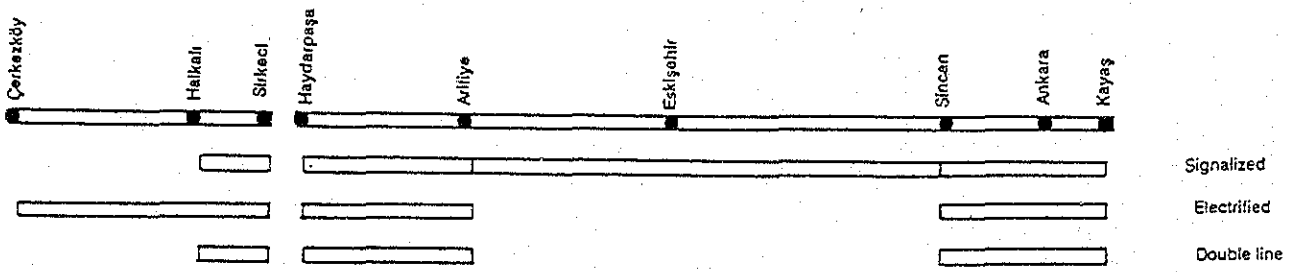


Table 1-4-10 Distribution of Track Lengths by Region

Regions	Mainline		Doubling Lines		Total Mainline		Secondary Tracks		Total Tracks	
	Non Elect.	Electrified	Non Elect.	Electrified	Non Elect.	Electrifiec	Non Elect.	Electrified	Non Elect.	Electrified
1	1,072	255	-	152	1,072	406	404	60	1,476	466
2	1,038	36	12	36	1,050	73	285	28	1,335	101
3	1,466	-	25	-	1,491	-	311	-	1,803	-
4	1,475	-	6	-	1,481	-	317	-	1,798	-
5	1,225	-	-	-	1,225	-	215	-	1,440	-
6	1,579	-	35	-	1,632	-	311	-	1,942	-
Total	7,873	291	78	188	7,951	479	1,843	88	9,794	567
Grand Total	8,164		266		8,430		1,931		10,361	