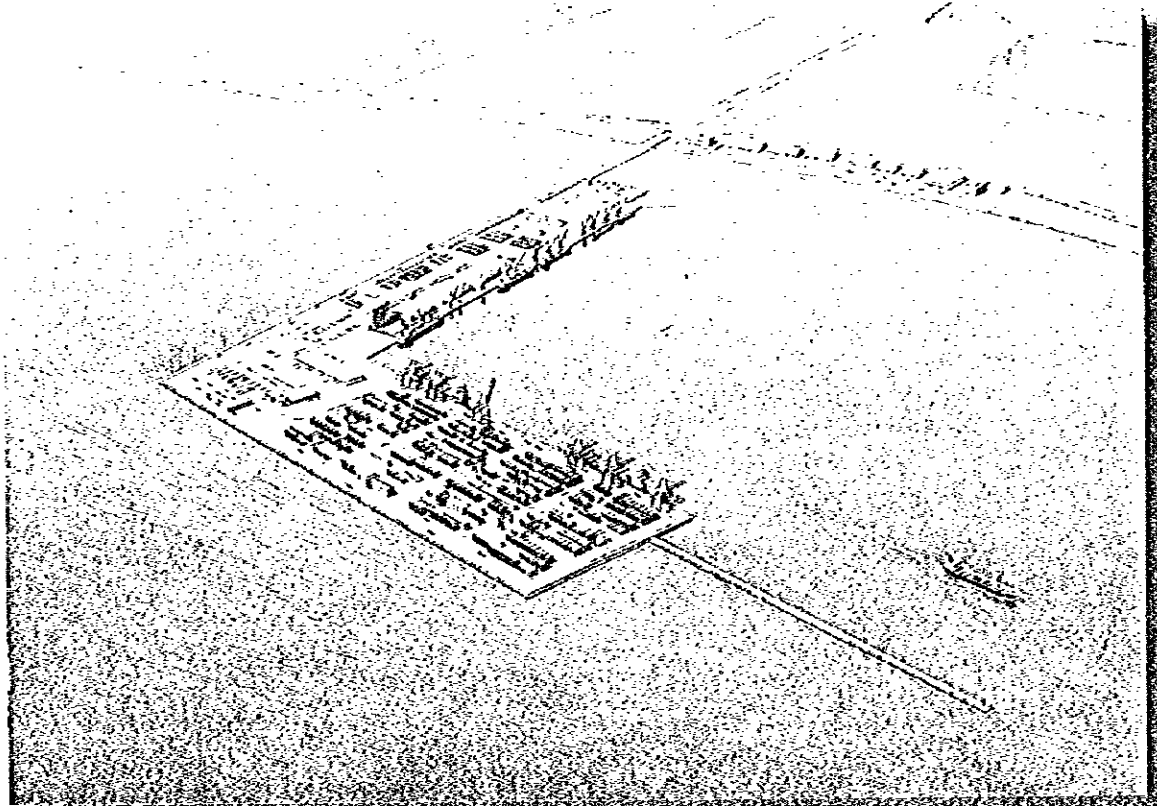


THE MASTER PLAN STUDY FOR THE PORTS DEVELOPMENT AT THE SEA OF MARMARA IN THE REPUBLIC OF TURKEY



FINAL REPORT SUMMARY

SEPTEMBER 1997

THE OVERSEAS COASTAL AREA DEVELOPMENT INSTITUTE OF JAPAN

NIPPON KOEI, CO., LTD.

JICA LIBRARY



J 1141139(4)

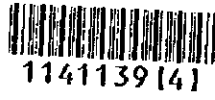
SSF
CR(3)
97-122(1/4)

LIBRARY

Exchange Rate

1 US\$ = T.L. 78,400 = 105 ¥

(as of June, 1996)



1141139 [4]

**THE MASTER PLAN STUDY
FOR
THE PORTS DEVELOPMENT
AT
THE SEA OF MARMARA
IN
THE REPUBLIC OF TURKEY**

**FINAL REPORT
SUMMARY**

SEPTEMBER 1997

PREFACE

In response to a request from the Government of Republic of Turkey, the Government of Japan decided to conduct "The Master Plan Study for The Ports Development at Sea of Marmara in The Republic of Turkey" in the Republic of Indonesia and entrusted the study to the Japan International Cooperation Agency (JICA).

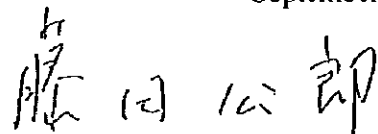
JICA sent to the Turkey a study team headed by Mr. Yoshinori Aoki , Senior Adviser of The Overseas Coastal Area Development Institute of Japan , four times between March 1996 and July 1997.

The team held discussions with the officials concerned of the Government of Turkey, and conducted field surveys at the study area. After the team returned to Japan, through 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.

September 1997



Kimio Fujita
President

Japan International Cooperation Agency

LETTER OF TRANSMITTAL

September 1997

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Sir,

I have the honour to submit the Final Report of the Master Plan Study for the Port Development at the Sea of Marmara in the Republic of Turkey.

The study was commenced in March 1996 by a study team consisting of the Overseas Coastal Area Development Institute of Japan (OCDI) and Nippon Koei, Co. Ltd. and concluded in September 1997 as per the contract with the Japan International Cooperation Agency (JICA).

In line with the scope of work agreed in October 1995 between both governments, the study aims at formulating a master plan for port development on the Sea of Marmara for the coming 20 years culminating in 2015 and formulating a master plan for a new port development in Thrace region for the coming 20 years culminating in 2015 and a short-term development plan for the period of 10 years culminating in 2005.

The study team carried out on-site studies, field surveys on natural and environmental conditions, interviews and discussions with various port-related agencies, and prepared hereby the Final Report of the Study.

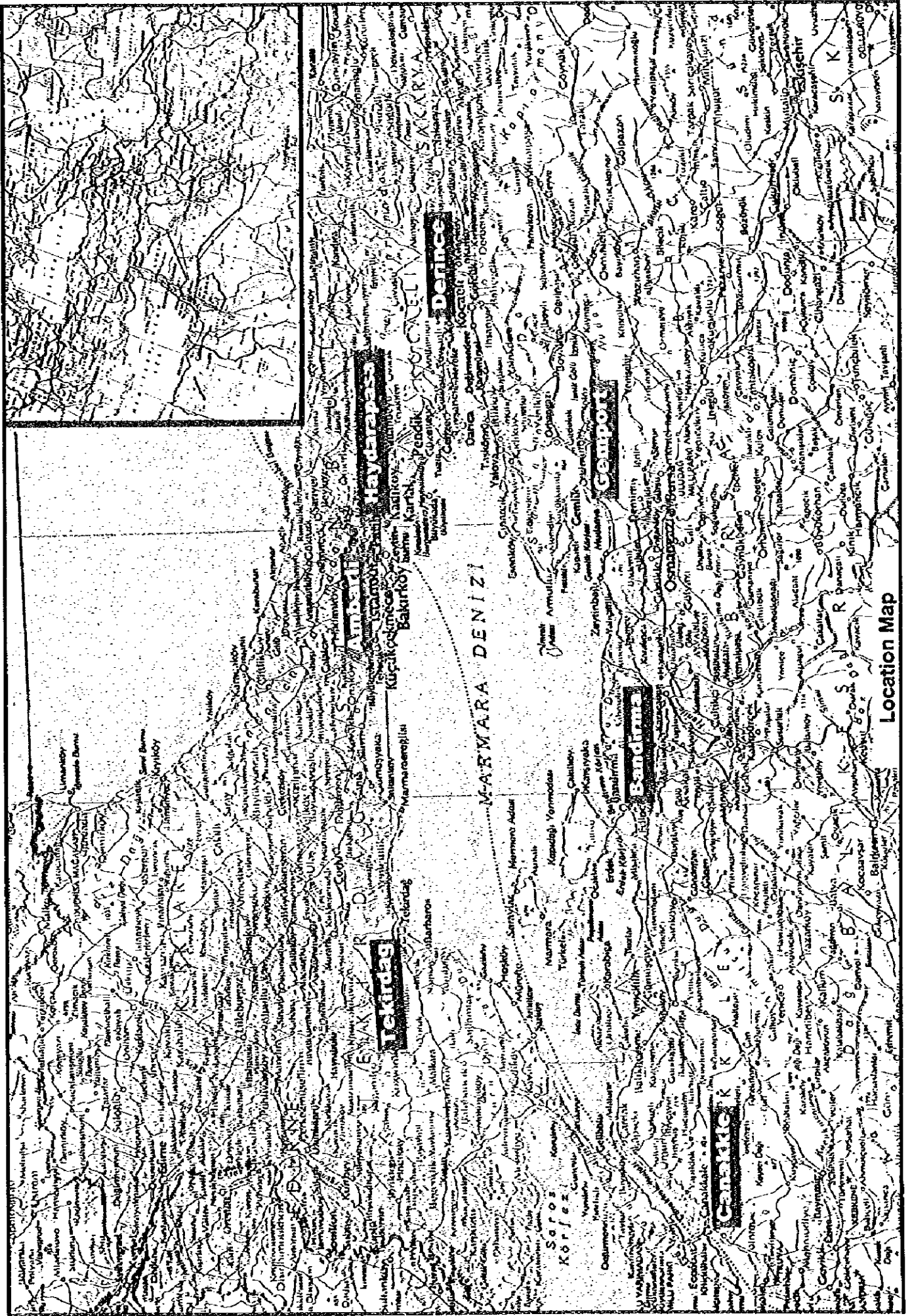
I would like to note that the completion of the study is greatly owed to the collaboration with the General Directorate of Construction of Railways, Harbours and Airports, Ministry of Transportation, and other related ministries, government agencies, authorities, shipping lines and agents concerned in Turkey.

I wish to thank the JICA, the Ministry of Foreign Affairs, the Ministry of Transport and the Overseas Economic Cooperation Fund for their assistance and suggestions extended to the study team throughout the study.

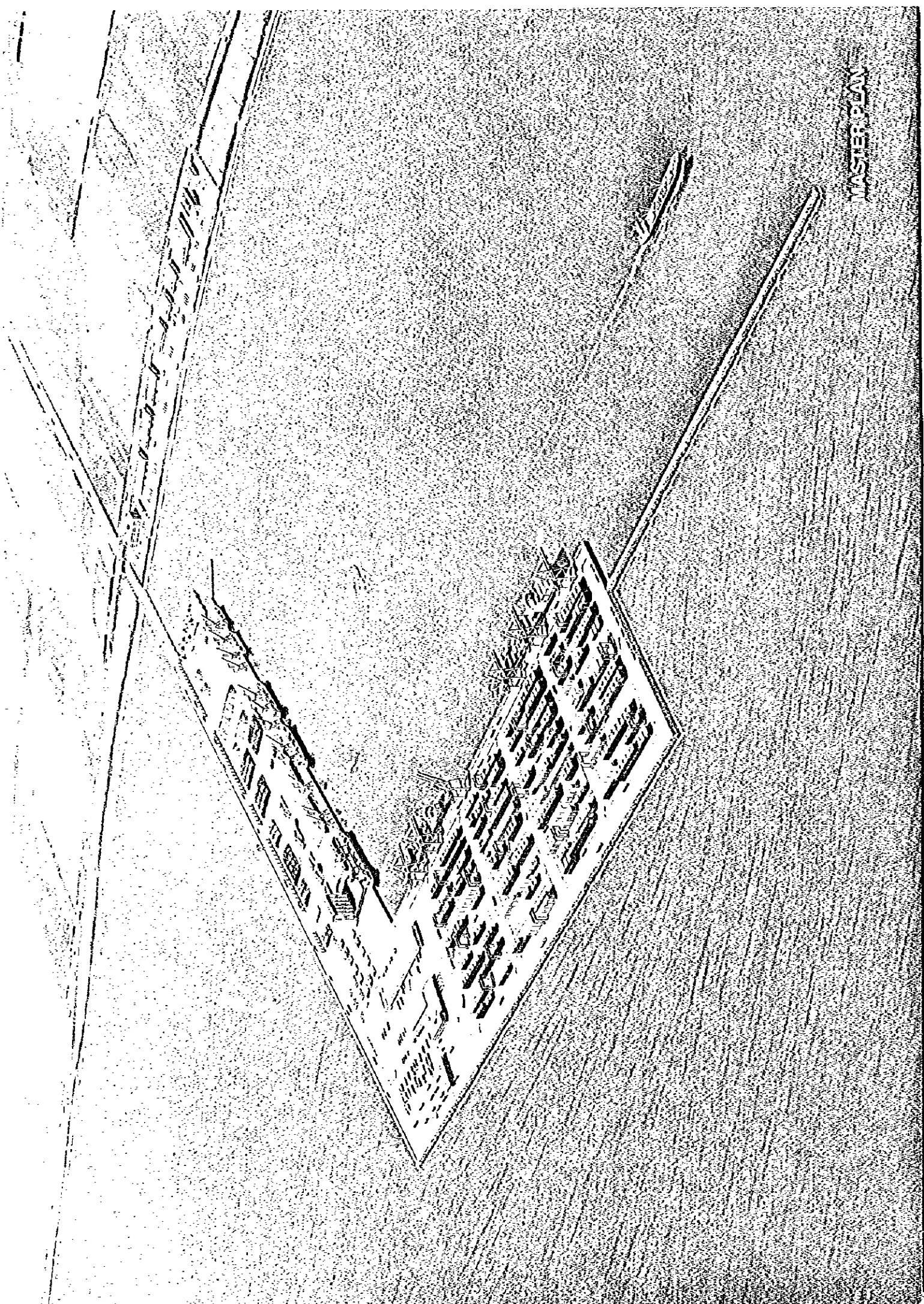
Yours sincerely,



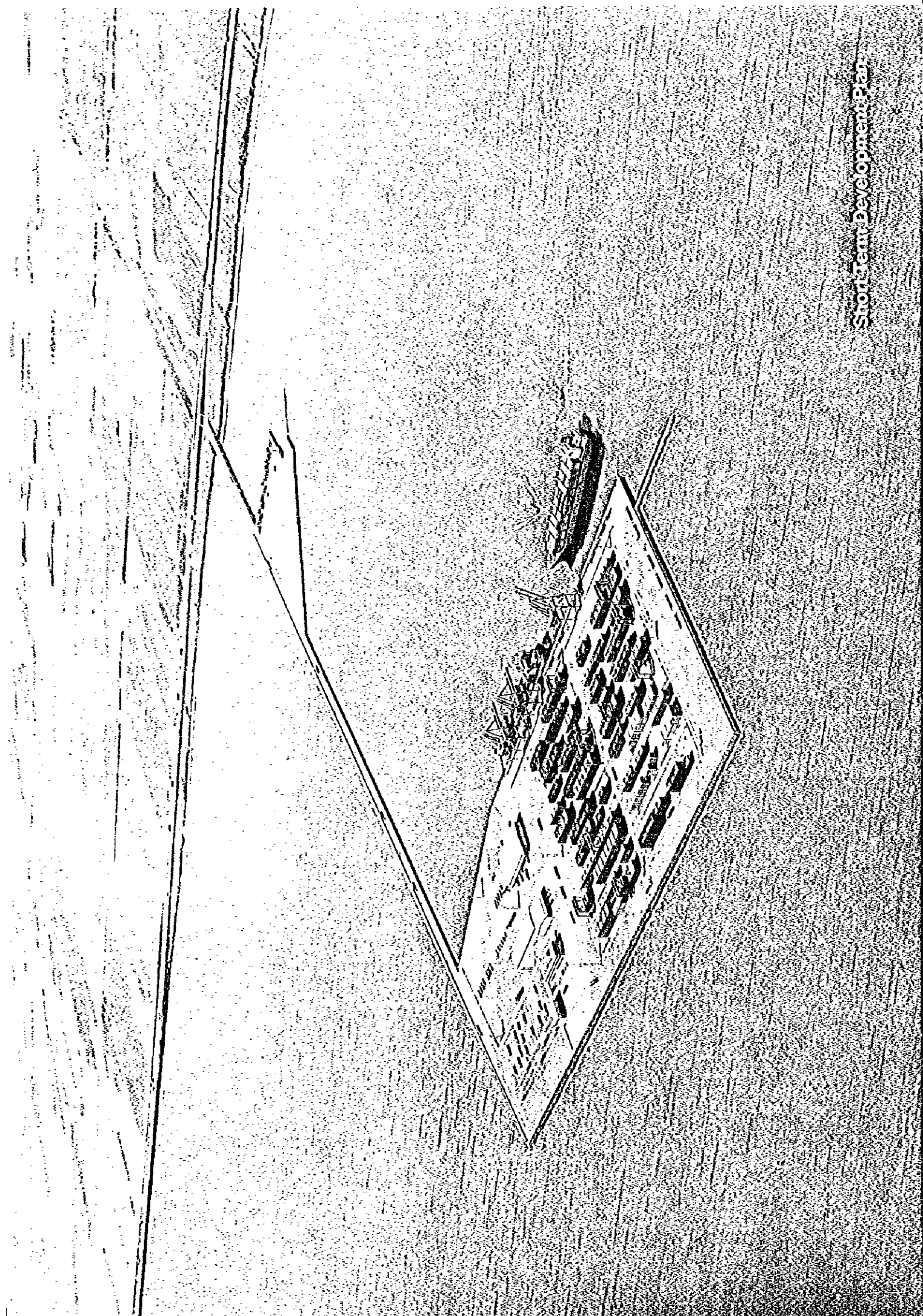
Yoshinori Aoki
Team Leader for the Master Plan Study
for the Port Development at the Sea of Marmara



Location Map



MASTER PLAN



Short-Term Development Plan

LIST OF ABBREVIATIONS

CDL	Chart Datum Level
CFS	Container Freight Station
CIS	Commonwealth of Independent States
DO	Dissolved Oxygen
DWT	Dead Weight Tonnage
DLH	General Directorate of the Construction of Railways, Harbors and Airports
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EU	European Unions
F.C.	Foreign Currency
FIRR	Financial Internal Rate of Return
FTZ	Free Trade Zone
GDP	Gross Domestic Products
JICA	Japan International Cooperation Agency
L.C.	Local Currency
MOE	Ministry of Environment
OECD	Organization for Economic Cooperation Development
OECE	Overseas Economic Cooperation Fund
SPO	State Planning Organization
SS	Suspended Solid
T.L.	Turkish Lira
TCDD	Turkish State Railways
TDI	Turkish Maritime Organization
TEU	Twenty Footer Equivalent Unit

Contents

Preface	
Letter of Transmittal	
Abbreviations	
Executive Summary	
Members	
1. Socio-economic Conditions of Turkey	15
2. International Maritime Transportation	
2.1 Economy and Trade in Surrounding Countries	17
2.2 International Maritime Transportation	17
2.3 Ports and Channels	18
3. Present Situation of the Sea of Marmara	
3.1 Coastal Zone Usage	21
3.2 Port Activities	21
3.3 Port Management	22
3.4 Land Transportation	26
3.5 Natural Conditions	26
3.6 Environmental Conditions	28
4. Master Plan for the Sea of Marmara	
4.1 Framework	29
4.2 Demand Forecast	31
4.3 Cargo Handling Capacity	33
4.4 Basic Concept of Coastal Development	36
4.5 Necessity of New Port	36
4.6 Site Selection for New Port	37
4.7 Long Term Marmara Port Development	38
5. Master Plan for New Port	
5.1 Demand Forecast	42
5.2 Requirements for the New Port	42
5.3 Development Plan for 2015	43
5.4 Preliminary Design	45
5.5 Cost Estimation and Stage Plan	46
5.6 Preliminary Economic Analysis	47
5.7 Port Management and Operations	50
6. Short-term Development Plan for New Port	
6.1 Short-term Development Project	53
6.2 Structural Design	54
6.3 Construction Planning and Implementation Plan	54
6.4 Cost Estimates	55
6.5 Economic Analysis	59
6.6 Financial Analysis	59
6.7 Preliminary Environmental Impact Assessment	63
7. Conclusion and Recommendations	
7.1 Conclusion	66
7.2 Recommendations	72

EXECUTIVE SUMMARY

Executive Summary

The Master Plan Study for the Port Development at the Sea of Marmara (March 1996 - August 1997)

Background and Objectives

Turkey is located in between Europe and Asia. Coastal area are faced the Black Sea, the Mediterranean Sea, the Aegean Sea and the sea of Marmara. The area surrounding the Sea of Marmara with an area of 11,500km² accounts for 10% of Turkey's total land area, 17% of its coastline, 25% of its population, 40% of Gross Domestic Product and 42% of cargo handling volume at ports. Obviously the Marmara region has great potential in terms of maritime utilization.

There are several major public and private ports in the Sea of Marmara. The biggest and aged port, Haydarpasa which is located in the center of Istanbul and has no expansion room is seriously congested with many waiting vessels. In addition to trucks from the port have been causing traffic jams on the road surrounding the port. Moreover, one of the most serious problems of container handling facilities in the region of Izmit is that the facilities tend to sprawl along the bay in a small size.

Owing to the economic growth in Turkey and international containerization, container cargo throughput at the ports in the Sea of Marmara have rapidly increased. Ports at the Sea are required to develop competitive terminals with enough capacity, deeper berths, efficient productivity and quality services.

In this regard, the Government of Turkey officially requested the Japanese government to conduct a Master Plan Study for Port Development on the Sea of Marmara. In response, the Japanese International Cooperation Agency (JICA) organized a study team and carried out the study to formulate a master plan for ports at the Sea of Marmara. This master plan examined the necessity of constructing a new port in the Thrace region. Based on this examination, a master plan for new port in Thrace for coming 20 years culminating in 2015 and a short-term development plan for the period of 10 years culminating in 2005 were also carried out.

Implementation of the Study

Since the Sea of Marmara is located at the crossroads of Europe, Asia, the the Mediterranean and the Black Sea, the study especially covered port development plans and cargo throughput forecast at the surrounding countries. International maritime transportation, Turkey's cargo throughput and ports' cargo throughput at the Sea of Marmara are also predicted in connection with the area's economic growth rate. The area surrounding the Sea of Marmara including parts of central Anatolia is divided into four independent hinterlands considering present cargo movement, land transportation distance and existing administrative boundary. In particular, Istanbul is divided into Thrace region and Izmit region to avoid road traffic congestion crossing the Bosphorus Strait.

The requirements are examined by comparing port demand and capacity based on each hinterland. To meet the port demand requirement, ports in the Sea of Marmara need to expand capacity significantly and new ports need to be constructed, based on the rational port development plan at the Sea of Marmara. The master plan at the Sea of Marmara covers all major public and private ports in the area as well as coastal area. Consequently, the development of a new port in Thrace has become the main factor in the new master plan for ports at the Sea of Marmara, although rather expansion of port facilities in Izmit is also important.

A new port have been proposed to be constructed at the military owned coastal area in the Thrace. Industrial development plan in Thrace also studied. The study proposed a master plan with a enormous room for future expansion. Site surveys of currents, water quality, air pollution soil conditions, ecological characteristics as well as culture assets in the project area were carried out as part of the study. The feasibility of the project is examined by financial and economical analyses of the short-term development plan and by an environmental impact assessment.

Conclusions

(Bottlenecks)

The biggest and aged port, Haydarpasa which is located in the center of Istanbul and has no expansion room is seriously congested with many waiting vessels. In addition, the trucks generated from the port have been causing traffic jams on the road surrounding the port.

One of the most serious problems of container handling facilities in the region of Izmit is that the facilities tend to sprawl along the bay in a small size. Small scale terminal is difficult to equip with large scale and modern equipment with high efficiency, thus it can not be competitive with the ports in the neighboring country and can hardly attract mother vessels. This forever relegates the status of the port to that of feeder port. This would affect the national economy through high transportation cost.

(Demand forecast)

The forecast total Turkish cargo volume in 2005 and 2015 become 1.75 times and 3.1 times of 1995, and cargo volumes are 210 million tons and 370 million tons. Marmara sea ports forecast cargo volume of 2005 and 2015 are 2.2 times and 4.1 times of 1995. Marmara sea ports hinterland is divided into four independent hinterland areas. Container cargo projection volume of Thrace area of 2005 and 2015 is 270 thousands and 580 thousands TEU respectively.

(Necessity of the New Port)

Cargo handling capacity in Thrace and Izmit regions will not be sufficient for the cargo volume in 2015. Though total container cargo demand in Izmit will be larger than that in Thrace, container cargo volume of 638,000 TEUs in Thrace and 433,000 TEUs in Izmit will exceed the capacity of ports respectively. To handle the cargo, it is necessary to increase the capacity of ports in Thrace and Izmit regions by 2015.

(Requirements of the New Port)

The new port should comply with the following requirements with a view to consolidating the position as a competitive container port.

- (1) To developed as the largest commercial port in the Thrace region for public infrastructure and distribution center in the region and nation and as a complementary port to Haydarpasa Port.
- (2) To comply with an urgent need for increasing the capacity of container.
- (3) To enable the port to accommodate Panamax ship of 50,000DWT class container vessel with capacity of 3,000TEU.
- (4) To be flexible to cope with future demand and to secure sufficient room for future expansion.
- (5) Not to deal with passenger.
- (6) To mitigate adverse effects on the environment.

Project Outline

(Master Plan for the Sea of Marmara)

Master plan for container terminals is shown in Table.

The most urgent matter in the master plan is to increase container cargo handling capacity, priority should be given to the followings;

- (1) Improvement of Haydarpasa container terminal
- (2) Construction of new container port in Thrace region
- (3) Conversion to container terminal at Bandirma port

Principle for Arrangement of Container Terminal

Region	Container Demand in 2015 (TEU)	Principle for Arrangement of Container Terminal
Izmit	1,342,000	<input type="checkbox"/> Improvement of Haydarpasa port <input type="checkbox"/> Practical use of existing and under-construction private ports <input type="checkbox"/> <i>Construction of Derince new container terminal</i>
Thrace	688,000	<input type="checkbox"/> Construction of a new container port <input type="checkbox"/> Practical use of an existing private ports
Balkesir	127,000	<input type="checkbox"/> Improvement at the depth of Bandirma port
Canakkale	20,000	<input type="checkbox"/> Use of new pier of Canakkale port

Note: Arrangement with Italic will be commenced after 2005.

(Master Plan for the New Port)

The new port will developed as the largest commercial port in the Thrace region and a complementary port to Haydarpasa port. The total project cost is approximately US\$ 400 million. Master plan of the new port for 2015 is as follows;

Master Plan for the New Port

Facilities	Container Terminal	Conventional cargo Terminal
Terminal Area	44 ha	50 ha
Berths	3 (d: 12~14m)	7 (d: 7.5~12m)
Handling Capacity	640,000 TEUs	6.6 mil. tons
Quaywall/Revetment	2,940 m	3,280 m
Breakwater	700 m	100 m
Reclamation	7.8 mil. m ³	4.5 mil. m ³
Storage Capacity	18,620 TEU	350,000 m ²
Cargo Handling Facilities	Gantry Crane 6 Transfer Crane 20 CFS 10,000 m ²	Grain Silo 45,000 tons Shore Crane 12

Note: d = berth depth

(Short-term Development Plan)

The proposed project for the short-term development plan is as follows;

1) Container terminal

Berth	2 (berth depth = 12 m)
Terminal Area	34.5 ha
Capacity	320,000 TEUs
Estimated Coast	US\$ 64.7 million

2) Breakwater

US\$ 3.0 million

3) Revetment

US\$ 64.2 million

4) Dock road including causeway

US\$ 3.8 million

5) Inner harbor

US\$ 5.6 million

6) Other

US\$ 18.2 million

Number of ground slot in the container yard is 3,588. As container handling facilities, three(3) gantry cranes and ten(10) transfer cranes are installed.

(Implementation Plan)

Main port facilities for short-term development plan consist of -12m container berths, container yard, small ship berth, causeway, temporary dock-road, revetment and improvement of crossing of existing road., etc. These facilities may be able to construct with local labor, local available equipment and materials due to without complexity.

(Cost Estimate)

Total project cost for the short-term development plan amounts to US\$160 million, of which US\$61 million represents the foreign currency component. Of the total project cost, US\$59 million would go for the container berth and container yard with the breakdown into cargo handling equipment amounting to US\$32 million civil works amounting to US\$26 million.

(Management and Operation)

Public sector should administer the new port from the viewpoint of people's welfare according to its master plan. For this purpose, construction of infrastructure must be performed by public sector and ownership of the land should be retained by public sector, while construction of the terminal including the superstructure and pavement, and its operation is recommended to be performed by private sector in order to encourage efficient cargo handling.

Project Evaluation

(Economic Analysis)

The EIRR of the long-term development plan 18.2 %. The EIRR for the short-term development plan results is 14.8%. Both development plan have sufficient viability. Even the worst case, where the project cost is assumed to increase by 10 % and the benefit reduced by 10 %, the EIRR for the short-term development plan is 11.8%. According to the SPO, the standard cut off line of EIRR in social infrastructure project is 11 to 12 % in Turkey. Therefore, this development project is viable from the viewpoint of the national economy.

(Financial Analysis)

FIRR is assessed at 5.6% in the infrastructure project and 23.2% in the superstructure project. Due to the sufficiently high tariff and exemption of the initial investment for the infrastructure, the superstructure project especially turns out to be very feasible. After conducting a sensitivity analysis, the FIRRs are still in a feasible range.

The indicators which show the financial soundness of each of the port management bodies are on appropriate levels, except for the one which shows "Loan Repayment Capacity" in the infrastructure project for the term from 2009 to 2016. However, since temporary cash shortage caused by this unsatisfactory result will be made up by cash excess in the following year, it can be judged that financial soundness of both management

bodies can be secured, based on the assumption that the temporary cash shortage can be covered by the internal resources of the management body.

(EIA)

Field surveys covered currents, water pollution, shore line configuration, sediment contamination, air pollution, terrestrial flora and fauna, aquatic species and fishing activity and cultural assets.

To assess the impacts of the port development, wind induced currents and the dispersion of water pollution and shoreline configuration are identified by means of computer simulation. Adverse effects on air pollution and marine/aquatic species are also studied. As a result no significant adverse effect is shown in the preliminary EIA.

(Overall Evaluation of the Project)

As one of the most important elements to develop ports in the Marmara area in consistent with the economic growth of the region, a new port have been proposed to be constructed at the military owned coastal area in the Thrace region with improvement plans at other ports in the Marmara region. No other feasible site than the site chosen could not be found and the site was practically the best choice. The development of the new port have been clarified to be feasible from technical, economical, financial and environmental aspects. One of the superior points of the plan is that it has a enormous room for future expansion. In order to secure the future expansion works, it is very important that the public sector controls the port infrastructure like land, revetments, breakwater so on. Moreover since the construction of such port infrastructure needs a large amount of investment and it requires a long period to call in the invested resources by the operation, the public sector itself is also financially recommended to invest and possess the infrastructures.

Recommendations

(Preparation of Port Statistics)

It was very difficult to gather statistics on cargo handled at ports and data concerning existing port facilities, especially those pertaining to private port facilities. Ports continuously grow and develop, in line with the national economy. Therefore, it is very important to develop ports based on long term development plans that contain the most accurate forecasts of future events as possible. The above mentioned information is fundamental in making a port development plan. It is strongly recommended to consolidate

legal and institutional frame for obtaining and maintaining these statistics.

(Formulation of National Long Term Port Development Plan)

It was observed that small scale private ports had been established or were going to be constructed. Especially for a container port, which is a capital-intensive industry where scale merit can be expected in terms of efficiency, this trend would have a deleterious effect on the international port competition and finally on the national economy. Turkish government is recommended to draft a long term port development master plan authorized as national plan and to examine strictly any application for port development from the private sector whether it is consistent with the master plan or not, so that a sprawl of container terminals will not occur.

(Guidance to the private sector in Marmara area)

Since the master plan for ports development in Marmara area has been prepared and a new port is proposed to be constructed to fulfill the requirement of the master plan, it is important that the government of Turkey is recommended to induce private sector not to attempt to construct any small scale container terminal within the same hinterland as the new port. Small scale and inefficient container terminal, in general, never can compete against one which has a large scale and more efficient. A large scale and efficient terminal attracts more ship services and more frequent ship services are more convenient for the exporter or consignee. To attempt constructing any small scale terminal is quite possible to turn out unsuccessful. It means such attempt could be a waste of resources and unnecessary environmental disturbance. These national loss should be avoided before hand.

(Review of Industrial Development Plan in Thrace)

Thrace region, some official industrial installation plans exist. But those industrialization plans in Thrace Region are planned without considering the new port. If the new port project goes forward, it is recommended that those plans be reviewed. The Free Trade Zone, in particular, is worthy of consideration and it is recommended that some FTZs be planned along the access road to the port. Though it can not be said that Thrace region, where the new port is planned, is highly developed, the region is blessed with favorable conditions and has high potential even in the present situation. For instance, the highway route No.E80 leads to Europe and the international airport connects the region to the world. If the new port comes into operation, the region will be fully fitted out with air, land and sea transportation. Moreover the region is in the vicinity of the biggest consumption area of Turkey, Istanbul.

(Practical Use of Port Hydraulic Research Center)

The configuration of the port plan proposed in this report is unprecedented in Turkey. Based on Japanese experience, serious technical problems are not anticipated, however, it is desirable to conduct some experimental and numerical model simulation studies. But as such studies are beyond the scope of the study, it is recommended that some experimental studies and numerical model simulation studies be conducted by utilizing the Port Hydraulic Research Center newly completed under the Japanese Technical Cooperation by JICA. The themes recommended to be studied are as follows.

- (1) the relation between the calmness in front of berths and the length of the breakwater.
- (2) the relation between the crown height of the revetment and the magnitude of the wave overtopping, especially at the corner connecting the revetment and breakwater.
- (3) stability of rubble mound in breakwater and revetment.
- (4) sea current estimation and sand drift phenomena

(Participation of Private Sectors)

Port is a basic infrastructure in a public water area for a nation's imports and exports so that the public sector should administer the port from the viewpoint of people's welfare according to its master plan. However, commercial activities related to the port are basically supported by private sectors in the field of terminal operations, stevedoring, harbour services and other ancillary services. Therefore, participation of the private sectors in these fields needs to be encouraged under the administration of public sector.

Based on this concept of public port, for the new terminal, public sector should provide only basic port infrastructures and invite the private sector to build superstructures and to operate its own terminal though ownership of the land would be retained by public sector. Introduction of private operators into terminal operation will encourage efficient cargo handling.

(Establishment of Port Authority)

In order to develop and operate ports properly, it is recommended that an port authority as a port managing body be established for each port in Turkey. The relevant municipality might participate in the authority.

(Simplification and Modernization of Procedures and Documentation)

In order not only to develop trade in this country but also to establish efficient container transport operations, it is strongly recommended that the procedures and

documentation required for container transport be simplified and modernized, in cooperation with all concerned organizations by extending the present computer system in TCDD ports.

Especially to reduce the long waiting time of containers in the new port and secure smooth door to door transportation, relevant customs law and legislation should be changed and customs clearance in which empty containers are taxed needs to be simplified.

(Port Sales)

Since the new port is located somewhat far from Istanbul which is the major consumer city in its hinterland, port promotion activities are one of the most important factors to attract port users and to secure adequate level of revenue. In order to accomplish this aim, effective actions such as establishment of port promotion strategy focusing on the most effective target groups or clients and active appeals in getting their understanding on real merits of utilizing the new port are recommended.

(Establishment of Competitive Port Tariff)

In addition to streamlining cargo handling and installing proper port facilities, to conquer the above mentioned locational disadvantage and the customary commercial practices which ignore rational economic principles and to attract mother container vessel and survive the heated competition between container ports in the East Mediterranean Sea and the Black Sea, port tariff of the new port should be competitive. Based on the results of the financial analysis, tariff for the new port can be lowered to some extent taking account of the above mentioned situation, although the present tariff is not at a high level compared with other ports in the Mediterranean Sea or in the world.

(Financial Arrangement)

Timely implementation of the project is crucial to relieve congestion of existing container terminals such as Haydarpasa of Istanbul. It is strongly recommended for DLH to begin making preparations and financial arrangements for the implementation of short-term development plan of the project immediately after the present feasibility study.

MEMBERS

Members of the study team and the steering committee are as follows;

Steering Committee

Mr. Selahattin BAYRAK	DLH, Assistant of General Director
Mr. Asaf KAYA	DLH, Head of Port Planning and Design Department
Mr. Yusuf Ziya BOYACI	DLH, Head of Port Construction Department
Mr. Zafer ÖZERKAN	DLH, Head of Railway Planning and Design Department
Mrs. Ülker YETGIN	DLH, Port Planning and Design Dept., Division Director
Mr. Enver YERDELEN	DLH, Port Planning and Design Dept., Division Director
Ms. Jale OYGÜR	DLH, Port Planning and Design Dept., Division Director
Mr. Metin SONUVAR	DLH, Port Planning and Design Dept., Division Director
Mr. Engin BILYAY	DLH, Port Planning and Design Dept., Civil Engineer
Mrs. Ülya EKILI	DLH, Port Planning and Design Dept., Civil Engineer
Mr. Mehmet SAG	DLH, Port Planning and Design Dept., Civil Engineer
Mr. Bektas ÇELEBI	DLH, Port Construction Department, Division Director
Mr. Cahit ERDOST	DLH, Port Construction Department, Division Director
Mr. Mustafa KADIOGLU	DLH, Port Construction Department, Division Director
Mr. Ahmet ASLAN	DLH, Port Construction Department, Division Director
Mr. Haluk Ibrahim OZMEN	DLH, Construction 4 th . Regional Directorate, Civil Engineer
Mr. Serdinç YILMAZ	Prime Ministry State Planning Organization, Expert
Mr. Necati DOGUL	Prime Ministry State Planning Organization, Expert
Mr. M. Danyal ASIK	Prime Ministry State Planning Organization, Department Director
Mrs. Tulin CANDIR	DPT, Prime Ministry State Planning Organization, Sector Responsible
Mr. Hayri MARASLIOGLU	Prime Ministry State Planning Organization, Expert
Mr. Fikret ÇAGLAR	Undersecretariat of Maritime Affairs, Head of Dept.
Mr. Cezair ORHAN	Ministry of Finance, Division Director
Mr. Murat ÇELEBI	Privatization Administration Directorate, Expert
Mr. Ali Cavit ÜN	Etibank General Directorate, Project Director
Mr. Ahmet YÜCEL	Etibank General Directorate, Division Director
Mr. Halis Alp ATAÇ	Etibank General Directorate, Vice Division Director
Mr. Ayhan ORHAN	Ministry of Industries and Trade, Division Director
Mr. Ibrahim ASLANTAS	Ministry of Industry and Trade, Division Manager
Mr. Ahmet ATES	Ministry of Industry and Trade, Engineer
Mr. Hikmet BALTACI	Chamber of Istanbul Industry, Vice Expert
Mr. Volkan YILDIRIM	Istanbul Chamber of Commerce, Division Director
Mr. Rüstü BUHAM	Istanbul Chamber of Commerce, Expert
Mr. Ali DIKILI	Prime Ministry Undersecretariat of Foreign Trade, Expert
Mr, Sukru OKUR	Prime Ministry Undersecretariat of Foreign Trade, Free Trade Zone Dept., Expert
Mr, Rifat KOK	Prime Ministry Undersecretariat of Foreign Trade, Free Trade Zone Dept., Technician
Mr. M Emin ERAY	Turkish Maritime Management, Vice Director

Mr. Riza Nur ÖNCÜ	Chamber of Shipping, Secretary General
Mr. Metin LEBLEBICIOGLU	Board of Chamber of Shipping
Mr. Nur POYANLI	Chamber of Shipping, Technical Division Director
Mr. Naci UYSAL	TCDD State of Railway Operation, Division Director
Mr. Ali Riza DAGLI	TCDD Presidency of Ports Development, Deputy Chief
Mr. Ergün BAYAR	TCDD Presidency of Ports Development, Expert Engineer
Mr. İrhan ARKAN	TCDD Presidency of Ports Development, Assistant Director
Mr. Adnan KESKİN	TCDD Presidency of Ports Development, Expert Engineer
Mr. Cetin ILTER	TDI, General Directorate of Maritime Operation, Division Director
Mrs. Çiğdem ERKUL	TCK, General Directorate of Highways, Civil Engineer
Mr. Kadir ÖZKAN	TCK, General Directorate of Highways, Technical Chief
Ms. Gulan CANDEMİR	TCK, General Directorate of Highways, Statistics Expert
Dr. Mustafa SENHAN	Meteorology General Directorate, Division Director
Mr. Ali KAYA	Meteorology General Directorate, Mathematician
Mr. Koray ÇAKAN	Ministry of Public Works and Settlement, City Planner
Mr. A. Sedat SERT	Ministry of Tourism, Division Director
Mr. Fatih AKSOY	Ministry of Energy and Natural Resources, Engineer
Ms. Macide ALTAS	Ministry of Energy and Natural Resources, Engineer
Ms. Hanife FİKRET	Ministry of Energy and Natural Resources, Engineer
Ms. Oya KURUSAKIZ	Ministry of Environment, EIA Department, City Planner
Ms. Elif GÖKÇEK	Ministry of Environment, Environment Engineer
Mr. Ahmet YAKUT	Ministry of Environment, Environment Expert
Mrs. Tulin ALPMAN	State Institute of Statistics, Division Director
Mr. Akin ASICI	State Institute of Statistics, Assistant Director
Mr. Ugur SAADETLIOGLU	Government Office of Tekirdag Province
Mr. Ergin GORK	T. Sise Cam Fab. A.S.; Director of Planning

Study Team

Dr. Yoshinori AOKI	Leader
Mr. Yoshikuni KOBAYASHI	International Traffic and Cargo Movement Analysis
Mr. Toshihiko MATSUURA	Port Planning/Environmental Considerations
Mr. Toshihiko KAMEMURA	Coastal Development/Demand Forecast(1)
Mr. Kazuyuki YAMAGUCHI	Demand Forecast(2)/Economic Analysis
Mr. Masao KOMATSU	Cargo Handling System
Mr. Hajime OWADA	Port Management/Financial Analysis
Mr. Noboru MURAI	Port Facility Design
Mr. Katsumi NAITOU	Construction Planning/Cost Estimation
Mr. Takakazu KAJIMA	Natural Condition Survey
Dr. Çoskun YURTERİ	Environmental Survey
Mr. Masayuki NAKAMURA	Coordinator
Mr. Motoshi KOGA	Coordinator
Mr. Tadahiko KAWADA	Coordinator
Mr. Naoki KUDO	Coordinator

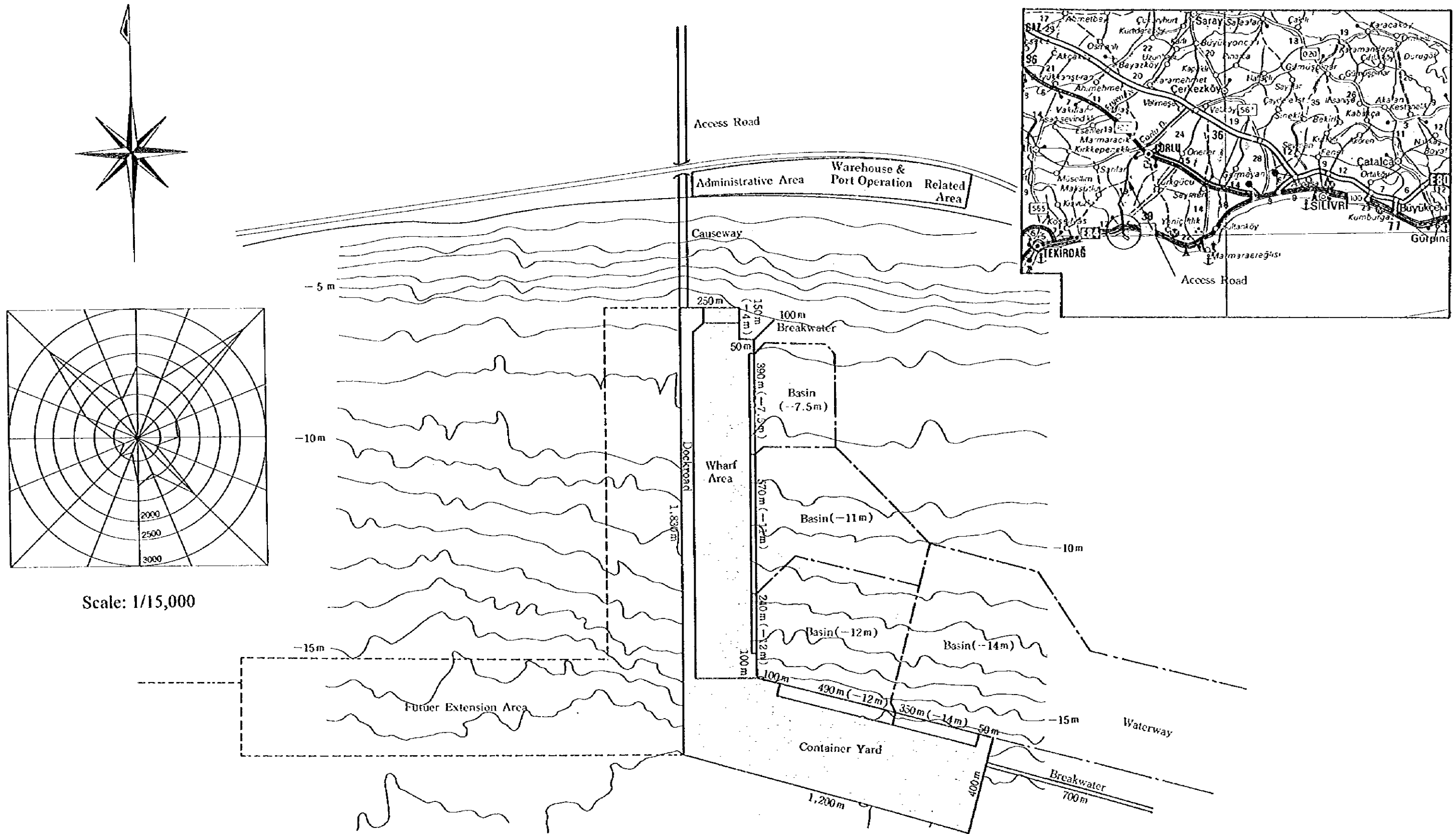


FIGURE General Layout of New Port Long Term Development Plan

SUMMARY

Chapter 1 Socio-economic Conditions of Turkey

(1)Demography

The first population census was done in 1927 and the second in 1935 and followed by censuses regularly every 5 years. The latest was done in 1990. Population projection conducted by SPO in 1994, which projected the population of year 2005 and 2015 are 71.7 million and 80.5 million respectively. Annual growth rate is 1.45 % in 1990 - 2015

(2)Economy

The Turkey's GDP amounted to around 98,000 billion Turkish Lira (T.L.) in 1995 at constant prices of the year 1987, had recorded annual growth rate of GDP 5.07 % on average in the period of 1980 - 1995. Annual growth rate had dropped by trade deficit in 1994.

(3)Foreign Trade

The annual average growth rate of trade volume in export and import in 1973 - 1992 are 4.8% and 6.6% respectively.

Main countries in the Turkish international trades are Germany, U.S.A, Italy, France, Saudi Arabia and U.K in the side of import and Germany, U.S.A, Italy, U.K, France and Russia in the side of export. Turkey has close relationship between OECD-European countries which occupies the share of 49.3 % in import and 49.2 % in export of Turkish international trade.

83.1 % of total exports value of Turkey is made by manufacturing goods. In the exported manufacturing goods, textiles have a big share and are increasing year by year to 39.2 % in 1993. Export share of basic metals and metal products are 12.9 % and 11.9 %. Chemicals are decreasing recently to 7.4 % in 1993. The largest share of imports is industrial supplies, and its share is 37.9 % in 1993. The second is machinery, occupies 24.2 % of total imports. Over 70 % of imports (excluding fuels) is concerned with industry.

(4)Industry

Turkey has a rich agricultural base. The main export item is processed fruits and

vegetables, followed by textile goods. Other high potential industries are agro business and food processing, automotive components, electrical and electronic appliances, chemicals and non-electrical machinery. Heavy industries, such as oil refinery, steel and iron, are mainly located in Izmit, Izmir, Zonguldak and Iskenderun. Light industries, such as clothing, leather, and food, are located in whole Turkey, and especially in Marmara region.

Turkey and the European Union (EU) have signed an agreement of establishing a customs union on March 6 1995. Customs union and further progress towards full membership with the EU, Turkey will deepen its economic globalization process.

(5) Government Budget

After the economic crisis in 1994, implementation of urgent stabilization program has improved the situation of budgetary balance and the deficit in the primary balance has disappeared. However due to an increase in interest payments, deficit in the general balance has increased again and amounts to 861 trillion T.L, which is 32% of the expected revenues, in the budget program of 1996.

The share of port-related investments in national budget has gradually decreased from 0.12 % in 1990 to 0.064 % in 1995. The share of port investments in port-related investments has also generally decreased from 56 % in 1989 to 34 % in 1995.

(6) National Development Plan

The plan period of Seventh Five Year Development Plan is 1996 - 2000. In the plan period, it is estimated that the annual average growth rate of value added by the main sectors will be 2.9-3.7% in agricultural sector, 6.0-7.7% in industrial sector and 5.1-6.8% in services sector. And total GDP annual growth rate will be 5.0 -6.6%

Chapter 2 International Maritime Transportation

2.1 Economy and Trade in Surrounding Countries

The average annual growth rate of fifteen countries of the EU was 2.0% from 1980-94, and 2.4% from 1970-94. In almost all countries, growth rates from 1980-94 were lower than the ones from 1970-94. The average annual growth rates were 3.9% in import and 4.1% in export from 1980-94, and 4.3% in import and 4.6% in export from 1970-94.

The countries of Eastern Europe and the former Soviet Union are now on the way to becoming market economies. The transition process started in 1990 and some effects are beginning to be seen, though the trends cannot be said to be stable. With some exceptions, inflation in these countries is expected to gradually slow down.

In Eastern Europe and the Baltics, it seems that the economic decline year of 1993 was a bottom of economic decline and their real GDP is beginning to grow again; recent annual growth rates are in the range of 4 - 5%.

On the other hand, the real total GDP of CIS countries continued to decline until 1995. If the EDRB projection in 1996 is realized and its trend becomes certain, 1996 will be seen as a turning point for the CIS economy. However, growth in countries such as, Azerbaijan, Tjikistan and Ukraine remains negative.

These countries are beginning to realize some success in their transition. But it is only in the initial stage, especially in the CIS. Projected GDP in 1996 still remains at 53% of the 1989 level in CIS and 87% in Eastern Europe.

Also, the international trade of these countries has become more stable since 1993 with some exceptions. However, the level of trade is far from that before 1990.

2.2 International Maritime Transportation

Total world cargo volume was 4.0 billion tons in 1990. Western Asia's cargo volume loaded was 527 million tons and 156 million tons unloaded, representing a world share of 13.2% and 3.8% respectively.

Volume of coal, grain and ore which are the main bulk cargoes in the world did

not increase much from 1979-95. On the other hand, handling volume of crude oil, which decreased during the first half of the 1980's, is expanding again. And the category "Other" continues to grow strongly. The expansion of the "Other" supports the containerization across the world today.

There is a remarkable trade in crude oil from the Middle East and Near East to N/W Europe and Mediterranean. The volume of crude oil related to the Mediterranean area is 182.2 million tons. Moreover, there is another 20 million tons which flows from the Black Sea to Western Europe.

The dry bulk from Mediterranean area amounted to 4.65 million tons in 1994 totally, and was distributed to Asia, UK and Continental, Mediterranean itself and so on. And total flow to Mediterranean amounted to 57.0 million tons. Their origins are mainly from North America, South America, Africa and so on.

In 1995, 141.6 million TEUs of container were handled in the ports all over the world. The world container throughput is expanding rapidly. Its average annual growth rate was 9.5% from 1980-95, and 10.3% from 1990-95. The container throughput in East Mediterranean / Black Sea countries was 3.41 million TEUs in 1995, led by Israel with 730 thousands TEUs, Greece with 697 thousands TEUs and Turkey with 603 thousands TEUs.

2.3 Ports and Channels

(1) Ports

The Study Team investigated the development plans of main ports of neighboring countries facing the Black Sea and the Mediterranean Sea.

1) Port of Constanza

Port of Constantza is the largest port in Romania and one of the largest ports on the Black Sea. The Port is divided into two sections: the North Port, where most cargo operations take place and the South Port, where there is ample room for establishing new port facilities.

In terms of the past trend of the throughput handled, after reaching its peak in the late 1980's when 65 million tons of annual throughput was handled, it decreased sharply until 1992 when 27 million tons of annual throughput was handled. This decrease was

caused by a political revolution , however the throughput has recovered gradually since then and reached 35 million tons in 1995.

The new container terminal with an annual capacity of 800,000 TEU is planned to cover an area of 81 hectares and accommodate 6 container berths between 14 and 16m in depth. The construction of the terminal excluding the superstructure has already been completed.

2) Port of Bourgas

The Port of Bourgas is the largest port in Bulgaria and has 28 berths with a total quay length of 3,470m. In 1995 the cargo handled in the port reached 24 mil. tons, of which 8 mil. tons of throughput is for dry bulk and general cargo including containerized cargo and 16 mil. tons of throughput is for liquid bulk cargo.

In the development plan 3 berths of 40ft depth are included. In 2015, annual container cargo volume is expected to reach around 100,000 TEU.

3) Port of Varna

The port of Varna is situated along the west coast of the Black Sea. After the revolution in 1989, cargo volume decreased, but with the revival of the Bulgarian economy there has been a substantial growth in the cargo traffic of the Port of Varna. The port has a master plan for its future development up to 2005.

4) Port of Odessa

Main ports of Ukraine in the Black Sea are Odessa, Ilyichevsk, and Yuzhnyy. These ports are located very near one another. Main cargo handled in Odessa is grain and sugar as import, and steel, paper and fertilizer as export. Handled volume of containers at the port of Odessa is about 19, 000 TEU, and 230,000ton in 1993.

A new container terminal is under construction. Area of the new terminal is about 100,000 m². The port expects to handle over 100,000TEU containers after the completion of this terminal.

5) Port of Novorossiysk

Main Russian ports in the Black Sea are Novorossiysk and Sochi. Novorossiysk is Russia's largest port in the Black Sea. Main import commodities are grain, sugar, alumina, food product and manufactured goods. On the other hand, export commodities are crude oil, oil products, cement, timber, steel and industrial equipment. New container

terminal with 13 million tons annual handling capacity is under construction.

6) Port of Piraeus

Origin of port dates back to about 5 B.C., and since then the Port of Piraeus has been playing an important role as a maritime transportation hub in the Eastern Mediterranean. Due to revolutionary changes in surrounding Eastern European countries, cargo traffic volume had decreased until 1993 when the cargo traffic volume was at its lowest level of 8.6 million tons. In 1995, the cargo volume increased over 10 million tons. Though the total cargo traffic volume has decreased, the container volume has been increasing gradually, and recorded 600 thousands TEU in 1995. New container terminal project is scheduled to be completed at the end of 1998, and target container throughput volume is 1,000,000 TEU in the year 2000.

(2) Channels

In 1994 approximately 425 million tons were transported via Europe's inland waterways. Moreover, the Rhine and the German and European canal system are capable of handling eight times as much as traffic as they do today.

The Main-Danube canal could handle six times as much. The Rhine-Main-Danube combination has a length of 3,500 km. This new major European waterway, which officially opened in September 1992, is now carrying more than six and a half million tons annually.

The Main-Danube canal is navigable by cargo motor ship of up to 2,000 DWT, and twin-barge pusher-tug assemblies of up to 3,300 DWT. Fleet units sailing on the Upper Danube usually consist of quadruplet fleets (vessel+2+2) with a total carrying capacity of approximately 6,000 tons.

Chapter 3 Present Situation of the Sea of Marmara

3.1 Coastal Zone Usage

This area has a coast line of 1,300km, which is 17 % of the total in Turkey.

Industrialization in Turkey first began in the Istanbul area. Because of its location as a key transportation point and its special geographical position, rapid urbanization and industrial development have taken place in this area. Various branches of industry have been developing and factories generally cover fertile agricultural land alongside roads, such as the Istanbul - Edirne (and Kirklareli) highway and the Istanbul - Tekirdag - Canakkale highway.

The large organized industries and their secondary branches are undergoing steady development in the Bursa area. The spread of industrial growth in this region is centered in three different directions around the transportation network.

There seems to be room for future coastal development along the northern central coast and the southern coast between Gemlik Bay and Bandirma Bay, and also along the southern coast of Erdek Bay. The Sea of Marmara will gradually be surrounded by the ongoing development which includes an industrial area and second house area.

3.2 Port Activities

There are 10 major public ports and 28 private large facilities at the Sea of Marmara and the two Straits which has an area of 11,500 km² and a length of 1,300 km coastline. Ten major public ports are Haydarpasa, Istanbul, Tekirdag, Gelibolu, Canakkale, Lapseki, Marmara Island, Bandirma, Mudanya and Derince. Major public ports are situated at the southern side of the Sea, because of the hinterland. They are also located on the coast of bays and the Straits, only Tekirdag port is on simple coastal line.

Total number of wharves in above public ports which can berth vessels up to 5,000 D/W is 39 berths. Out of the 39, the Port of Haydarpasa has 15 berths and the Port of Bandirma has 14 berths.

Most private port facilities are located on the north coast of the Izmit Bay where heavy industries are densely located though some are found at the inmost part of Gemlik

Bay, the base of the Kapidag Peninsula and on northeastern coast of the Sea of Marmara. These private facilities are mainly used for their own use, however, general cargo such as container cargo has been handled in these ports recently. In particular, the Gempont and the Ambarli port are used for public cargo, such as construction materials, container.

Small ports are concentrated around the Kapidag Peninsula and islands, because of poor land transportation. Ports and facilities along the Straits are mainly used for passenger transport.

Generally speaking, almost all ports do not have sufficient storage yards and expansion area.

The annual handling cargo volume at the Sea of Marmara is approximately 50 million tons and its share is 42% of the total of Turkey. Cargo handling volume of the Izmit bay is more than 50% of the total of the Sea of Marmara. There are five(5) ports which handle container cargo in the Sea of Marmara: Haydarpasa, Derince and Bandirma under control of TCDD and Gempont and Sedef under private authority.

3.3 Port Management

(1) Port Administration System

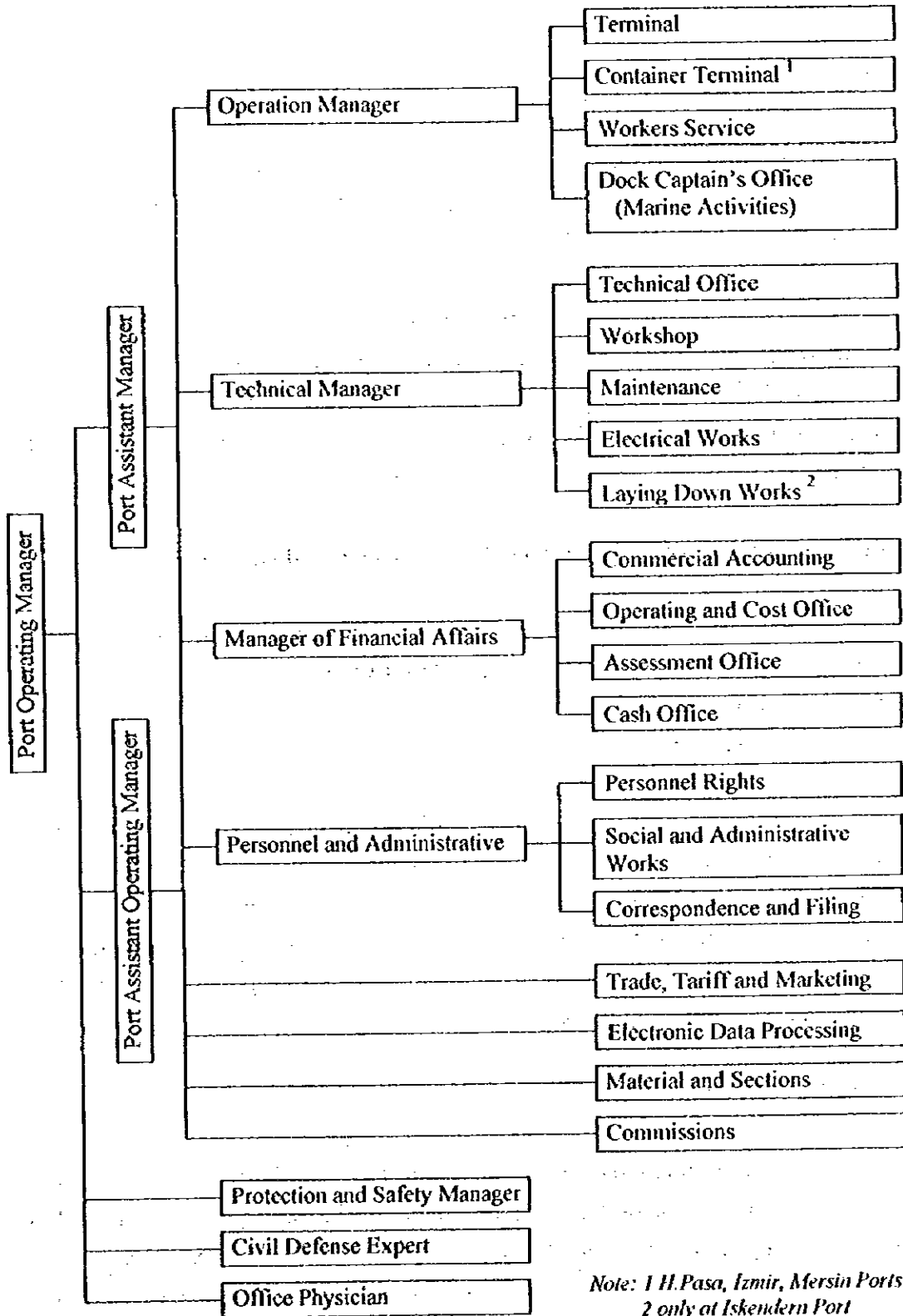
Turkey has approx. 260 shore facilities which are divided into general-purpose and specialized ports. From the administrative point of view, they are divided into public and private ports. Port management of public ports is carried out by either state economic enterprises, provincial peculiar administrations, municipalities, state industrial enterprises or semi-public sectors.

Most of the major general-purpose ports are operated by two state economic enterprises, i.e. TCDD and TDI which are under the control of the Ministry of Transportation. Major specialized ports are operated by either state industrial enterprises or semi-public sectors and are under the control of the Ministry of Industry.

(2) Present Situation of Port Management and Operation

The organization chart of ports operated by TCDD is shown in Figure. Port services can be offered for 24 hours a day and throughout the whole year, with the

Organization Chart of Ports Operated by TCDD



exception of a few days. New computer system to cover all kinds of cargo-related activities is now being developed in Haydarpasa Port instead of the present one and TCDD plans to extend the system to the other TCDD ports.

(3) Port Finance

TCDD ports have suffered a loss since 1993 due to the increase of non-operating costs, however, the loss has decreased significantly. TDI ports got into the black in 1992 and total net income has increased steadily since then.

TCDD and TDI ports basically have the same tariffs which also apply to other public ports, while private port authority can set port tariffs according to the conditions of the port. In order to set and revise tariffs, the central government's approval is necessary. Individual port management bodies cannot change their charges flexibly according to local conditions.

(4) Present Problems regarding the Port Management and Operation

Empty containers are subject to custom clearance, which is one of the reasons for the long waiting time of containers in the Port. Even after joining the Customs Union, the customs law and legislation have not been changed in accordance with the European Customs regulations so far.

Gantry cranes and transfer cranes in Haydarpasa Port are quite old and often require maintenance, which causes the decrease of productivity in the port activity. Because of the lack of trucks available for operations in the Port, agencies have to hire trucks and workers for quick loading/unloading operations. Since tugs and pilots services are operated by TCDD and TDI respectively, insufficient linkage in the works of these services causes delay in the vessel schedule.

(5) Privatization in Turkey

The privatization program was initiated in 1983, and finally the new privatization law was enacted in 1994 upon formation of a political and social consensus. Since 1985 a total of 157 companies have been taken into the privatization portfolio. 113 companies of them were privatized either via sale of shares or asset sale since 1986 and total sales value of privatization implementations has amounted to about US\$3.1 billion since 1985.

(6) Privatization of the Ports

Eight ports, i.e. Antalya, Tekirdag, Trabzon, Rize, Ordu, Sinop, Giresun and Hopa ports, operated by TDI are now to be privatized according to the privatization program. The selection of the eight ports to be privatized is based on their cargo port characteristics, that is, cargo ports are generally more profitable than passenger ports. According to the Privatization Administration, the privatization of TCDD ports can probably be included in the plan in 1998.

(7) System of Port Development, Management and Operation

Present system of existing ports' development, management and operations is shown in Table. Existing public ports are planned, constructed, owned and operated by state owned enterprises, i.e. TCDD or TDI with the exception of the private operator companies in Tekirdag, Gulluk and Dikili Ports. Regarding the TDI Ports, after being privatized, operator and tug/pilot will be private companies.

System of Development, Management and Operation in Turkish Ports

		TCDD Ports	TDI Ports		TDI Ports after being Privatized		Private Ports
			Tekirdag, Gulluk, Dikili	Other Ports	Existing Facilities	Developed Facilities after Privatization	
Master Plan							
Construction	Breakwater				●*		
	Dredging		○				
	Reclamation						●
	Terminal				○		
Ownership			○				
Berthing Scheme			(Open)				
Operator		○	●	○			
Tug & Pilot		○ (TCDD & TDI)		○		●	○ & ●

○ Public ● Private

* Agreement with the Privatization Administration in cooperation with TDI is required.

3.4 Land Transportation

The road network in the Marmara region has a length of approximately 9,000 km. The motorway located in this area is Trans-European North-South Motorway, E80. The most congested section in the region in which average daily traffic value is 70,565 is Istanbul and Gebze. Sixteen percent of traffic is truck and trailer in the section. The number of vehicles passed the two bridges crossing the Bosphorus strait is some 280,000 car/day.

Only 3% of the total Turkish railway system are double line and 11% of total are electrified. The share of railway in freight transport was 8.0% in 1994.

3.5 Natural Conditions

(1) Geographic Conditions

The proposed port site is located in the military owned coastal area, in the north west coastal zone of the Sea of Marmara, approximately 15 km east of the city of Tekirdag which belongs to western Thrace region. The site is connected by a highway between Istanbul and Canakkale.

(2) Meteorological Conditions

The Sea of Marmara is under the influenced by the Mediterranean in summer and the north pole in winter. The climatic difference between the northern and southern portions in the Sea of Marmara is profound.

① Wind

According to the wind observation records from 1975 to 1984, predominant wind direction is from NNE and followed by NNW, WNW and SSE. The maximum wind velocity under occurrence return period of 50 years is estimated as 23.8m/sec from NE, 19.5m/sec from SSW , 18.0m/sec from S, 17.4m/sec from SSE.

As to the maximum wind velocity affecting the proposed port site, it is estimated as 19.5m/sec from SSW, 17.5m/sec from SSE under occurrence probability of 50 years and the maximum wind velocity is estimated as less than 14m/sec under occurrence probability of 1 year. On the other hand, the average wind velocity is recorded as 3.1m/sec at Tekirdag and maximum wind velocity is 28.9 m/sec from NNW(Feb) for the last thirty (30) to thirty

one (31) years.

② Earthquake

Turkey is classified into five (5) seismic zones. The active seismic zone in the Sea of Marmara spreads over an extensive area of zone two(2) in the Northern portion and zone one(1) in the Southern portion.

(3) Oceanographic Conditions

① Wave

Waves in the Sea of Marmara area are generally low (below 1.0m) The strongest winds influencing the proposed port site are from SW to SE direction. The occurrence probability is estimated as 2.7m for 5 years, 3.05m for 10 years, 3.84m for 25 years and, 4.17m for 50 years.

② Current

Due to the small amplitude of tide fluctuation, no significant current movement which could make maneuvering difficult exists. However, the prevailing directions of current are between west-northeast and northeast-east-southeast. The current velocities are relatively higher in these direction limits. The surface currents in the sea of Marmara are parallel to the shore with a mean velocity of 45 cm/sec, minimum velocity of 21 cm/sec and maximum velocity of 69 cm/sec.

③ Tide

Since the Sea of Marmara is located in between the straits of Istanbul and Cannakate, the Sea of Marmara is geographically a water passage system linking the Black Sea and the Aegean Sea. These two seas have a great influence on the Sea of Marmara. The region of the Sea of Marmara is affected by two district seasonal climatic regimes. The range of sea level movements depends largely upon local conditions, being much more marked in bays and inlets than in more open places, and occasionally as high as 30cm.

(4) Geological Conditions

① General Geology

The subsoil formation is mainly composed of yellow, brown, and gray colored layer mixed with medium-thickly bedded sandstone, silt stone and claystone alternations. Since 1997, 53 offshore borings were carried out and 10 onshore borings were carried out

in the proposed sites. According to the results, rock is found in comparatively shallow subsurface. Their boring logs are described below;

- Top layer is 0.4~8.1m thick loose-medium sand shell with SPT value of 9.
- Second layer underlying the top layer consists of stiff-very stiff yellow-gray sandy clay containing thin shells with SPT value of 12~23.
- Third layer underlying the second layer is 1.5~3.5m thick, medium dense, yellow-gray shelly sand with SPT value of 10~19.
- Fourth layer(bottom layer) is sandstone-clay stone in various weathered status, ranging from highly weathered, slightly weathered to fresh rocks.

3.6 Environmental Conditions

Marmara region as a whole has a size which is approximately equal to that of some European countries. Therefore it is difficult to compile scientifically and technically appropriate all the existing data and records within the limited period in meaningful way. However, main problems concern with air, water and soil pollution.

As an overall assessment, one can state that the environmental quality of the region is significantly deteriorated near the major settlement area including particularly the metropolitan area of Istanbul, Bursa and Izmit. In these areas, a series of environmental problems could be listed in terms of air, water and soil quality due to excessive urbanization.

Further, these parts of the region are also highly industrialized and exposed to environmental pollution originating from various different factories including sugar, cement, fertilizer, paper, leather and petrochemical plants. On the other hand, in particular the rural parts of Marmara region and Thrace, a relatively clean environment with quality parameters safely below the currently effective legal limits and guideline values is encountered.

Chapter 4 Master Plan for the Sea of Marmara

4.1 Framework

The framework contains three key factors. The first is future GDP growth rate of Turkey. The second is future trends of trade between EU and Turkey. The third is future GDP growth of East European countries and CIS.

(1)GDP of Turkey

Annual GDP growth rates and GDP level for three scenario are shown in Table.

Assumption of Future GDP Growth

Year (Period)		1995	1995-2000	2000	2000-2015	2015
High	rate level	1.000	6.60%	1.377	7.60%	4.132
Medium	rate level	1.000	5.80%	1.326	6.30%	3.315
Low	rate level	1.000	5.00%	1.276	5.00%	2.653

(2)Eastern Europe and CIS's Economy

Two cases were set with the expression of GDP growth. Smooth transition toward market economy are expected in the high growth case. On the other hand, in the second case, a lower growth rate is imaged because of the delay of the recovery of market reliability.

High growth case	GDP growth of E. Europe	5.0% over 1995-2015
	GDP growth of CIS	3.0% over 1995-2005 4.0% over 2005-2015
Low growth case	GDP growth of E. Europe	3.8% over 1995-2015
	GDP growth of CIS	1.5% over 1995-2015

(3)Relationship between Turkey and EU

In future, if the relationship between Turkey and EU would be strengthened

including full Turkish participation to EU, the coefficient of trade function might be shifted up. Two cases are set, one is the accelerated trade coefficient case and the other is low case. Turkey's coefficient of trade function to EU has been changed by 10% in export and 5.7% in import in the accelerated case.

(4) Industrial Development in Thrace Region

It is assumed that no heavy chemical industry is established within planned time span in the Thrace region. The future industrial plan in Thrace region by province shows various contributions to the whole industrial GDP of the province. In European Istanbul, the share of planned industry is small. But in Tekirdag and Edirne, these shares are high. These tendency is considered to be reflection of the government policy of the industrial decentralization.

Then according to this policy, with the synergistic effect induced by the new port, the share of industrial product in Istanbul is assumed to decrease gradually. And it is assumed that the share of industrial production in Istanbul, which is around 90 % at present, will decrease to 80 % in 2005 and 70% in 2015.

Since much of Turkey's foreign trade is with European countries and the share of trade by road is large, new industrial development such as FTZ in Thrace region will reduce the road traffic load crossing the Straits in comparison with development in Anatolia.

(5) Scenario for Framework

As scenario to forecast cargo volume, four(4) cases are selected, these are High case, Medium case (High), Medium case (Low) and Low case.

		Accelerated case		Low case	
Trade with EU		High growth case	Low growth case	High growth case	Low growth case
East Europe & CIS					
Turkish GDP	High growth	study			
	Medium growth	study	study		
	Low growth				study

4.2 Demand Forecast

(1) Methodology

Two difference methods are adopted for future port cargo volume forecast. Macroscopic method forecasts the total cargo volume as a whole by statistical correlation between the cargo volume and socio-economic indices such as GDP of the hinterland of the port and/or population and the past time trend. Microscopic method is a cumulative method forecasting the cargo volume based on the analysis of the patterns of major commodities individually (related indices, the forecast demand and supply situation). To forecast the total cargo volume of Turkey and whole Marmara sea ports, macroscopic method is conducted according to the four(4) scenarios. On the other hand, to forecast the cargo volume of Thrace region, both methods are conducted. Marmara sea ports hinterland is divided into four independent hinterland areas: Thrace area, Izmit area, Balikesir area and Canakkale area

(2) Forecast Cargo Volume

1) Turkey

In medium case (high), forecast Turkey cargo volume in 2005 and 2015 are as follows. Total cargo volume of 2005 and 2015 become 1.75 times and 3.1 times of 1995 respectively.

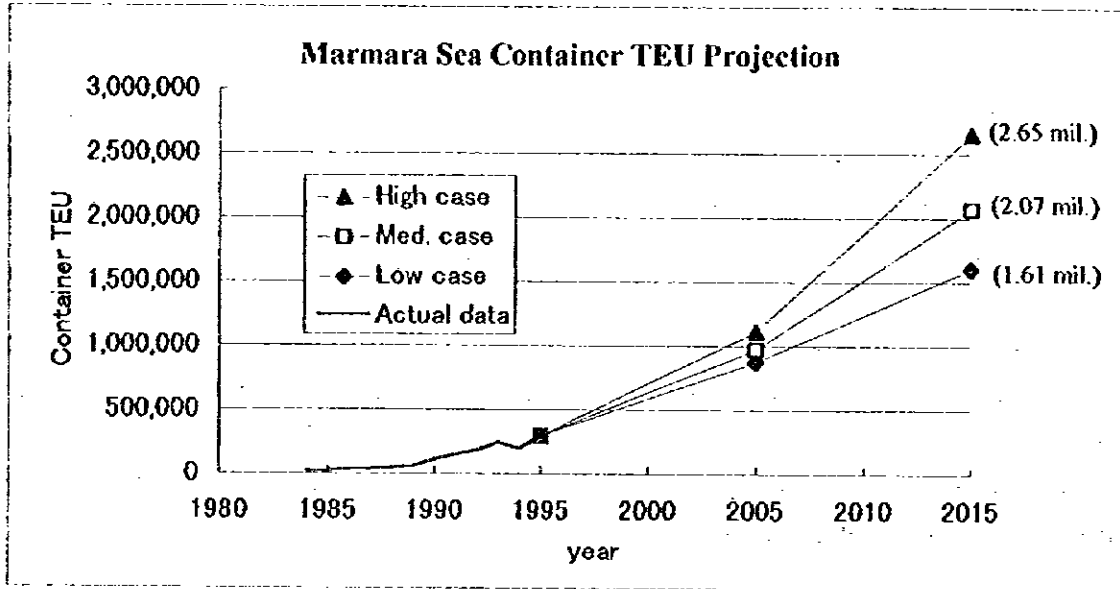
Cargo Volume of Turkey					unit : mil. ton	
year	Domestic cargo	Import cargo	Export cargo	Crude oil	Total cargo	
1995	31	42	20	25	119	
2005	58	74	40	35	207	
2015	107	133	82	44	366	

Note: Forecast volume in 2005 & 2015 are ones of Medium case(High).

2) Marmara Sea Ports

Forecast Marmara sea ports public cargo volume in 2005 and 2015 are as follows. Total cargo volume of 2005 and 2015 become 2.2 times and 4.1 times the 1994 level respectively. Total container cargo volume of 2005 and 2015 become 3.5 times and 7.0 times the 1995 level respectively and would certainly continue increasing after 2015 as long as the economic in the area would grow. Among the four economic growth scenarios, medium case(high) was chosen for cargo volume forecast of port planning, because the

case is appropriate from the latest economic growth and physical planning should have some room for extra demand.



year		Thrace	Izmit	Balikesir	Canakkale	Total
1994	Dry bulk	6,672	1,919	1,365	297	10,253
	Liquid bulk	1	574	59	0	634
	General cargo	849	3,308	597	126	4,880
	Total	7,522	5,801	2,021	423	15,767
2005	Dry bulk	9,921	7,183	2,676	420	20,200
	Liquid bulk	3	919	78	0	1,000
	General cargo	3,523	8,357	962	158	13,000
	Total	13,447	16,459	3,716	578	34,200
	Container('000TEU)	274	633	60	10	977
2015	Dry bulk	16,454	13,802	5,132	712	36,100
	Liquid bulk	3	919	78	0	1,000
	General cargo	7,498	18,000	2,094	308	27,900
	Total	23,955	32,721	7,304	1,020	65,000
	Container('000TEU)	580	1,342	127	20	2,069

Note: Forecast volume in 2005 & 2015 are ones of Medium case(High).

3) Thrace Region

Forecast cargo volume of Thrace region in 2005 and 2015 are shown in following Tables. Demand of dry bulk cargo volume will continuously increase, but liquid bulk cargo volume will maintain the same level of 1995.

Forecast Cargo Volume in Thrace by Cargo Type

Cargo Type		2005	2015
Dry Bulk (‘000 ton)	Domestic	5,794	11,422
	International	2,925	4,525
	Total	8,719	15,947
Liquid Bulk (‘000 ton)	Domestic	30	30
	International	162	162
	Total	192	192
Non Container General (‘000 ton)	Domestic	367	479
	International	944	1,644
	Total	1,311	2,122
Container (‘000 TEU)	Domestic	16	43
	International	256	537
	Total	272	580

4.3 Cargo Handling Capacity

Result of comparison of cargo demand of the Sea of Marmara in 2015 and improved cargo handling capacity is as follows.

At Izmit area, container cargo will be handled at Haydarpaşa, Derince, Gemlik (GEMPORT), and other private ports such as BELEDE and SEDEF. Haydarpaşa port has an improvement plan of container terminal to increase maximum storage capacity up to 11,000 TEU and purchase new container handling equipment such as two gantry cranes, seven transfer cranes and three reach stackers. Container handling capacity will be about 300,000 TEUs. Derince port is planning to construct a container berth in 1997 between RO/RO berth and No. 6 berth. This new container berth and existing RO/RO berth will be utilized to handle container cargo, if the railway elimination at the backyard of the berth goes well and the necessary container yard space can be secured. In addition to these berth, new container terminal is planned to be constructed to handle the further demand. Shortage of container handling capacity is about 433,000 TEU. This amount shall be handled by the new container terminal built at Derince.

This figure has been derived from arithmetic evaluation of ideal capacities that are expected to be provided by the private sector and through ongoing construction work of TCDD in existing Derince and hayderpaşa ports.

Of course the above computed shortage of container handling capacity will be higher, if the assumed capacities will not be achieved due to inadequate container stacking

yard and delays in timely implementation of the facilities and provision of necessary equipment in the ongoing construction work.

On the other hand, the realization of a new modern container terminal with deeper and longer berths and sufficient stacking area providing highway and railway access to hinterland is expected to rapidly increase container traffic in Izmit region, since Turkish coastlines will be providing main port service to large vessels instead of giving feeder service by multipurpose or conventional facilities.

Thus attention needs to be paid to capacity requirement and time of implementation for Derince new container port.

At Thrace area, container handling capacity of existing port is about 50,000 TEU. Shortage of container handling capacity is about 638,000 TEU including transshipment containers. This amount shall be handled by the new container terminal in the New port. There is a large cargo demand for dry bulk cargo. Dry bulk cargo shall be handled by existing ports and also the New port.

At Balkesir area, Bandirma port will handle all demand of this area including container cargo utilizing the new container terminal and extended berth for bulk cargo.

At Canakkale area, Gelibolu port and Canakkale port can handle all demand of this area.

Cargo handling capacity and cargo demand in year 2015 is summarized as follows.

Improved Cargo Handling Capacity and Cargo Demand in Year 2015

Hinterland		General	Non Container	Dry	Liquid
		Container			
		1,000 TEU	1,000 ton	1,000 ton	1,000 ton
Thrace	Capacity('96)	50	1,752	11,882	60
	Capacity	770	2,008	17,380	60
	Demand	688	1,807	16,454	3
	Difference	82	201	927	57
Izmit	Capacity('96)	453	6,296	7,735	460
	Capacity	2,110	6,029	14,061	1,307
	Demand	1,342	4,150	13,802	919
	Difference	768	1,879	258	388
Balkesir	Capacity('96)	0	1,005	5,348	350
	Capacity	142	486	6,168	350
	Demand	127	478	5,132	78
	Difference	15	8	1,036	272
Canakkale	Capacity('96)	0	86	150	0
	Capacity	30	138	841	0
	Demand	20	104	712	0
	Difference	10	34	129	0
Total	Capacity	3,052	8,662	38,450	1,717
	Demand	2,178	6,540	36,100	1,000

4.4 Basic Concept of Coastal Development

The area surrounding the Sea of Marmara accounts for 10% of Turkey's total land area, 17% of its coastline, 25% of its population, 30% of its public investment, 40% of Gross Domestic Product and 42% of cargo handling volume at ports. Obviously the Marmara region has great potential in terms of maritime utilization.

According to the international transportation environment and the Marmara area's demand forecast, the Sea of Marmara will still be an important intersection of international traffic. The cargo volume handled in the ports at the Sea of Marmara will increase by about four times in comparison with that in 1995. The traffic volume passing through the Sea of Marmara is estimated to double.

Coastal development direction of the Sea of Marmara is to control industrial development in the Istanbul and Kocaeli area, to decentralize industrial function along the coast of the Sea of Marmara and to preserve the coastal environment, so as to maintain sustainable development in the Sea of Marmara

The priority of land transportation development has been shifting from spoke-like networking to circle-like, and "Marmara corridor" will be formulated in the 21st century. In future, strengthening of the route between Istanbul and Tekirdag on the northern coast, widening of the route between Istanbul and Izmit, and strengthening of the route between Izmit and Bursa will proceed.

4.5 Necessity of New Port

Based on projected cargo demand, cargo handling capacity in the Thrace region will not be sufficient for the cargo volume in 2015. Container cargo volume of approximately 638,000TEU, general cargo volume of 230,000 tons and dry bulk cargo volume of 5,223,000 tons will exceed the capacity of ports in the Thrace region.

To handle the above volume of cargo, it is necessary to increase the capacity of ports in the Thrace region. A simple extension of the existing port will not be enough to deal with the forecast cargo. A new commercial port to mainly handle container and bulk cargo should be constructed in the Thrace region by 2015.

4.6 Site Selection for New Port

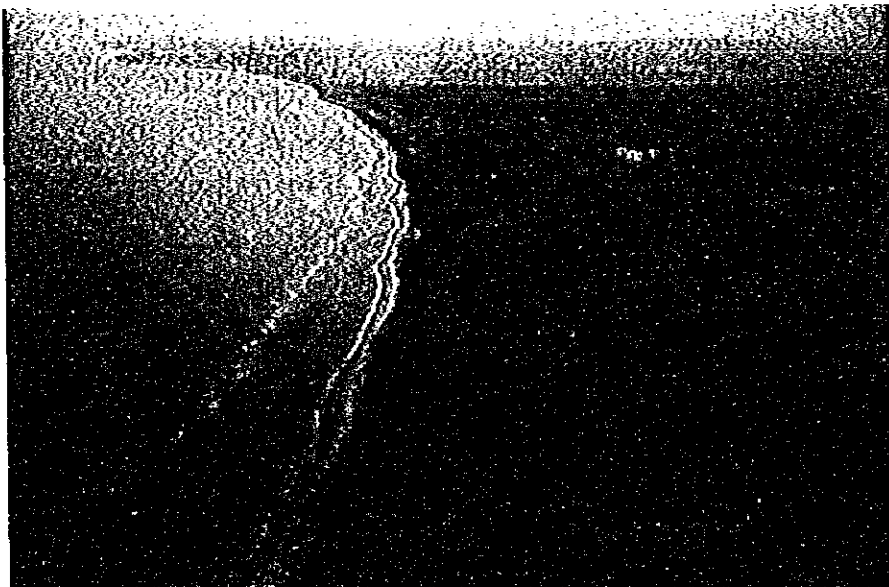
First of all, without new port construction in Thrace region or extension of Tekirdag port, there would be serious traffic congestion on the roads surrounding the ports in Istanbul and Izmit area by tracks transporting cargo to Hyadarpasa port, Derince port or private ports in the Izmit Bay.

Generally, keeping economical effect of accumulated industrial infrastructure in city of Istanbul and Kocaeli region, the decentralization of industrial infrastructure to the outskirts of the Sea of Marmara should be accelerated to remove the negative effects of centralization.

Two proposed sites in Thrace region, namely Tekirdag Port and Military Owned Coastal Area were examined from various points of view as a site for a new port construction.

Tekirdag Port is inferior to Military Owned Coastal Area in terms of space for a new port, room for future extension, environmental affect and removal for access road. Therefore, Military Owned Coastal Area is superior as a site for the new port in the Thrace region. It is important to secure room for port expansion after 2015 in Military Owned Coastal Area.

Aerial Photo of Site



4.7 Long Term Marmara Port Development

Principle for arrangement of container terminals in the Sea of Marmara is as follows;

Principle for Container Terminal Arrangement

Hinterland (Region)	Container Demand in 2015	Principle for Arrangement of Container Terminal
Thrace	688,000TEU	-Construction of a new container port -Practical use of an existing private port
Izmit	1,342,000TEU	-Improvement of Haydarpaşa port -Practical use of existing and under-construction private ports -Construction of Derince new container terminal
Balkesir	127,000TEU	-Improvement at the depth of Bandırma port
Canakkale	20,000TEU	-Use of new pier of Canakkale port

Since container demand will definitely increase after the year 2015 and container cargo will be important for port operation, sufficient room for expansion should be kept arranging the container terminal.

Based on the conceptual zoning plan and above principle for container terminal arrangement, principles for each port development are shown in Table.

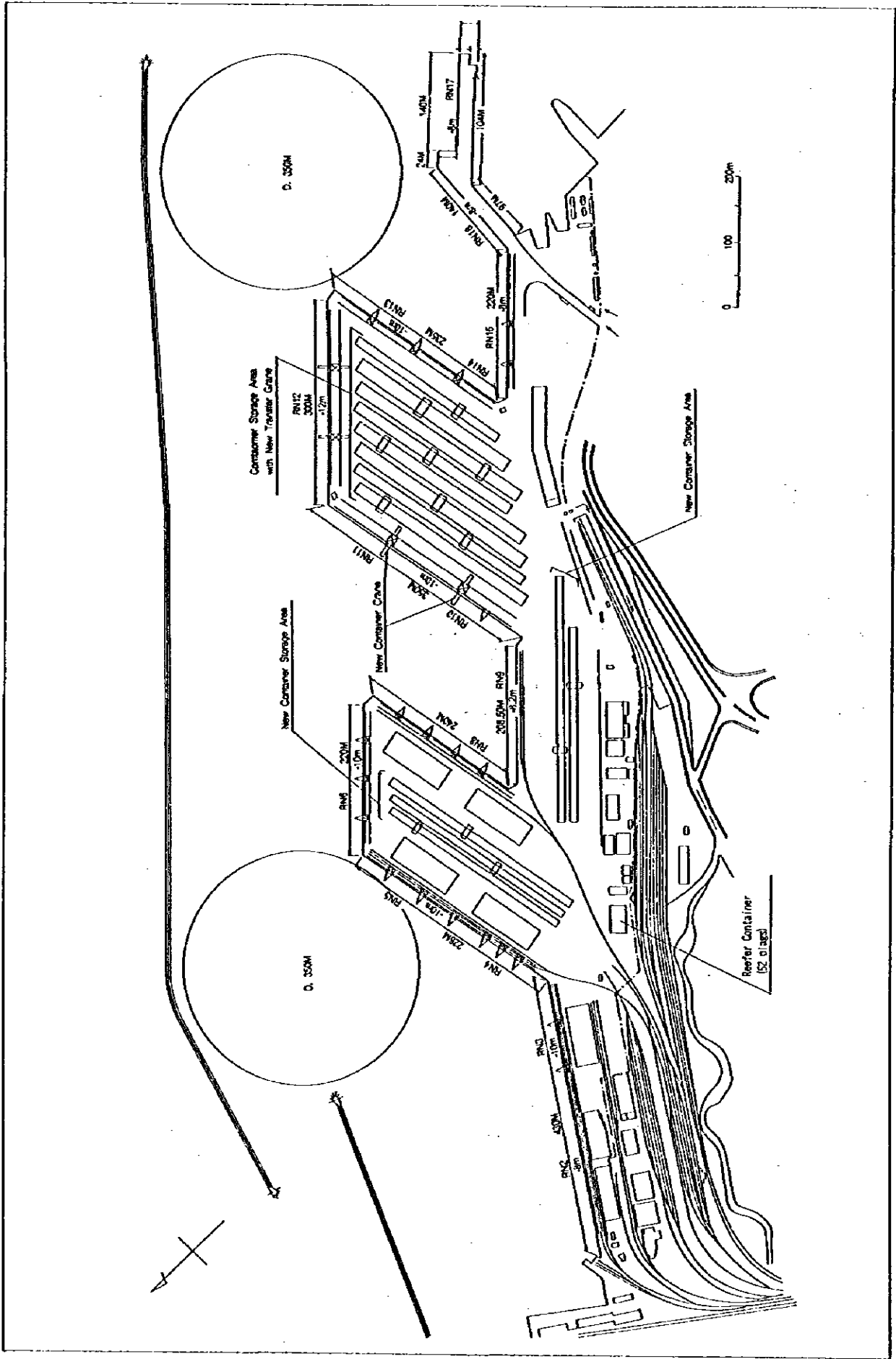
According to the annual growth of cargo volume, container cargo volume will increase remarkably. On the other hand, container cargo demand for Marmara region exceeds the capacity of ports in the Sea of Marmara. The most urgent matter is to increase container cargo handling capacity. Therefore, priority should be given to the followings:

- (1) Improvement of Haydarpaşa container terminal
- (2) Construction of new container port in Thrace region
- (3) Conversion to container terminal at Bandırma port

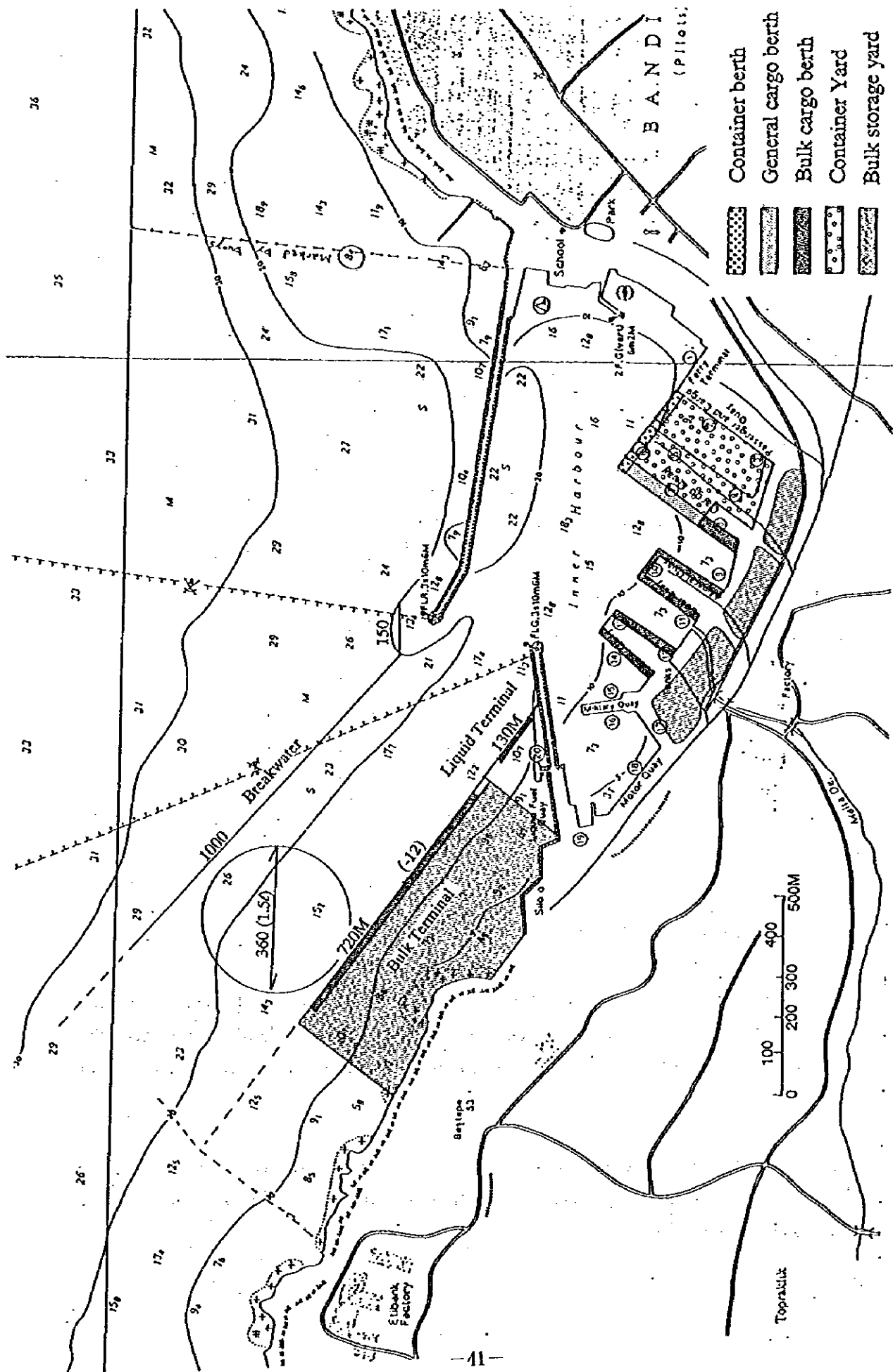
Improvement layout plan of Haydarpaşa container terminal and conversion layout plan to container terminal at Bandırma port are shown in Figures.

Principle for Each Port Development

PORT	Principle for Port Development
1.Haydarpasa	-Advanced International Port (Container, RO/RO, General cargo, International & Domestic Passenger Terminal) -Restructuring port facilities(Expansion of container yard, Improvement of Passenger Terminal)
2.Derince	-Commercial Port (Container, General & Bulk cargo) -Construction of New container terminal & Enhancement of existing facilities
3.Gemlik	-Commercial Port(Efficient Operation, Gradual improvement of Gemport)
4.Mudanya	-Regional main port & Supplementary port of Gemport -Enhancement of Facilities for Recreation
5.Bandırma	-Commercial Port(Core port for bulk cargo in the south) -Construction of Container Terminal and Bulk Terminal -Development of land transportation network
6.Gelibolu	-Regional main port(Regional cargo & Domestic Passenger)
7.Canakkale	-Commercial Port(Regional cargo & International and Domestic Passenger) -Completion of Sub-port
8.Tekirdag	-Commercial Port(Regional cargo)
9.Ambarlı	-Commercial Port(Core port for bulk cargo in the north & General cargo/Container cargo) -Completion of Port
10.Istanbul	-Restructuring Waterfront(International & Domestic Passenger Terminal, Ferry Terminal, Park & Restaurants)



Haydarpara Port Development Plan



Bandirma Port Development Plan