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No. 102

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF DEVELOPMENT,
NEW COMMUNITIES, HOUSING AND PUBLIC UTILITIES
ARAB REPUBLIC OF EGYPT

THE URGENT DEVELOPMENT PLAN
OF
THE SUEZ BAY COASTAL AREA DEVELOPMENT

DETAILED DESIGN STUDY

SUMMARY REPORT

NOVEMBER, 1993

PACIFIC CONSULTANTS INTERNATIONAL
OCEAN CONSULTANT, JAPAN CO., LTD.

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PREFACE

In response to a request from the Government of the Arab Republic of Egypt, the Government of Japan decided to conduct a Detailed Design Study on the Urgent Development Plan of the Suez Bay Coastal Area Development in Egypt and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Egypt a study team five times between March 1992 and November 1993, which was headed by Mr. Kazunari Makino, Advisor of Pacific Consultants International (PCI) and was composed of the staff members of PCI and Ocean Consultant Japan Co., Ltd.

The team conducted field surveys at the study area, and held discussions with officials concerned of the Government of Egypt and other public agencies. 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 enhance of friendly relations between out two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Arab Republic of Egypt and other public organizations for the close cooperation extended to the team.

November 1993

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency

November 1993

Mr. Kensuke Yanagiya
President
Japan International Cooperation Agency
Tokyo, Japan

Dear Mr. Yanagiya,

Letter of Transmittal

We are pleased to submit to you the Final Report on the Urgent Development Plan of the Suez Bay Coastal Area Development Project in the Arab Republic of Egypt. The reports contain the results of the detailed design study carried out and the Tender Documents for the Project in accordance with the contract entered into with your Japan International Cooperation Agency (JICA), by Pacific Consultants International in collaboration with Ocean Consultant, Japan Co., Ltd.

The study team conducted the field surveys five times at site during the period from March 1992 to November 1993. The results of the field surveys and of the studies made in Japan were fully discussed and exchanged views with the organizations concerned of the Government of Egypt, and the study team prepared the Tender Documents on various facilities and infrastructure for proposed construction of the industrial complex at Ataqa and Adabiya areas, the outcomes of which were compiled in this report.

Taking this opportunity, we wish to express our sincere appreciation to the Ministry of Development, New Communities, Housing and Public Utilities and other organizations concerned of the Government of Arab Republic of Egypt for their close cooperation and assistance rendered to us during our stay in Egypt. And furthermore, our appreciation must also to go your Agency the Ministry of Foreign Affairs, the Ministry of Transport and the Japanese Embassy in Egypt and JICA Egypt office for their valuable advice and support extended to us.

Yours faithfully,

Kazunari Makino
Team Leader

The Suez Bay Coastal Area Development Study Team

Arab Republic of Egypt

The Urgent Development Plan

of

The Suez Bay Coastal Area Development

Summary Report

Contents

SUMMARY

The Japanese Government, in response to the request of the Egyptian Government, made a decision to carry out a follow-up study relevant to the Ataqa - Adabiya Short Term Development Plan included in the Suez Bay Coastal Area Development Study (hereinafter called Master Plan) which was completed in August 1986, after which the Japan International Cooperation Agency (JICA) implemented its study in 1989.

The Short Term Development Plan was re-analyzed and re-evaluated by the follow-up study conducted by the JICA experts, by which the Egyptian Government was recommended to implement it under the name of an Urgent Development Study. Following this, the Egyptian Government made a request to the Japanese Government to implement the detailed design study of the project.

Based on this request, the Japanese Government made a decision to perform the Urgent Development Plan of the Suez Bay Coastal Area Development Study consisting of the preparation of the detailed design and tender documents for the international competitive tendering which were necessary for the construction project, and JICA implemented its design study during the period from March 1992 to October 1993.

The location plan for the Short Term Development Plan of the Suez Bay Coastal Area Development Study implemented by JICA in 1986 was revised and a new location plan was prepared taking into account the recent economic conditions in Egypt as well as the current situations of land use in the project area.
The main change made, among others, in the plan was such that the Adabiya Industrial Freezone originally scheduled to be built in Adabiya was shifted to the place where adjacent to the Ataqa Industrial Estate.

Based on this new Master Plan, the Detailed Design Study was carried out on the following infrastructure/ facilities relevant to the industrial complex:

Roads
- Widening and improvement of 10.3 km section of the existing Suez - Adabiya Road;
- New construction of roads for access to the industrial complex and within the complex;

Water Treatment Facilities
- Water intake pump station (Capacity 100,000 t/day).
- Aqueduct (Lineal metre, approx. 20 km);
- Treatment facility (Capacity 100,000 t/day);
- Water distribution lines;
- Draw-off water distribution lines for watering the plantation in Green-belt, utility zone in Ataqa Industrial Estate, medians and streets;

Wastewater Treatment Facilities

- Wastewater treatment plant (Capacity 55,800 t/day);
- Wastewater collection pipelines;
- Sewer pipelines and sewer relay pump stations from the residential area to U.S. Aid sewerage plant;

Grain Silo Terminal

- Handling quantity of grain products: 1,800,000 t/year;
- Grain berth: One (1) berth 300 m, depth of water C.D. -15 m
- Magnitude of vessels for berthing: 80,000 DWT
- Grain silo and mechanical tower:
  Silo storage capacity: 100,000 t
- Administration building, workshop, etc.

Bulk Cargo Terminal

- Proposed handling quantity of bulk cargo: 767,000 t/year;
- Bulk cargo berth:
  Two (2) berthes 420 m, Depth of Water C.D -13 m;

The berth can accommodate the following vessels:

- Cargo ship : 2 x 20,000 DWT,
- Container ship : 1 x 20,000 DWT,
- Container ship : 2 x 15,000 DWT,

- Incinerator : One (1) set
- Bulk cargo yard, concrete pavement : 24,000 m²
- Administration building, watching tower, etc.

Small BoatBasin

- 5 berths 270 m, depth of water C.D. -5 m

Tugboat

- 32 ton tugboat, One (1)
- 36 ton tugboat, Two (2)

Radar System

- For use within the ports of Ataqa, Adabiya and Ibrahim

Railway

- Transport quantity: 1,260,000 t/year;
- Loading line, marshaling line, connecting line and various provisions thereof.
- Signaling system and telecommunications.

Building Works in Centre Area

- Centre "A" (Ataqa coastal Industrial Estate)

- Centre "B" (Ataqa Industrial Estate)
- Centre "C" (Adabiya Freezone)
- The Centre Areas include various facilities, such as administration Bldg., Police Station, Fire Station, Mosque, Medical Clinic, Restaurant, Social Club, Post Office, Custom House, Substation facilities, etc.

Power Supply Network and Road Lightning

- 66 kV power supply lines routes and conduits
- 22 kV power supply lines and conduits
- Local Substation (Water Treatment Plant, Wastewater Treatment Plant, Water Intake Plant, Grain Terminal, Cargo Terminal, Railway, Centre "A", Centre "B", and Centre "C")
- Unit Substations
- Road lightning
- Telephone conduits

Grain Cargo Handling Equipment

- Grain unloaders : 2 units, 650 t/hr/unit

Incidentally, the detail design for relocation of high voltage wires, substations for 220/66 kV and 60/22 kV, supply and wastewater drainage pipe lines in the residential area is to be carried out by the Egypt side, therefore, the design preparation was excluded.

Environmental Impact Analysis Study included in the Detailed Design Study was carried out on the following two main points:

(1) Impacts to the sea water quality by the proposed wastewater treatment plant.
(2) Impacts to the ambient air quality by the proposed industrial complex.

In order to achieve these two study objectives, in the first place, the current conditions at the proposed project site and its neighborhood area were investigated, and the probable environmental impacts to be caused by the development plan were predicted and evaluated.

The results of this investigation revealed that the impacts to the sea water quality by the proposed wastewater treatment plant would be very limited. On one hand, it disclosed that the impacts to the ambient air quality by the proposed industrial complex indicate high concentration of SO_2 in the proposed residential area next to and located south of the industrial complex would suffer the deterioration of air quality as for SO_2 to some extent. The use of the natural gas containing a less sulfurous ingredient as fuel in the industrial complex would be one of the countermeasures.

In implementing this project, the whole project is divided into eleven (11) Work Components from A1 to A11 and three (3) procurement contracts from B1 to B3 (Unloaders, Tugboats and Radar System). And furthermore, the Tender Documents comprise (1) Instructions to Tenderers, (2) General Conditions of Contract (Civil and Building Works), (3) Special Specifications, (4) General Specifications (Civil & Building Works), (5) Bill of Quantities, (6) Design Drawings and, (7) Procurement Contract Documents; totaling 12 different kinds of documents were prepared.

The project cost estimate was prepared by deviding it into two parts, that is, the local currency components (Egyptian Pound) and the foreign currency components (U.S. Dollar) based on the prevailing market prices in 1993. The estimated project cost is L.E 482,900,000 and U.S$ 215,800,000. The project implementation period is expected to be seven (7) years including one (1) year for tenderings, commencing in July 1994.

Chapter 1 Introduction

CHAPTER 1 INTRODUCTION

The Government of the Arab Republic of Egypt established the Second 5 year Social and Economic Development Plan (86/87-91/92), and has paid a persistent effort to improve the foreign exchange receipts and to decentralize the increasing population and industries from such major metropolitan areas as Cairo and Alexandria to local districts as far as possible.

The Egyptian Government put forward a request to the Japanese Government, in relation with the Development Plan, to set up a "Suez Bay Coastal Area Development Programme" in order to reconstruct the devastated Suez region caused by the war broke out in 1967 and furthermore, to help develop the region to a large city having the population as many as one million in 2000.

In response to this request, the Japan International Cooperation Agency (JICA) implemented by 1986 the Suez Bay Coastal Area Development Study and worked out a Master Plan and carried out a Feasibility Study pertaining to the Short Term Development Plan for the Ataqa Commercial Port, Ataqa Industrial Estate, Adabiya Industrial Freezone, etc. in view of the Master Plan and according to the priority of the terms of the implementation.

Following this Study, JICA conducted a follow-up study in 1988 including the review of the Study and consequently, made a recommendation to implement the Urgent Development Plan for construction of the Ataqa Commercial Port, Ataqa Industrial Estate and Adabiya Industrial Freezone. After the completion of this Study, the construction of the Ataqa Fishery Port was carried out during the period of 1989 and February 1993 on grant aid basis rendered by the Japanese Government.

In addition, the Egyptian Government made a request to the Japanese Government in June 1991 to carry out the detailed design study on various facilities and infrastructure which are requisite of constructing the Ataqa Commercial Port, Ataqa Industrial Estate and Adabiya Industrial Freezone.

This Detailed Design Study was implemented in conformity with the request, and the project was comprised of the detailed engineering design for the construction of various facilities and infrastructure and the preparation of a complete set of the tender documents to call for international competitive tenders.

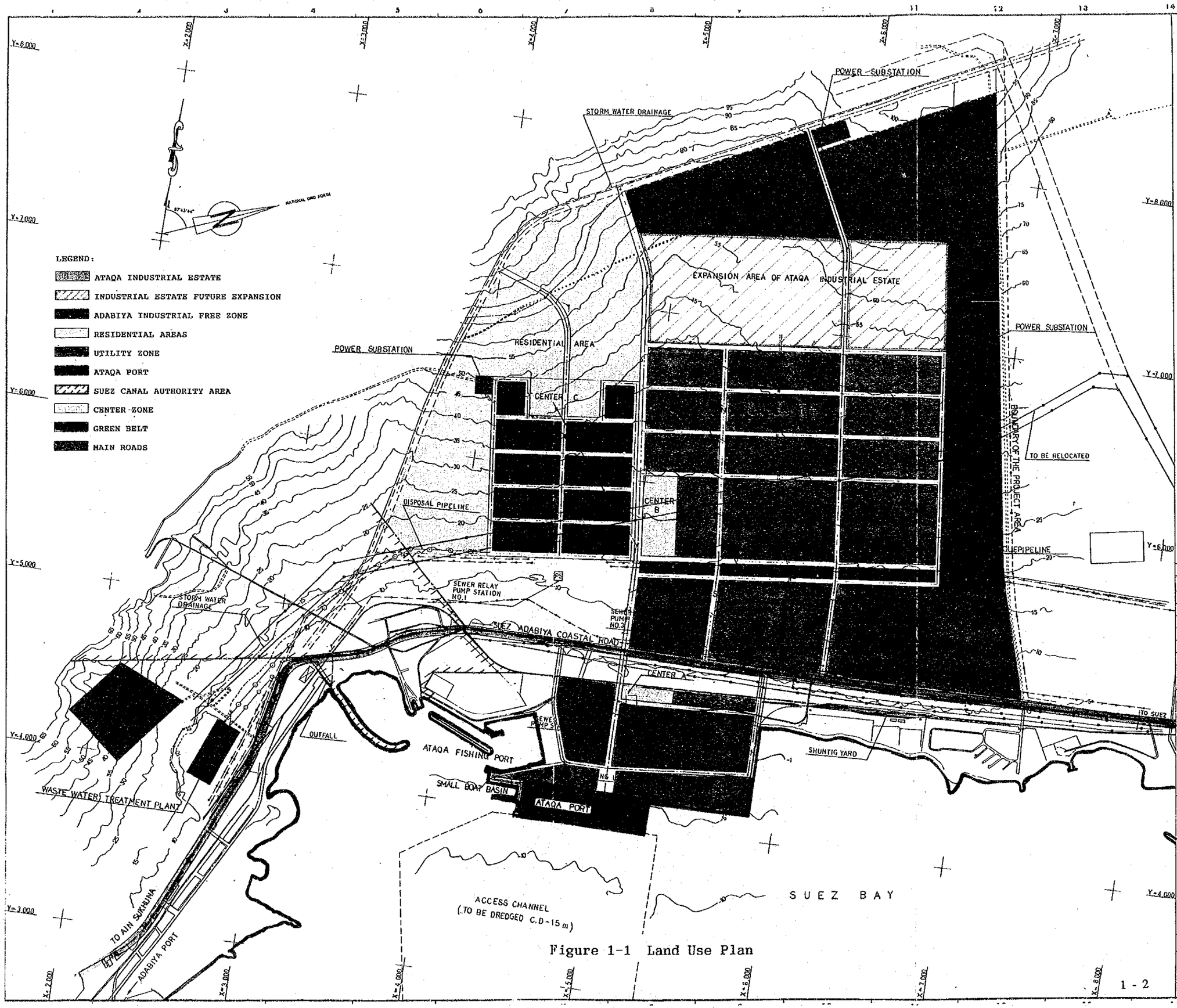

Figure 1-1 Land Use Plan

GENERAL NOTES

L E G E N D

EXISTING FACILITIES

- RAILWAY
- ASPHALT ROAD
- TRACK
- TELEPHONE LINE
- POWER TRANS LINE
- EMBEDDED PIPE LINE

DESCRIPTIONS	DWG. NO.
REFERENCE DRAWINGS	

NO.	DATE	DESCRIPTIONS	BY	APP'D
REVISIONS				

ARAB REPUBLIC OF EGYPT

MINISTRY OF DEVELOPMENT,
NEW COMMUNITIES, HOUSING AND PUBLIC UTILITIES

THE DETAILED DESIGN ON THE URGENT DEVELOPMENT PLAN
OF
THE SUEZ BAY COASTAL AREA DEVELOPMENT

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

SUBMITTED	APPROVED	SCALE	REV. NO.
		1 : 10,000	
DATE March 1993		DWG. NO.	

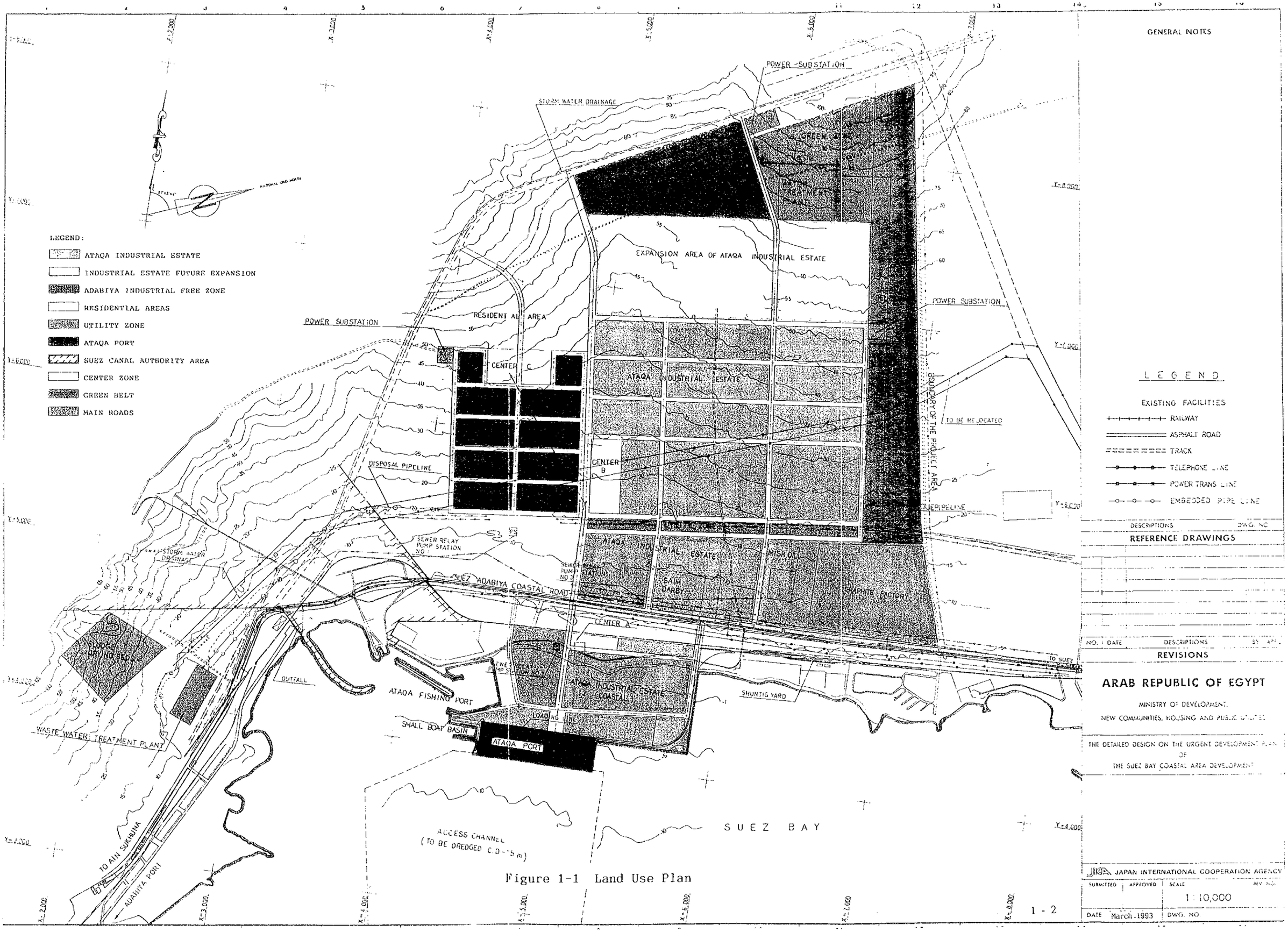

Figure 1-1 Land Use Plan

Chapter 2 Industrial Development

CHAPTER 2 INDUSTRIAL DEVELOPMENT

2.1 OVERVIEW OF THE CURRENT EGYPTIAN ECONOMY

Almost 6 years have passed since a Master Plan and a Short Term Development Plan of Suez Bay Coastal Area were prepared by the JICA Study Team. During the period, the Egyptian economy has achieved annual growth rate in the range of around 4 - 6 %. However when the Gulf War broke out in 1990, the country had to face various difficulties such as a sudden rise of unemployment accompanied by sharp decrease of foreign exchange receipts due to the mass return of overseas Egyptian workers, decreased numbers of foreign tourists as well as ships passing through the Canal.

Therefore the trend of growth began to decline and it is likely to become difficult to achieve the national target rate of 5.3 % set under the Second 5 Year Social and Economic Development Plan (86/87 - 91/92). Under these circumstances, the government considers seriously the increased number of unemployment as an important issue and has paid utmost efforts in opening new labor export markets in other neighboring countries and to create more job opportunities through prioritization of the government housing construction programs.

Another important policy issue is the economic reform from the traditional planned economy to the market economy. The government has implemented her reform policies such as liberalization of foreign exchange rate and interest, promotion of privatization in the economic activities and reduction and abolishment of the various subsidies according to the schedule. These efforts in the transitional period always accompany more or less pains but will definitely revitalize and enhance her economy with better results in the long run.

2.2 NATIONAL POLICIES FOR INDUSTRIALIZATION

The industrial sector contributed 17.7 % of the GDP and 14.1 % of employment in 1988/89. The current major industrial policies area; (1) Increase production of such commodities as iron and steel, ceramics and cement, paper, fertilizer, spinning and weaving and petroleum, (2) Coordination between heavy industries of basic material groups and light industries of consumer products groups to secure self-sufficiency, to reduce imports and to increase manufactured export, (3) Privatization of economic activities, (4) Cancellation negative lists for industrial license except for production of military hardware.

2.3 INVESTMENT PROMOTION POLICIES

A new investment law was promulgated as No. 230 of 1989 which incorporated and amended the previous Law No. 43 of 1974 (Investment of Arab and Foreign Funds and Free Zones) and Law No. 159 of 1981 (Law on Joint Stock Companies, Partnership Limited by Shares and Limited

Liability Companies). The features of the new law are; (1) Unrestricted ownership of investment capital, (2) No discrimination with regard to privileges granted under the Law, (3) Right of acquisition of land and real estate, (4) No control of price and profit and other tax incentives.

2.4 DEMOGRAPHIC CHANGES

While the national growth rate of population during the period under review was 2.5 % per annum, Suez City recorded 5.1 % growth rate which is more than double the national growth rate. The population share of the urban governorates of Cairo, Alexandria, Port Said and Suez has decreased by one point. However the population of the Greater Cairo (Cairo City, Giza City, Markaz El-Giza and Shobra El-Khiema City) is still growing with annual increase of 200 thousand. To cope with the various urban problems in the Greater Cairo, Suez is expected more to play a vital role to help control and release these population pressures to the Greater Cairo.

2.5 CHANGES IN THE PHYSICAL SETTINGS OF SUEZ - ATAQA - ADABIYA

There has been impressive achievements in reconstruction and development and an image of the war damaged city almost disappeared. A number of development have taken place within the area planned in the previous study and it becomes necessary to review the previous plans to a large extent. Such projects are either built and or under construction as utility facilities of the Suez City sewage treatment plant in Ataqa, an additional installation of the power transmission lines, transportation facilities of Adabiya - Cairo Diversion Road, Ataqa Fishery Port, additional berths at Adabiya Port, new location of the Adabiya Port Management Office Building, an extension of Adabiya Naval Base, Edible Oil and Graphite Factories and a Gas Station.

2.6 LOCATION AND LAND USE PLAN

Taking into consideration these changes, the Steering Committee of the MODANC and the Study Team mutually confirmed the premises of reviewing. Then the Study Team initially developed 4 alternative location and land use plans and evaluated from development costs, land use efficiency, revenue, attraction to investors as well as to the surrounding communities and degree of easiness in coordination with the concerned agencies, which resulted in formulation of No. 5 plan approved in principle by the MODANC on September 10, 1992. Then in the course of basic design and detail design, some minor modifications were made and finally approved by the MODANC as shown in Figure 2.1. Changes in land use of Ataqa Industrial Estate and Adabiya Industrial Free Zone are as follows:

(1) ATAQA INDUSTRIAL ESTATE

	Previous Plan	Plan reviewed
Gross Area	400 ha	432 ha
Factory Lot Area	310	347
Utilities	15	15
Common Facilities	13	11
Road and Others	62	59

(2) ADABIYA INDUSTRIAL FREE ZONE

	Previous Plan	Plan reviewed
Gross Area	82	84
Factory Lot Area	52	56
Utilities	1	-
Common Facilities	7	7
Road and Others	22	21

Types of Industry Likely to be Located and its Model Zone.

An attempt was made to identify the types of industry which are likely to be located through analysis of the data of the enterprises located in the 7 New Communities developed by the MODANC, trend of national industrial production in the past 5 years, trend of foreign trade, national policies for industrialization and investment, the data of some selected export processing zone in South East Asia and locational features of Ataqa and Adabiya. The results are shown below and Figure 2.2.

Broad Class	Medium Class	Characteristics
Consumer related Industries	flour milling, sugar refining, wood prod. furniture, textiles apparels, leather goods toys	coastal/imported materials labor intensive
Basic Material Industries	plastic, rubber, paper products, iron, steel ceramics, cement, fertilizer chemicals	coastal/imported materials local materials
Engineering and Assembly Industries	electric & electronic, appliances, transportation machinery & equipment	labor & market accessibility

Assumed planning frameworks are as follows:

(1) ATAQA INDUSTRIAL ESTATE

	Previous Plan	Plan reviewed
Number of Factories	70	380
Number of Employment	14,000	22,000
Investment	-	EL1296 million
Production	EL203 million	EL1272 million
Water	40,300 tonspd	40,000 tonspd

(2) ADABIYA INDUSTRIAL FREE ZONE

	Previous Plan	Plan reviewed
Number of Factories	40	380
Number of Employment	6,600	12,000
Investment	-	EL700 million
Production	EL76 million	EL820 million
Water	2,500 tonspd	6,700 tonspd

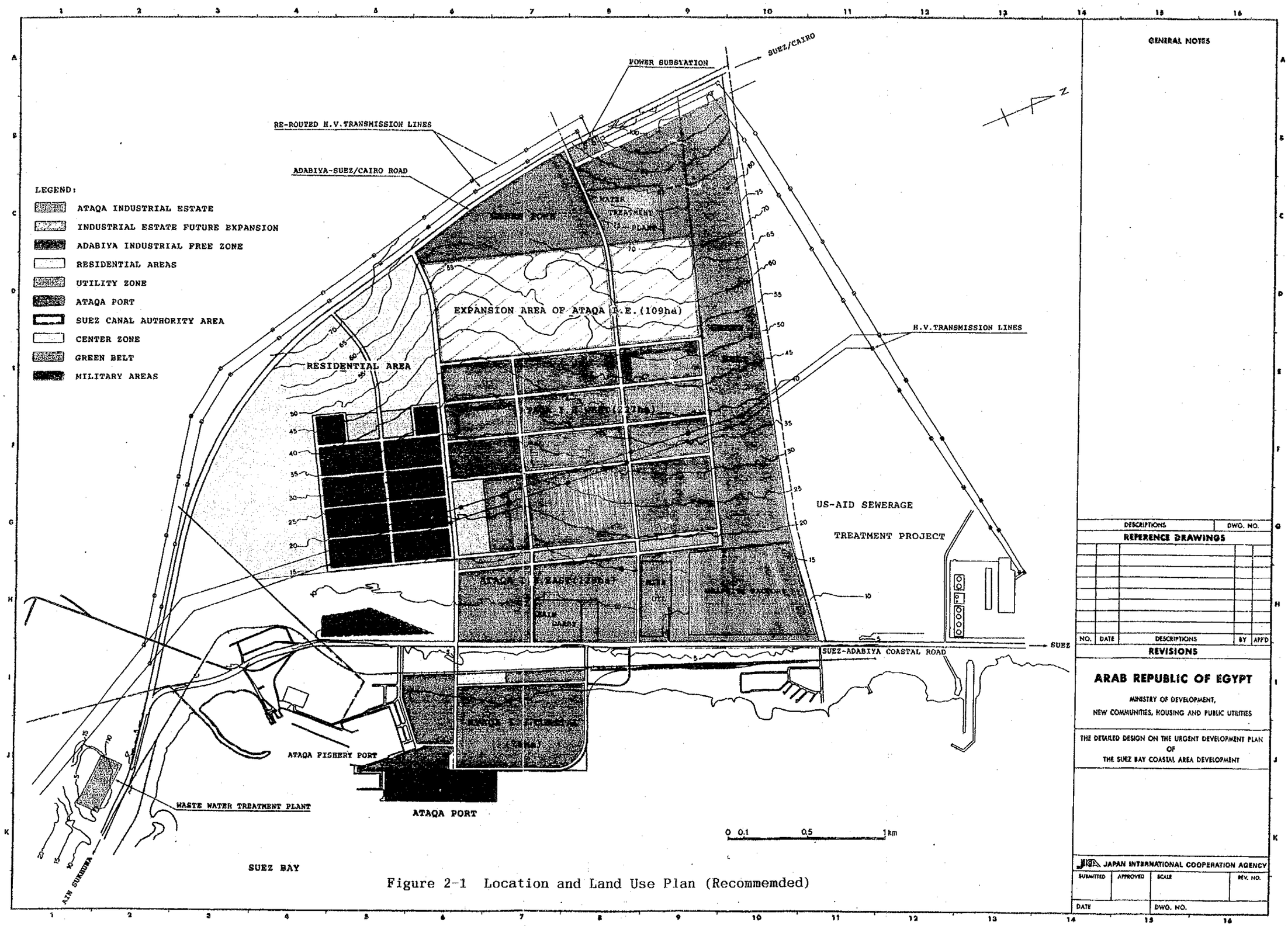

Figure 2-1 Location and Land Use Plan (Recommemded)

GENERAL NOTES

DESCRIPTIONS	DWG. NO.
REFERENCE DRAWINGS	

NO.	DATE	DESCRIPTIONS	BY	APP'D
REVISIONS				

ARAB REPUBLIC OF EGYPT

MINISTRY OF DEVELOPMENT,
NEW COMMUNITIES, HOUSING AND PUBLIC UTILITIES

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JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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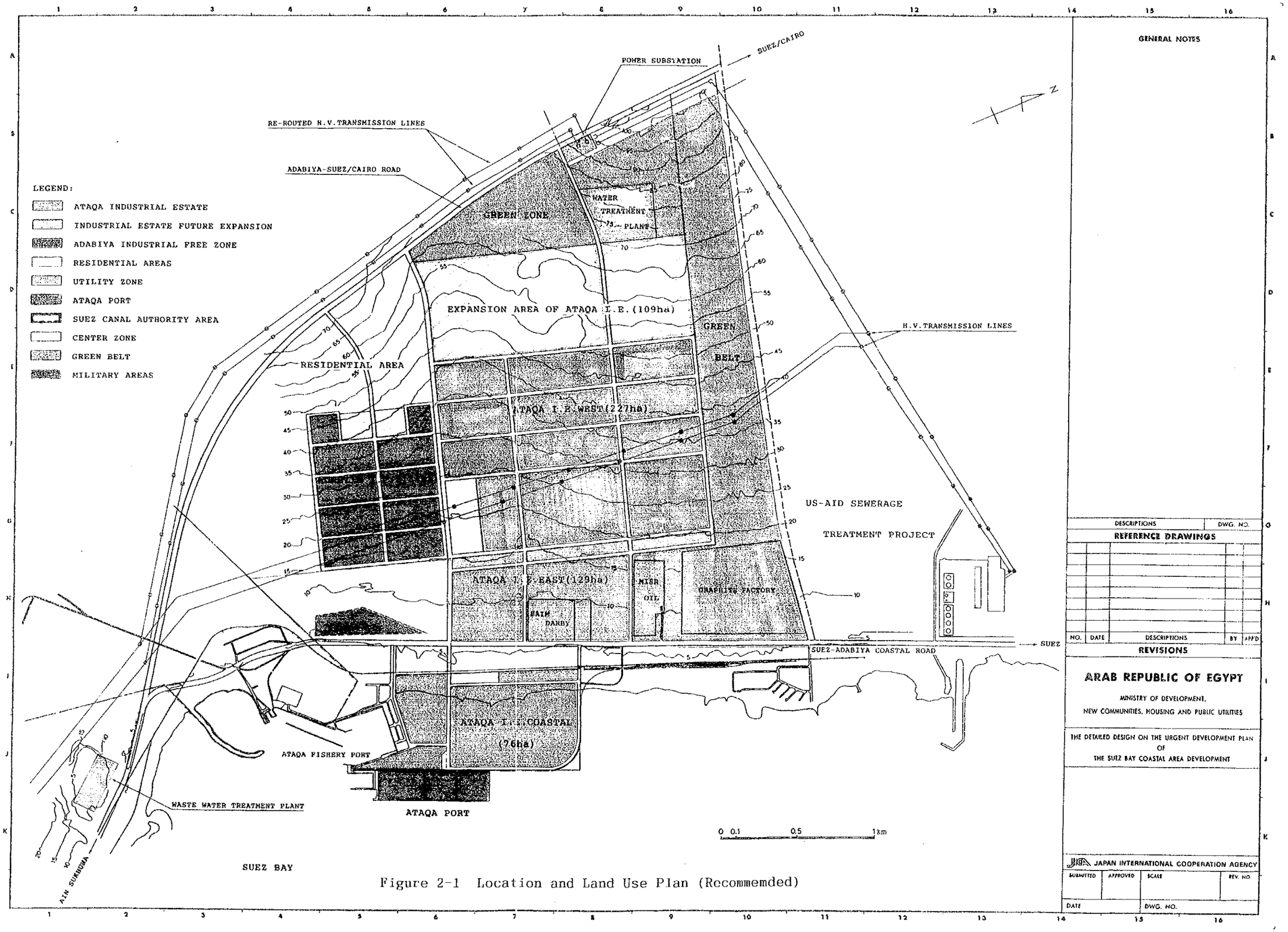


Figure 2-1 Location and Land Use Plan (Recommemded)

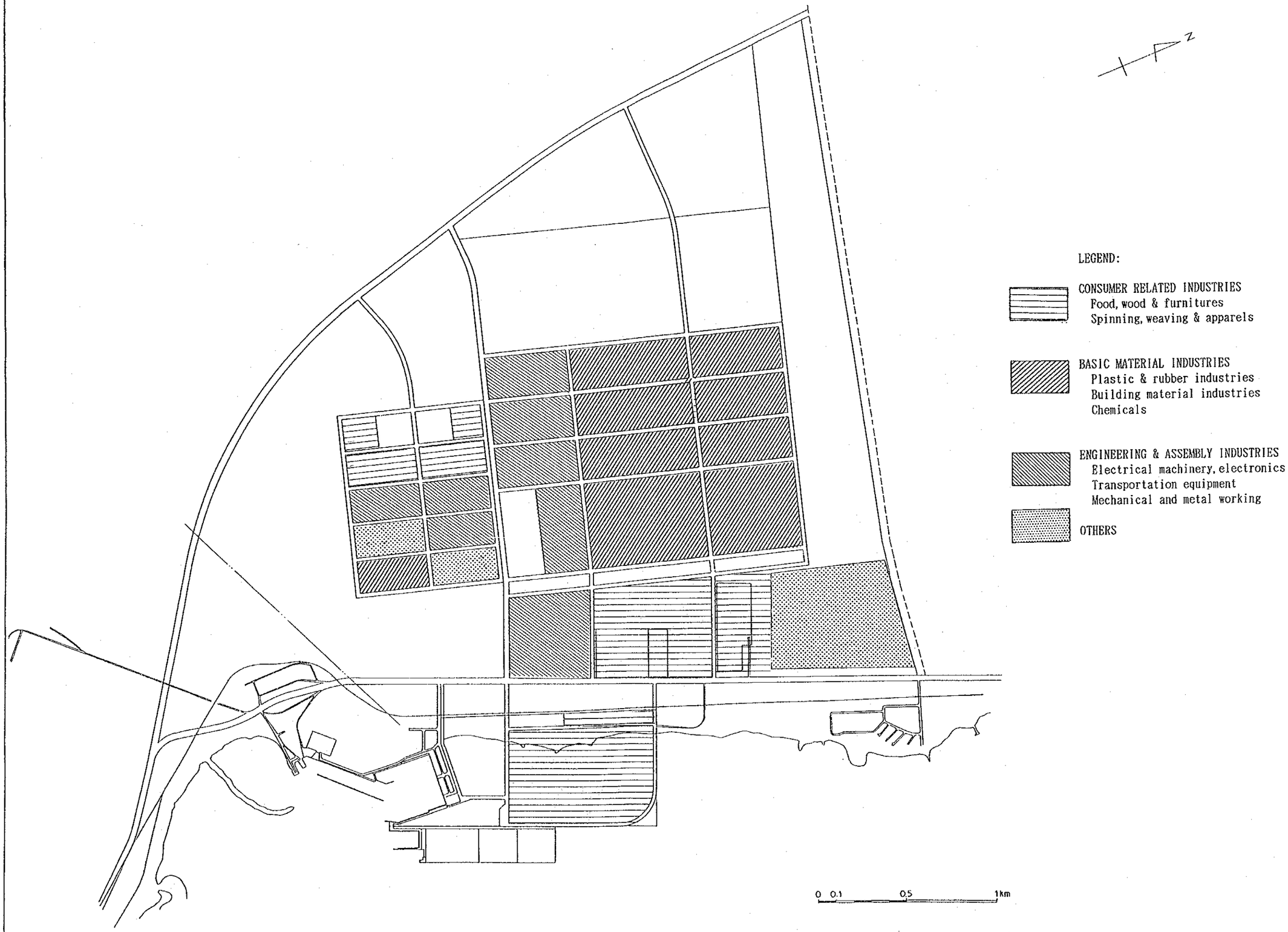


Figure 2-2 A Zoning Plan by Type of Industries

Chapter 3 Detailed Design Study

CHAPTER 3 DETAILED DESIGN STUDY

3.1 SURVEY AND SOIL INVESTIGATIONS

3.1.1 TOPOGRAPHIC AND BATHYMETRIC SURVEY

Topographic and bathymetric survey for the Project were conducted during the period from April to June 1992 in the project area, such as, (1) Topographic survey at and nearby the proposed Ataqa I.E. and Adabitya I.F.Z., (2) Route survey along the proposed raw water pipeline including water intake area, (3) Route survey along the Adabiya/Suez Coastal Road, (4) Sounding in and nearby the proposed Ataqa I.E. Coastal and Ataqa Port Area.

The following main features were obtained from the survey;

(1) In the Ataqa I.E. area , the Adabiya/Suez Coastal Road runs about 300 m land side from the offshore line, and the elevation of the road is in the range of EL +5 m and EL 6 m.

(2) The foot of Mt. Ataqa exists toward land side about 3 km form the Coastal Road, and the elevation of the foot is approximately above EL +80. The proposed Ataqa I.E. and Adabiya I.F.Z. gently slope at 1 : 40 (2.5 %).

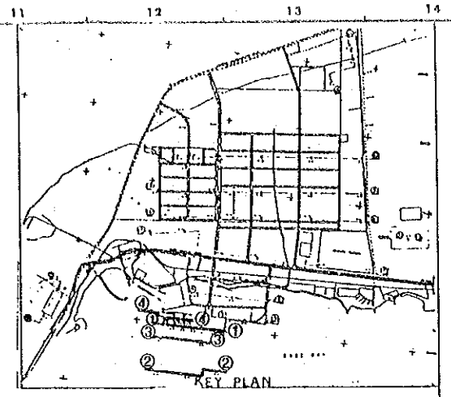
(3) The area of the proposed Waste Water Treatment Plant, which locates at between Adabiya Port and Ataqa I.E., has been excavated to use the material for reclamation of Adabiya Port construction. The size of the excavated hole is about 250 m x 450 m and the elevation of bottom of the hole is EL +1 m, while the original elevation of the area about EL +10 m.

(4) From the shore line toward the sea, the sea bed of 1,500 m in length gradually becomes deep allay down to CD -15 m which a slope of 1 : 100. Farther off the shore are, the sea bed has been dredged down to CD -15 m and CD -18 m.

3.1.2 SOIL INVESTIGATION

In order to obtain the information relevant to the sub-surface conditions and soil characteristics required for the detailed design of the Project, the soil investigation was performed during the period from April to July 1992.

The soil investigation consisting of 24 off-shore borings and 44 on -land borings were conducted in the proposed Ataqa I.E., Adabiya I.F.Z., and Ataqa Port area. In addition to these investigations, 11 borings and 11 C.B.R. tests, along the Adabiya/Suez Coastal Road, and 21 borings along the raw water pipeline were carried out.



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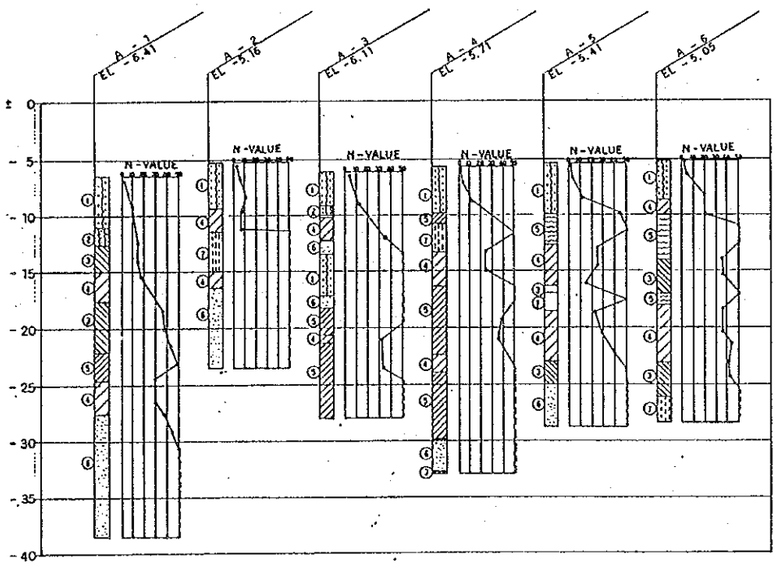

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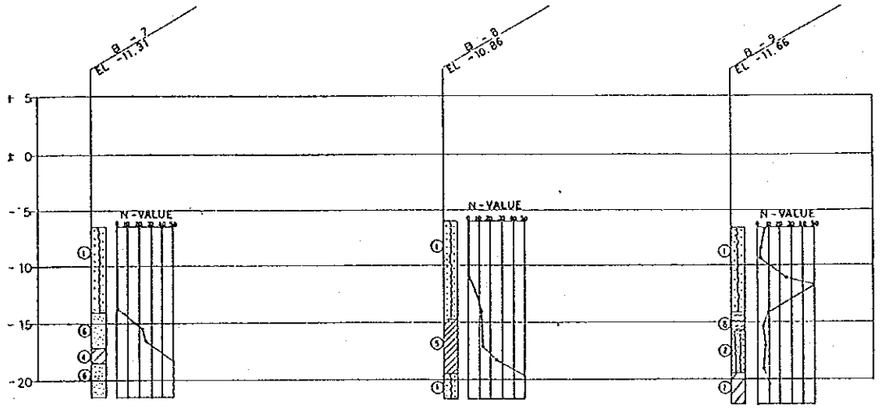

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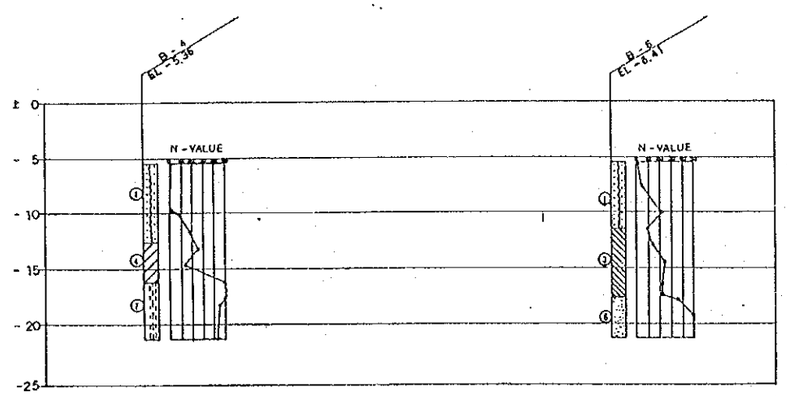

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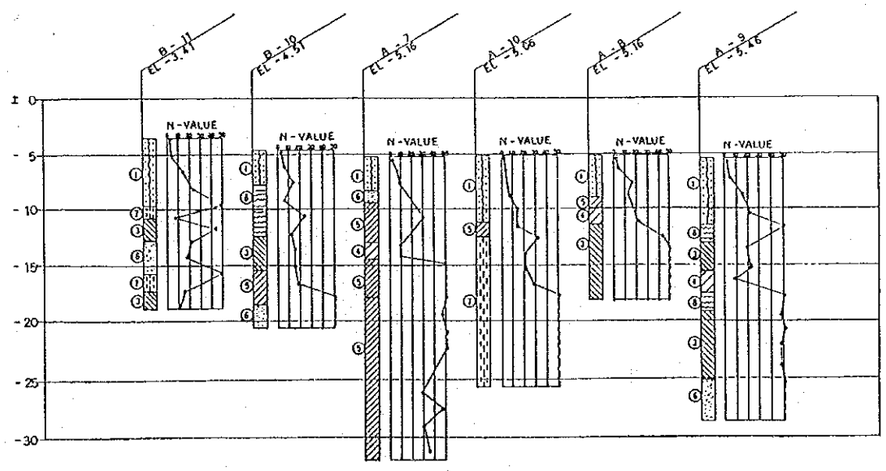

Figure 3.1-1 Soil Profile(1)

GENERAL NOTES

LEGEND

① OOLITIC SAND
② SILTY CLAY WITH LIMESTONE PIECES
③ LIMY SILTY WITH LIMESTONE PIECES
④ SILTY CLAY
⑤ LIMY SILTY CLAY WITH SAND
⑥ SAND
⑦ DOLOMETIC LIMESTONE FRAGMENTS
⑧ GRAVEL AND SAND
⑨ SAND AND SILT WITH GRAVEL

Elevation : Refer to Egypt National Datum Level
Horizontal Scale : None

DESCRIPTIONS	DWG. NO.
REFERENCE DRAWINGS	

NO.	DATE	DESCRIPTIONS	BY	APP'D
REVISIONS				

ARAB REPUBLIC OF EGYPT

MINISTRY OF DEVELOPMENT, NEW COMMUNITIES, HOUSING AND PUBLIC UTILITIES

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SOIL PROFILE (1)

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

SUBMITTED	APPROVED	SCALE	REV. NO.
		NON SCALE	
DATE March, 1993		DWG. NO. 2-2-02	

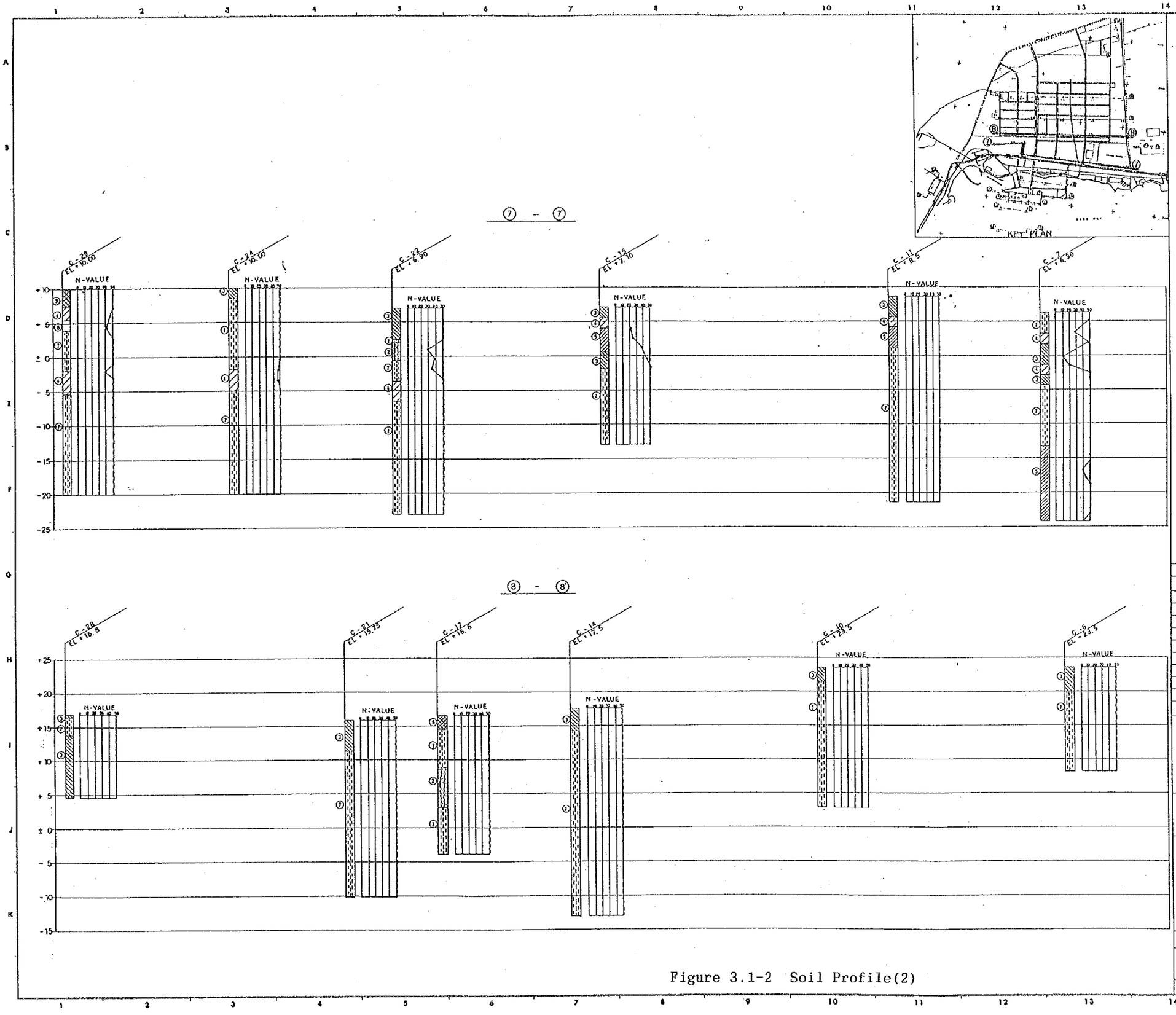


Figure 3.1-2 Soil Profile(2)

Typical boring logs of the off-shore and on-land borings are shown in Figure 3.1-1 and Figure 3.1-2 and the main findings of the soil investigation are as follows:

(1) Off-shore boring showed that the sea bed along the quay consists of layer having N-value of 2-10 with thickness about 4 m (CD -6 m to CD -10 m), the clay layer with silt and shale having N-value of 8 to 15, and the layer of sand or limy silt with limestone pieces of N-value of 50-100. The sea bed of the two shallower spots (about 1,500 m off-shore) consists of sand with shale and cemented sand pieces. Thickness of this layer is about 6 m (form CD -2 m to -8 m), and N-value is about 7 to 27. Below the layer, the coral layer with thickness of 1.5 m having N-value of 80, and from CD -8 m to -15 m, sandy layer with coral pieces and clay layer with limestone pieces having N-value of 6-10 are existing.

(2) On-land boring reveals that surface layer is composed of limy silt with limestone pieces and sand with gravel. The thickness of this layers is 2-5, and N-value is in the range of 40-50 m. Below the surface layer, a layer of dolomite limestone fragments, limy silty clay with sand, and silty clay with limestone pieces having N-value of more than 50 are existing.

(3) Field CBR value along the Adabiya/Suez Coastal Road varies in the rage of 3.2 - 17.5 %.

The results of these field soil investigations and laboratory tests are reflected in the detailed design of the Project.

3.2 DESIGN CONDITIONS

Design conditions described in the chapter are applied for all the project components otherwise described in the following chapters.

3.2.1 NATURAL CONDITIONS

(1) METEOROLOGICAL CONDITIONS

(a)	Temperature	:	Max. 45.8 °C Min. 10.4 °C
(b)	Rainfall	:	9.6 mm/hr 23.4 mm-day (30 year return period)
(c)	Wind	:	Wind velocity for wave hindcast : 41 knot (21.1 m/sec.) (For design of structures : 70 m/sec. is applied)
	Wind Direction	:	N and NE

(2) MARITIME CONDITIONS

(a) Tide

High Water Level Spring (H.W.L.S.)	:	+1.90 m
High Water Level Neap (H.W.L.N.)	:	+1.60 m

Low Water Level Neap (L.W.L.N.)	:	+0.70 m
Low Water Level Spring (L.W.L.S.)	:	+0.40 m
Chat Datum (CD)	:	±0.00 m
Egyptian National Datum Level (E.N.D.L.)	:	±1.137 m

(Elevation for land structures refers to E.N.D.L. and for Marine Structures refers to CD.)

(b) Wave

Significant	Wave Height H1/3	:	1.3 m
	Wave Period T1/3	:	5.2 sec.
	Wave Direction	:	E and SSE

(c) Current

Max. velocity near the Suez Canal	:	1 knot (51.4 cm/sec.)

(3) TOPOGRAPHY AND HYDOROGRAPHY

The design of structures and facilities are based on the results of the survey conducted by JICA Study Team from April to July in 1992 and the available maps provided by MODANC.

(4) SOIL CONDITIONS

Table 3.2-1 Reclamation and Filling Materials

Items	Unit Weight (t/m^3)	Internal Angle (Degree)
Dredged Material (sand silt)	1.7	30
Rubble Stone	1.8	40
Compacted Fill Sand	1.8	30

Soil conditions at each site are shown in CHAPTER 3.1.2.

5) SEISMIC CONDITIONS

No seismic force is considered for the structures to be constructed for the project except the following:

Kh = 0.05 for quaywall and silos of Ataqa Port

(Kh : horizontal seismic coefficient)

3.2.2 MATERIALS

(1) CONCRETE

Concrete structure should be designed in accordance with the Standard Specifications for Plain and Reinforced Concrete (Japan Society of Civil Engineers) for civil structures, unless otherwise described in each chapter.

The following conditions should be taken into consideration for civil structures:

Table 3.2-2 Concrete Strength

Compressive Strength (28 days) (kg/cm^2)	Allowable Bending Compressive Strength (kg/cm^2)	Allowable Shear Stress (kg/cm^2)	Allowable Bond Stress (kg/cm^2) Round/Deformed
240	90	4.5	8.0/16.0
180	70	4.0	7.0/14.0

Table 3.2-3 Concrete Unit Weight

Type	Unit Weight (t/m^3)
RC Concrete	2.45/2.50
Plain Concrete	2.30

Table 3.2-4 Increase of Allowable Stress

Type	Normal Condition	Seismic Condition
RC Concrete	1.0	1.5
Reinforcing Bar	1.0	1.5

(2) REINFORCING STEEL BAR

Table 3.2-5 Allowable Stress

Type	Allowable Stress (kg/m^2)	Unit Weight (t/m^3)
Round Bar	1,400	7.85
Deformed Bar	1,800	7.85

(3) STONE

Table 3.2-6 Internal Angle and Unit Weight

Type	Internal Angle (Degree)	Unit Weight (t/m^3)
Rubble Stone	40	1.8
Unscreened Gravel	30	1.8

3.3 PORT

3.3.1 PORT FACILITIES SUBJECT TO DESIGN

Some of the main port facilities of this project are outlined in the following:

(1) ATAQA PORT

The main facilities proposed for the Ataqa Commercial Port comprise the construction of one (1) grain berth for ships of 80,000 DWT (the depth of water) CD. -15.0 m, length 310 m) and of two (2) bulk cargo berths for ships of 20,000 DWT (the depth of water CD. 13.0 m, length 420 m; the construction of the proposed yard for grain terminal and bulk cargo terminal (approx. 18 ha); and the construction of the proposed area for the coastal industrial complex (approx. 60 ha) with dredging and reclamation works and of the navigational channel, quaywall, and berthing facilities.

(2) SMALL BOAT BASIN

The small boat basin is to be constructed adjacent to the south of the grain terminal and it includes the construction of quaywalls for five (5) berths (CD. -5.0 m, length 50 m x 5 = 250 m) to be used by service boats which are requisite of berthing of the vessels to the Adabiya Commercial Port and Ataqa Commercial Port as well as the construction of the breakwater.

(3) TUGBOATS

Tow different size of tugboats are assigned, that is, one (1) 32 tons tugboat and two (2) 25 tons tugboats to assist maximum 80,000 DWT ships in berthing and deberthing.

(4) RADA SYSTEM

A rada system is provided to manage and control the ship maneuvering within the Ataqa Port, Adabiya Port and Ibrahim Port and at the same, time to assist the ships in the navigation in the harbour area.

3.3.2 ITEMS AND SCOPE OF WORK FOR PORT DESIGN

In the Feasibility Study carried out by JICA in 1986, the functional share assigned to the Ataqa Commercial Port and Adabiya Commercial Port are defined, that is, the Adabiya Port was expected to handle general cargoes, special cargoes, container cargoes, etc., while the Ataqa Port was expected to handle grain products and other bulk cargoes. Development of the Adabiya Port was proceeded by the Red Sea Port Authority of the Ministry of Maritime Transport and is expected to complete the construction of the proposed seven berths including the development of the existing berth in 1995 which is the target year set forth by the Short Term Development Plan in the Feasibility Study. In the Ataqa Commercial Port Development Plan, the coal terminal project was deleted from the Short Term Developments Plan in the JICA Feasibility Study, nevertheless, the construction plans for the grain terminal and bulk cargo terminal remain unchanged.

Inasmuch as the construction plan for the Adabiya Port was deleted form this Study, the detailed design relevant to the navigational channel onto the Adabiya Port as well as the berth facilities were excluded, and furthermore, the coal terminal plan of the Ataqa Port was excluded. Because of this, it was decided to leave off the detail design for the navigational channel at the north side to access the Ataqa Port.

The items of the port facilities for which the detailed design were carried out are shown in Table 3.3-1 and the magnitude of the facilities designed is as indicated in Table 3.3-2.

(1) SCOPE OF THE WORKS

Table 3.3-1 Project Components in Urgent Development Plans

Components	Sub Components/Work Item
(1) Ataqa Commercial Port	
1) Terminals	1 Land Reclamation 2 Fence & Gate 3 Roads & Pavement in the Port Area 4 Water Supply in the Port Area 5 Sewerage System in the Port Area 6 Power Supply System and telephone in the Port Area 7 Railway in the Port Area 8 Incinerator 9 Port administration building and building works in the port area 10 Revetment and temporary revetment 11 Channel & Basin 12 Navigational aid
2) Grain Terminal	1 -15.0 m Quaywall 2 Foundation of Unloader Crane 3 Utility Duct on the Quay 4 Unloader 5 Grain Handling Silo 6 Apron Pavement
3) Bulk Cargo Terminal	1 -13.0 m Quaywall 2 Utility Duct 3 Pavement of Open Storage Yard
(2) Small Boat Basin	1 -5.0 m Quaywall 2 Breakwater
(3) Tug Boats	Radar System
(4) Radar System	Tug Boats

Table 3.3-2 Scale and Dimensions of the Port Facilities

Components	Scale and Dimensions	
(1) Ataqa Commercial Port		
1) Land Reclamation	Port Area	Approx. 18 ha
	Coastal I.E.	Approx. 60 ha
2) Navigational Channel and Basin (Dredging)	Channel	L = 7,100 m CD. -15.0 m
	Basin for Grain Berth	A = 20 ha CD. -15.0 m
	Basin for Bulk Cargo Berths	A = 35 ha CD. -13.0 m
3) Grain Quaywall	Concrete Caisson	L = 15 m 22 Units
	Caisson Quaywall	L = 330 m CD. -15.0 m
	Super Structures etc.	
4) Bulk Cargo Quaywall	Concrete Caisson	L = 15 m 29 Units
	Caisson Quaywall	L = 435 m CD. -13.0 m
	Super Structures etc.	
5) Revetment	South Revetment	L = 144 m
	Temporary Revetment	L = 810 m
	Dyke for Disposal of Fines	L = 800 m
	Boundary Concrete of Reclaimed Land Block	L = 570
6) Incinerator	Incinerator	
(2) Small Boat Basin		
1) Quaywall (CD. -5.0 m)	North Quaywall (1 Berth) and Revetment	L = 70 m
	West Quaywall (2 Berths) and Revetment	L = 112 m
	South Quaywall (2 Berths) and Revetment	L = 110 m
2) Breakwater	Breakwater	
	Inside the Berth	L = 140 m
	Outside the Berth	L = 155 m
(3) Tugboats	Tugboats	
	One (1) 32 ton Tugboats	
	Two (2) 25 ton Tugboats	
(4) Radar System	Radar System	One, complete

3.3.3 ARRANGEMENT PLAN OF PORT FACILITIES

The plan has been set up on the assumption that the annual handling quantity of grain products at the grain berth in 2000 would be 1,300,000 ton and the same in 2010 would be 1,800,000 ton. The annual cargo handling quantity at the bulk cargo berth was assumed to be 767,000 ton similar to that of the Short Term Development Plan in *JICA's Feasibility Study.

Note : * JICA, Short Term Development Plan Report on page 20.

The condition of the Port Facilities Plan are tabulated in Table 3.3-3, and a plan arrangement of the Grain Berth, Bulk Cargo Berth and Small Boat Basin is shown in Figure 3.3-1, 3.3-2 and 3.3-3.

Tabke 3.3-3 Conditions of the Port Facilities Plan

Port	Ataqa Commercial Port			Small Boat Basin	
Wharf	Grain Wharf	Bulk Cargo Wharf		Small Boat Wharf	
Objective Ships					
Kind of Ships	Grain Carrier	Cargo Ships	Container Ship	Tug Boat	Service Boat
Tonnage	80,000 DWT	20,000 DWT	20,000 DWT	300 G.T.	300 G.T.
Overall length	250 m	170 m	201 m	38.7 m	39.2 m
Moulded depth	38.5 m	23.7 m	27.1 m	10.0 m	8.0 m
Full Load Draft	14.5 m	9.6 m	10.6 m	3.5 m	2.2 m
Design Condition					
Approach Velocity	0.1 m/sec.	0.15 m/sec.		0.3 m/sec.	
Approach Angle	0 - 6 Degree	0 - 6 Degree		0 - 6 Degree	
Design Surcharge	4.0 t/m²	6.0 t/m²		1.0 t/m²	
Berth Length	300 m	210 m		50 m	
Design Depth	CD. -15.0 m	CD. -13.0 m		CD. -5.0 m	
Necessary Number of Berth	1 Berth	2 Berths		5 Berths	
Cargo Handling Equipment					
Equipment Handling Capacity	Unloader 630 Ton 2 Units	Ship Loader		-	
Weight of Unloader	420 Ton				
Wheel Gauge	9 m				
Design Wheel Load	35 Ton/Wheel				
Off-shore Facilities					
Depth of Channel	CD. -15.0 m			CD. -5.0 m	
Depth of Turning Basin	CD. -15.0 m			CD. -5.0 m	
Depth of Mooring Basin	CD. -15.0 m	CD. -13.0 m			

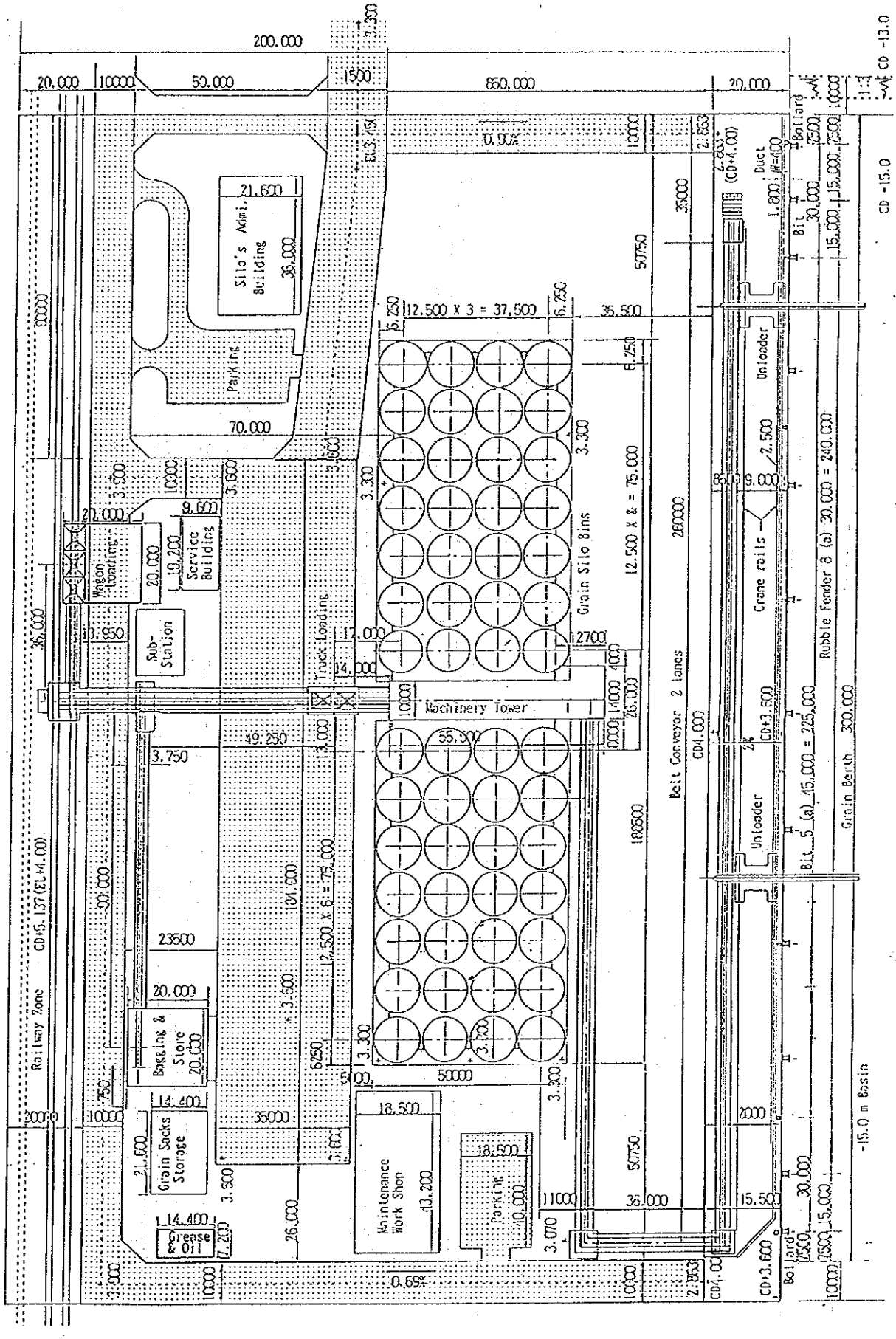


Figure 3.3-1 General Layout of Grain Silo Terminal

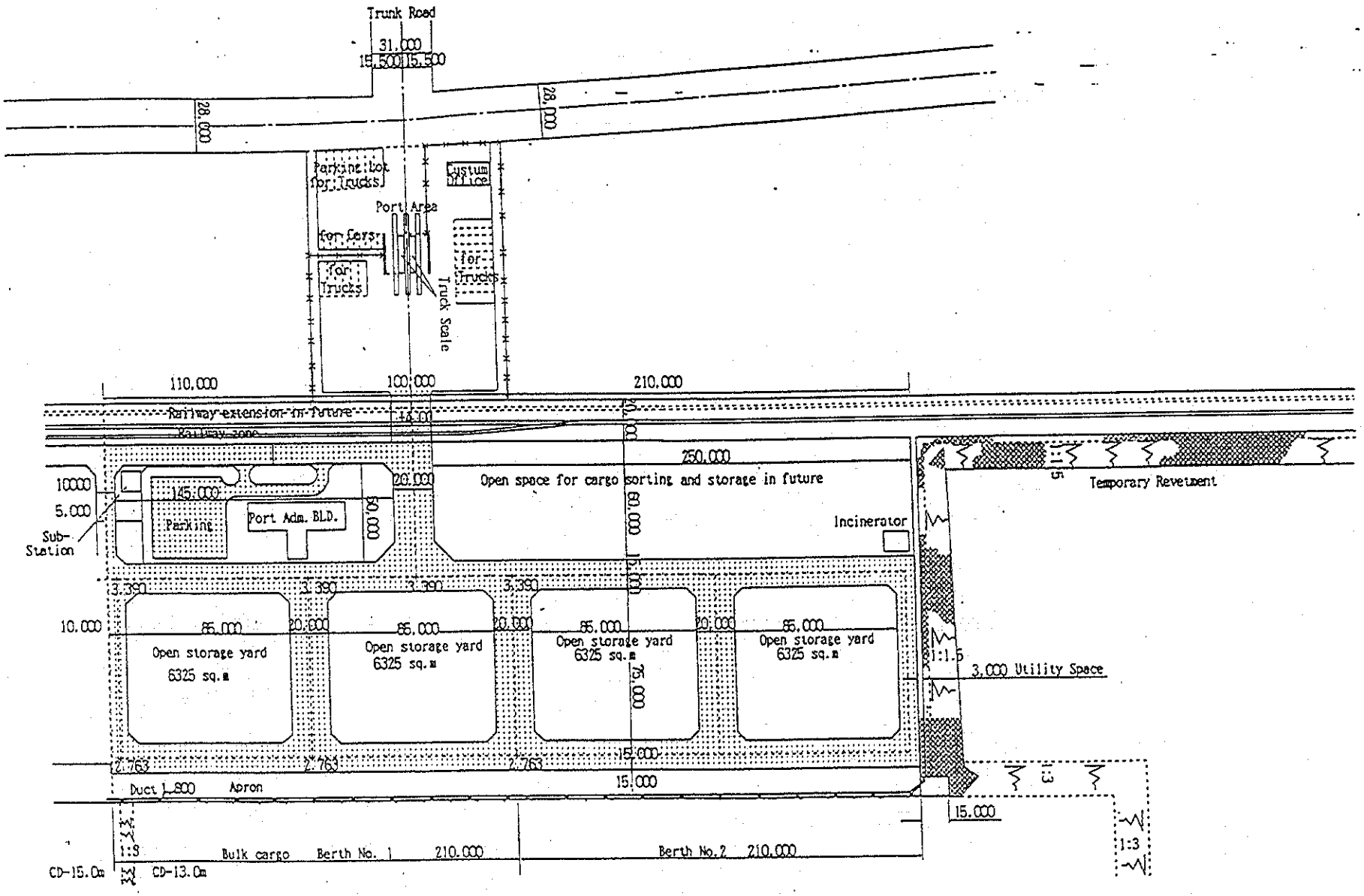


Figure 3.3-2 General Plan of Bulk Cargo Terminal

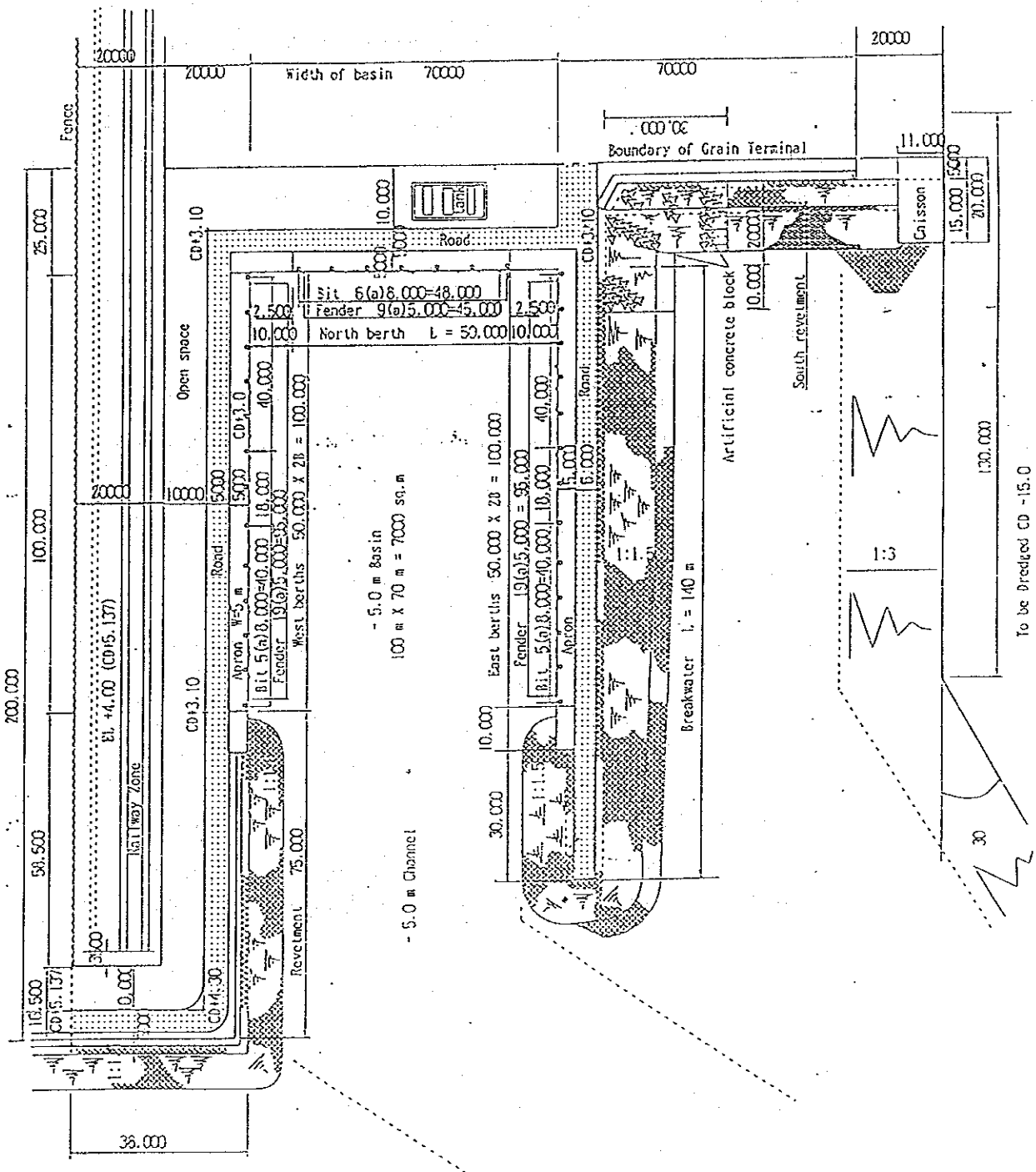


Figure 3.3-3 Small Boat Basin General Layout Plan

3.3.4 DETAILED DESIGN FOR PORT FACILITIES

(1) DREDGING AND RECLAMATION

In the construction of the reclaimed land for Ataqa Industrial Coastal Area as well as the port area for Grain Terminal and Bulk Cargo Terminal, it is proposed to utilize the material which could be obtained by the dredging at proposed navigational channel, turning basin, construction site of the berth, quaywall, etc. The total estimated quantity of the dredged material and reclamation is as shown below. The material which would fall short amounting to approximately 1,100,000 m^3 would be supplemented by either excavating the navigation channel deeper or widening the berthing area.

Dredging material quantity	:	5 million m^3
Reclaimed material quantity	:	6.1 million m^3

The dredging and reclamation plan is shown in Figure 3.3-4. Incidentally, the silt material which would be generated at the time when the reclaiming work is in progress, it is proposed to be stored in an area surrounded with dikes of 250 m x 550 m to be built on off-short at the north side of the reclaimed area.

(2) DESIGN CRITERIA OF WHARF AND STRUCTURE OF QUAYWALL

The design criteria of Grain Wharf, Bulk cargo wharf and of Small Boat Basin to be adopted in the preparation of the detailed design is as shown in Table 3.3-4.

The results of a comparative design carried out on the type of structures of the Grain Wharf and of the Bulk Cargo Wharf which are important out of the port structures disclosed that the concrete caisson structure would be the most appropriate, as it is most economical and free from any problems in the terms of technical aspects and of the availability of materials at site. The design criteria of the concrete caisson is tabulated in Table 3.3-5, and the typical cross-section of the wharf is shown in Figure 3.3-5.

(3) SMALL BOAT BASIN AND REVETMENT

It was decided to adopt a concrete block structure and a rock mound structure for the small boat basin and for the revetment respectively form the viewpoint of various reasons, that is, the existing soil conditions at the proposed construction site is considered good, 2) the stone masonry material is available in the neighbourhood area at a reasonable price 3) many of the existing structures at site are employing the same type of structures as mentioned above.

A typical type of the basin built with the concrete block for the small boat basin and of the revetment constructed with the rock mound is shown in Figure 3.3-6 and 3.3-7.

(4) NAVIGATIONAL CHANNEL

The existing access navigational channel and the anchorage area for vessels passing through the Suez Canal has been dredged down to the depth of CD. -15 m to CD. -18 m and the width of the navigational channel is kept to 500 m. In the light of this, it was determined to utilize this channel for access to that of the Ataqa Commercial Port.

3.3.5 DETAILED DESIGN

(1) QUAYWALL

Table 3.3-4 Wharf

Wharf	Grain Wharf	Bulk Cargo Wharf	Small Boat Wharf
Scale and Dimensions			
Number of Berths	1 Berth	2 Berths	5 Berths
Length of Berths	310 m	420 m	250 m
Overall Length of Quaywall	330 m	435 m	292 m
Water Depth	CD -15.0 m	CD -13.0 m	CD -5.0 m
Crown Height (Face line)	CD +3.6 m	CD +3.6 m	CD +3.0 m
Width of Apron	20 m	15 m	5 m
Gradient of Apron	2.0 %	2.0 %	2.0 %
Structural Type	Reinforced concrete caisson	Reinforced concrete caisson	Concrete block
Foundation			
Material	Rubble Stone 30 - 200 kg/pcs	Rubble Stone 30 - 200 kg/pcs	Rubble Stone 30 - 200 kg/pcs
Thickness of Stone	2.0 m	2.0 m	2.0 m
Top Level of Foundation Stone	CD -15.5 m	CD -13.5 m	CD -5.0 m
Scoring protection	500 kg/pcs Armor stone	500 kg/pcs Armor stone	-
Super Structure			
Type of Concrete	Sulfate Resistance Cement	Sulfate Resistance Cement	Sulfate Resistance Cement
Design Strength of Concrete	240 kg/m²	240 kg/m²	240 kg/m²
Fender	Rubber Fender	Rubber Fender	Rubber Fender
Energy Absorption	Min. 55 t-m	Min. 32 t-m	Min. 7 t-m
Reaction Force	Max. 130 ton	Max. 100 ton	Max. 50 ton
Bollard, Bitt			
Tractive Force on Bollard	200 ton	100 ton	-
Tractive Force on Bitt	100 ton	70 ton	15 ton

DREDGING PLAN

S= 1 : 4, 000

COORDINATES OF KEY POINTS

	X	Y
A	5,360	3,970
B	4,530	3,970
C	4,430	3,970
D	3,910.4	3,670

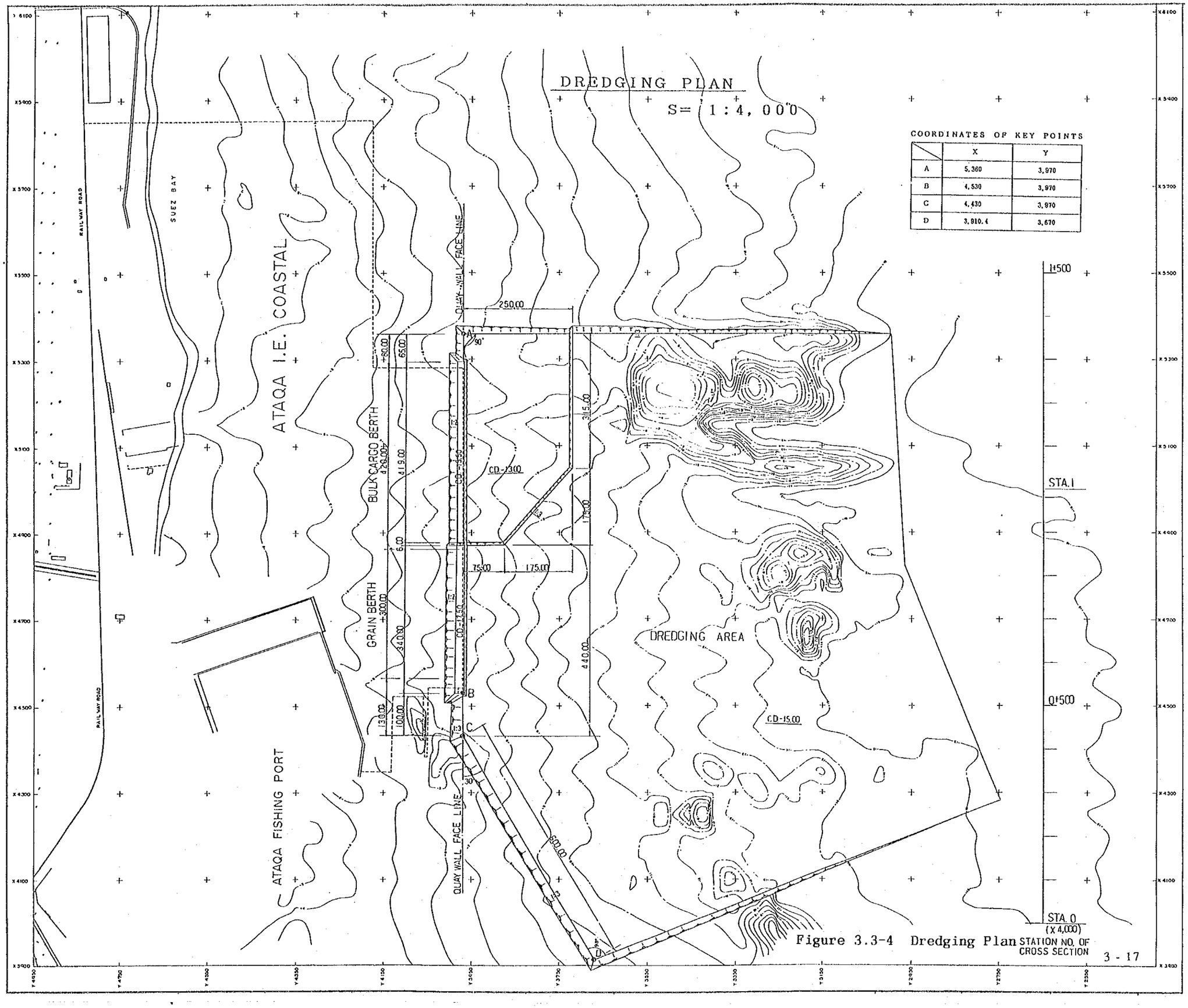


Figure 3.3-4 Dredging Plan

STATION NO. OF CROSS SECTION

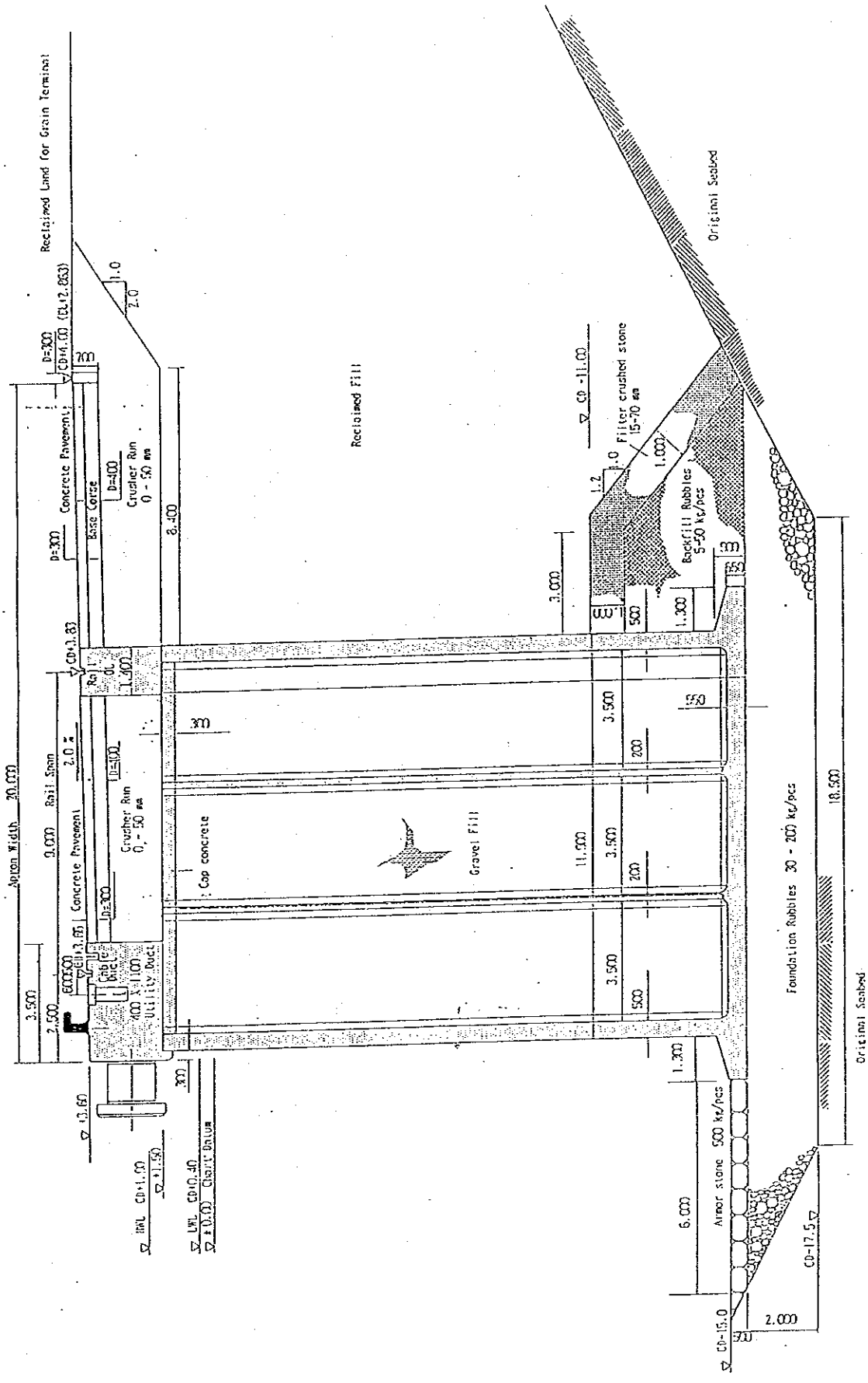


Figure 3.3-5 Typical Cross Section of Grain Wharf (Grain Berth)

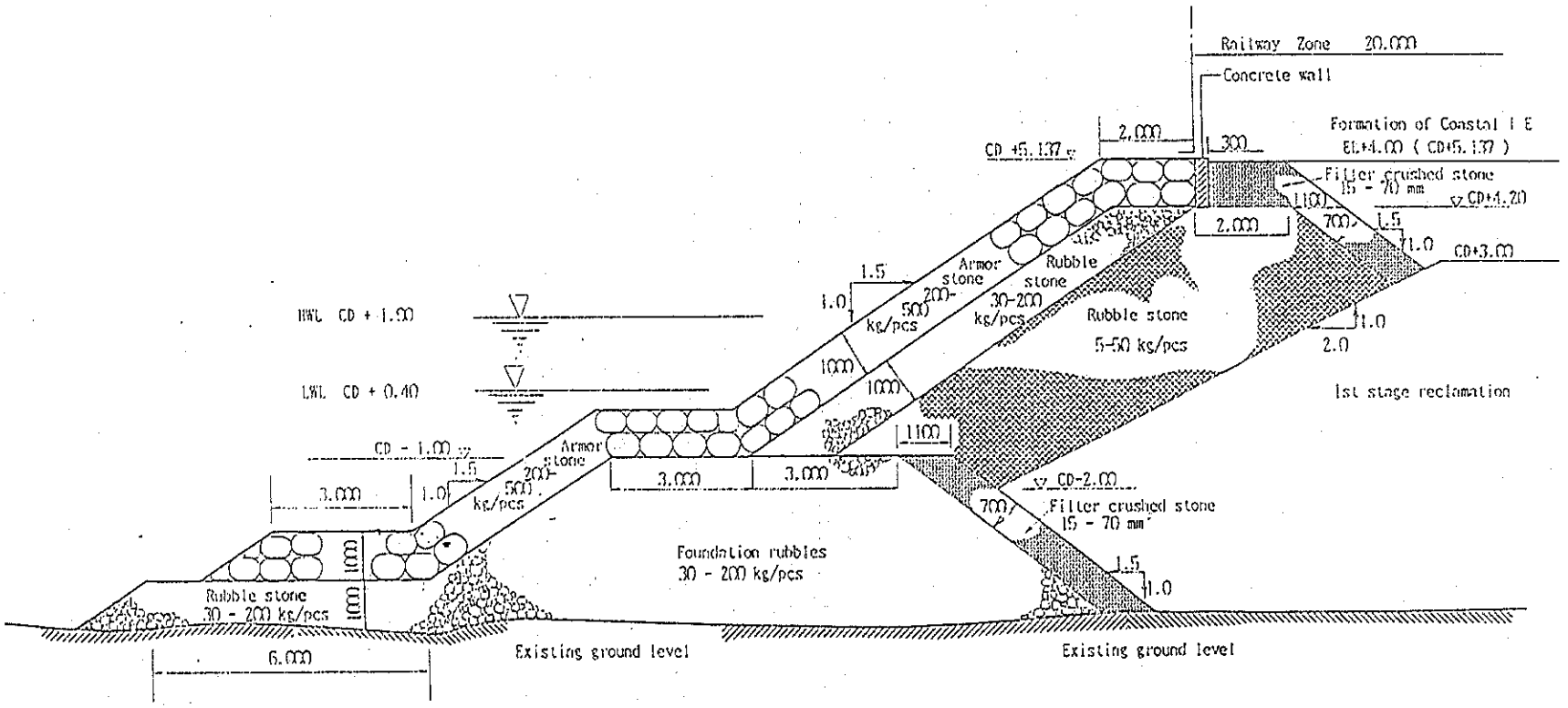


Figure 3.3-6 Typical Cross Section of Revetment

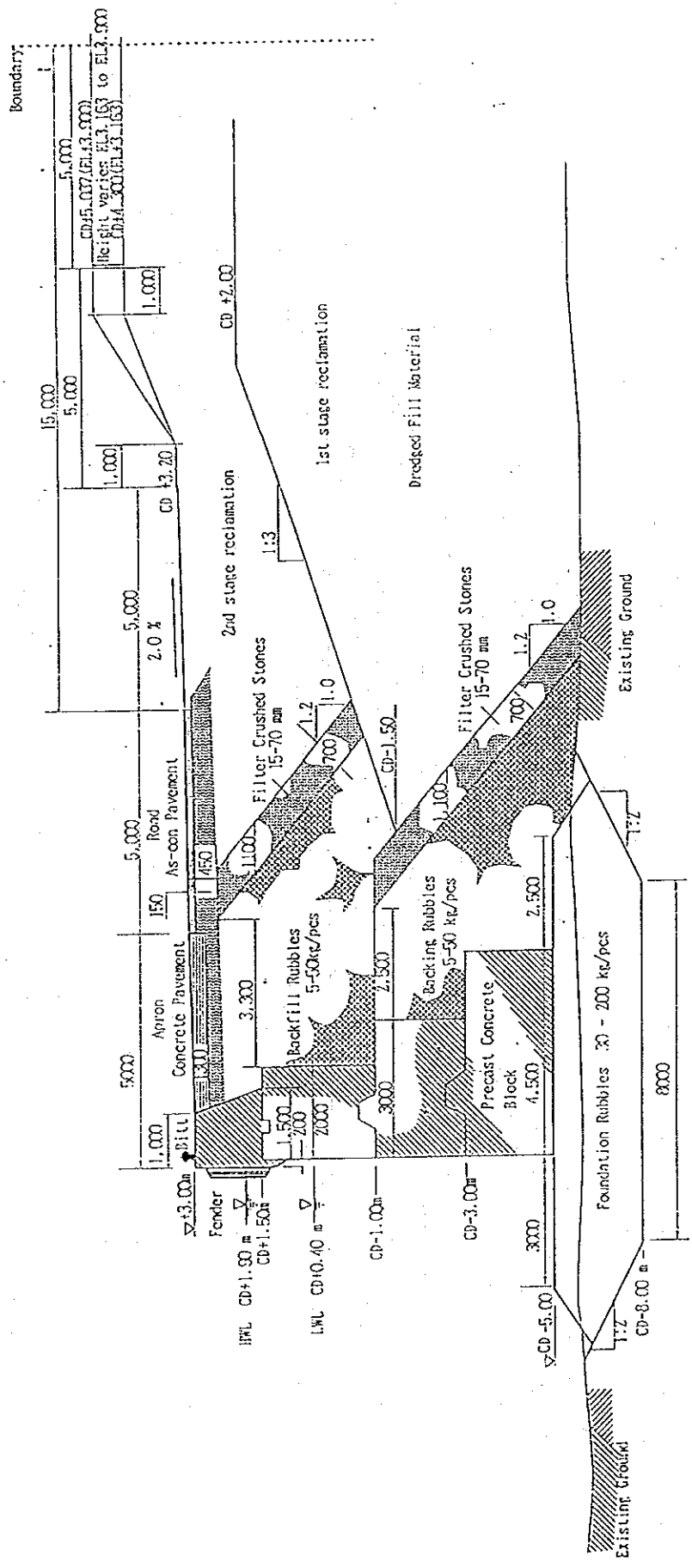


Figure 3.3-7 Typical Cross Section of Small Boat Basin

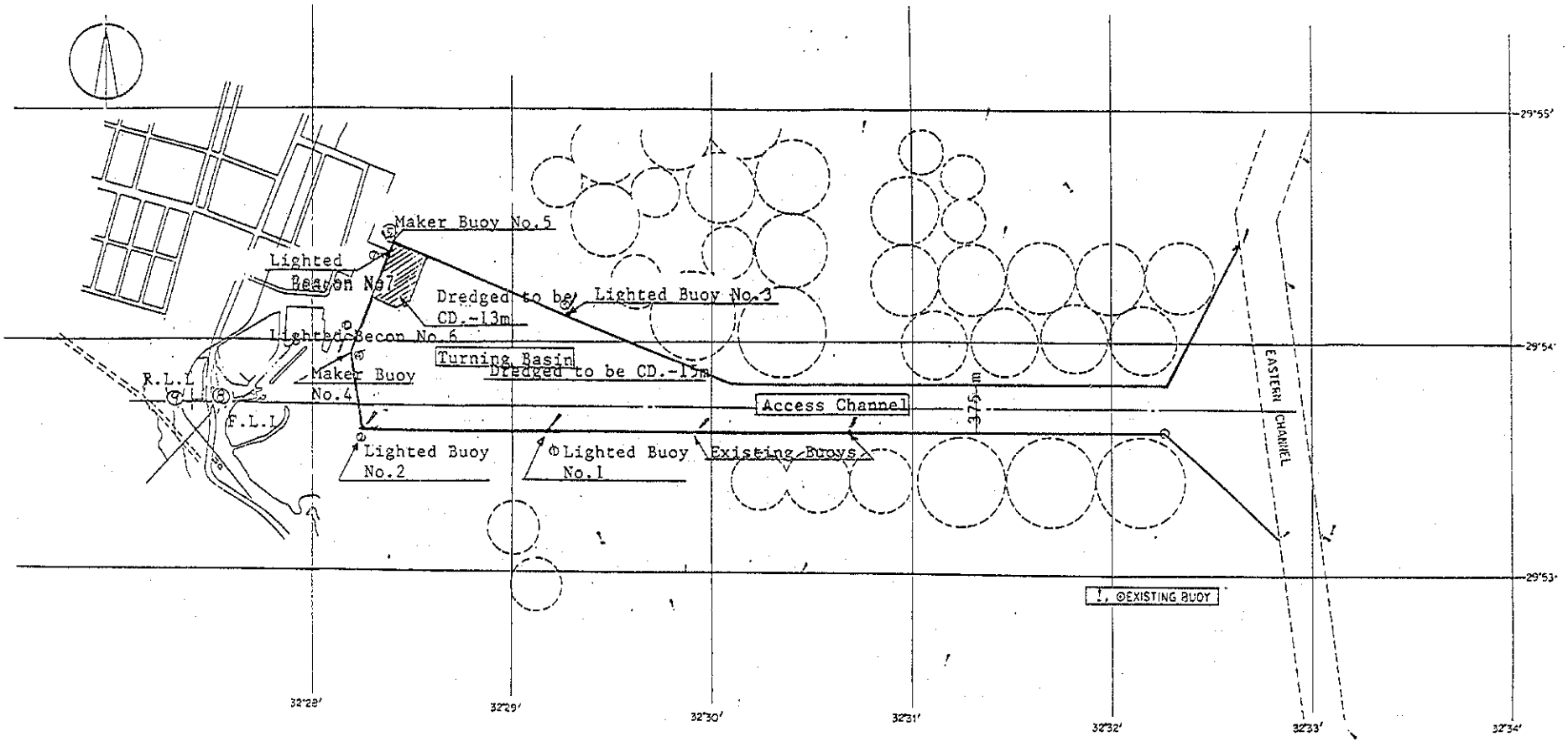


Figure 3.3-8 Layout of Navigation Aid

(2) REINFORCED CONCRETE CAISSON

Table 3.3-5 Design Criteria Caisson

Type of Caisson	Type A	Type B
Scale and Dimensions of Caisson		
Height	17.0 m	15.0 m
Width	11.9 m	10.0 m
Width of Footing	14.5 m	12.0 m
Length	15.0 m	15.0 m
Thickness of Side wall	50 cm	50 cm
Thickness of Partition wall	20 cm	20 cm
Thickness of Slab	55 cm	55 cm
Caisson		
Concrete	Sulfate Resistance Cement	240 kg/m²
Steel Bar	STK 40	
Content of Steel Bar	100 kg/Concrete m³	103 kg/Concrete m³
Filling Material	5 - 50 kg gravel	
Thickness of Cover Concrete	D = 300 mm	D = 300 mm

(3) NAVIGATION AID

To provide a navigation aid, it was designed to set up three (3) sets of lighting buoys and two (2) sets of marker buoys at the boundary of the navigational channel, and two (2) sets of lighting beacons on the wharf and two (2) sets of leading lights on the ground over the extended centre line of the navigational channel. The location of setting up these navigational aid to indicated in Figure 3.3-8.

3.3.6 TUGBOAT

One 32 ton bollard pull tugboat and two 25 ton bollard pull tugboats should be provided to assist the vessels up to 80,000 DWT in berthing.

In addition to the towing and pushing functions, the tugboats should have the following special equipment of fire fighting and salvage purposes:-

32 ton tugboat:
a) Fire fighting equipment by sea water and form with three (3) monitors
b) Salvage equipment and diving equipment

25 ton tugboat
a) Fire fighting equipment with one (1) monitor

The principal particulars and equipment of the tugboats are outlined below.

Table 3.3-6 Principal Particulars and Equipment of Tugboats

Particulars	32 ton tugboat	25 ton tugboat
Number of boat	One (1)	Two (2)
Loa (m)	about 32.0	about 20.0
lpp (m)	about 30.0	about 18.0
Beam (m)	about 8.6	about 7.0
Draft (m)	not more than 4.5 m	about 2.5
Gross Ton	about 300	about 150
Bollard Pull (ton)	at least 32.0	at least 25.0
at MCR Ahead	at least 32.0	at least 25.0
Complement	at least 8	at least 8
Classification Society	LR ABS or equivalent	LR ABS or equivalent
Trial Speed (knots) (100 % loaded Cond.)	at least 12.0	at least 11.0
Cruising Range (N.M)	at least 1,500	at least 1,200
Main Engine	4-cycle Marine Diesel x 2 sets	4-cycle Marine Diesel x 2 sets
Propulsion	Voith-Schneider x 2	Voith-Schneider x 2
Towing Equipment	Winch combined with windlass (force) towing hook	Winch combined with windlass (force) towing hook
Fire Fighting	Sea water and form 3 monitors	Sea water and form 1 monitor
Salvage Equipment	Welding, cutting machine, diving equipment, under water video camera, etc. 1 - work boat	not provided
Spare Parts	1,500 working hours	1,500 working hours

3.3.7 PADAR

The objective of installing the harbor control radar system is to realize the maximum vessel moving service in the port area, and to assist in the safety navigation of vessels within the port water limit, and to improve the environmental sea pollution increasing by vessel transportation activities.

The following systems and functions will be equipped for the harbor control radar for Ataqa Commercial Port.

- Radar Surveillance/Monitoring System for vessel traffic monitoring and assistance to navigation.
- VHF Maritime Communication Equipment System for corresponding with the vessels.
- Meteorological Observation Function to assist in the vessel movement and pilotage operation.
- Ship Schedule Indicating Function for organizing the vessel movement.

The following principal equipment are allocated at Ataqa, Adabiya and Ibrahim port;

(1) ATAQA PORT

Radar Site	On the top of silo building at Ataqa Port (60 m high above sea level)
Control Center	Port watching tower at Ataqa Port

- X-band 50 kW Radar Equipment (Dual System)	1 set
- X-band 9-feet Radar Antenna	1 set
- Radar Display/Control Console	1 set
- VHF Radio Equipment	2 sets
- Voice Recorder	1 set
- Ship Schedule Indication Equipment	1 set
- Meteorological Observation Equipment	1 set
- Optical Fiber Data Link	1 set
- Emergency Power Supply Equipment	1 set

(2) ADABIYA PORT

Monitor station : Port office at Adabiya Port

- Radar Display Console	1 set
- VHF Radio Equipment	2 sets
- Ship Schedule Indication Equipment	1 set

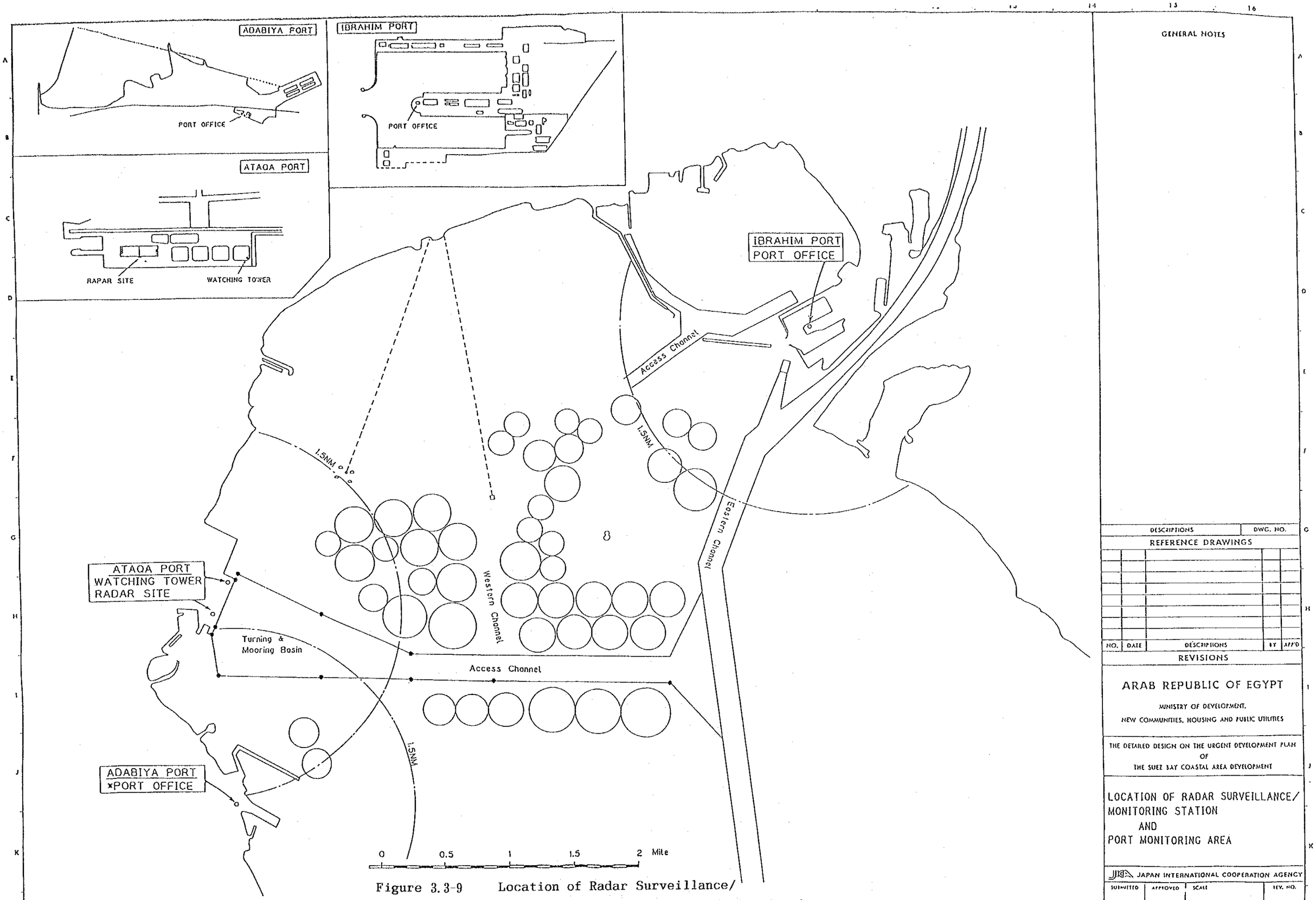


Figure 3.3-9 Location of Radar Surveillance/ Monitoring Station and Port Monitoring Area

GENERAL NOTES

DESCRIPTIONS	DWG. NO.
REFERENCE DRAWINGS	

NO.	DATE	DESCRIPTIONS	BY	APP'D
REVISIONS				

ARAB REPUBLIC OF EGYPT

MINISTRY OF DEVELOPMENT, NEW COMMUNITIES, HOUSING AND PUBLIC UTILITIES

THE DETAILED DESIGN ON THE URGENT DEVELOPMENT PLAN OF THE SUEZ BAY COASTAL AREA DEVELOPMENT

LOCATION OF RADAR SURVEILLANCE/ MONITORING STATION AND PORT MONITORING AREA

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

SUBMITTED	APPROVED	SCALE	REV. NO.
DATE		DWG. NO. 3-10-1	

(3) IBRAHIM PORT

Port Station : Port office at Ibrahim Port

- VHF Radio Equipment 2 sets

(4) RADIO DATA LINK (BETWEEN ATAQA AND ADABIYA)

- 2 GHZ band TDM/PSK Multiplex Radio Equipment 1 system

3.3.8 INCINERATOR

Incinerator is to be installed in the Ataqa Port area. The material to be incinerated are garbage generated from the Ataqa Port.

The incinerator shall be of 600 ton/year combustion capacity with combustion chamber volume of 6.3 m^3 or more.

3.4 ROADS, PAVEMENT AND EARTH WORK

3.4.1 SUMMARY OF DESIGN CONDITIONS AND CRITERIA

(1) ROAD NETWORK PLAN

The road network plan is based on the Feasibility Study, and the roads form a checker-board pattern to ensure the convenience of vehicles to and from each factory lot as shown in Figure 3.4-1.

(2) TYPE OF ROADS

The road network comprises four (4) different configurations in terms of the roadway width as tabulated in the following:

Table 3.4-1 Road Width

Roadway Width (m)	No. of Lanes	R.O.W. Width (m)	Type of Construction Work
*35	4	45	Widening of re-alignment
30	4	40	New construction
21	2	31	New construction
18	2	28	New construction

* Suez - Adabiya Coastal Road

(3) EARTHWORK

The roads have been designed according to the existing topography and to keep the road elevations similar to the existing ground levels as practicable as possible to ensure that the roadway cut and embankment volume could be minimized and yet well-balanced. The design of grading for each proposed factory lot has been excluded leaving the grading work to the investor.

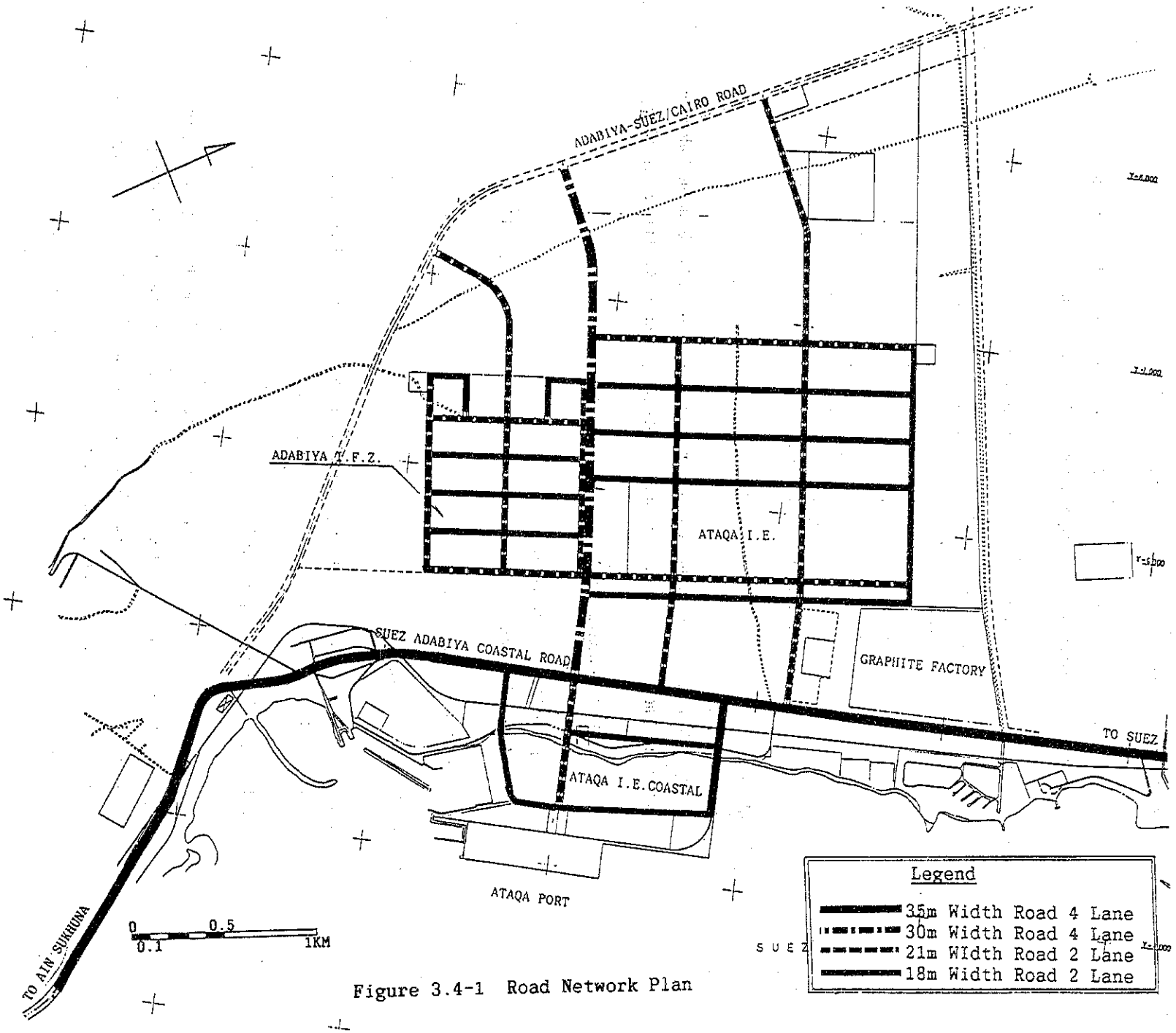


Figure 3.4-1 Road Network Plan

(4) ROAD ALIGNMENT AND INTERSECTIONS

The road alignment and intersections have been designed meeting the road network plan, design speed and existing topography. The design speeds are tabulated as follow:

Table 3.4-2 Road Design Speed

Road Width	Design Speed
35 m	120 km/hr
30 m	100 km/hr
21 m	80 km/hr
18 m	80 km/hr

(5) PAVEMENT

The asphalt concrete pavement structure design has been carried out based on the following C.B.R. values and the expected traffic volume forecast referred to in the Feasibility Study Report:

- Suez - Adabiya Coastal Road : 6
- Ataqa Industrial Estate (Land area) and Adabiya Industrial Free-Zone : 12
- Ataqa Industrial Estate (Coastal) : 8

(6) ROAD FURNITURES

The road furnitures such as road markings, traffic signs, etc. have been designed in line with the Egyptian traffic rules, regulations and codes wherever applicable.

(7) TYPICAL PAVEMENT STRUCTURE

All project roads have been designed to all weather type paved with asphalt concrete consisting of subbase course, base course, asphalt concrete binder course and asphalt concrete surface course. Figure 3.4-2 shows the Typical Pavement Structure. This road pavement design was prepared in compliance with the Egyptian and Japanese standard.

3.4.2 TOTAL ROAD LENGTH DESIGNED

The total road lengths designed and classified accord to the road width in each area is as follows:

Table 3.4-3 Road Length

Road Width / Area	30.0 m	21.0 m	18.0 m	Total
Ataqa Industrial Estate (Land area)	2,728	8,551	8,237	19,516
Adabiya Industrial Free-zone	-	5,570	3,280	8,850
Ataqa Industrial Estate (Coastal)	-	684	3,141	3,825
Total	2,728	14,805	14,658	32,191

Note: The existing Suez - Adabiya Coastal road scheduled to undergo the widening to make up to 35 m in width for a section of 10.3 km in length is excluded from the table mentioned above.

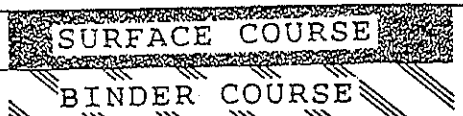
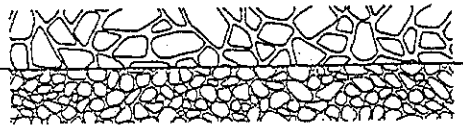
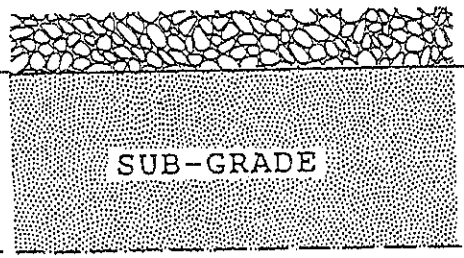
Cross Section	Materials	Thickness Conversion Factor
 SURFACE COURSE / BINDER COURSE	Hot Mixture (Bituminous Material)	1.00
 BASE COURSE	Graded Crushed Stone (Modified C.B.R.more than 80)	0.35
 SUB-BASE COURSE	Crushed Stone (Modified C.B.R.more than 20)	0.20
 SUB-GRADE	C.B.R. -Suez Adabiya Coastal Road : 6 -Ataqa I.E.(Land Area) and Adabiya I.F.Z. :12 -Ataqa I.E.(Coastal) : 8	

Figure 3.4-2 Typical Pavement Structure

3.5 RAILWAY

3.5.1 ROLE OF PROPOSED RAILWAY

The purpose of the proposed railway is to transport imported wheat and other grain products from the proposed Ataqa Port to the inland areas. The role of the proposed railway is to receive empty trains from the main line, to break down the trains in the yard, to load wheat or other grain products on the loading line in the proposed bonded area of the Ataqa Port, to build up trains in the shunting yard and to despatch the loaded trains to the main line. To achieve these objectives, a branch station, a shunting yard, loading lines and their connecting line have been designed.

3.5.2 DESIGN CONDITIONS

(1) TRAFFIC VOLUME FORECAST

The traffic volume of wheat and other grains is forecasted as follows:

Table 3.5-1 Traffic Volume Forecast

Year	2000	2010
Total volume (thousand ton/year)	1,300	1,800
Volume transported by rail (thousand ton/year) (70 % of total)	910	1,260

(2) TRAIN COMPOSITION

The train to transport grain products has been planned to consist of a locomotive and maximum 25 wagons on the main line. The train will be divided into two portions in the shunting yard and each portion with maximum 13 wagons will be operated to the loading area one by one, because the effective length of the loading line is too short to accommodate the whole trainset due to lack of Right-of-Way.

(3) NUMBER OF TRAINS TO BE OPERATED

The number of trains to be operated on the main line to transport the forecasted traffic volume of grain products has been computed as follows:

Year 2000 3 trains
Year 2010 4 trains

3.5.3 DESIGN CRITERIA

(1) STRUCTURE GAUGE AND LOADING GAUGE

The Egyptian National Railways (hereinafter refered to ENR) standard has been adopted to the structure gauge and loading gauge of the proposed railway.

(2) TRACK ALIGNMENT

The ENR design criteria has been adopted for track alignment in the station yard.

(3) TRACK STRUCTURE

Basically, a ballasted track has been adopted for the proposed railway. Only for the loading line and crossing with road, a paved track has been adopted.

(4) SIGNALLING AND TELECOMMUNICATION SYSTEM

The signalling and telecommunication system have been designed based on the train operation system so as to conform to the train operating regulations of ENR. The system has been composed of the almost same system as already installed on the existing Suez-Adabiya Line.

3.5.4 ALIGNMENT OF RAILWAY

The alignment of the railway is shown in Figure 3.5-1 and Figure 3.5-2.

(1) LOADING LINE

(a) Length of Loading Line

Loading has been planned to be carried out onto the trainset divided into two portions as mentioned above. Each portion comprises maximum 13 wagons and a locomotive. The effective length required to accommodate the portion has been computed at 252 meters.

(b) Track Alignment

The track alignment has been planned as shown in Figure 3.5-2. The dotted line on the figure is to be constructed in future when the train operation becomes busy.

(2) SHUNTING YARD

Two despatching lines, two receiving lines, one locomotive running line, one draw up line, two stabling lines and three inspection lines have been designed in the shunting yard. The alignment of the tracks is shown in Figure 3.5-2.

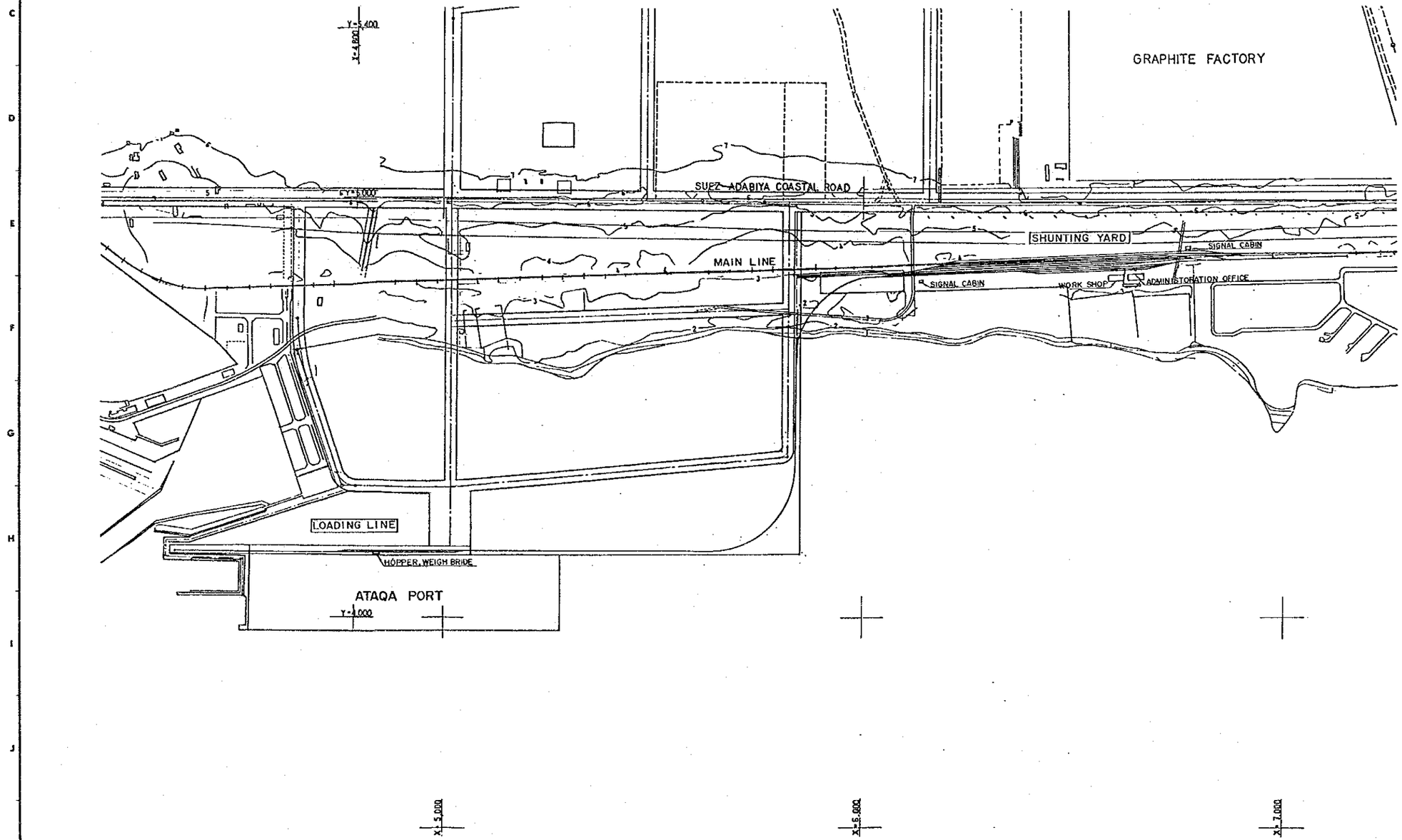
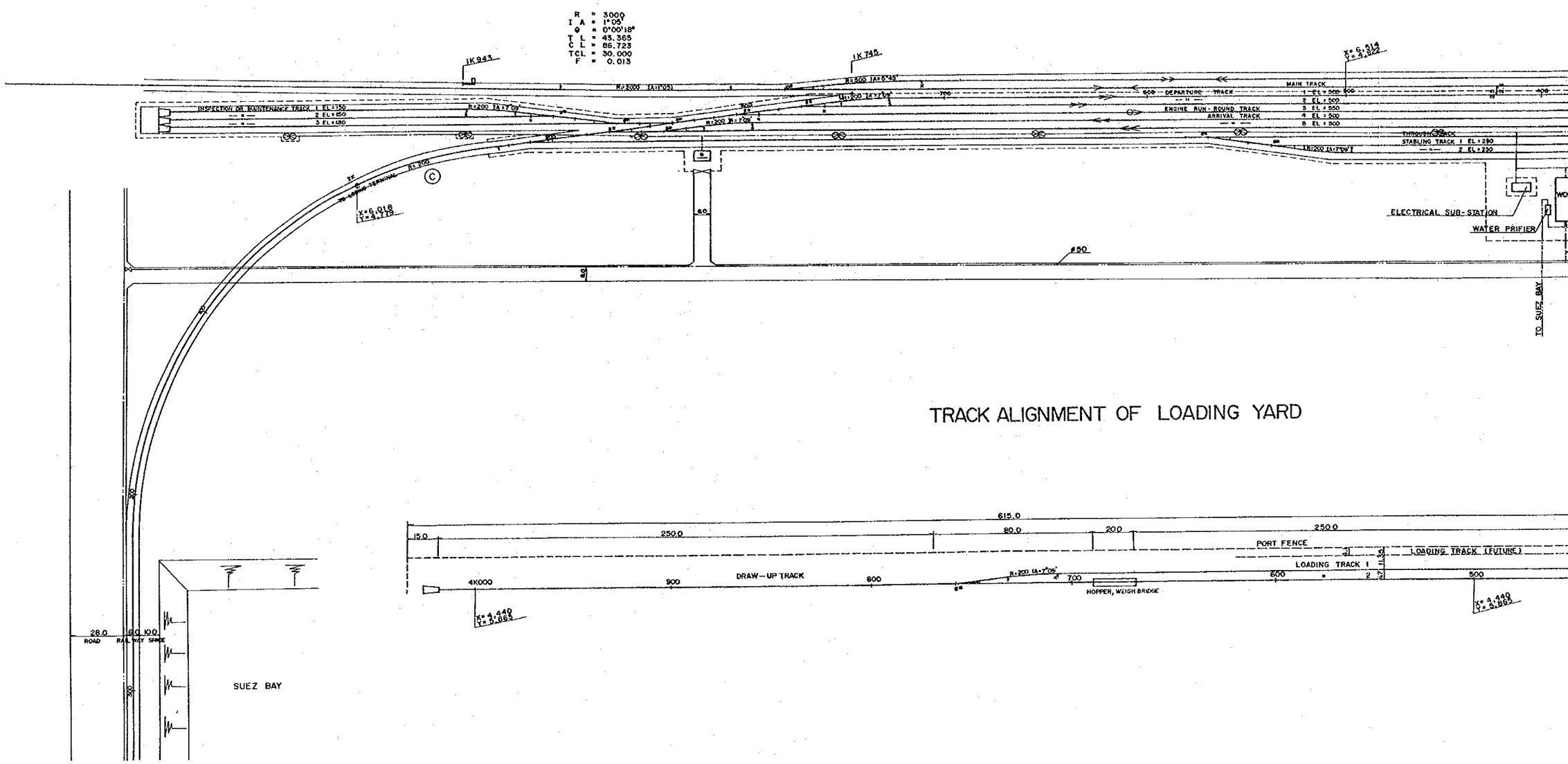


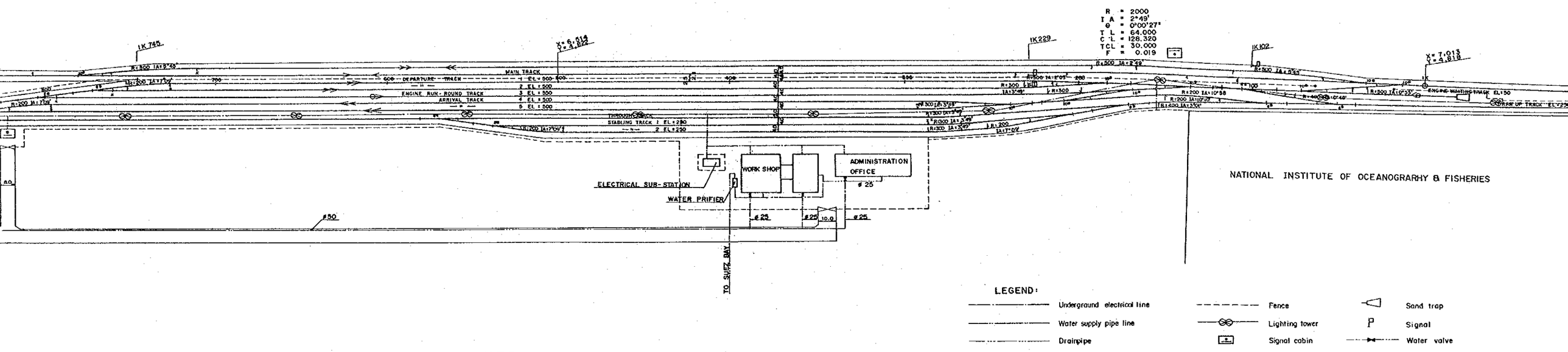
Figure 3.5-1 Horizontal Alingnment of Railway

TRACK ALIGNMENT OF SHUNTING YARD

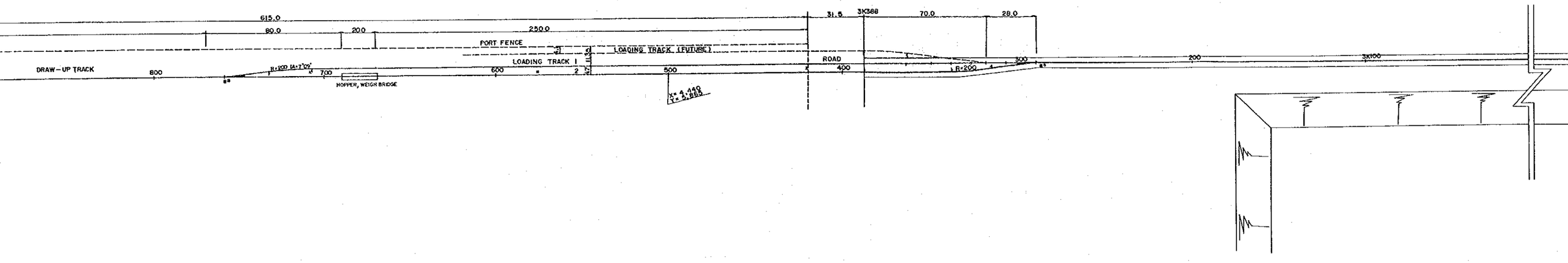


TRACK ALIGNMENT OF LOADING YARD

TRACK ALIGNMENT OF SHUNTING YARD



TRACK ALIGNMENT OF LOADING YARD



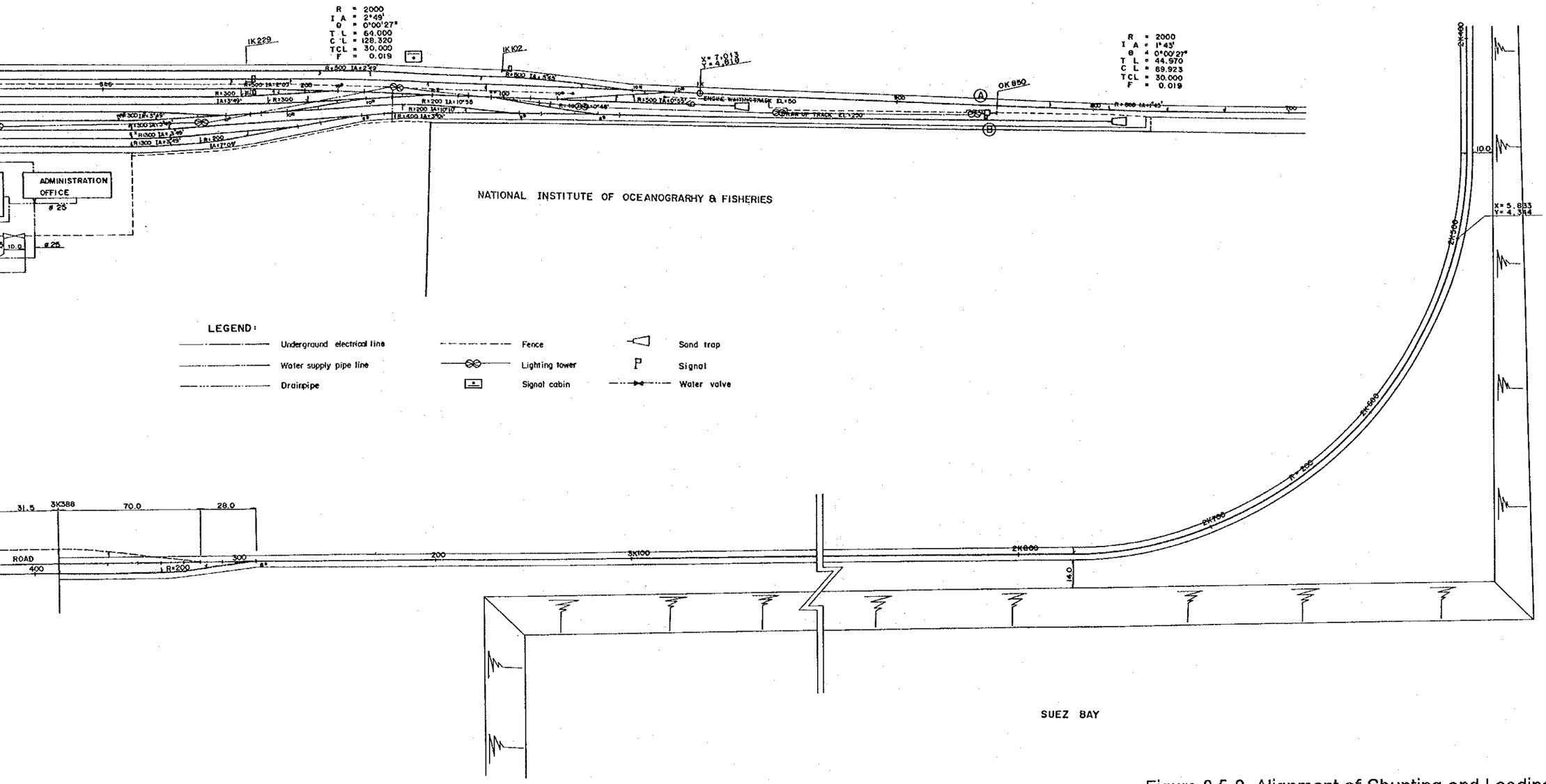


Figure 3.5-2 Alignment of Shunting and Loading Yard

(3) CONNECTING LINE

A line connecting the loading line with the shunting yard has been designed. The line is of single track, because only one train will be operated on the line at the same time.

3.5.5 SIGNALLING SYSTEM

(1) BLOCK SYSTEM

A staff block system has been applied on the main line.

(2) INTERLOCKING MACHINE

A mechanical interlocking system has been adopted to the signalling system.

(3) SIGNAL CABIN

Two signal cabins, Cabin No. 1 and No. 2, have been designed. The staff instrument and block telephone to be installed in the Cabin No. 1.

(4) SIGNAL

Semaphore signal system has been adopted for the signals related to the main line. Shunting signals has been designed to be erected in front of the turnouts to control the shunting of cars and locomotives.

(5) SAFETY DEVICE AT LEVEL CROSSING

Safety device has been designed to be installed at the level crossing with the main road to/from the port. The safety device includes barriers and warning devices.

3.5.6 TELECOMMUNICATIONS

(1) TELECOMMUNICATION FACILITIES TO BE CONNECTED TO THE EXISTING ENR NETWORK

The telecommunication facilities to be connected to the existing ENR network include the following devices:

- Telephone system for general use
- Block telephone
- Train despatching telephone

(2) TELECOMMUNICATION FACILITIES FOR THE PROPOSED YARD

The telecommunication facilities to be equipped for the shunting yard, loading line and connecting line include the following devices:

Station premises telephone
Radio system for operation and maintenance

3.5.7 BUILDING

An office building and a workshop and storage building for the railway operation have been designed so as to be constructed adjacent to the shunting yard.

3.6 BUILDINGS

3.6.1 SCOPE OF WORKS

The scope of the building design was as follows:

- Conceptual planning study
- Preliminary design
- Detailed design and tender documents preparation

The buildings covered by the planning, study and design were as follows:

In-Ataqa Industrial Estate (Center A)

- Administration Building
- Police and Fire Station
- Dispensary (Clinic)
- Mosque
- Restaurant
- Power Substation

In Ataqa Industrial Estate (Center B)

- Administration Building
- Police and Fire Station
- Post Office
- Dispensary
- Mosque
- Restaurant
- Social Club
- Power Substation

In Adabiya Industrial Free Zone (Center C)

- Administration Building
- Police and Fire Station
- Field Customs Office
- Dispensary
- Mosque
- Restaurant
- Control Gate
- Power Substation

In Ataqa Port Grain Terminal

- Administration Building
- Service Building
- Grease and Oil Storage
- Grain Sacks Storage
- Grain Sacks Bagging
- Maintenance Shop/Spare Parts Storage

In Ataqa Port Bulk Cargo Terminal

- Administration Building
- Field Customs Office
- Control Gate
- Viewing Tower
- Power Substation
- Incinerator Station

3.6.2 DESIGN CONDITIONS AND CRITERIA

The design conditions and criteria established were as described below.

(1) FLOOR AREA REQUIREMENTS

The floor area requirements for the buildings in each zone were set up by means of calculating the net area of the zone mentioned below and taking into consideration the expected number of the employees.

Zone	Number of employees
Ataqa Industrial Estate	12,000
Adabiya Industrial Free Zone	16,800
Coastal Area	4,020

Meetings and communications with the following authorities and entities were conducted to confirm the floor area requirements:

For the Ataqa Industrial Estate

- Head of the engineering department at the Silo And Storage Company
- Ministry Of Development And New Communities (MODANC)
- General Organization For Industry (GOFI)

For the Adabiya Industrial Free Zone

- Head of the General Authority for Investment (GAFI)
- Head of the engineering department at GAFI
- Administrators of the Ameriya Free Zone in Alexandria
- MODANC

(2) ARCHITECTURAL DESIGN CRITERIA

The major criteria, among others established for architectural designs of the buildings were as follows:

- National standards and codes authorized in Egypt shall be applied to the design of the buildings primarily.
- Style and form of the buildings shall suit the local climate, culture and social needs.
- While the buildings shall be functional in terms of operation and maintenance, the project cost shall be kept as low as possible.
- The buildings shall be monumental to represent the image of the respective areas and become landmarks in the areas.

(3) STRUCTURAL DESIGN CRITERIA

The major criteria established for structural designs of the buildings were as follows:

- The structural designs shall be carried out in accordance with the Egyptian Code of practice.
- The design method shall be Ultimate Strength Design Method.

(4) MECHANICAL DESIGN CRITERIA

The major criteria established for mechanical designs of the buildings were as follows:

- The areas and spaces in the buildings shall be designated to be either air-conditioned, mechanically ventilated or naturally ventilated.
- The domestic cold and hot water supply systems and the sanitary drainage system within the buildings shall be designed using the fixture demand method in accordance with the Uniform Plumbing Code 1988.
- The fire fighting system for the buildings should be of stand pipe system.

(5) ELECTRICAL DESIGN CRITERIA

The major criteria established for electrical designs of the buildings were as follows:

- The building electrical system shall be designed for a high level of continuity, safety, quality, efficiency and reliability with a minimum maintenance.
- The high voltage distribution system shall be of 20 kV, 3 phase, 3 wire, 50 Hz. The low voltage system shall be 380/220 V, 3 phase, 4 wire, 50 Hz.
- As a general rule, each building should be provided with an emergency standby generator, lightning protection system, grounding system, central annunciation and control system, telephone system, and fire detection and alarm system.

(6) LANDSCAPE DESIGN CRITERIA

The major criteria established for landscape designs were as follows:

- The general concept shall be that the outdoor spaces are vital in the creation of a pleasant environment.
- Care shall be taken to conserve the existing natural character of the area.
- Spaces dominated by vehicles and by pedestrians shall be clearly separated from each other to ensure the traffic safety.

3.6.3 PRELIMINARY DESIGN

The preliminary design of the buildings were conducted as described below.

(1) ARCHITECTURAL DESIGN

As an overall concept, Center B was planned to function as a center of the industrial community, therefore, such major facilities common to the community as main facilities of police and fire offices, dispensary, mosque and social club would be located in this area, while Center A was designed to serve only for the nearby industry community and the port area, and Center C was to serve for only specifically designated areas of Adabiya industrial Free Zone.

As a general study, alternative solutions to the following have been studied and evaluated:

- Allocation of the buildings within Center C

  The Scheme A and Scheme B were planned for the Center C and evaluated from the viewpoint of functions such as the security control, circulation of vehicles and pedestrians, and flexibility in site utilization, and the Scheme A was selected as a more suitable one.

- Integration of facilities to minimize number of the buildings

Although the given site areas for center zones are sufficient enough to allocate the required number of buildings, an approach to minimize number of the buildings was taken in order to lower the construction costs, to reduce the operation and maintenance problems without sacrificing the functions of each building. As a result of this study, the following recommendations were established:

(a) Individual buildings are required for
- Customs and quarantine field office
- Mosque
- Control gate
- Fire and police stations

(b) Either an individual building or a combined building is good for
- Exhibition hall
- Restaurant
- Dispensary
- Social club
- Spare parts, grease/oil and other storage

(c) A combined building is recommendable for
- Branch office of Ministry
- Customs and quarantine office
- Post and telecommunication office
- Trading offices
- Branch offices of banks
- Administration office

In addition to the above-mentioned studies, various aspects such as the site environment, security control, traffic circulation and future expansion possibility were taken into account in the preliminary design.

(2) STRUCTURAL DESIGN

The structural system chosen for the buildings is reinforced concrete post-and-beam system, except for the grain sacks storage, as the spans of the buildings planned are appropriate for the system.

As the superstructures of the buildings are light and the bearing capacity of the soil is big enough according to the soil report, isolated footing are proposed.

(3) MECHANICAL DESIGN

A chilled water central air-conditioning system is proposed for the administrative buildings. Large areas such as bank offices, trading shops and waiting halls are air-conditioned using air handling units, while relatively small areas such as office rooms and examination rooms are by using fan coil units.

Package air-conditioners are proposed for the restaurants, social buildings and exhibition hall.

A mechanical ventilation system is recommended for toilets, workshops and storage areas. Toilets are provided with only exhaust fans, while the workshops and store areas are equipped with both the fresh air intake and exhaust fans.

Mosque and fire and police stations are designed for natural ventilation. If there is a need for air-conditioning of the offices in these buildings, window type air-conditioners can be provided.

As to the plumbing system, pressurized water supply network are recommended. Sewerage conveyance system proposed in general is the gravity system where practical.

(4) ELECTRICAL DESIGN

Lighting for the office rooms, reading rooms, library, etc. are by fluorescent lamps, while a combination of fluorescent lamps and incandescent lamps are proposed for the conference and meeting rooms, cafeteria, restaurants, etc. Lighting system for all other rooms and spaces are selected in accordance with the functional requirements.

(5) LANDSCAPE DESIGN

The preliminary landscaping design was prepared taking into account the vehicular traffic safety, separation of the vehicular and pedestrian movements, separation of public and private spaces, improvement of micro-climate, grading for storm water drainage, enhancement of continuity of appearance, distinction of specific areas as required, etc., by introduction of variety of landscaping elements such as street furniture, pavements, plants, walls, and screens.

The preliminary designs were presented to the relevant authorities, and several comments such as the following were received.

- Add a power station to the Ataqa Port grain terminal site.
- Separate the grain storage from the oil storage.

- Separate the grain sacks storage from the grain sacks bagging.
- Change the orientation of some buildings.
- Add lockers in the restaurant for the workmen.
- The boundary fences shall be of chain links to decrease the number of guard posts.

3.6.4 DETAILED DESIGN

The detailed design was developed based on the results of the preliminary design and taking into account the comments from the relevant authorities. At the initial stage of the detailed design, the revised preliminary design and drawings were approved by the following authorities:

- General Organization for Industries for facilities in Centers A and B
- GAFI for facilities in Center C
- Red Sea Port Authority and the customs for facilities in Ataqa Port Area
- General Company for Silo and Storage for facilities in Ataqa Port Area
- MODANC for all facilities

The detailed design and the back up information and data were compiled into the Interim Report 2, the Design Drawing Package and the Calculation Sheet Package. Site plans of Centers Band C are attached to the following pages.

Table 3.6-1 List Buildings in Detailed Design

Area and Building Name	No. of stories	Type of structure	Gross floor area (m^2)
Ataqa Industrial Estate (Center A)			
1) Administration building	1	RC	728
2) Police and fire station	1	RC	276
3) Mosque	2	RC	650
4) Dispensary (clinic)	1	RC	103
5) Restaurant	1	RC	378
6) Power substation	1	RC	187
Subtotal			2,322
Ataqa Industrial Estate (Center B)			
1) Administration building	2	RC	1,477
2) Police and fire station	2	RC	921
3) Mosque	2	RC	2,073
4) Dispensary	1	RC	1,544
5) Restaurant	1	RC	440
6) Power substation	1	RC	187
7) Social club	1	RC	907
8) Post office	1	RC	207
Subtotal			7,756
Adabiya Industrial Free Zone (Center C)			
1) Administration building	2	RC	1,935
2) Police and fire station	1	RC	444
3) Mosque	2	RC	650
4) Dispensary	1	RC	104
5) Restaurant	1	RC	516
6) Power substation	1	RC	187
7) Field customs office	1	RC	203
8) Control gate	1	RC	56
Subtotal			4,095
Ataqa Port Bulk Cargo Terminal			
1) Administration building	2	RC	2,070
2) Power substation	1	RC	187
3) Field customs office	1	RC	204
4) Control gate	1	RC	25
5) Viewing tower	35 m high	RC	99
6) Incinerator station	1	RC	14
Subtotal			2,599

Area and Building Name	No. of stories	Type of structure	Gross floor area (m^2)
Ataqa Port Grain Terminal			
1) Administration building	2	RC	1,375
2) Service building	1	RC	184
3) Grease and oil storage	1	RC	104
4) Grain sacks storage	1	STL	415
5) Grain sacks bagging	1	RC	400
6) Maintenance shop/spare parts store	1	RC	894
Subtotal			3,372
Total			20,144

Legend: RC = Reinforced concrete
STL = Steel frame

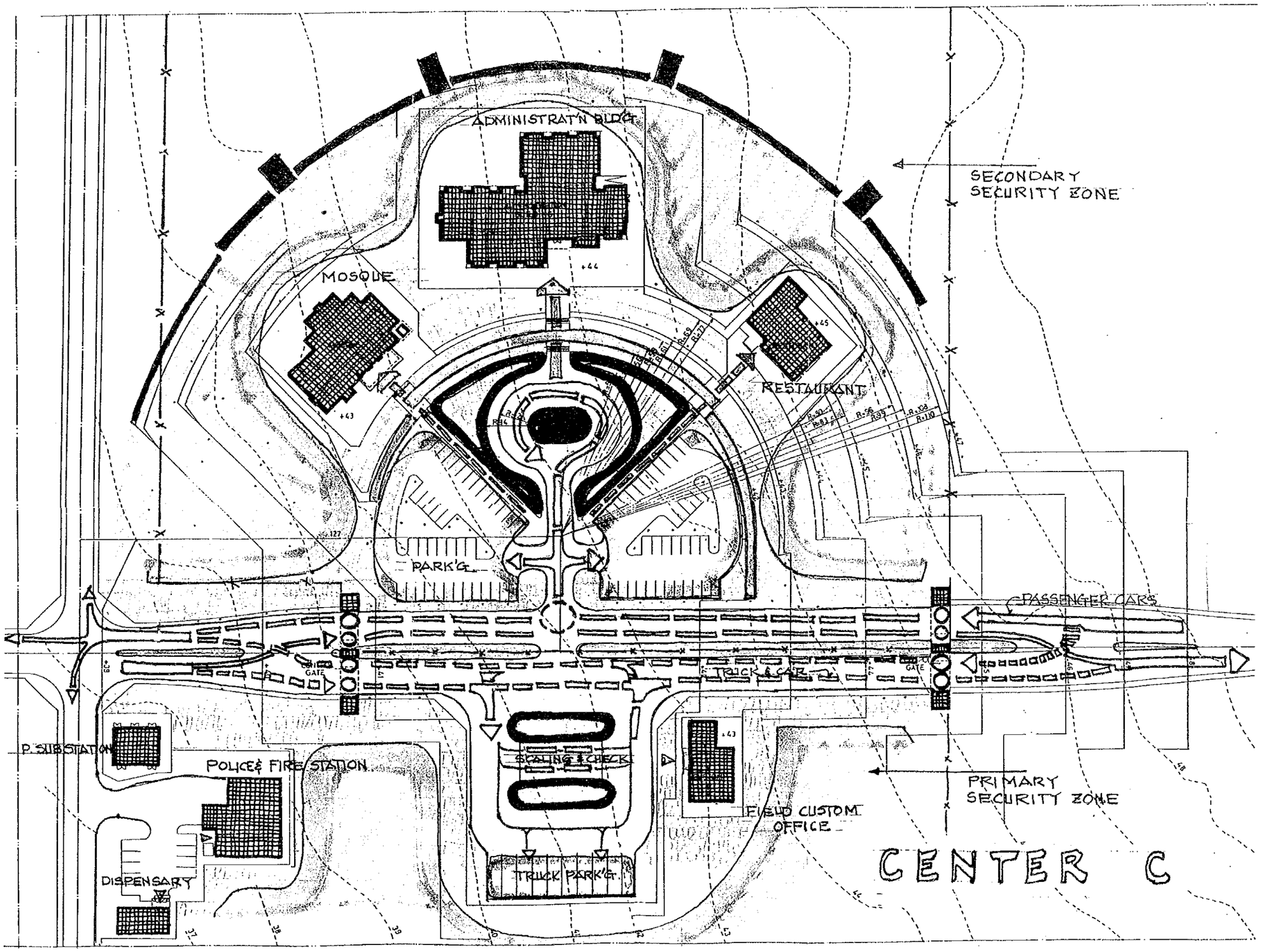


Figure 3.6-1 Center-C Landscaping Plan

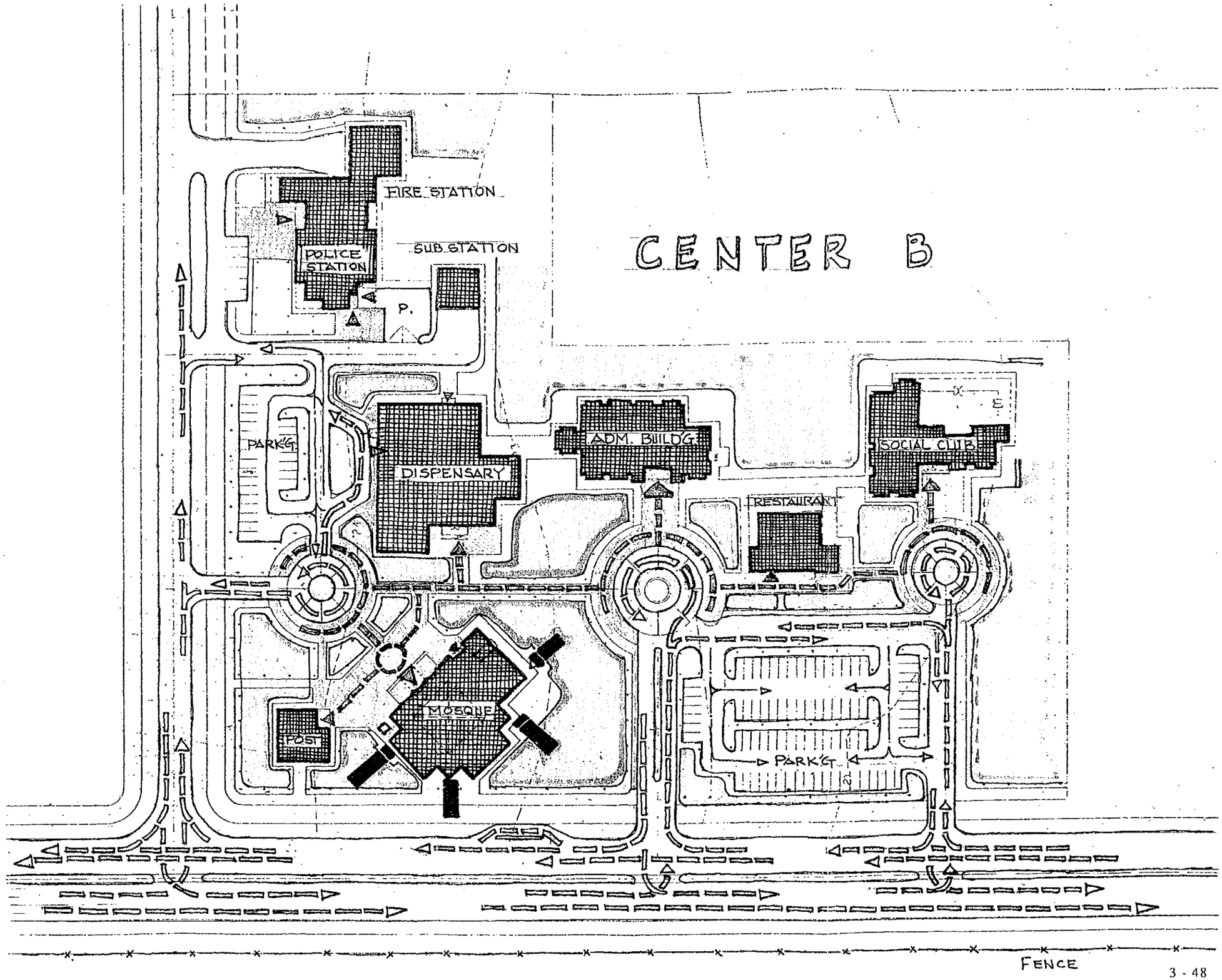


Figure 3.6-2 Center-B Landscaping Plan

3.7 WATER SUPPLY SYSTEM

3.7.1 OUTLINE OF WATER SUPPLY SYSTEM

Location and general layout of the water supply facilities are shown in Figure 3.7-1.

(1) RAW WATER

The water source of the system is the Suez Sweetwater Canal. This raw water is originated from the Nile River. The water of the Nile River, firstly, flow into the Ismilia Canal, then branches off to the Suez Sweetwater Canal. The distance between the Nile River and the intake point (traced along canals) is approximately 230 km.

(2) WATER SUPPLY FACILITIES

The water supply system to be constructed under this project consists of the Intake, Aqueduct, Water treatment plant, Treated water distribution pipeline and Draw-off water distribution pipeline.

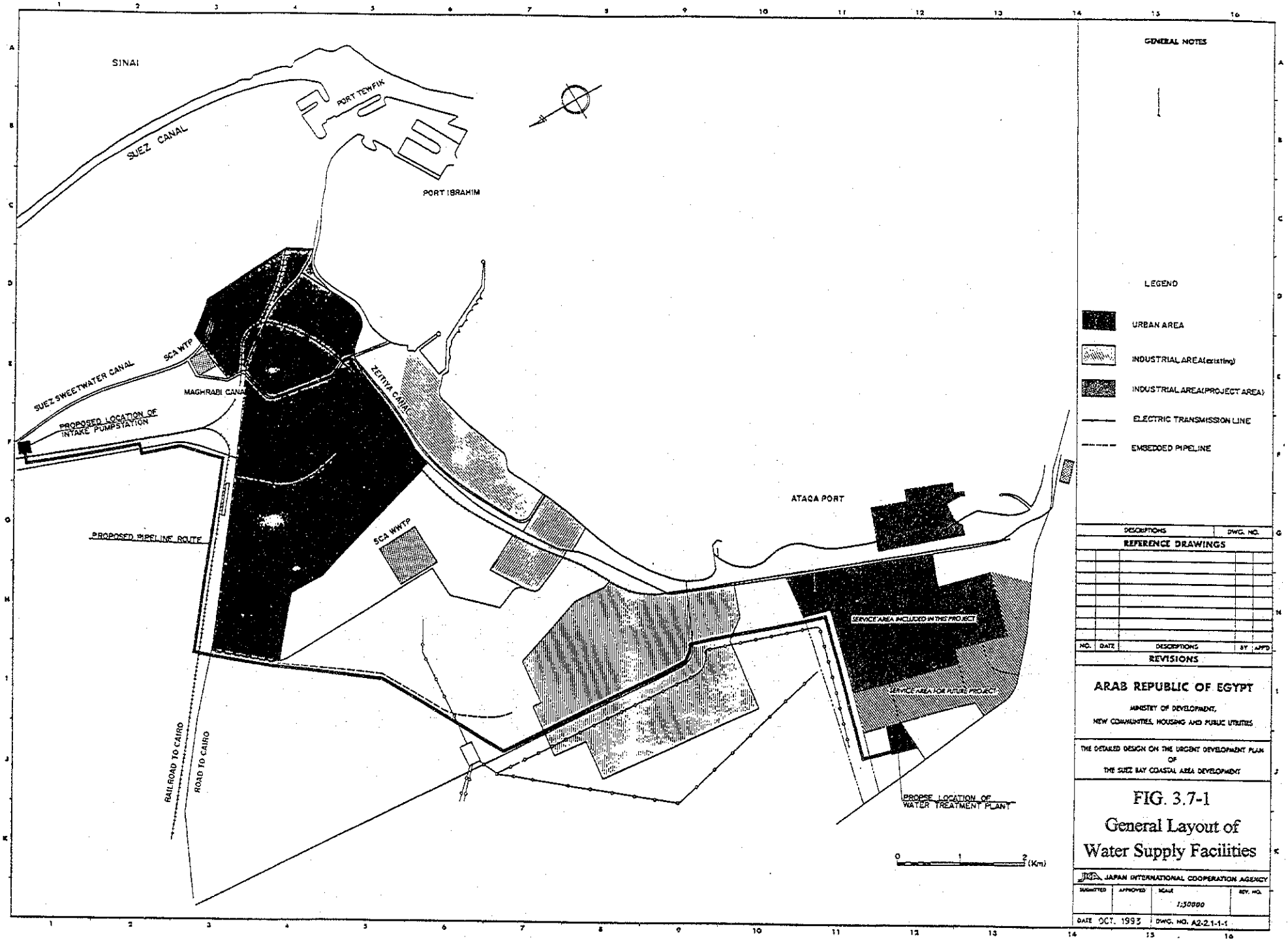
The production and supply capacity of the water supply system is 100,000 cu.m per day.

(3) INTAKE FACILITIES

The Intake facilities are located at about 3 km up-stream from the end of Suez sweetwater canal in the Suez city. The raw water is collected from the Suez Sweetwater Canal at the rate of 100,000 cu.m per day as maximum, then pumped up to the water treatment plant to be constructed at the Ataqa Industrial Estate through the Aqueduct Pipeline.

(4) AQUEDUCT PIPELINE

The raw water is to be conveyed to the water treatment plant through the aqueduct is about 19.5 km in length with 85.3 m of elevation differences. The pipeline route runs from the intake pump station, through the Suez Railway Station, the North-West desert, El Zaytla road, the Suez Thermal Power Plant, Carbon factory in Ataqa, then reaches to the water treatment plant. This route keeps is kept away from the urban area of the Suez City, to facilitate construction and land acquisition. This pipeline route includes two railroad crossings, one aque-bridge and road crossings.


SINAI
SUEZ CANAL
PORT TEWFIK
PORT IBRAHIM
SUEZ SWEETWATER CANAL
SCA WTP
MAGHRABI CANAL
PROPOSED LOCATION OF INTAKE PUMPSTATION
PROPOSED PIPELINE ROUTE
ATAQA PORT
SCA WWTP
SERVICE AREA INCLUDED IN THIS PROJECT
SERVICE AREA FOR FUTURE PROJECT
RAILROAD TO CAIRO
ROAD TO CAIRO
PROPOSE LOCATION OF WATER TREATMENT PLANT
0 1 2 (Km)
GENERAL NOTES
LEGEND
URBAN AREA
INDUSTRIAL AREA(existing)
INDUSTRIAL AREA(PROJECT AREA)
ELECTRIC TRANSMISSION LINE
EMBEDDED PIPELINE
DESCRIPTIONS
DWG. NO.
REFERENCE DRAWINGS
NO. DATE DESCRIPTIONS BY APPD
REVISIONS
ARAB REPUBLIC OF EGYPT
MINISTRY OF DEVELOPMENT, NEW COMMUNITIES, HOUSING AND PUBLIC UTILITIES
THE DETAILED DESIGN ON THE URGENT DEVELOPMENT PLAN OF THE SUEZ BAY COASTAL AREA DEVELOPMENT
FIG. 3.7-1
General Layout of Water Supply Facilities
JICA JAPAN INTERNATIONAL COOPERATION AGENCY
SUBMITTED APPROVED SCALE 1:50000 REV. NO.
DATE OCT. 1993 DWG. NO. A2-2.1-1-1

(5) WATER TREATMENT FACILITIES

The water treatment plant (WTP) is located in the Ataqa Industrial Estate. Design treated water production capacity is 100,000 m³/day in all. The treatment system is divided into 4 series of production lines. Each series has a production capacity of 25,000 m³/day. This division is due to consideration of expandability for the production capacity in accordance with the growth of water demand. The water treatment plant consists of water treatment facilities, sludge treatment facilities, operation and maintenance facilities and power supply facilities. As a major feature of the plant, the sludge treatment facilities have a function to recycle the sludge water for plantation purpose.

(6) DISTRIBUTION PIPELINE

The treated water is distributed to the service area by gravity flow from the WTP. The service area is about 437 ha, including Ataqa Industrial Estate East, West and Coastal (Ataqa I.E. East, West and Coastal), Adabiya Industrial Free Zone (Adabiya I.F.Z.), Ataqa Port (Bulk cargo terminal, Grain silo and Railway facilities) and Wastewater treatment plant. Other than the above service areas, Ataqa I.E. Expantion and ancillary residential area as the future expanding projections, also include the elements of the production capacity. However, the distribution system of these future projection are excluded from this design. The treated water distribution pipeline network includes from trunk line (main) to secondary/tertiary lines, but house connection system is not covered in this design. As well as the treated water, the draw-off water will also be distributed to the service area through the draw-off water pipeline network for the irrigation and planning purpose.

(7) MAINTENANCE OF SLUDGE DRAW-OFF (RECYCLING)

The sludge draw-off water generated in the course of treatment process is partially recycled. The draw-off water is collected in the draw-off water reservoir, and separated with super-natant and sub-natant. The super-natant, which is expected to be SS 50 mg/l, is distributed for the above mentioned purpose. The remaining sub-natant is dewatered in the sludge drying beds by evaporation and disposed at the surrounding desert. According to the demand calculation, the draw- off water supply quantity is scheduled at 3,200 m³/day. The service area of draw-off water is the project area except for the Ataqa port and the wastewater treatment plant.

(8) POWER SUPPLY SYSTEM

The water supply facilities use two individual power supply lines. The first one is for the intake pumping station which receives 11 kV from supply line, and the other is for the water treatment