社会開発調査部報告書

No. 42

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

GENERAL AUTHORITY FOR ROADS, BRIDGES AND LAND TRANSPORT
MINISTRY OF TRANSPORT AND COMMUNICATIONS
THE GOVERNMENT OF THE ARAB REPUBLIC OF EGYPT

THE DETAILED DESIGN STUDY ON THE PROJECT FOR CONSTRUCTION OF THE SUEZ CANAL BRIDGE IN EGYPT

FINAL REPORT

EXECUTIVE SUMMARY

JANUARY 1997

PACIFIC CONSULTANTS INTERNATIONAL
CHODAI CO., LTD.

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NOTE

The following exchange rate was adopted through this report :

US $ 1.00 = LE 3.4 (November 1996)

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 PROJECT FOR CONSTRUCTION OF THE SUEZ CANAL BRIDGE and entrusted the study to Japan International Cooperation Agency (JICA).

JICA sent a study team to the Republic of Egypt between October 1996 and January 1997. The study team was headed by Mr. Hiroyuki ENDO and composed of members of Pacific Consultants International and Chodai Co., LTD.

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

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

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

January 1997

Kimio FUJITA
President
Japan International Cooperation Agency

January 1997

Mr. Kimio FUJITA
President
Japan International Cooperation Agency
Tokyo, Japan

Dear Sir,

Letter of Transmittal

We are pleased to submit you the report on the Detailed Design Study on the Project for Construction of the Suez Canal Bridge in Egypt. The report contains the advice and suggestion of he authorities concerned of the Government of Japan and your Agency as well as the comments made by the Ministry of Transport and Communications, General Authority for Roads, Bridges and Land Transport and the authorities concerned in the Arab Republic of Egypt. The reports consist of six volumes, an Executive Summary, a Detailed Design Report, Design Calculation Reports, Prequalification Documents, Tender Documents and Priced Bill of Quantities. This report presents the Detailed design Study on the Project for Construction of the Suez Canal Bridge in Egypt.

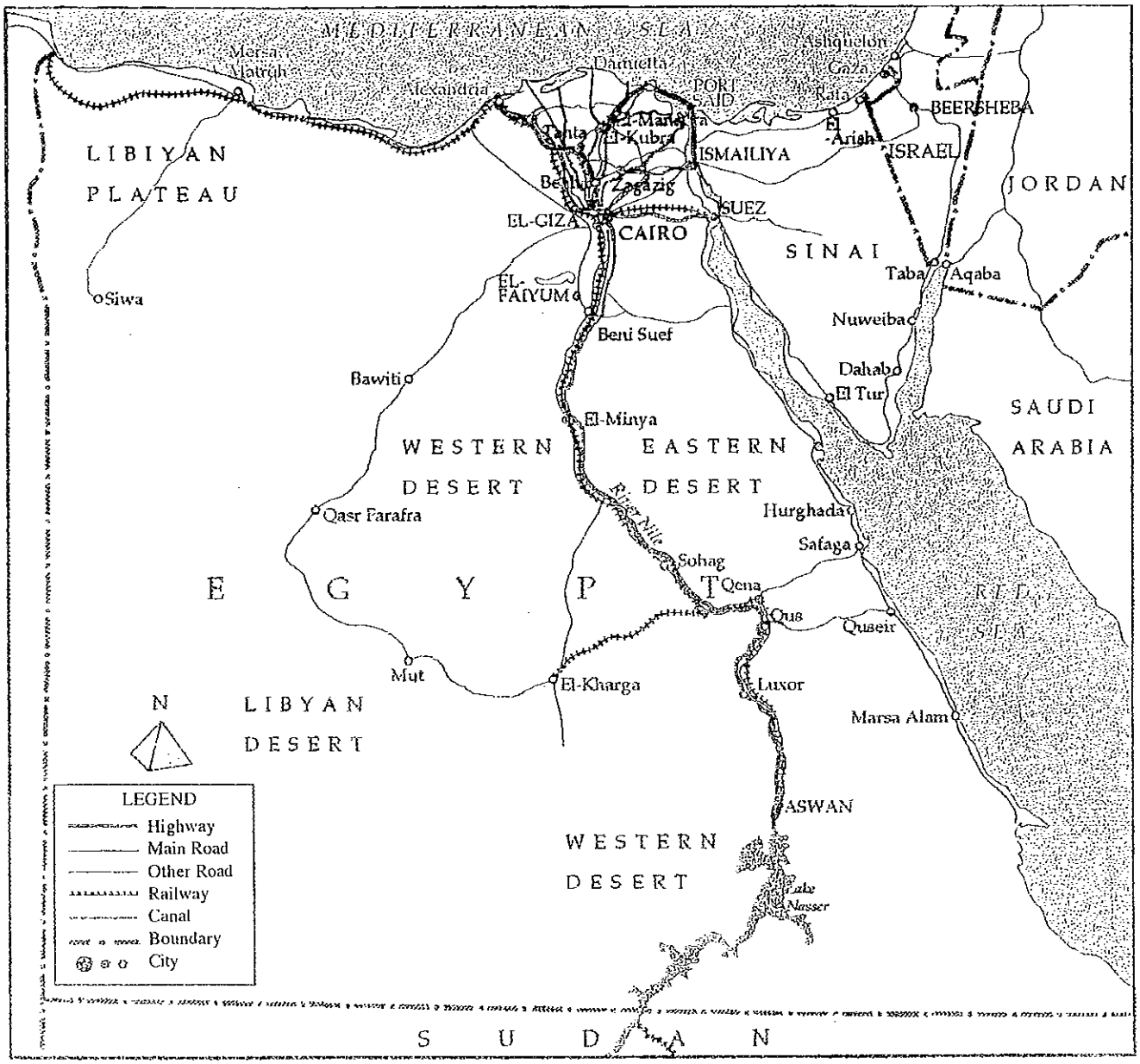
The Sinai Peninsula occupies the North - Eastern quarter of Egypt, and is expected to become the important center of economy, culture and politics with the development of the Sinai Peninsula. We believe that this project will contribute greatly to upgrade the transport system across the area which is presently provided with Ahmed Hamdi Tunnel and six ferry systems crossing the Suez Canal.

We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs, the Ministry of Construction and the Ministry of Transport. We also wish to express our deep gratitude to the Ministry of Transport and Communications and the Governmental Agencies concerned in the Arab Republic of Egypt, the Japanese Embassy at Egypt for the close cooperation and assistance extended to us during out study. We hope this report will contribute to construct a bridge crossing the Suez Canal at Qantara.

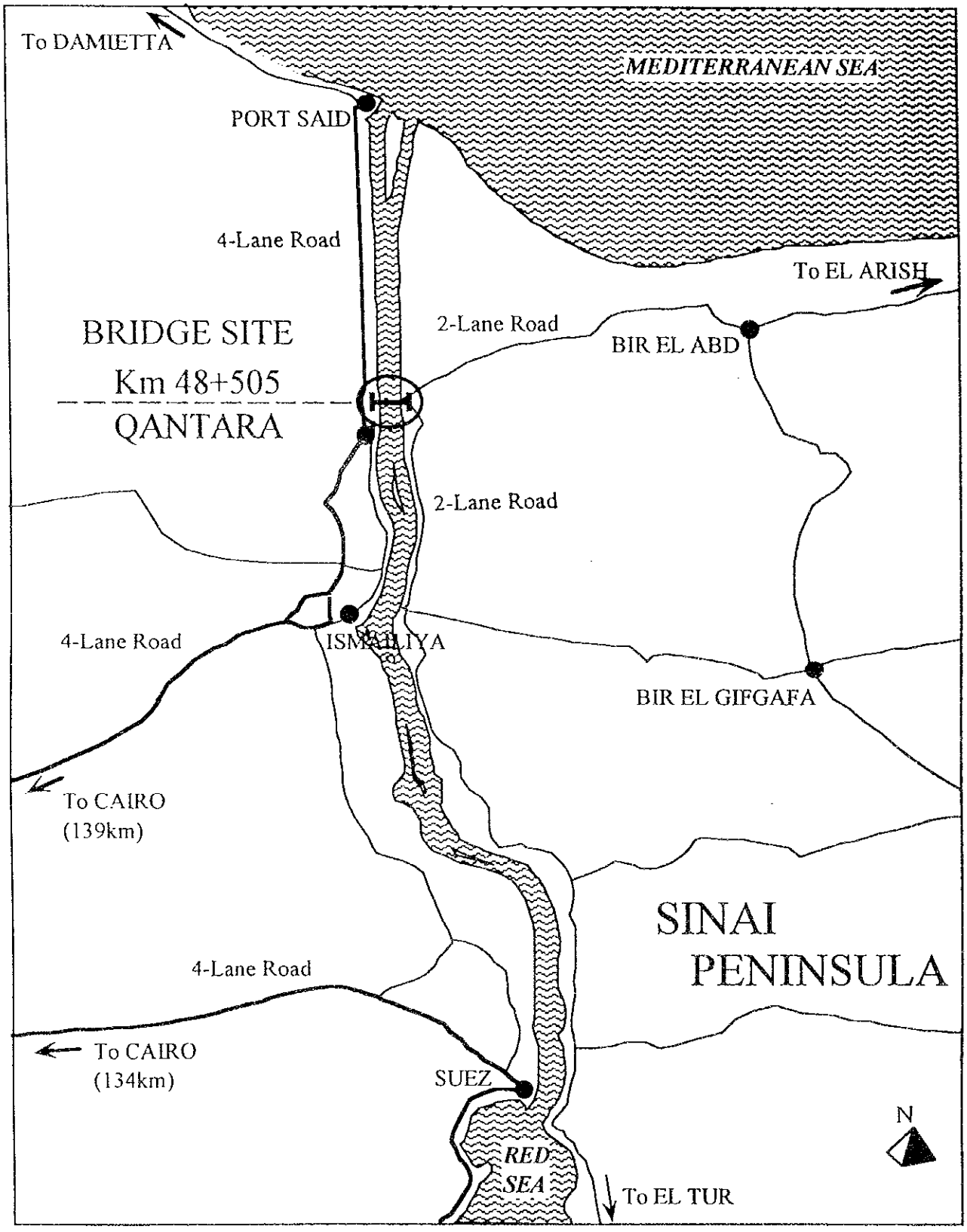
Very truly yours,

Hiroyuki Endo

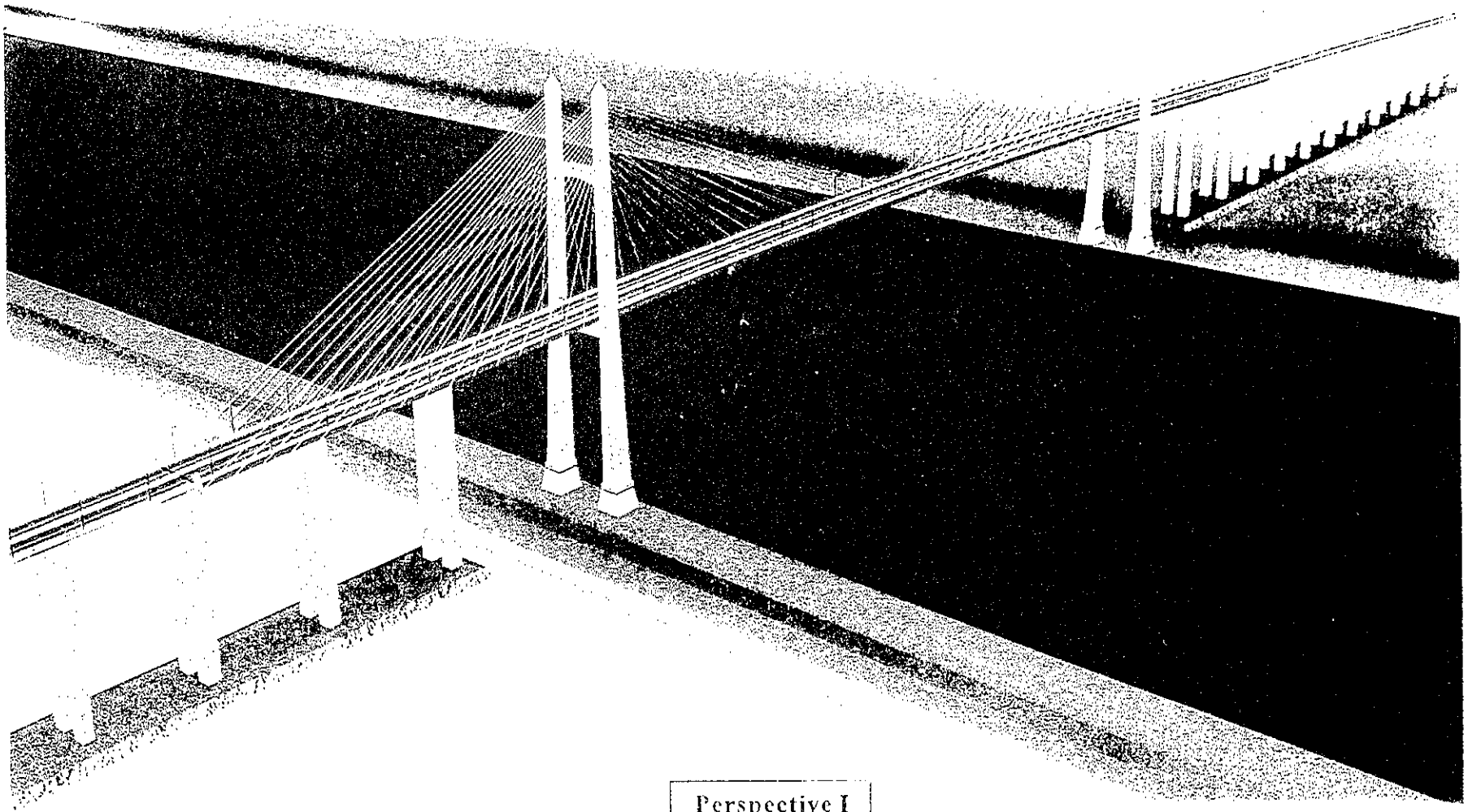
Mr. Hiroyuki ENDO
Team Leader
The Detailed Design Study on the
Project for Construction of the
Suez Canal Bridge in Egypt



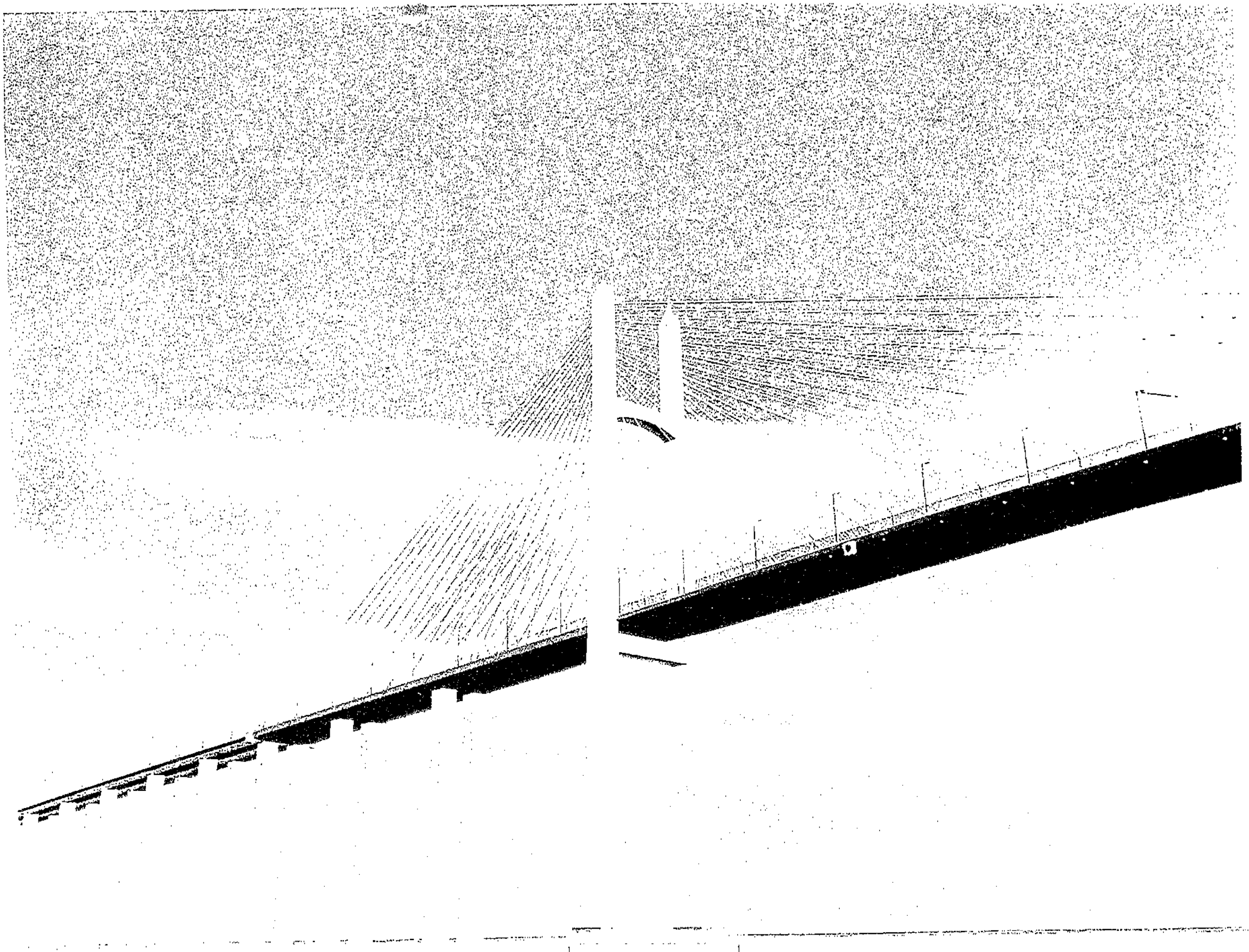
Project Location Map



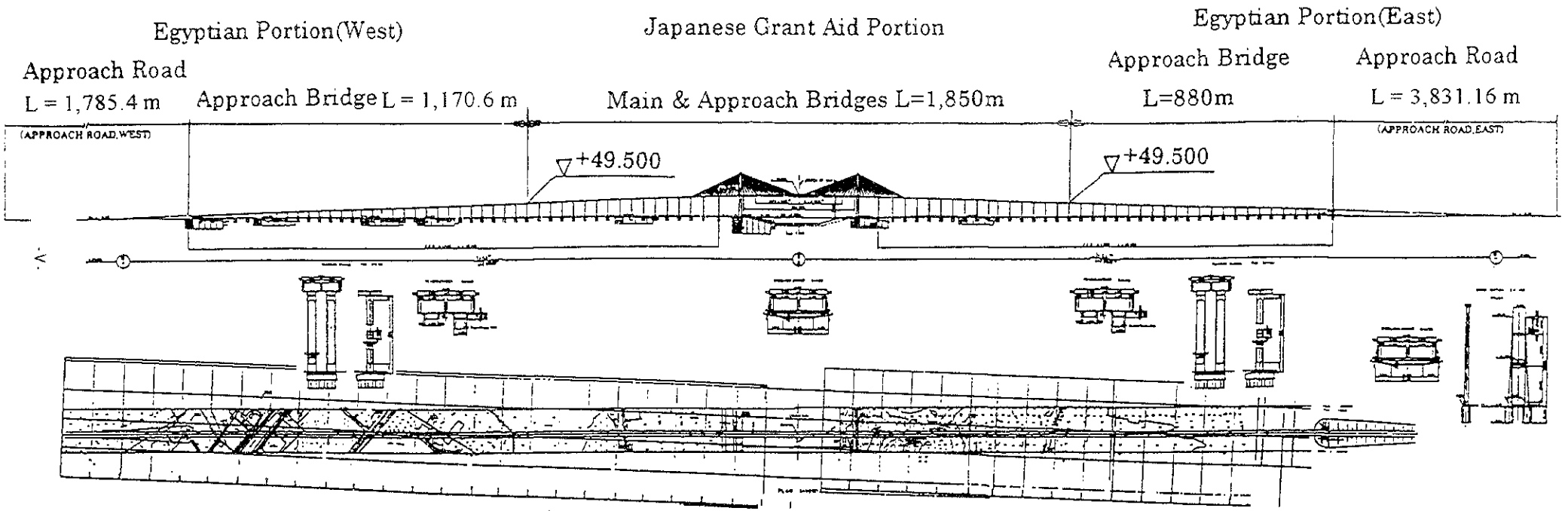
Project Location Map



Perspective I



Perspective II



Work Allotment

Table of Contents

1. Introduction

This Executive Summary contains a brief resume of the conclusions of "The Detailed Design Study on the Project for Construction of the Sue Canal Bridge in Egypt" conducted within the period from October, 1996 to January, 1997.

1.1 Background of the Study

Much of the residential and cultivated land in Egypt lies in the area north of Cairo, which is less than 4 % of the total land area. The country is faced with problems caused by concentrations of population in this area. The increase in agricultural production has caused the soils to become overworked, and the heavy demand for the water has caused environmental, economic and food shortage problems. To ease these problems and further adverse economic developments, the Government of the Arab Republic of Egypt set out the "National Project for the Development of Sinai" (NPDS) in September 1994. The NPDS proposes to develop the Sinai Peninsula by the year 2017 to accommodate 3.2 million residents and to create a labor pool of 0.8 million people and this was approved and given top priority under the Implementation Clause of the National Project in 1995. The total capital to be invested for this project was estimated at approximately EL 75 billion to be disbursed between 1994 and 2017.

As the principal development projects under this NPDS priority of agriculture, mining and tourism, start to move forward, an increase in road traffic over the Suez Canal has become evident. It is therefore becoming urgent to provide a suitable and efficient means of road transport across the Suez Canal, to access the Sinai Peninsula.
The Suez Canal, which was built in 1896, and extends from Port Said in the North to Suez in the South with a total length of 195 km, divides the Greater Cairo Metropolitan area from the Sinai Peninsula. The only means currently available for crossing the Suez Canal, are one tunnel at the South and seven ferry boat systems.

It has been forecast that by the year 2017, the daily road traffic over the Suez Canal would reach 50,000 to 60,000 vehicles/day, and would exceed the present allowable road traffic capacity of approximately 22,000 vehicles/day. In order to cope with this increase in traffic, it is evident that some new crossing facility is required. The present ferry boat system operates by making use of the intervals provided by the breaks in the convoys, but there is a limit to how much more this system can accommodate. The safe passage of the ships transiting the Suez Canal will be endangered, if the existing system is expanded any further and therefore the ferry system cannot be considered

capable of catering for any future increases in the road traffic. Thus it has become necessary to provide a new crossing facility of either a road bridge or a tunnel.

Prior to the setting out of the NPDS in June 1994, the Government of Egypt requested the Government of Japan to study the feasibility of constructing a new structure to cross the Suez Canal. After conducting a preliminary survey in October 1994, and a preparatory study (scope of works mission) in January 1995, a full scale study was implemented in May 1995. The findings of this Study Team were published in the Interim Report dated March 1996, and recommended that the most suitable crossing structure would be a 4 lane road bridge of 3,901 m in length.

The objective of the Project is to construct a bridge across the Suez Canal to cope with future increased traffic demand, which was forecast in the NPDS. This Project for construction of the Suez Canal Bridge has already been selected as a part of the development scheme, and is of major political importance. This bridge project will be a symbol of progress for the Middle East Peace Process and is also expected to contribute to the development of not only Egypt but also the whole North African and Mediterranean Area, and it will connect the two major continents of Africa and Asia.

The funding for this road bridge crossing of the Suez Canal was confirmed between the two countries, at which it was agreed that Japan would contribute 60% and Egypt the remaining 40% , at a meeting of the Grant Aid Contact Mission held in June 1996.

The Basic Design Study Team was dispatched to Cairo in August 1996, to work in parallel with the Feasibility Study, which was on going in the same period.
In the Basic Design Study the work allotment between the Japanese Grant Aid Portion and the Egyptian Portion, the project implementation plan and the cost estimate for the Japanese Grant Aid Portion were carried out, based on the preliminary design results conducted in the Feasibility Study.
The Detailed Design Study, which was requested to the Government of Japan, was agreed to be implemented under the Technical Assistance Scheme and commenced in October, 1996.
It is planned to submit the Final Reports in January, 1997.

1.2 Objectives of the Study

The Objective of the Study is to review the Feasibility Study and the Basic Design, and to prepare the Detailed Design for construction of the Suez Canal Bridge.
A Supplementary topographical survey, geotechnical investigation and construction material survey together with the preparation of tender and contract documents, and technology transfer program to the key Egyptian Counterparts have also been included in the Study.

1.3 Study Area

The Study area is shown on the Project Location Map.
The study area is at Qantara, and the centerline of the Bridge is located at 48 km + 505 along the Suez Canal.

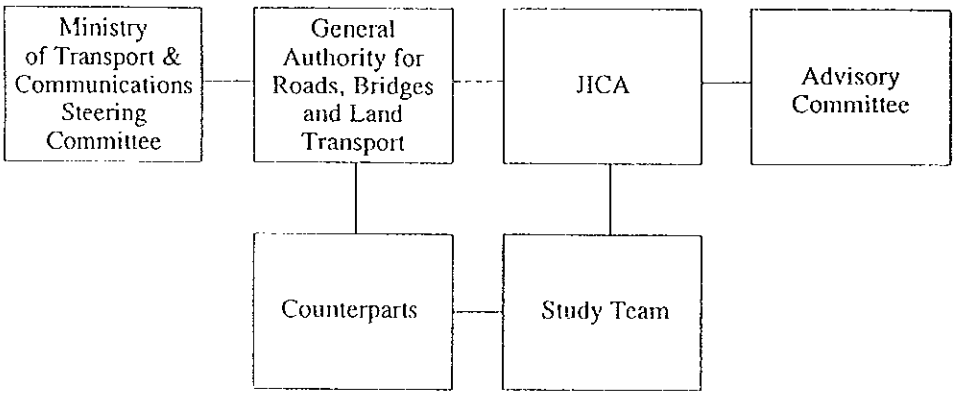
1.4 Scope and Contents of the Study

The scope of the study is to review the Feasibility Study and the Basic Design Study, and to execute the Detailed Design of the Suez Canal Bridge to Cross the Suez Canal at Qantara.
The contents of the Study will be summarized as follows:

- Review of the Feasibility Study and the Basic Design Study
- Field Survey
- Supplementary Topographic Survey and Soil and Material Surveys
- Detailed Design of the Main Bridge, the Approach Bridges and the Approach Roads
- Construction Plan
- Project Cost Estimate
- Tender and Contract Documents

1.5 Study Organization

The study organization is shown below.



2. Review of Feasibility Study and Basic Design Study

Since the Detailed Design Study commenced immediately after the completion of the Feasibility Study and the Basic Design Study, a review of the socio economic frame work and traffic volume was not required, and the major part of the review, therefore, is to confirm the details of the Design Conditions.

2.1 Confirmation of Design Conditions

The fundamental conditions, agreed in the Feasibility Study and the Basic Design, were discussed and agreed in detail, in the first Field Survey (Inception Stage) and the second Field Survey and in the following minutes of meetings:

First minuets dated : October 12, 1996
second minutes dated : November 12, 1996

2.2 Contents and Extent of Sub-Letting Works in Egypt

The following works were Sub-Let to local firms in Egypt, in order to supplement the topographic and geotechnical surveys, which were conducted in the Feasibility Study.

- Supplementary Topographic Survey
  - Establishment of 5 project bench marks (stable concrete structures) at East and West ends of the Project, the Railway Crossing, and at both Banks of the Suez Canal.
  - Centerline Survey and establishment of centerline and Right of Way stakes (at 500 m intervals
  - Cross Section Survey of the Canal

- Geotechnical Investigation
  - Soil exploration (Mechanical boring, Depth 25 m)

    West bank 6 holes
    East bank 6 holes
    SPT 300 samples
  - Ground Water Level and Samplings

    3 points on each bank
    (survey of water level at each point and the Suez Canal).
    Sampling and chemical analysis of water

- Materials Testing
  - Coarse Aggregates
    - Sieve test
    - Abrasion test
    - Alkali aggregate reaction test
  - Fine Aggregate
    - Sieve test
    - Alkali aggregate reaction test
  - Embankment Soil
    - Grain size analysis
    - Density
    - CBR Test
    - pH Test

    3 samples, each at 2 sources.

2.3 Determination of Location of Crossing

In the Interim Report of the Feasibility Study, Qantara (at 48 km + 505) was selected as a crossing point of the Bridge, and finally the location was agreed between the Japanese and Egyptian Governments.

2.4 Selection of Structure Type

In the Feasibility Study, which commenced in May, 1995, the Preliminary Design was executed. In the Basic Design, the results of the Preliminary Design from the Feasibility Study were adopted, and the work allotment between the Japanese Grant Aid Portion and the Egyptian Portion and project Cost Estimate were made.
The Project is to construct a 4-lane bridge and approach roads to cope with the projected traffic demand of 28,000 vehicles/day at Qantara in 2017.

The Project will be financed by the Japanese Grant Aid and Egyptian Funds.

The outline of the Project is summarized as follows:

Main Bridge		
Type of Bridge	:	Cable-stayed bridge with steel box girder
Main Pylon	:	H-type, reinforced concrete (RC)
Main Pylon Base	:	Diaphragm wall
Main Girder	:	Steel box girder, steel deck
Bridge Length	:	L = 730 m
Span Arrangement	:	163 m + 404 m + 163 m
Effective Width	:	B = 16.3 m
Pavement	:	Asphalt concrete, 8 cm thick
Approach Bridge		
Bridge Type	:	PSC box girder, continuous rigid frame type and continuous girder type
Foundation	:	Cast-in-place concrete pile, ϕ1.5 m
Bridge Length	:	1,440 m (East Bank), 1,730.6 m (West Bank)
Span Spacing	:	40 m (standard)
Effective Width	:	B = 16.3 m
Approach Roads		
Road Lengths	:	3,831.16 m (East Bank), 1,785.4 m (West Bank)
Effective Width	:	19.6 m
Max. Embankment Height	:	Approx. 20 m (East Bank), approx. 10 m (West Bank)
Embankment Slopes	:	2:1(H:V), benched approx. every 5 m
Embankment Protection	:	Slope protection by stone pitching
Numbers of Lanes	:	4 lanes

From the above bridge and road details, the section higher than Formation Level (F.L.) 49.5 m will be implemented under the Japanese Grant Aid Scheme, as follows:

Main Bridge	:	L = 730 m	
Approach Bridge	:	East Bank	L = 560 m
		West Bank	L = 560 m

Construction for the whole of the project will be supervised under the Japanese Grant Aid.

3. Detailed Design

When the Inception Report was submitted, explained and discussed, the process of the Detailed Design was fully explained by the Study Team, and the Design Standards and Specifications to be adopted were confirmed and agreed between the both parties.

3.1 Design Standards and Specifications

3.1.1 Geometric and Road Design

(1) General

The geometric design of the road crossing over the Suez Canal has been carried out based on Egyptian standards taking into consideration the local conditions.

(2) Design Standards and Specifications

The following Egyptian standards issued by GARBLT, have been used for the design of the road crossing over the Suez Canal where possible.

- Highway Geometric Design Standard (English)
- Geometric Design of Roads; 1994 (Arabic)

The following standards have been used to supplement the Egyptian standards for the geometric design of the road crossing;

- "Geometric Design of Highways and Streets" AASHTO (USA)
- "Geometric Design Standard" Japan Road Association (Japan)
- "British Standard" British Standard Institution (Britain).

3.1.2 Main Bridge

(1) General Description

The Detailed Design of the Suez Canal main bridge has been basically carried out in accordance with the " The Egyptian Code for Loads and Forces in Construction (Arab Republic of Egypt)" (hereinafter referred to as "Egyptian Code") which defines

the prime design standards for loading. Although the principal loading concept has been in accordance with the Egyptian Code, various detailed calculation methods have been based on Japanese specifications supplemented by British specifications as listed below.

(2) Design Standards and Specifications to be used

The following codes and standards have been used in the design;

- Japanese Specifications for Highway Bridges, Feb. 1994, Japan Road Association (hereinafter referred to as "SHB")
- Egyptian Standard Specifications for Construction Materials
- British Standards, 5400, Part 1 to 10, 1988
- Egyptian Code for Loads and Forces in Construction
- BD 37/88, Loads for Highway Bridges

3.1.3 Approach Bridges

(1) General Description

The Detailed Design of the Suez Canal approach bridges has been basically carried out in accordance with the " The Egyptian Code for Design and Execution of Reinforced Concrete Structures (Arab Republic of Egypt)" (hereinafter referred to as "Egyptian Code") which defines the prime design standards for loading. Although the principal loading concept has been in accordance with the Egyptian Code, various detailed calculation methods have been based on Japanese specifications as listed in Paragraph (2) below.

(2) Design Standards to be used

The following Standards have been used for this detailed design study.

【Arab Republic of Egypt】
[Ministry of Construction, New Communities, Housing and Public Utilities]
• The Egyptian Code for Design and Execution of Reinforced Concrete Structures (1989)

【United Kingdom of Great Britain and Northern Ireland】
[British Standard Institution]
- BS 5400 : Steel, Concrete and Composite Bridges (1988), Part 1 to 10

[The United States of America]

[American Association of State Highway and Transportation Officials]

- Standard Specifications for Highway Bridges (Fifteenth Edition 1992)
- Standard Specifications for Transportation Materials and Methods of Sampling and Testing

[American Concrete Institute] (hereinafter referred to as "ACI")

- Building Code Requirements for Reinforced Concrete (ACI 318-83)

[Japan Road Association]

- Road Structure Ordinance
- Specifications for Highway Bridges (SHB) (February, 1994) - Part I to V
- Design Guideline for Concrete Highway Bridges (February, 1994)
- Construction Guideline for Concrete Highway Bridges (February, 1994)
- Guideline for Road Design and Works
- Guideline for Drainage Design of Roads

[Japan Highway Public Corporation]

- Design Standard for Highway Bridges (February, 1994)

3.2 Design Method and Analysis

3.2.1 Geometric Road Design

The geometric design of the road crossing over the Suez Canal has been carried out based on Egyptian standards taking into consideration the local conditions.

3.2.2 Main Bridge

The "Allowable Stress Design" method has been used for the design works in accordance with the Japanese Code. The "Limit State Design" method has been adopted to check the structural safety factor under ultimate and serviceability limit state with the British Standards BS 5400. The stability of the foundation under various loading conditions has been checked using the Japanese Standards.

The "Static Design" method (Modified Acceleration Response Method) has been used for the earthquake resistance design in accordance with the Japanese Code. The "Dynamic Design" method (Response Spectrum and Time History Seismic Analysis) based on the Japanese Standard has been adopted to check this.

3.2.3 Approach Bridges

The "Allowable Stress Design" method has been used for the design works in accordance with the Japanese Code. The "Limit State Design" method has been adopted to check the structural safety factor under ultimate and serviceability limit state with the Japanese Standard SHB Part III and British Standards BS 5400. The stability of the foundation under various loading conditions has been checked using the Japanese Standards.

3.3 Construction Plan

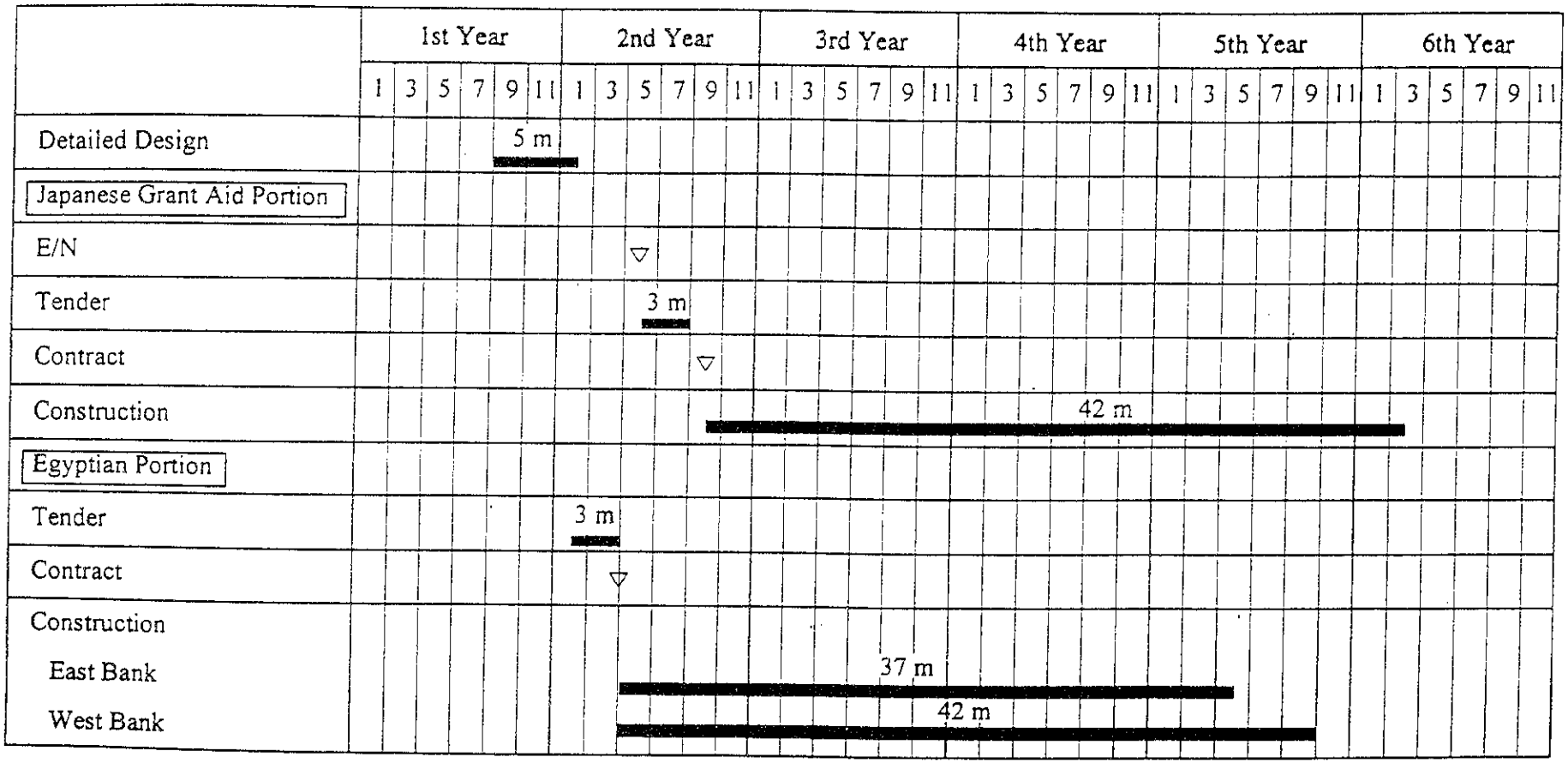
The Project consists of the proposed construction of a long span cable-stayed bridge, which will be the longest bridge in Egypt, over the Suez Canal.
The construction plan has been made under the following concept.

- In consideration of the various constraints and to keep the construction costs low, the total construction is planned to be completed in 42 months.
- In order to keep the construction costs low, it is proposed to reuse the bridge erection equipment, general construction equipment and temporary materials to the greatest extent. Local construction materials will be procured where their quality is satisfactory, and their quantities procured are sufficient.
- Since there is limited experience in Egypt of a large bridge construction project similar to this and the cable stayed bridge requires a high level of accuracy in design and construction, it is planned to dispatch a group of specialists and experienced engineers from Japan in order to ensure accuracy and smooth running of the Project.
- Since the bridge construction will be performed over the Suez Canal, construction methods will be selected to permit the actual construction time over the canal to be as short as possible.
- The length of the approach bridge to be constructed by the Japanese side will be 1,120 m, and the length to be constructed by the Egyptian side will be 2,051 m, and the construction methods selected will be of a type that will permit the construction times for the superstructure and the substructures to be kept as short as possible.

- In the course of organizing for the construction supervision, the whole construction programme management will be formulated in order to cope with the problems, which might occur due to differences of financial sources and contractors.

The above concept and the construction plan, procurement planning for major materials, plant and equipment have been taken into account, and the following construction schedule has been made.

CONSTRUCTION SCHEDULE



4. Project Implementation Program

4.1 Project Implementation Program

(1) The flow of activities of the Project under the Japanese Grant Aid can be divided as follows:

1) Detailed Design

Detailed design for both the Japanese Grant Aid Portion and the Egyptian Portion will be executed under Japanese Technical Assistance.

2) Pre-Qualifications

After review and approval of the evaluation criteria of the contractor's qualifications with JICA, then issue the invitation to contractor's to prequalify. This process will be conducted by the Japanese consultant as the executing agency for the Egyptian Government.

3) Tendering and Contract Award

a) Tendering and Contract Award

The selection of the Contractor will be witnessed by representatives of JICA, the consultant, government representatives of the Egyptian government, and the Tenderers. The Tender Award will be made at the Tender Opening. The Contract will be a direct Agreement between the Government of Egypt and the Japanese contractor (consultant and construction contractor). The whole Contract process will be conducted under the Open Tender System rules with Japanese contractors.

b) Bank Arrangement

In parallel with conclusion of the Contract, the Government of Egypt will make arrangements with a Japanese foreign exchange bank to open the account for receiving the Japanese Assistance fund and paying the Japanese Contractor. This bank arrangement will be the basis for the Authorization to Pay (A/P) issued by the Government of Egypt, which is necessary for the Applicant to obtain the export approval from the Ministry of International Trade and Industry of Japan and to receive the Advance Payment under the contract payment clause.

c) Verification of Contract

"Verification of Contract" means the Japanese government confirms that the contract above mentioned is eligible as the object of this grant aid project, which is the condition for effectuation of this contract.

d) Execution of Contract

The Japanese contractor shall execute the terms of the contract upon receipt of the Contract Authentication and A/P documents.

4) Construction

The construction consists mainly of mobilization and preparation, the construction of the bridges and approach roads, and demobilization. The mobilization and preparation will comprise procurement of the necessary materials and equipment immediately after the contract signing together with the setting up the transportation, temporary facilities at the site (assembly yard for the steel girders, establishing the concrete plant, PC concrete yard, reinforcing steel yard, concrete form work fabrication yard, and the site office). The demobilization will comprise the removal of the materials and equipment upon completion of the woks, removal of the temporary facilities, and overall clean up.

(2) The flow of the activities of the Project under the Egyptian portion can be divided as follows:

Pre-Qualification
↓
Tender and Contract
↓
Construction

When the implementation of the Egyptian portion is carried out simultaneously with the implementation of the Japanese Grant Aid portion, the Japanese consultant will assist the Egyptian government for Pre-Qualification, Tender and Contract. However, if the implementation of the Egyptian portion is commenced prior to the Exchange of Notes (E/N), the Egyptian government has to carry out Pre-Qualification, Tender and Contract.

4.2 Tender and Contract Documents

In preparing the Tender Documents for the Construction of the Suez Canal Bridge, the difference of the prevailing tendering practice for civil works in the Arab Republic of Egypt and the system for Japanese Grant Aid Projects has been taken into consideration. In general, the Tender Documents shown below have been prepared. The contents required for the preparation of the documents for this Project were decided during the discussions with the General Authority for Roads, Bridges and Land Transport (GARBLT).

Documents	for Egyptian Section	for Japanese Grant Aid Section
Pre Qualification	0	0
Instruction to Tenderers	0	0
Forms of Tender	0	0
1) Form of Tender & Appendix	0	0
2) Form of Contract Agreement	0	0
+ Appendix	0	-
3) Form of Tender Bond	0	0
4) Form of Performance Bond		
General Conditions of Contract	0	-
Particular Conditions of Contract	0	0
Bills of Quantities	0	-
General Specification	0	0
Special Specification	0	0
Drawings	0	0

5. Conclusion and Recommendations

The effects of the project will be summarized as follows :

1) In accordance with the results of the Feasibility Study, the traffic volume requiring to cross the Suez Canal at the year of 2017, when the "National Project for the Development of Sinai" (NPDS) is completed, will reach 56,800 vehicles/day, which is much greater than 22,000 vehicles/day of the total existing capacity of the A H tunnel and all the ferry crossings.
The traffic demand to cross the proposed bridge site is forecast as 28,000 vehicles/day in the year 2017. In order to ensure the success of the NPDS, the bridge construction is necessary.

2) In Qantara, where the proposed bridge will cross the Suez Canal, the West Bank has been developed already. However on the East Bank at present development is proceeding. Therefore the development of the whole region of East and West Banks will be accelerated more, when the 4-lane Suez Canal Bridge is completed, and it will contribute greatly to the Regional Development.

3) The bridge construction will contribute to the progress of the Development plan of Sinai Peninsula and development of the East Mediterranean Coastal Area, and furthermore it will be a symbol of the Middle East Peace Process.

The Government of the Arab Republic of Egypt has specified this Project as a First Priority Project of the Nation, and the budget for project implementation of the first year (1996/97) has been secured.
The budgets for the second year (1997/98) to the fourth year (1999/2000) have been submitted to the Ministry of Planning.
Therefore it is recommended that the Project be implemented, as agreed between the governments of Japan and Egypt as a Joint Project.

The technology transfer to the Egyptian Counterparts has been executed through at the Feasibility Study, the Basic Design Study and the Detailed Design Study.
In particular the Counterparts Study in Japan, which included site surveys of long-span bridges and cable stayed bridges and wind tunnel experiment, etc., has provided them with further technology and the effects of this transfer can be expected to be very beneficial.

EL ABASSAH IRRIGTION CANAL

CAIRO-ISMAILIYA-PORT SAID ROAD

EGYPTIAN PORTION-THE WAST BANK L = 1 170 600

Prestressed Continuous Box Girder

Length of Approach Bridges L = 1 739 600

Prestressed C

5 × 40 000 = 200 000 | 141 000 (30 500 | 40 000 | 40 000 | 30 500) | 5 × 37 800 = 189 000 | 141 000 (30 500 | 40 000 | 40 000 | 30 500) | 6 × 36 600 = 219 600 | 7 × 40 000 = 280 000

BRW1 BRW2 BRW3 BRW4 BRW5 BRW6

+10.854 +17.445 +22.036 +28.335 +28.988 +40.235 +49.47

AW P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16 P17 P18 P19 P20 P21 P22 P23 P24 P25 P26 P27 P28 P29 P30 P31 P32 P33 P34 P35 P36 P37 P38 P39 P40 P41

MAIN LA

i = 3.3 %
L = 2303.03 m

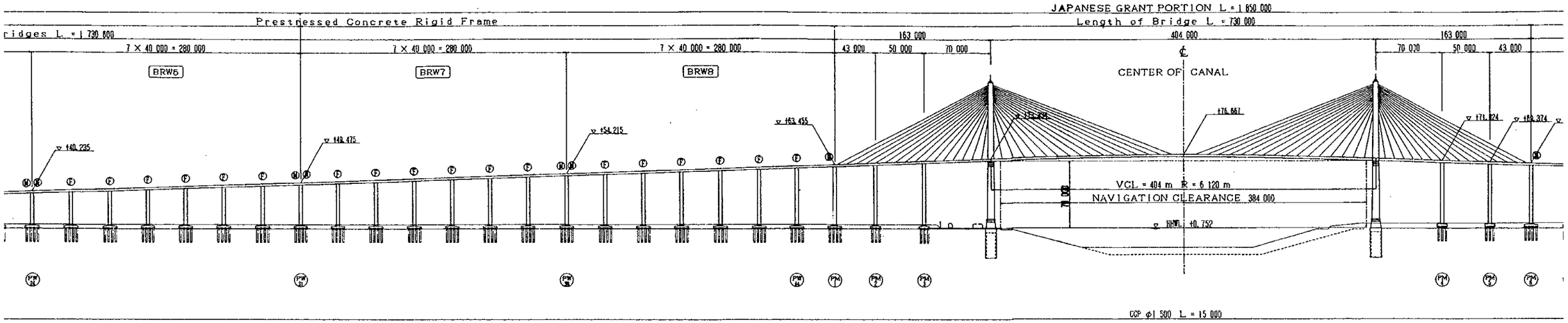
Prestressed Concrete Continuous Box

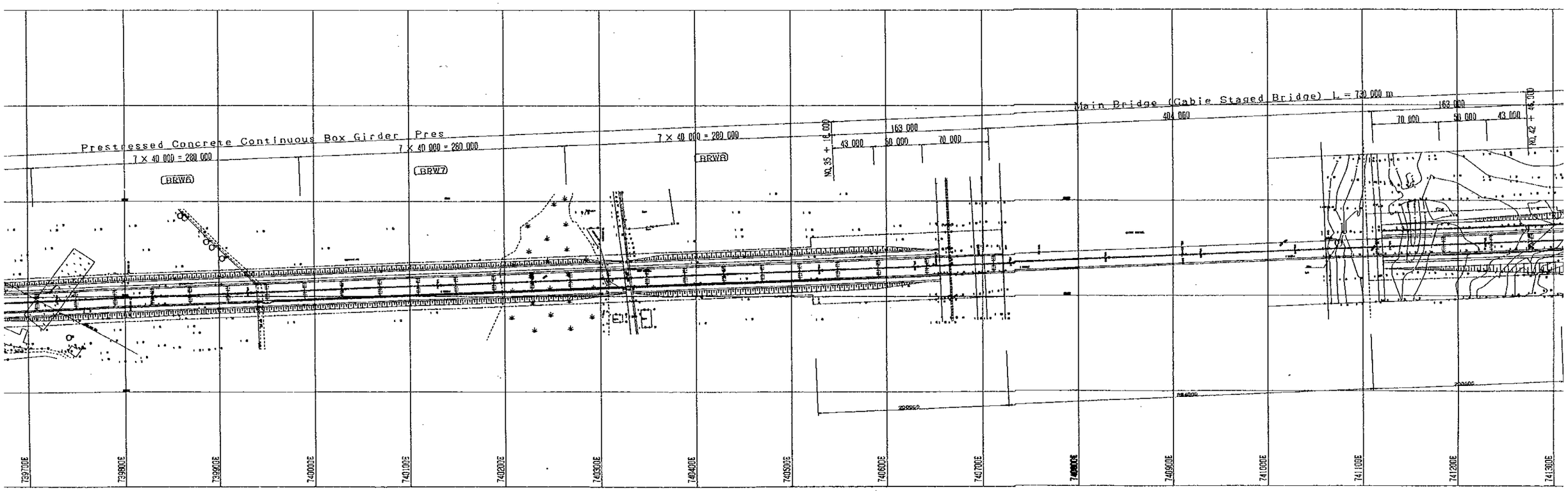
NO.17 + 66.400

5 × 40 000 = 200 000 | 141 000 (30 500 | 40 000 | 40 000 | 30 500) | 5 × 37 800 = 189 000 | 141 000 (30 500 | 40 000 | 40 000 | 30 500) | 6 × 36 600 = 219 600 | 7 × 40 000 = 280 000

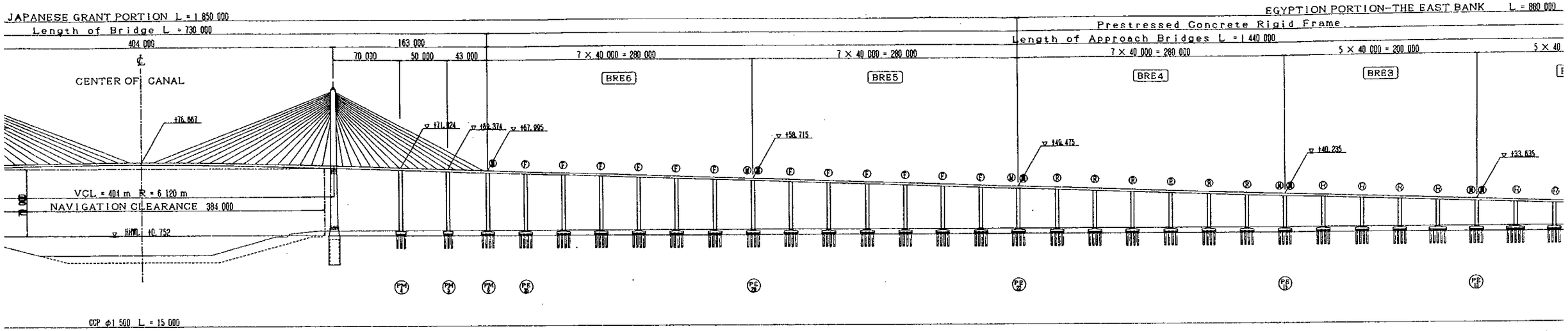
BRW1 BRW2 BRW3 BRW4 BRW5 BRW6

7395000E 7396000E 7397000E 7398000E 7399000E 7390000E 7391000E 7392000E 7393000E 7394000E 7395000E 7396000E 7397000E 7398000E 7399000E 7400000E

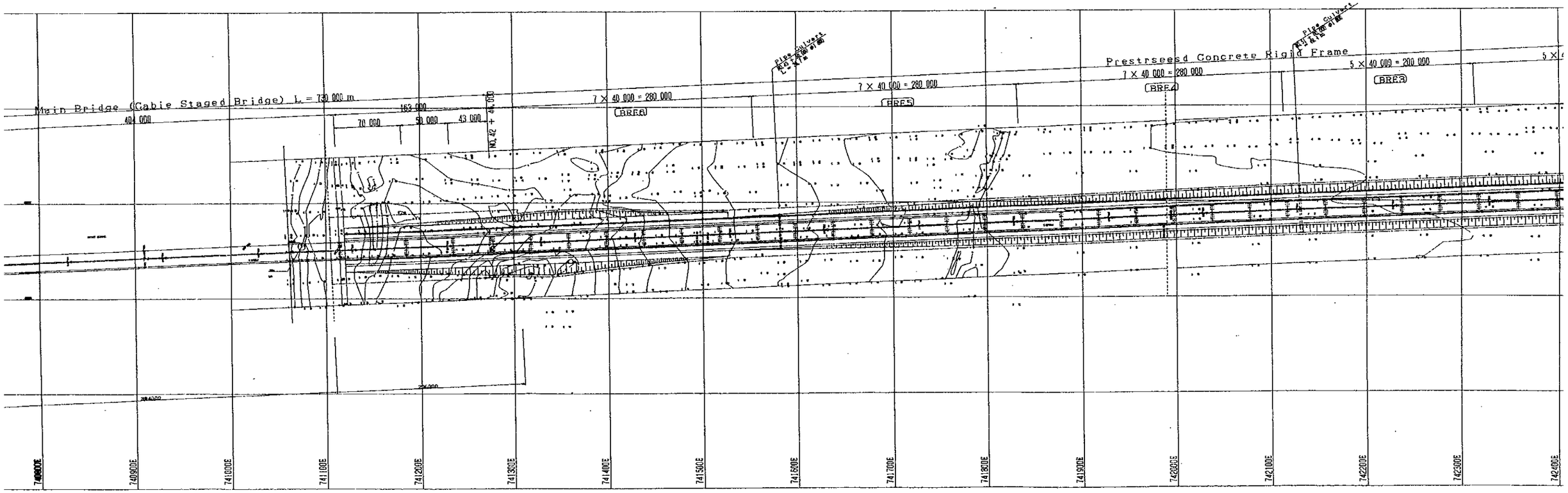

JAPANESE GRANT PORTION L = 1 650 000
Length of Bridge L = 730 000
Prestressed Concrete Rigid Frame
ridges L = 1 730 600
7 X 40 000 = 280 000
7 X 40 000 = 280 000
7 X 40 000 = 280 000
BRW6
BRW7
BRW8
163 000
43 000
50 000
70 000
404 000
CENTER OF CANAL
163 000
70 000
50 000
43 000
+40.235
+48.475
+58.215
+63.455
+76.867
+71.324
+69.374
VCL = 404 m R = 6 120 m
NAVIGATION CLEARANCE 384 000
HHWL +0.752
CGP φ1 500 L = 15 000
MAIN LAND (WEST)
PROFILE H = 1 : 2000
i = 3.3 %
L = 2303.03 m


Prestressed Concrete Continuous Box Girder Pres
7 X 40 000 = 280 000
7 X 40 000 = 280 000
7 X 40 000 = 280 000
BRW6
BRW7
BRW8
Main Bridge (Cable Staged Bridge) L = 730 000 m
404 000
163 000
70 000
50 000
43 000
739700E
739800E
739900E
740000E
740100E
740200E
740300E
740400E
740500E
740600E
740700E
740800E
740900E
741000E
741100E
741200E
741300E

PLAN S = 1 : 2000



PROFILE H = 1 : 2000

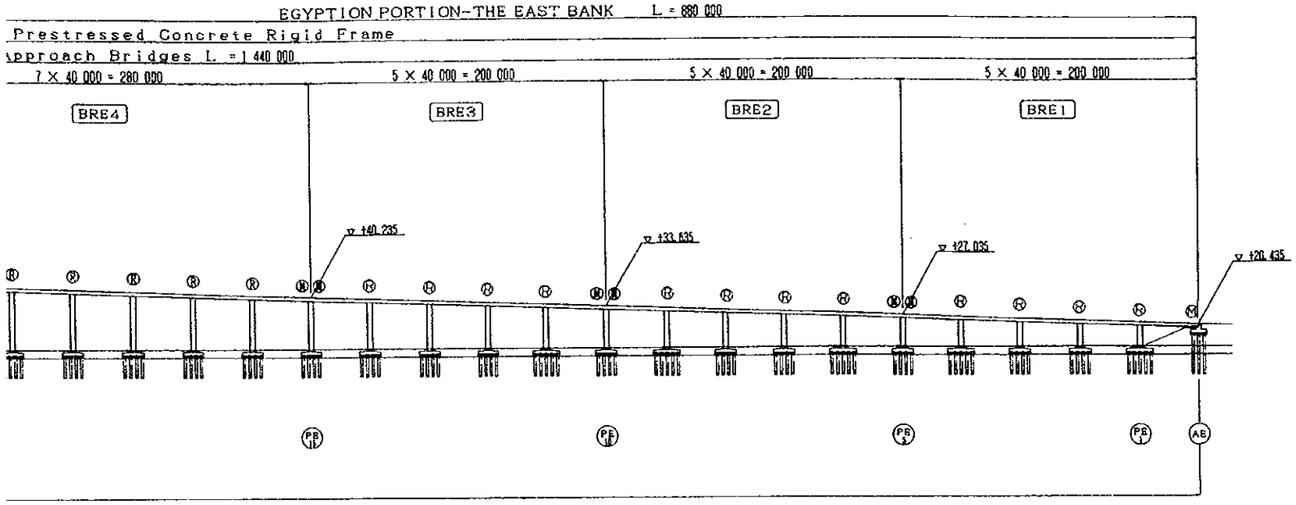


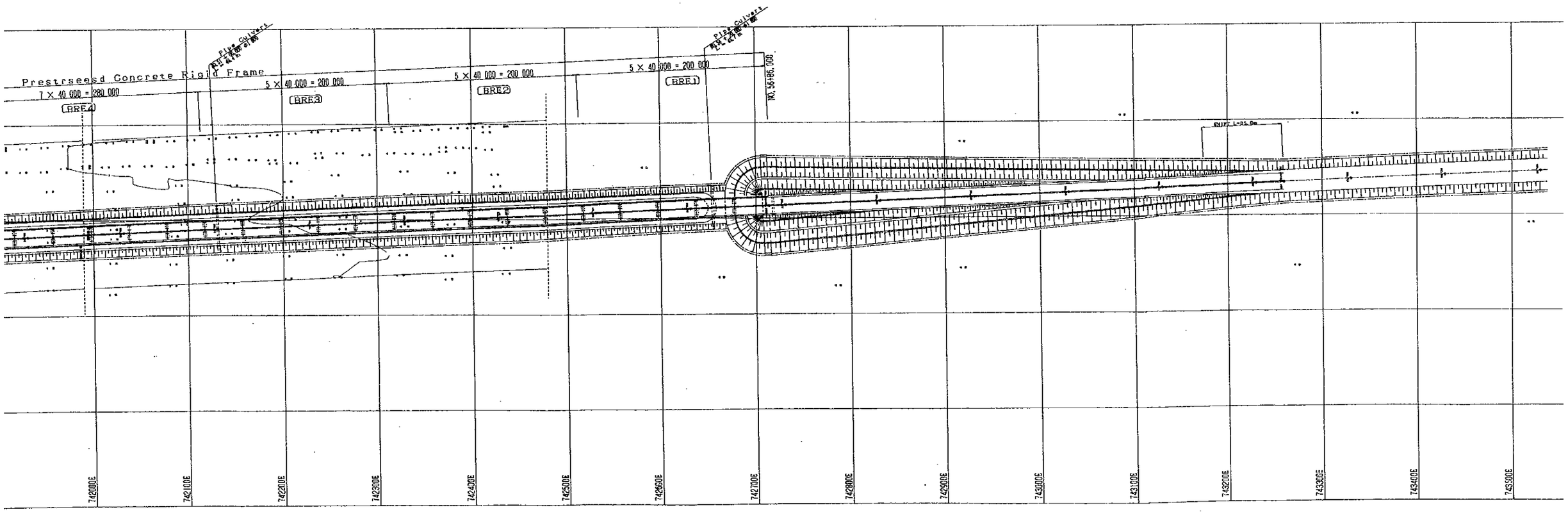
PLAN S = 1 : 2000

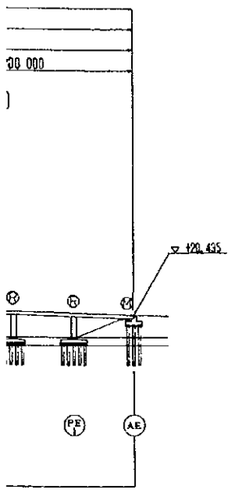
EGYPTION PORTION-THE EAST BANK L = 880 000

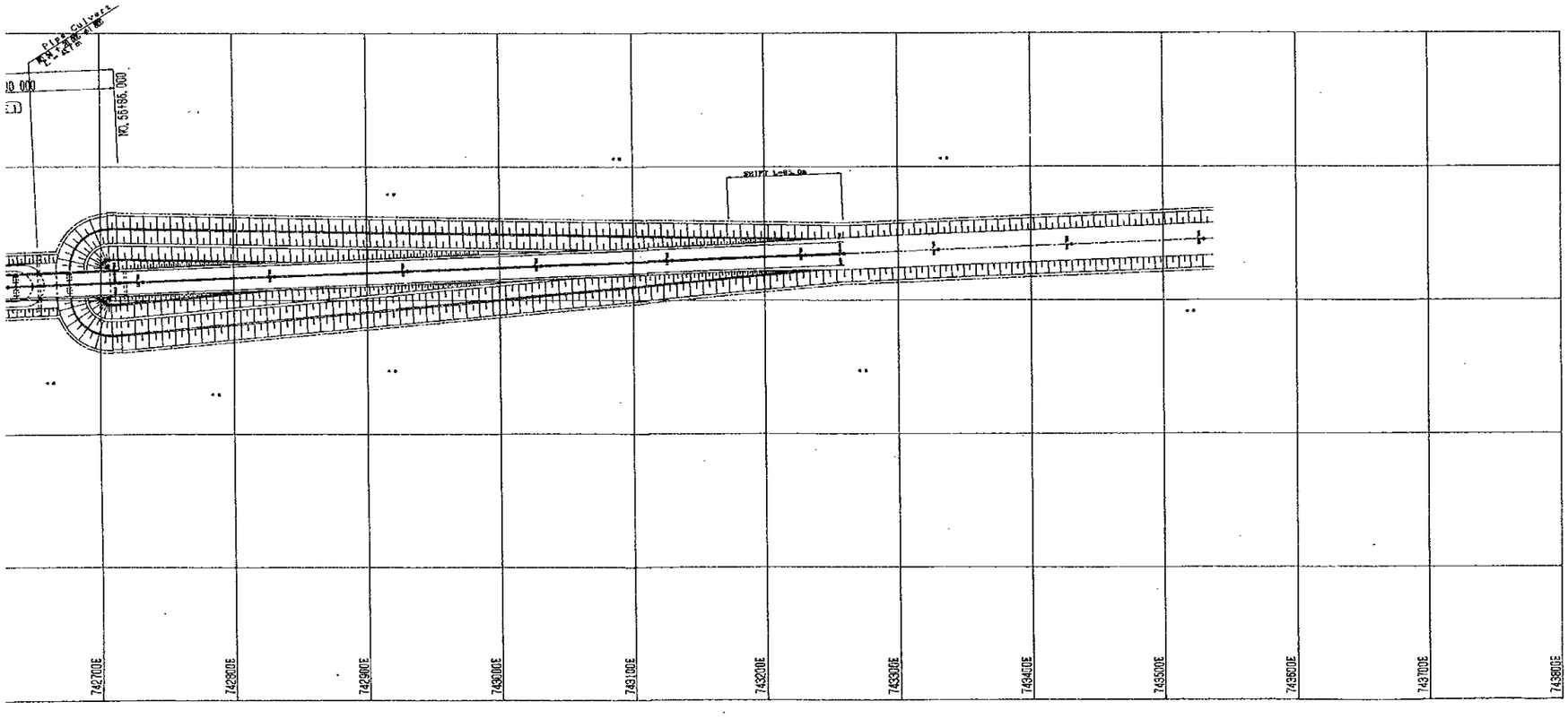
Prestressed Concrete Rigid Frame

Approach Bridges L = 1 440 000









ARAB REPUBLIC OF EGYPT
MINISTRY OF TRANSPORT & COMMUNICATIONS
GENERAL AUTHORITY FOR ROADS, BRIDGES AND LAND TRANSPORT (GARBLT)

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

PROJECT
SUEZ CANAL BRIDGE PROJECT

CONTRACTOR:

CONSULTANT
PACIFIC CONSULTANTS INTERNATIONAL CHODAI CO.,LTD.

DRAWING TITLE: GENERAL VIEW OF SUEZ CANAL CORSSING (2)

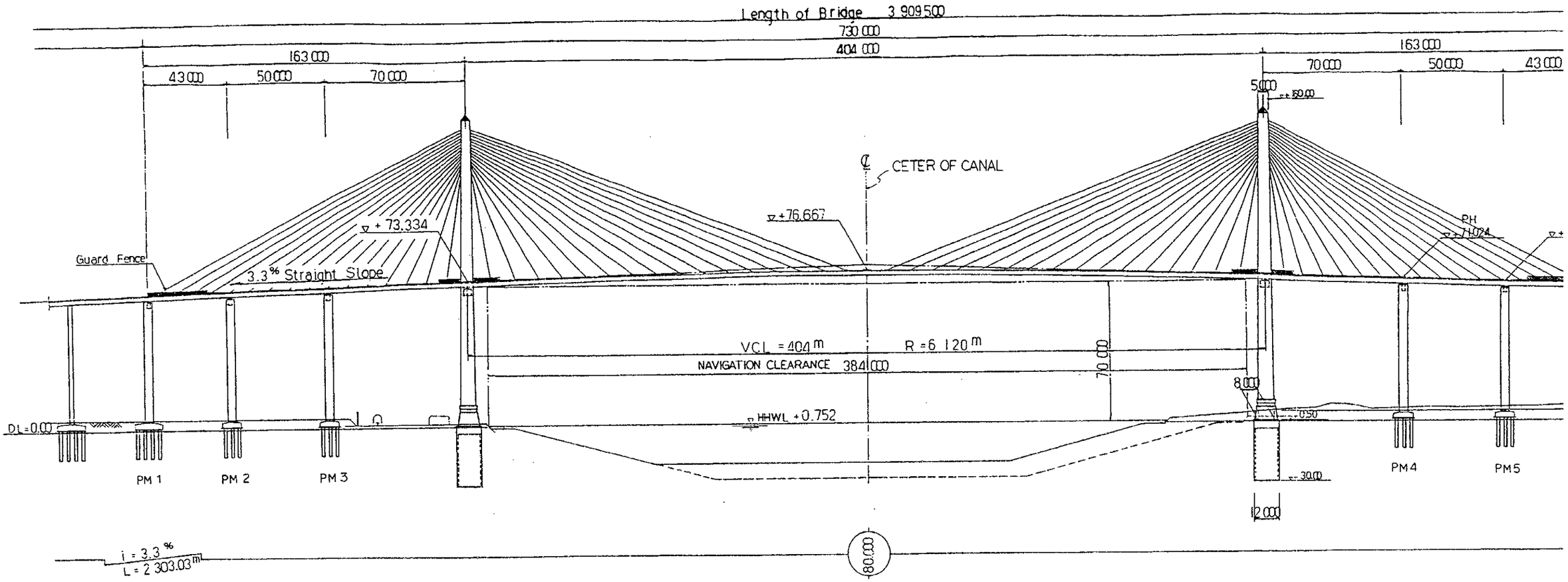
DESIGN:
CHECK:
SCALE:
DATE:
DRAWING NO: A-6

GENERAL VIEW

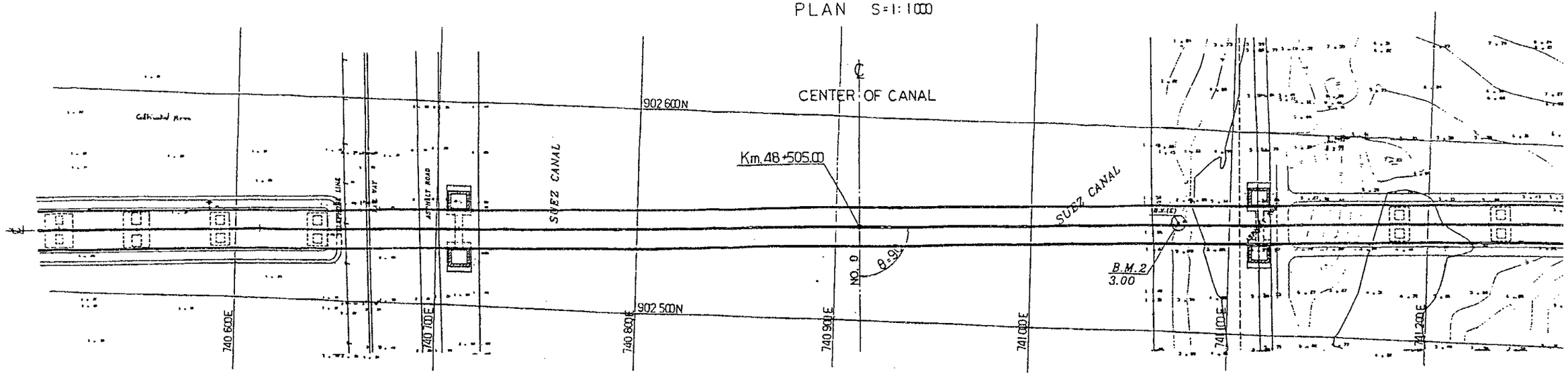
MAIN BRIDGE (STEEL BOX GIRDER)

West

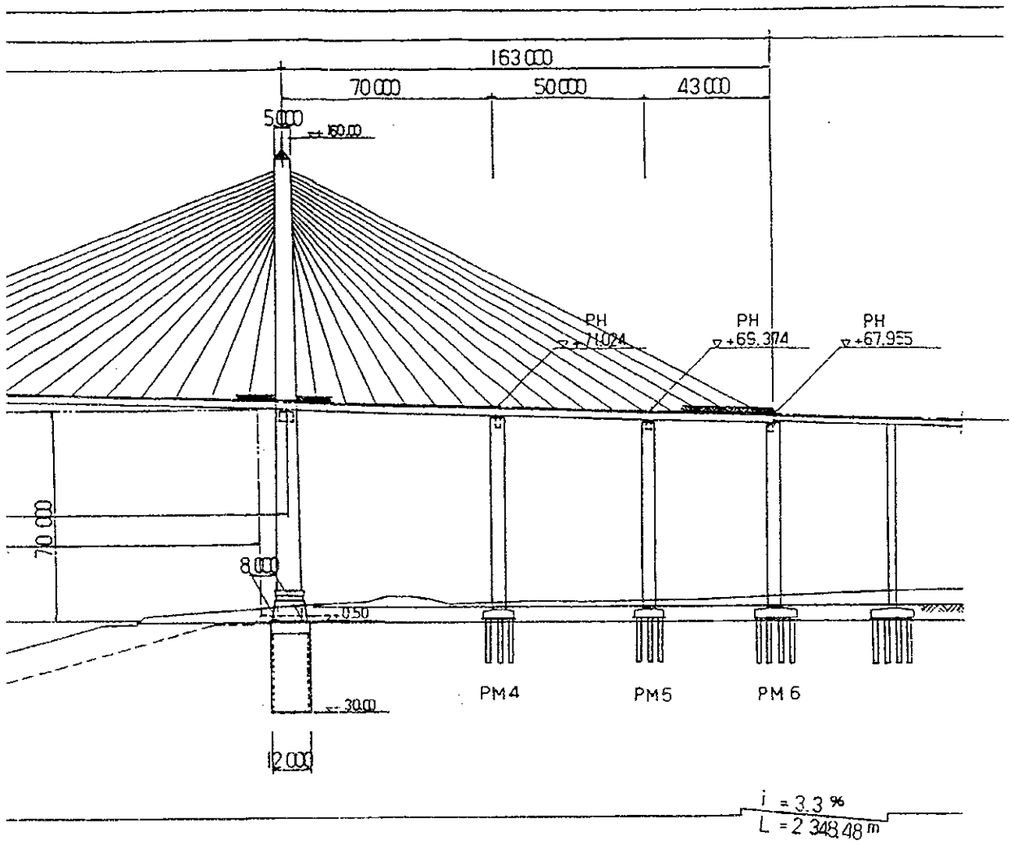
PROFILE S=1:1000

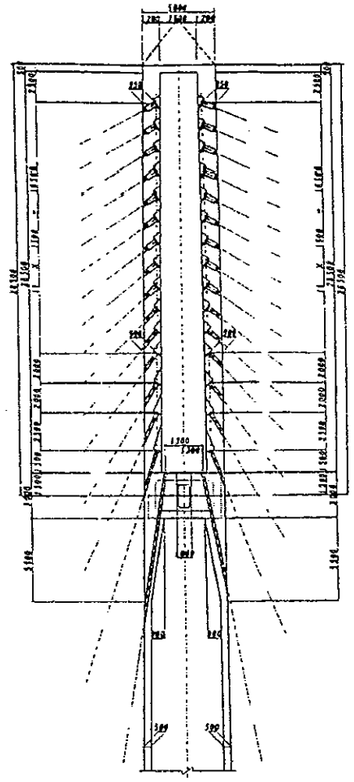


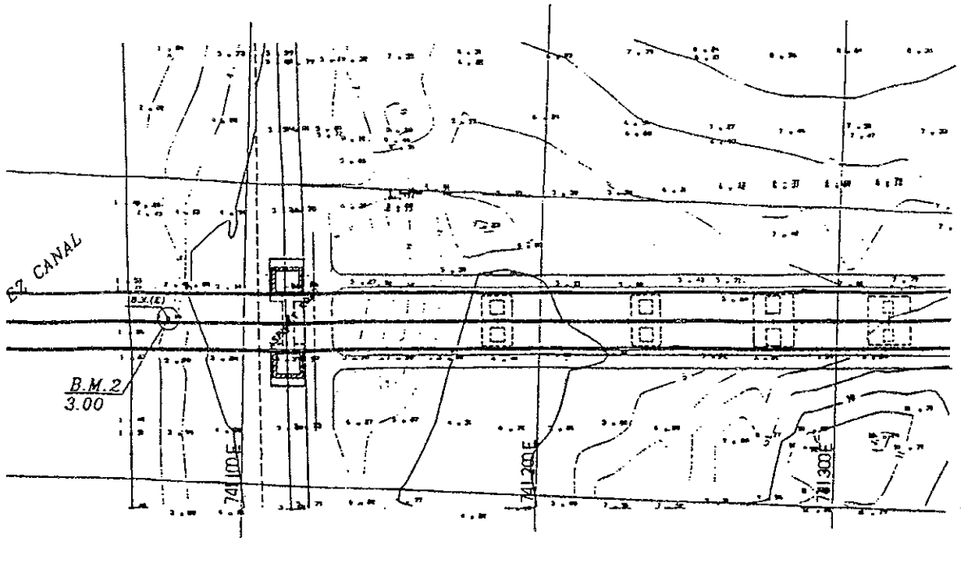
PLAN S=1:1000



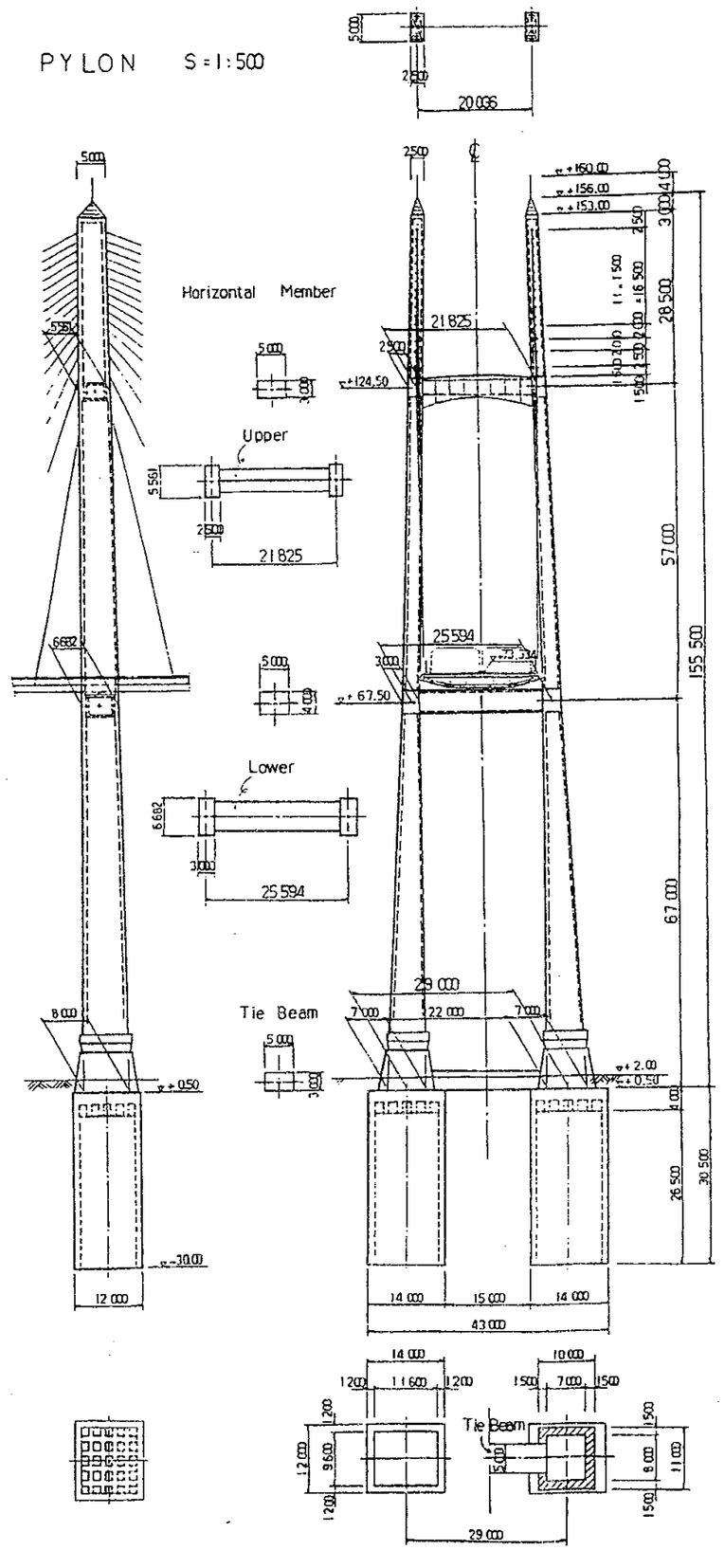
East



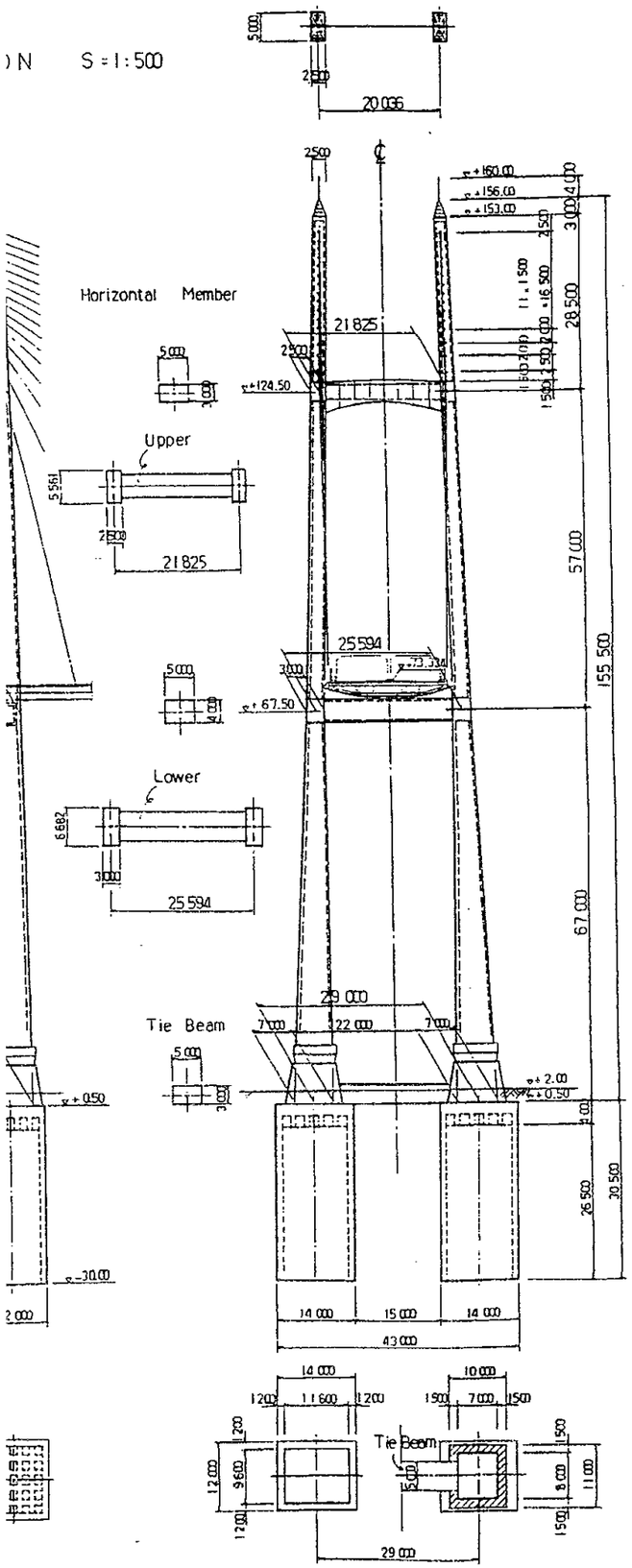




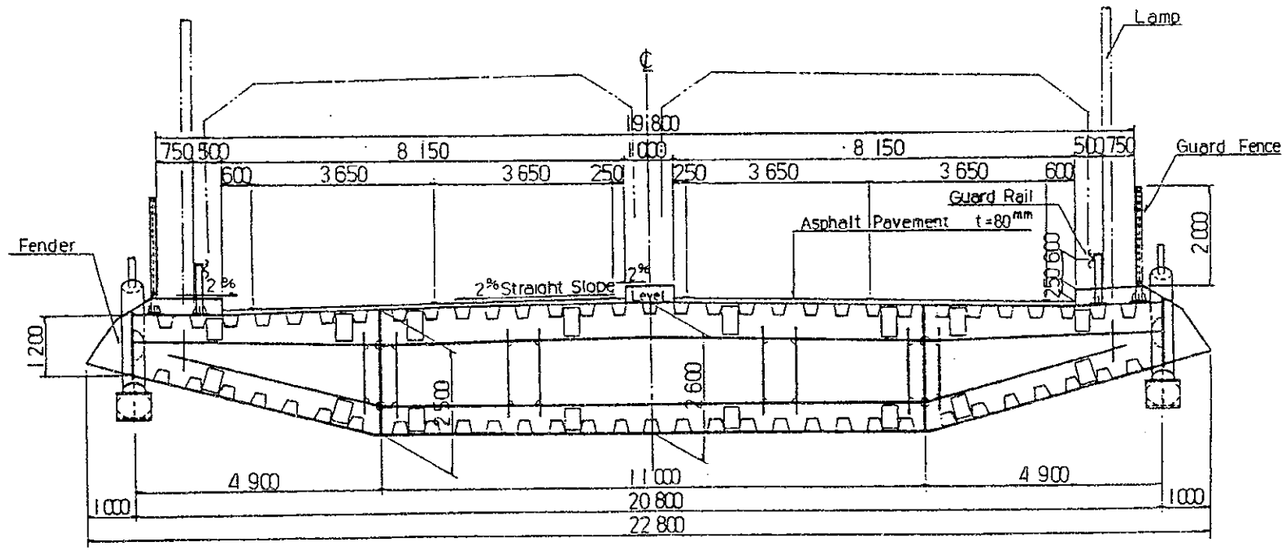
PYLON S = 1:500



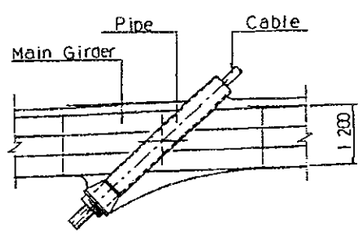
)N S=1:500



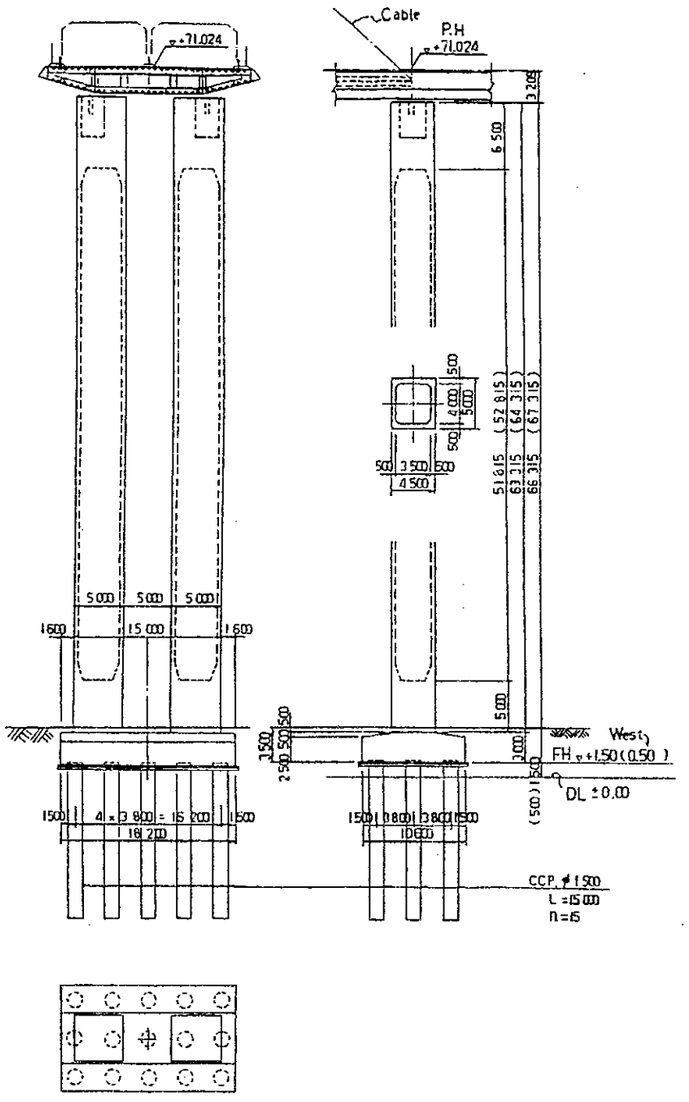
Main Girder Cross Section S=1:60



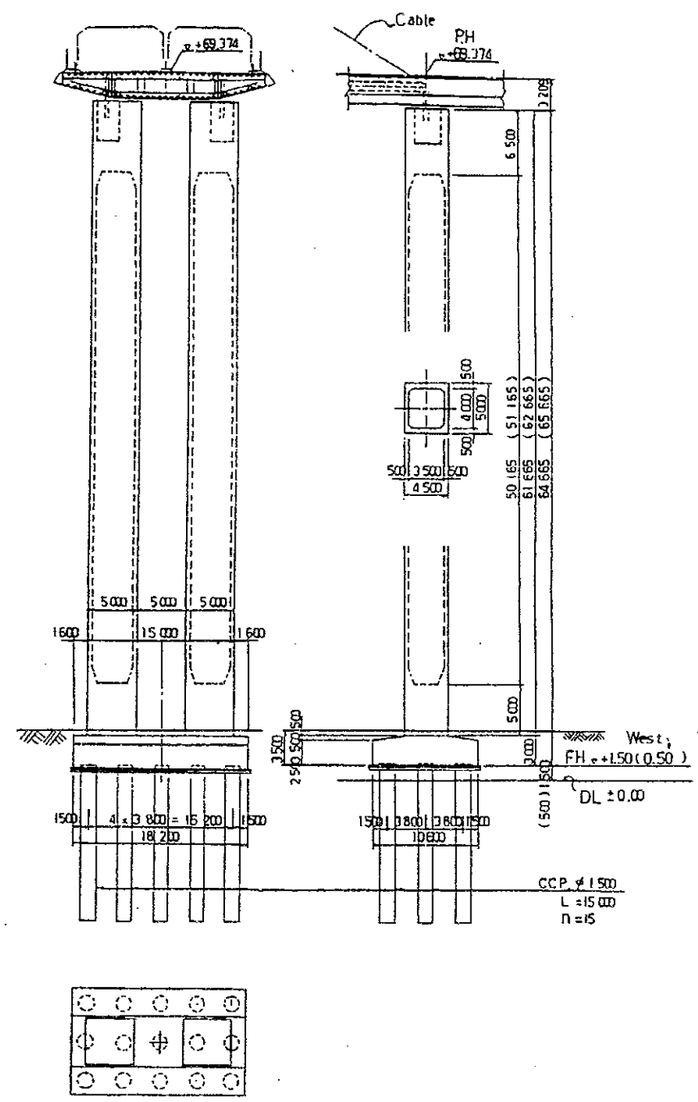
Cable Anchorage



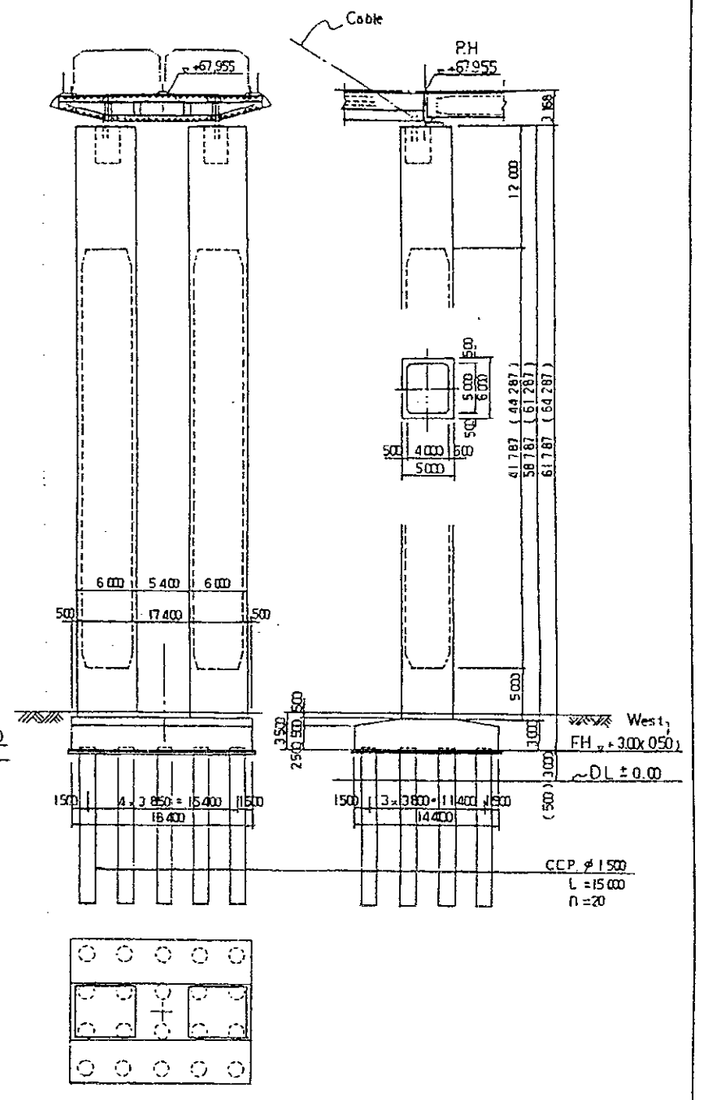
Pier S=1:300



PM4(PM3)



PM5(PM2)



PM6(PM1)

ARAB REPUBLIC OF EGYPT MINISTRY OF TRANSPORT & COMMUNICATIONS GENERAL AUTHORITY FOR ROADS, BRIDGES AND LAND TRANSPORT (GARBLT)	JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
PROJECT: SUEZ CANAL BRIDGE PROJECT	
CONTRACTOR	CONSULTANT: PACIFIC CONSULTANTS INTERNATIONAL CHODAI CO.,LTD.
DRAWING TITLE: General View of Main Girder	
DESIGN / CHECK	DATE / SCALE / DRAWING NO. M-1