APPENDIX 1

BASIC DESIGN STUDY TEAM

List of Study Team Members (Basic Design Study)

Name	Assignment	Position
Mr. Shinichi MORI	Team Leader	Official, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs
Mr. Masatoshi YAMADA	Water Supply Planner	General Affairs Division, Kobe City Government
Mr. Tomomi DATE	Sanitary Drainage Planner	Sewage Works Bureau, Kawasaki City Government
Mr. Ryosuke TERANISHI	Water Supply and Sewer System Planner	Yachiyo Engineering Co., Ltd.
Mr. Hanshichi HIGASHIGUCHI	Water Supply System Designer	Yachiyo Engineering Co., Ltd.
Mr. Masahiro TAKEUCHI	Sewer System Designer	Yachiyo Engineering Co., Ltd.
Mr. Masatsugu KOMIYA	Mechanical Designer	Yachiyo Engineering Co., Ltd.
Mr. Yutaka OHSUGA	Civil Engineer	Yachiyo Engineering Co., Ltd.

List of Study Team Members (Draft Final Reporting Team)

Name	Assignment	Position
Ms. Chiho MURAMATSU	Team Leader	Official, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs
Mr. Ryosuke TERANISHI	Water Supply and Sanitary System Planner	Yachiyo Engineering Co., Ltd.
Mr. Hanshichi HIGASHIGUCHI	Water Supply System Designer	Yachiyo Engineering Co., Ltd.
Mr. Masahiro TAKEUCHI	Sewer System Designer	Yachiyo Engineering Co., Ltd.

APPENDIX 2

FIELD SURVEY SCHEDULE

1. Field Survey Schedule (Basic Study Team)

No.	Date	Day of the week	Weather	Place of stay	Schedule	Detail of Study Items
1	Jun. 1	Mon.	Fine	Paris	Lv. Tokyo at 12:50 on AF 275 Ar. Paris at 18:20	Departure of Consultant Team from Japan
2	" 2	Tue.	Fine	Cairo	Lv. Paris at 14:40 on AF8210 Ar. Cairo at 20:10	Arrival of the team in Egypt
3	" 3	Wed.	Fine	Cairo		Courtesy visit to and discussions at JICA Cairo Office. Courtesy visit to and discussions at Giza City Council on Inception Report, questionnaire, grant aid cooperation system and survey schedule, etc. Market survey
4	" 4	Thu.	Fine	Cairo		Discussions with Giza City Council. Courtesy visits to GCWSA and GOSD to explain and disucuss questionnaire. Site survey (Monib district) and collection of data. Market survey
5	" 5	Fri.	Fine	Cairo		Team meeting, sorting of collected data and study.
6	" 6	Sat.	Fine	Cairo		Site survey (South Giza Waterworks) and measurement. Technical discussions with GCWSA. Market survey
7	" 7	Sun.	Fine	Cairo		Site survey (No. 5 Sewerage Relay Pump Station). Survey of similar sewerage relay pump stations (No. 4 Pump Station, ?? Pump Station and Pyramid Pump Station). Technical discussions with GOSD. Discussions with JICA Office. Market survey
8	" 8	Mon.	Fine	Cairo		Survey of similar sewerage treatment plant (Embaba Waterworks, Rod El Farag Waterworks). Technical discussions with GCWSAand GOSD. Market survey
9	" 9	Tue.	Fine	Cairo		Discussions with Giza City Council. Technical discussions with GOSD. Market survey

No.	Date	Day of the week	Weather	Place of stay	Schedule	Detail of Study Items
10	Jun. 10	Wed.	Fine	Cairo		Site survey (sewer trunk line route) Sorting of collected data and study. Market survey
11	" 11	Thu.	Fine	Cairo		Site survey and measurement. Sorting of collected data and study. Market survey
12	" 12	Fri.	Fine	Cairo		Team meeting, sorting of collected data and study.
13	" 13	Sat.	Fine	Cairo		Site survey (South Giza Waterworks) Survey of similar sewerage relay pump station (Ameria Pump Station). Arrival of government members of Study Team in Cairo (AF8004)
14	" 14	Sun.	Fine	Cairo		Team meeting Site survey (Monib District and sewer trunk line route)
15	" 15	Mon.	Fine	Cairo		Courtesy visit to GOSD. Site survey (Pyramid Pump Station) Courtesy visits to and discussions at Japanese Embassy, JICA Office and MOIC. Technical discussions with GCWSA.
16	" 16	Tue.	Fine	Cairo		Site survey (South Giza Waterworks and No. 5 Sewerage Relay Pump Station). Survey of similar sewerage treatment plant (Embaba sewerage treatment plant, ?? sewerage treatment plant). Market survey
17	" 17	Wed.	Fine	Cairo		Technical discussions with GOSD. Market survey Preparation of field report.
18	" 18	Thu.	Fine	Cairo		Technical discussions with GOSD. Market survey Preparation of field report.
19	" 19	Fri.	Fine	Cairo		Team meeting, sorting of collected data and study.
20	" 20	Sat.	Fine	Cairo		Courtesy visit to Giza City Council to disscuss M/D. Technical discussions with GCWSA. Market survey Preparation of field report.

No.	Date	Day of the week	Weather	Place of stay	Schedule	Detail of Study Items
21	Jun. 21	Sun.	Fine	Cairo		Courtesy visit to GCWSA. Discussions with Giza City Council and MOIC on M/D. Site survey (sewer trunk line route) Technical discussions with GOSD. Market survey Preparation of field report.
22	" 22	Mon.	Fine	Cairo		Confirmation and signing of M/D. Technical discussions with GCWSA and GOSD. Market survey Preparation of field report.
23	" 23	Tue.	Fine	Cairo		Discussions with Giza City Council. Market survey Preparation of field report. Departure of government members and consultant members (Osuga) from Egypt. (LH 683)
24	" 24	Wed.	Fine	Cairo		Explanation and submission of field report to Giza City Council, GCWSA and GOSD. Market survey
25	" 25	Thu.	Fine	Cairo		Explanation and submission of field report to CWO, Egyptian State Railway and Giza Irrigation Authority. Market survey Farewell visits to Japanese Embassy and JICA Office to report field survey findings.
26	" 26	Fri.	Fine	Cairo		Team meeting, sorting of collected data and study.
27	" 27	Sat.	Fine	Cairo		Farewell visits to GCWSA and GOSD. Farewell visits to Giza City Council to report field survey findings. Market survey
28	" 28	Sun.	Fine	Frankfurt	Lv. Cairo at 07:30 on LH 683 Ar. Frankfurt at 11:30	Final departure of consultant members (Teranishi, Higashiguchi, Takeuchi, Komiya) from Egypt.
29	" 29	Mon.	Fine	in air-plane	Lv. Frankfurt at 17:00 on LH 710	
30	" 30	Tue.	Rain		Ar. Tokyo at 11:00	Arrival of consultant members (Teranishi, Higashiguchi, Takeuchi, Komiya) in Japan

2. Schedule of Draft Final Reporting Team

No.	Date	Day of the week	Weather	Place of stay	Schedule	Detail of Study Items
1	Oct. 24	Sat.	Fine	Paris	Lv. Tokyo at 12:50 on AF 275 Ar. Paris at 18:20	Departure of the Study Team from Japan
2	" 25	Sun.	Fine	Cairo	Lv. Paris at 16:55 on AF8004 Ar. Cairo at 22:25	Arrival of the Study Team in Egypt
3	" 26	Mon.	Fine	Cairo		Courtesy visit to and discussion at JICA Cairo Office. Courtesy visit to and discussion at Japanese Embassy. Courtesy visit to MOIC.
4	" 27	Tue.	Fine	Cairo		Courtesy visit to Giza City Council. Courtesy visit to GCWSA. Courtesy visit to CWO.
5	" 28	Wed.	Fine	Cairo		Courtesy visit to GOSD. Discussion with GCWSA and courtesy visit to chairman.
6	" 29	Thu.	Fine	Cairo		Discussion with Giza City Council on M/D. Site Survey (South Giza Waterworks and Monib district)
7	" 30	Fri.	Fine	Cairo		Team Meeting
8	" 31	Sat.	Fine	Cairo		Signing of M/D
9	Nov. 1	Sun.	Fine	Cairo		Discussion with and farewell visit to GCWSA. Discussion with and farewell visit to GOSD. Farewell visit to MOIC.
10	" 2	Mon.	Fine	Paris	Lv. Cairo at 8:00 on AF8003 Ar. Paris at 11:50	Departure of the Study Team from Egypt.
11	" 3	Tue.	Cloudy	in air-plane	Lv. Paris at 15:00 on AF276	
12	" 4	Wed.	Cloudy		Ar. Tokyo at 10:55	Arrival of the Study Team in Japan.

APPENDIX 3

LIST OF INTERVIEWEES IN EGYPT

List of Interviewees in Egypt

Place of Work and Name	Position
Ministry of International Cooperation (MOIC)	
Mr. Hamid Moustafa	Undersecretary
Mr. Mohsen Sadek	Director of Japan Department
Giza City	
Gen. Fouad Khalil	Mayor
Dr. Nabil Makhlouf	Technical Advisor
Mr. Said Said Mohmoud	Manager of Engineering Department
Mr. Ahmed El Darmely	Administrator
Greater Cairo Water Supply Authority (GCWSA)	
Mr. Saad El Deen El Deeb	Chairman
Mr. Adel El Toweiry	Vice-Chairman
Mr. Mahmoud Abo Khalaf	Technical Advisor to Chairman
Mrs. Laila Abd El Monem	Chief Engineer of Technical Advisor Section
Mr. Farah Kamel	Manager of Mechanical & Electrical Section of Project Department
South Giza Waterworks	
Mr. Saliman Wahken Aly	Plant Manager
Mrs. Nagwa Zaghlaul	Maintenance Engineer (Mechanical)
Mr. Mohamed Shawky	Maintenance Engineer (Electrical)
Mr. Said Kasen	Maintenance Engineer (Mechanical)
Mr. Nagy Gayed	Chief of Laboratory
Greater Cairo General Organization for Sanitary Drainage (GOSD)	
Mr. Ahmed Abd Maksoud	Chairman
Mr. Abdel Kadr Hamdy	Technical Advisor of Chairman
Mr. Obeid Faheem Girgis	Assistant of Project Departmen Manager
Mr. Samir Abdel Moneim	General Manager of West Bank
Mr. Samir Badr El Deen	Manager of Mechanical Section
Mr. Ahmed Hameza Ahmed	Electrical and Mechanical Department (Mechanical Engineer)
Mrs. Faten Zakry Kobrial	Electrical and Mechanical Department (Electrical Engineer)

Organization for the Execution of the Greater Cairo Wastewater Project (CWO)

Mr. Talat Abu Seda	Vice Chairman

Egyptian State Railway

Mr. Mohamed Marai	General Manager of Railway Engineering Department of Central Region

Giza Irrigation Authority

Mrs. Sohair Mokhtar Ali	Inspector Giza Section

Embaba Waterworks

Mr. Ahmed Soliman	Plant Manager

Rod El Farag Waterworks

Mr. Kamel Abdou Mohamed	Plant Manager

Pyramids Pump Station

Mr. John Crone	Training Specialist of AMBRIC

Pump Station No.4

Mr. Victor William	Plant Manager

Embassy of Japan in Egypt

Mr. Teruaki Nagasaki	Councilor
Mr. Kazuhiro Kikuchi	First Secretary
Mr. Naoaki Kurumada	First Secretary

JICA Egypt Office (Cairo)

Mr. Kenji Iwaguchi	Resident Representative
Mr. Tatsuro Yonebayashi	Deputy Resident Representative
Mr. Shigeru Okamoto	Assistant Resident Representative
Mr. Kazuhide Nagasawa	Assistant Resident Representative

APPENDIX 4

MINUTES OF DISCUSSIONS

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY ON THE PROJECT FOR THE WATER SUPPLY AND SEWER SYSTEM UPGRADING IN MONIB, GIZA CITY (PHASE 2) IN THE ARAB REPUBLIC OF EGYPT

In response to the request of the Government of the Arab Republic of Egypt, and based on the results of the preliminary study for the Project of the Water Supply and Sewer System Upgrading in Monib, Giza City, Japan International Cooperation Agency (JICA) decided to implement a basic design study for the Project of the Water Supply and Sewer System Upgrading in Monib, Giza City (Phase-2) (hereinafter referred to as "the Project") and sent the study team headed by Mr. Shinichi Mori, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs to the Arab Republic of Egypt from June 2 to June 28, 1992.

The team had a series of discussions with the authorities concerned of the Government of the Arab Republic of Egypt and conducted a field survey in the Project site.

As a result of the discussions and the field survey, both parties have agreed to recommend to their respective Governments the main items described on the attached sheets.

The team will proceed to the works and prepare the Basic Design Study Report.

Giza, June 22, 1992

Mr. Shinichi MORI
Leader
Basic Design Study Team
JICA

Mr. Fouad KHALIL
Mayor of Giza City

Witnessed by:

Mr. Hamed MOUSTAFA
Undersecretary
Ministry of International Cooperation

ATTACHMENT

1. Objective

The objective of the Project is to upgrade the present conditions of both water supply and sewer system in Monib, Giza City in order to improve the living standards of the low income group of inhabitants in the area.

2. Project Site

The Project site is Monib, Giza City, Giza Governorate, the location of which is shown in Annex-I.

3. Responsible and Executing Organization

- Responsible and Coordinating Organization for the Project:
  Giza Governorate

- Executing Organization of the Project:
  Giza City

4. The Project Components

The following items were requested by the authorities concerned of the Government of the Arab Republic of Egypt. However, final items will be decided after further studies.

(1) Expansion of South Giza Waterworks (maximum 35,000 m^3/day)
(2) Construction of Water Supply Main Line (diameter 1,200mm, total length approximately 2.4km)
(3) Construction of Sewer Booster Pumping Station No.5 (B) (1650 L/S x 3 units)
(4) Services necessary for the construction mentioned in (1) to (3) and for the detailed design thereof, which can not be covered by Giza Governorate.

5. Japan's Grant Aid System

(1) Giza Governorate has acknowledged the system of Japan's Grant Aid explained by the team.

(2) The Government of the Arab Republic of Egypt will take the necessary measures described in Annex-II for smooth implementation of the Project, on condition that the Grant Aid assistance by the Government of Japan is extended to the Project.

(3) Giza City's share in financing the Project (local currency) will be used in accordance with the relevant laws and regulations of the Arab Republic of Egypt such as tendering, procurement, etc.

6. Schedule of the Study

(1) JICA will prepare draft report in English and despatch a mission to the Arab Republic of Egypt in order to explain its contents in October, 1992. The study will include cost estimate of the Project in foreign and local currencies. These estimates will be submitted to Giza Governorate.

(2) In case that the contents of the report are accepted in principle by Giza Governorate, JICA will complete a final report and send it to Egypt around January, 1993.

7. Required Assistance from Giza Governorate in case Japan's Grant is executed:

(1) to secure land for water supply and sewer system and other related facilities.

(2) to provide temporary land for a construction liaison office, warehouse, stockyard, jacking pit plant, etc., during the construction period.

(3) to provide necessary data and information for detailed design. These data and information are not eligible to be delivered to third parties or brought to their notice unless there is a written consent by Giza Governorate.

(4) to give permission required for test pitting to check underground services at the time of detailed design, if necessary.

(5) to take necessary actions to expedite the approval for executions of the Project by Giza Governorate.

(6) to give permission required for all the works related to the Project, e.g., opening of manholes, entering into railway and canal lot, surveying on the road, etc.

(7) to witness and confirm by the authorities concerned when test pitting and, protection and relocation of services are carried out.

(8) to take necessary measures for inhabitant's cooperation and traffic control.

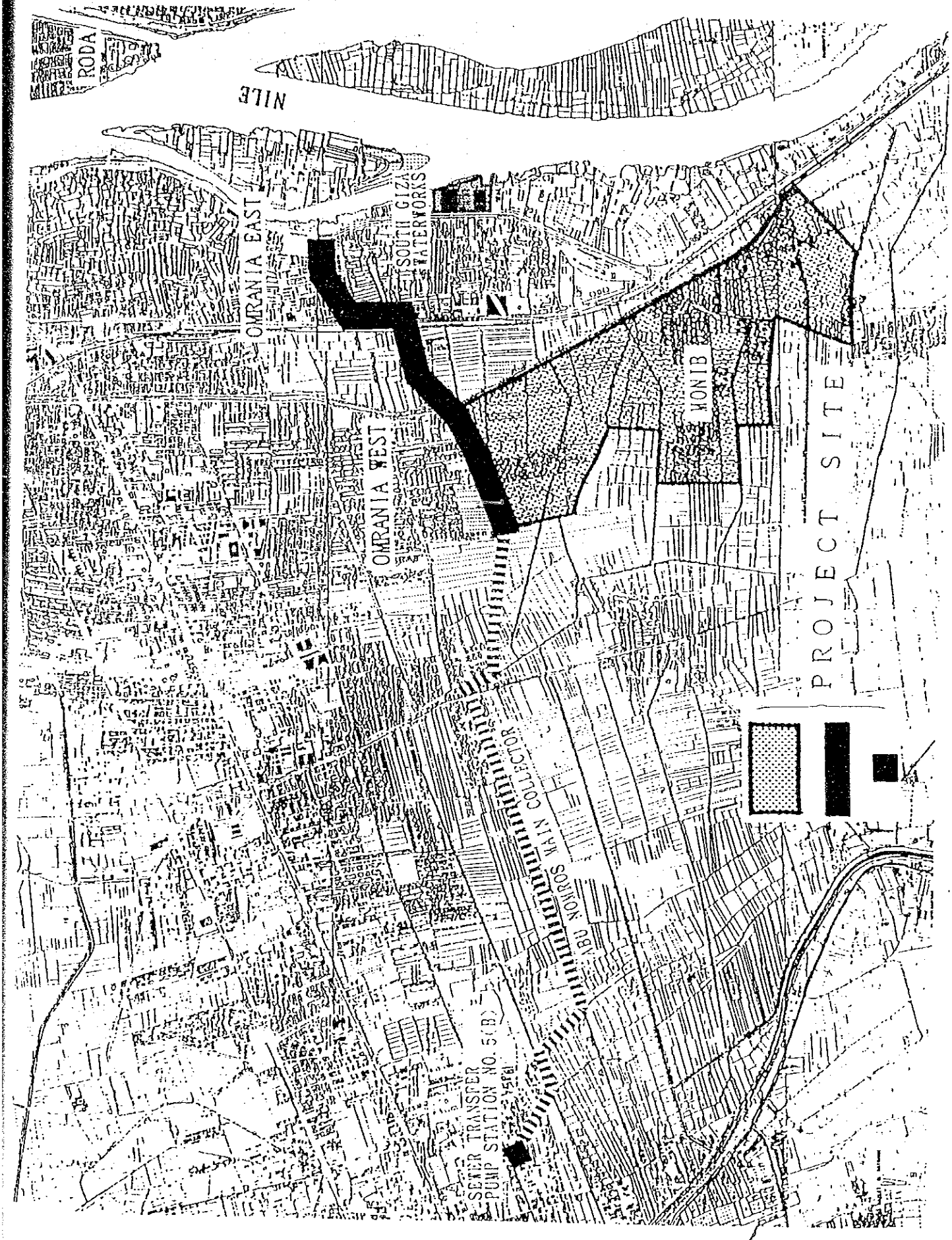
(9) to take necessary measures for historical remains which may be encountered during the construction period, if any.

(10) to provide disposal places of the water including silt, clay, etc., discharged during the construction period.

(11) to secure suspension of water supply during the connection works of the proposed water supply trunk line and the existing line.

(12) to form a steering committee in Giza City to expedite the Project.

ANNEX-I LOCATION MAP



ANNEX-II Recommendations for Undertakings by the Government of the Arab Republic of Egypt in case Japan's Grant is executed:

1. to undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the site.

2. to construct the access road to the site prior to the commencement of the construction.

3. to provide facilities for distribution of electricity, water supply, telephone, drainage and other incidental facilities to the Project site.

4. to ensure prompt unloading and customs clearance at ports of disembarkation in the Arab Republic of Egypt and internal transportation therein of the products purchased under the Grant.

5. to secure, with respect to the supply of the products and services under the verified contracts that Japanese nationals shall not be subject to any customs duties, internal taxes and other fiscal levies which may be imposed in the Arab Republic of Egypt.

6. to accord Japanese Nationals whose services may be required in connection with the supply of the products and services under the verified contract such facilities as may be necessary for their entry into Egypt and stay therein for the performance of their work in accordance with the relevant laws and regulations of the Arab Republic of Egypt.

7. to maintain and use properly and effectively the facilities constructed and equipment under the Grant.

8. to bear all the expenses other than those to be borne by the Grant, necessary for the execution of the Project.

2. Draft Report Explanation

MINUTES OF DISCUSSIONS

BASIC DESIGN STUDY ON THE PROJECT FOR THE WATER SUPPLY AND SEWER SYSTEM UPGRADING IN MONIB, GIZA CITY IN THE ARAB REPUBLIC OF EGYPT (PHASE 2)

(CONSULTATION ON DRAFT REPORT)

In June 1992, Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team on the Project for the Water Supply and Sewer System Upgrading in Monib, Giza City (Phase 2) (hereinafter referred to as "the Project"), to the Arab Republic of Egypt, and through discussions, field survey, and technical examination of the results in Japan, has prepared the draft report of the study.

In order to explain and to consult the Egyptian side on the components of the draft report, JICA sent to Egypt a Study Team (hereinafter referred to as "the Team"), which is headed by Ms. Chiho MURAMATSU, Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs, and is scheduled to stay in the country from October 25 to November 2, 1992.

As a result of discussion, both parties confirmed the main items described on the attached sheets.

Giza, October 31, 1992

村松千穂

Ms. Chiho MURAMATSU
Leader
Draft Report Explanation Team
JICA

Mr. Fouad KHALIL
Mayor of Giza City

ATTACHMENT

1. Components of Draft Report

Giza Governorate has acknowledged and accepted in principle the components of the Draft Report proposed by the Team as stated in "MEMORANDUM ON DRAFT REPORT" signed on the same day.
Giza Governorate has acknowledged the cost estimate of the Project explained by the Team.

2. Japan's Grant Aid system

Giza Governorate has acknowledged the system of Japan's Grant Aid explained by the Team.

3. Further schedule

The Team will make the Final Report in accordance with the confirmed items, and send it to Giza Governorate by the beginning of January 1993.

4. Recommendations for undertakings by Giza Governorate in case Japan's Grant Aid is executed

Giza Governorate agreed to request the related authorities to take the following measures for successfully accomplishing the objectives of the Project and for maximizing the positive effects of the Project.

Prior to project implementation

(1) to ascertain the will of beneficiaries to pay a water charge after completion of the Project in order to secure a continuous revenue flow to cover the operation and maintenance expenses of the new facilities.

(2) to obtain the agreement of local inhabitants not to dispose of vinyl objects, cloth, paper, etc., into the sewer facilities through enlightenment to local inhabitants, to maintain their proper functioning and to reduce the operation and maintenance expenses.

(3) to conduct public relations activities in order to secure cooperation for the construction work, particularly possible traffic jams, construction noise, etc.

(4) to secure the necessary budget for the work to be undertaken by the Egyptian side.

During project implementation

(5) to appoint several full-time engineers at the initial stage of Project implementation with a view to improving their expertise which will enable them to be responsible for the plan, construction, operation and maintenance of water supply and sewer facilities, to learn the technical aspects of the Project for the maintenance work in the future.

After completion of project

(6) to secure adequate budget of operation and maintenance for the facilities by surely collecting the water service charge based on (1) above.

(7) to take the necessary measures to transfer the property of the new facilities to GCWSA and GOSD.

(8) to ensure that GCWSA and GOSD conduct the operation and maintenance of the transferred facilities in a responsible manner.

MEMORANDUM ON DRAFT REPORT

BASIC DESIGN STUDY ON THE PROJECT FOR
THE WATER SUPPLY AND SEWER SYSTEM UPGRADING IN MONIB,
GIZA CITY
IN
THE ARAB REPUBLIC OF EGYPT
(PHASE 2)

With regard to the Project for the Water Supply and Sewer System Upgrading in Monib, Giza City (Phase 2) (the Project), the Draft Report Explanation Team of JICA (the Team) has explained and consulted the Egyptian side on the components of the draft report of the Project. As a result of the explanation by the Team and discussions with the related authorities, the Egyptian side has acknowledged and accepted in principle the components of the draft report.

The Egyptian side and the Team confirmed that the report of the Basic Design Study of the Project will be finalized in Japan taking into account the items attached in the Annex and the final report will be submitted officially to the Egyptian side by the beginning of January, 1993.

Giza, October 31, 1992

村松千穂

Ms. Chiho MURAMATSU
Leader
Draft Report Explanation Team
JICA

Mr. Fouad KHALIL
Mayor of Giza City

ANNEX: Confirmation and Modification on Draft Report

1. Confirmation on Draft Report

The Egyptian side and the Team has discussed the draft report and the Egyptian side accepted the components of the draft report on condition that the following revisions will be taken into account for the finalization of the Basic Design Study Report. The details of the revisions are shown in the attached letters issued by the related authorities (Greater Cairo Water Supply Authority (GCWSA), Greater Cairo General Organization for Sanitary Drainage (GOSD) and Organization for Execution of Greater Cairo Wastewater Project (CWO)) to Giza City.

2. Modification on Draft Report

2.1 Expansion of South Giza Waterworks (Comments from GCWSA)

2.1.1 Sludge Basin (Page 128, Paragraph 4.3.2.6-(7))

Sludge basin proposed in the draft report shall be eliminated from the Project.

2.1.2 Raw Water Pipe Diameter (Page 118, Paragraph 4.3.2.5-(2)-2))

The pipe diameter of raw water pipe shall be of 1,200mm, instead of 1,100mm.

2.1.3 Factory Test of Raw Water Intake Pump by Spare Impeller of 100,000 cub-meter/day

Factory test for the impeller with capacity of 100,000 cub-meter/day, which will be provided as a spare, shall be conducted.

2.2 Sewer Transfer Pump Station No.5(B)(Comments from GOSD)

2.2.1 Spacing of Screen (Page 165, Paragraph 4.3.4.7-(2)-2))

Spacing of screens shall not be less than 150mm.

2.2.2 Capacity of Hoist Crane (Page 165, Paragraph 4.3.4.7-(2)-3))

Capacity of the hoist crane shall be 2 tons, instead of 1 ton.

(نموذج ٢٠٢٢ م)

الهيئة العامة
لمرفق مياه القاهرة الكبرى
مكتب رئيس مجلس الادارة

بسم الله الرحمن الرحيم
" وجعلنا من الماء كل شيء حي "
صدق الله العظيم

٢٧١٦٤

القاهرة في ١٩٩٢/١٠/٢٨
رقم

السيد الاستاذ / رئيس مجلس مدينة الجيزه
محافظة الجيزه
مكتب وكيل أول الوزاره ـ رئيس مجلس المدينه

تحيه طيبه وبعد ،

بالأشاره الى كتابكم بتاريخ ١٩٩٢/١٠/١٤ والمرفق معه مسوده التقرير النهائى لتصميم المرحلة الثانيه من مشروع تطوير شبكة المياه والصرف الصحى بمنطقة المنيب .

وبالأشاره الى المناقشات التى تمت مع الوفد اليابانى بتاريخ ١٩٩٢/١٠/٢٧ ـ و ١٩٩٢/١٠/٢٨ بخصوص بعض الملاحظات الفنيه على مسودة التقرير والى ماتم الاتفاق عليه طبقا لما هو وارد بالتقرير الفنى المرفق .

نأمل الأحاطه بأن الهيئه توافق على مسودة التقرير الفنى بعد تعديله طبقا لما هو وارد بالتقرير الفنى المرفق وموافقة الجانب اليابانى .

وتفضلوا بقبول وافر الاحترام . ،،،

أ.ع.

رئيس مجلس الاداره
مهندس سعد الدين محمد حسن الديب

مرفق التقرير الفنى بالتعديلات المطلوبه

GREATER CAIRO WATER SUPPLY AUTHORITY (GCWSA)

October 28, 1992

Gen. Fouad Khalil
Mayor of Giza City

Dear Sir,

With reference to your letter dated 14/10/1992, accompanied by the draft final report for the Project for the Water Supply and Sewer System Upgrading in Monib, Giza City and the discussions with the Japanese mission on 27th and 28th of October concerning the technical comments on the draft final report and what is agreed upon according to the attached report, please be advised that GCWSA approved the draft final report on condition that the report is modified as it is mentioned in the attached report which has been confirmed by the Japanese side.

Best regards.

Chairman,

Eng. Saad El-din Mohamed Hassan El-Dieb

Attached: Confirmation and Modification on Draft Report

CONFIRMATION AND MODIFICATION ON DRAFT REPORT

1. Confirmation on Draft Report

The Egyptian side for Greater Cairo Water Supply Authority (GCWSA) and the Japanese Team has discussed the draft report, and the Egyptian side accepted the components of the draft report after considering the following modifications:

1.1. Treatment Process Facilities

GCWSA has agreed to give the full chance to Japanese technology for treatment process facilities to be applied in this project as such technology has not been applied before in any of Greater Cairo Treatment Plants and the technical data concerning treatment process facilities have been accepted based on the experiences of Japanese side.

2. Modification on Draft Report

Following revisions will be taken into account for the finalization of the Basic Design Study Report concerning expansion of South Giza Waterworks

2.1. Sludge Basin (Page 128, Paragraph 4.3.2.6-(7))

GCWSA has pointed out that the sludge basin for wastewater from back washing at the rapid sand filter and the sludge from the sedimentation basin is not practically employed in all the other waterworks in Greater Cairo, and the sludge from the waterworks is directory discharged to the Nile. Therefore, the sludge basin as proposed in the draft report shall be eliminated from the Project.

The Team has acknowledged the above comment and confirmed that the sludge basin will not be included in the Project. Idea of the system of sludge basin will be described in Paragraph 5.3, as a recommendation for future plan.

2.2. Raw Water Pipe Diameter (Page 118, Paragraph 4.3.2.5-(2)-2))

GCWSA has recommended to install bigger size of raw water pipe with diameter 1,200 mm, instead of 1,100 mm as proposed in the draft report.

The intention of this idea is to make sure the long life operation of the pipe in order to decrease internal friction by the water velocity inside the pipe.

The Team has acknowledged the above idea. The Team has confirmed that the pipe diameter shall be of 1,200 mm and the water velocity inside the pipe will be approximately 2.2 meter/sec when the overall expansion plan for South Giza Waterworks is completed with the design water purification capacity of 215,000 cub-meter/day.

In this case, the 1,200 mm raw water pipe line will have interchageability with the water supply trunk line for the project , The flow regulation valve with diameter 1000 mm shall be installed with enlargement piece 1000 /1200 mm .

2.3. Factory Test of Raw Water Intake Pump

GCWSA has recommended to conduct the Factory Test of the raw water intake pump by using the spare impeller with capacity of 100,000 cub-meter/day .

The Team has acknowledged the above recommendation, and informed that the above test shall be conducted as a part of the factory tests.

الهيئة العامة
لمرافق الصرف الصحى للقاهرة الكبرى
رئيس مجلس الادارة

General Organization
Cairo Sanitory Drainage utility
Chairman

القيد : ٨٠١ ق

التاريخ : ٢١/١٠/١٩٩٢

المرفقات :

الموضوع: المنحة اليابانية لمدينة الجيزة

السيد اللواء / رئيس مدينة الجيزة

تحية طيبة ... وبعد :

بالاحالة الى كتاب سيادتكم بتاريخ ١٤/١٠/١٩٩٢ بخصوص التقرير المبدئى لاسس التصميم والمواصفات لمشروع محطة الرفع الحلزونية رقم ٥ ب بمدينة الجيزة وبعد مراجعة التقرير والاجتماع بالوفد اليابانى بتاريخ ٢٨/١٠/١٩٩٢ .

يرجى التكرم بالاحاطة بالآتى :

١ - دراسة أمكانية تقديم البرنامج الزمنى التنفيذى بنهو وتشغيل محطة الرفع الحلزونية قبل يونيه ١٩٩٥ حيث ستكون مشروعاتنا جاهزة قبل هذا التاريخ بسنه على الاقل أى فى يونيه ٩٤ وهذه المشروعات سترفع المياه الى المحطة الحلزونية وبذلك يمكن الاستفادة من المشروع .

٢ - ان تكون المصافى ذات مقاس لايقل عن ١٥ × ١٥ سم مع أهمية دراسة زيادة حمولة الونش الخاص بالمصافى الى ٢ طن .

٣ - التهطين يجب ان يكون لجميع اجزاء المحطة بمواد مقاومة لمياه وغازات الصرف الصحى .

٤ - يفضل ان تكون المظلة الشمسية للطلمبات من الحديد .

٥ - سوف يتم انشاء الاعمال المدنية والكهربائية شاملة محطة القوى (التوليد) لعدد ٤ طلمبات اما الطلمبات ستكون بعدد ٣ وحدات كاملة .

٦ - يعتمد ماجاء باللوحة الكهربائية رقم EGM-S-10

٧ - يتم انشاء الخزان الرئيسى للوقود (التوليد) تحت منسوب الارض مجاورا لمحطة القوى .

٨ - سيتم دراسة قطع الغيار لمدة سنتين لاحقا .

على ضوء ماجاء بماليه نأمل الاحاطة بأن الهيئة توافق على ماجاء بالتقرير المبدئى للاسس التصميمية ونشكر الفريق اليابانى الذى قام بهذه الدراسة .

وتفضلوا بقبول فائق الاحترام ،،،

التوقيع:

مهندس/ أحمد عبد المقصود السيد
رئيس مجلس الادارة

صورة مرسلة للدكتور مهندس / نبيل مخلوف

" هنـاء "

GENERAL ORGANIZATION FOR SANITARY DRAINAGE (GOSD)

October 31, 1992

Gen. Fouad Khalil
Mayor of Giza City

Subject: Japanese Grant Aid Project for Giza City

Dear Sir,

With reference to your letter dated 14/10/1992 for the subject above, please note the following.

After our study of the draft final report with your letter, especially for the screw pump station No.5(B) and after the meeting with the Japanese mission on 28th of October, we have confirmed as follows:

1. GOSD requested the Japanese side to study whether the construction of Sewer Transfer Pump Station No.5(B) is finished and the station can be operated before June, 1995, because the project of Abu Nomros Main Collector will be completed on June, 1994 and the Collector will be ready to transfer the sewage to the station so that the people in the area can get benefit earlier.
2. Spacing of screen for the station shall not be less than 150mm and the capacity of hoist crane shall be 2 tons.
3. Lining with anti-corrosion material shall be applied for all the parts to be contacted with wastewater and gas.
4. It is preferable for the sunshed of the pump station to be made of steel.
5. Civil and electrical work shall be done for 4 units of generator, while the number of screw pump shall be three.
6. Drawing No. EGM-S-10 is acceptable for electrical work.
7. Underground fuel tank for generator will be constructed close to the existing generator room.
8. The comments on spare parts will be done in the separate letter.

With respect to the mentioned above, please note that GOSD agreed on the draft final report and we would like to thank the Japanese side for their study.

Best regards.

Chairman,

Ahmed Abd El Maksoud

وزارة الاسكان والمرافق
الجهاز التنفيذى لمشروع الصرف الصحى
القاهرة الكبرى

القاهرة فى ١٩٩٢/١٠/٢٩

السيد اللواء/ وكيل اول الوزارة
رئيس مدينة الجيزة

تحيه طيبه وبعد

نتشرف بالاحاطة بأن الجهاز قد قام بمراجعة مسودة تقرير تطوير شبكات المياه والصرف الصحى بمنطقة المنيب والمقدم من المكتب الاستشارى اليابانى ياشيو انجنيرنج والتضمن انشاء محطة الرفع الطرزونية رقم (٥) ضمن مشروع مجارى الهرم والتى ستخدم مجمع ابو النمرس ويوافق الجهاز على ما جاء بالتقرير المشار اليه فيما يتعلق بمحطة الرفع المذكورة .

برجاء الإحاطة والتنبيه باللازم ...

وتفضلوا بقبول فائق الاحترام ...

رئيس الجهاز
مهندس/سلامة احمد سالم

الجهاز التنفيذى لمشروع الصرف الصحى القاهرة الكبرى
الارشيف العام
الرقم :
التاريخ : ١٩٩٢/١٠/٢٩
الملفات :
الموضوع :

L/170

العنوان : ٤٤ شارع رمسيس - مبنى الجهاز التنفيذى لمشروع الصرف الصحى بالقاهرة .
تلفون ٧٦٠٣١٩ - ٧٥٩١٠٢ - ٧٤٩١٣٦ محولى ٧٤٩٥٧٥ - ٧٥٧٠٦٢ - تلكس : un ٩٢٠٦٦

Organization for Execution of Greater Cairo Wastewater Project

Date: October 29, 1992

Gen. Fouad Khalil
Mayor of Giza City

Dear sir:

Please be advised that CWO has reviewed the Draft Final Report for the Project for Water Supply and Sewer System Upgrading in Monib, Giza City (Phase 2) submitted by the Japanese side including the construction of Sewer Transfer Pump station No.5(B) which will serve Abu Nomras Main Collector.

CWO agreed on the contents of the Draft Final Report concerning Sewer Transfer Pump Station No.5(B).

Thanking you, Best regards.

Head of CWO
Eng. Salama Ahmed Salem

APPENDIX 5

FIELD REPORT

JAPAN INTERNATIONAL COOPERATION AGENCY
THE BASIC DESIGN STUDY ON THE PROJECT FOR THE WATER SUPPLY AND SEWER SYSTEM UPGRADING IN MONIB, GIZA CITY (PHASE 2) IN THE ARAB REPUBLIC OF EGYPT

June 27, 1992

Mr. Fouad Khalil
Mayor of Giza City
Giza Governorate

Re: The Project for the Water Supply and Sewer System Upgrading in Monib, Giza City (Phase-2)

Sub: Submission of Field Report

Dear Sir,

With regard to the captioned project, in accordance with the inception report prepared by the basic design study team, we, as the consultant team of the basic design, submit herewith three (3) copies of the field report which shows the basic technical concept of the Project.

As mentioned in the field report, we have already submitted and explained relative section in the report to the authorities concerned with your official.

Therefore, you are kindly requested to inform us of your comment by the beginning of July, 1992, if any.

We thank you for your kindness and deepest cooperation extended to us during our stay in Egypt.

Yours very truly,

Ryosuke Teranishi
Leader of Consultant Team of
JICA Basic Design Study Team

[FIELD REPORT]

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THE BASIC DESIGN STUDY
ON
THE PROJECT FOR
THE WATER SUPPLY AND SEWER SYSTEM UPGRADING
IN MONIB, GIZA CITY (PHASE-2)
IN
THE REPUBLIC OF EGYPT

FIELD REPORT

JUNE, 1992

CONSULTANT TEAM OF BASIC DESIGN STUDY

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

[FIELD REPORT]

1. Introduction

This report has been prepared unofficially by the consultant team of basic design study (hereinafter referred to as "the consultant team") for the Project for the Water Supply and Sewer System Upgrading in Monib, Giza City (Phase-2) in the Arab Republic of Egypt (hereinafter referred to as "the Project"), based on the field survey and discussions with authorities concerned of the Government of Egypt, in order to build mutual understanding and to prevent misunderstanding of the Project.

However, all the items in the basic concept are subject to the approval of the Japanese Government, and some items in this report may be modified based on the result of the further study in Japan.

2. Required Conditions for Construction Work

For the construction work, the following items shall be required in order to make smooth implementation of the Project.

2.1 Temporary yard for the construction work

(1) Provision of temporary land for the construction with the following space:

- For temporary yard for water supply work : Approx. 10,000M^2
  (This area shall be provided by GCWSA in the expansion plant yard of South Giza Waterworks - refer to Field Report No. 3.1)
- For temporary yard for sewer work : Approx. 2,500M^2
  (This area shall be provided by GOSD in and around Sewer Pump Station No.5 - refer to Field Report No. 3.5)
- For temporary yard for water supply pipes : Approx. 1,500M^2
  (This area shall be provided by Giza Governorate)

(2) Provision of disposal places of the water including silt, clay, etc., discharged during the construction period.

The transportation distance from the Project site to the disposal places shall be as follows:

- For dumping yard for the disposal of surplus soil from excavation work : Approx. 20km
- For disposal place of the removal of groundwater from excavation work : Within the project site (canal)

2.2 Origin of the materials to be used for the Project

We are planning to use the construction materials and equipment available in the Greater Cairo region as much as possible.

However, some construction materials and equipment are not available by the following reasons:

- They are not available in the Greater Cairo region.
- It is very difficult to procure them in the Greater Cairo region.
- It is doubtful to maintain the desired safety and quality of facilities to be constructed and/or the construction schedule.

Therefore, such materials and equipment shall be transported from Japan. Main materials and equipment to be procured in Egypt and Japan are shown in the attached table.

To avoid any trouble and/or delay for the Project, necessary measures on the import and transportation of the materials and equipment into Egypt shall be taken by Giza City for the Japanese Contractor.

2.3 Necessary measures to be taken during the construction work

In order to execute the work smoothly on the road and avoid any trouble and/or inconvenience with the inhabitants during the construction period of the Project, necessary measures for such as getting permissions, conducting traffic control, etc., for the work shall be taken by Giza City for the Japanese Contractor.

3. Field Report submitted to the authority concerned

As described in the previous Section 1 "Introduction", in order to built mutual understanding and to prevent misunderstanding of the Project, we have submitted the field report to the authority concerned.

The list of the authority concerned which we have submitted the report is given below. The reports submitted to the authority are attached herewith.

Sec. No.	Title of Report	Name of Authority	Date of Submission
3.1	Conceptual Plan of Expansion for South Giza Waterworks	GCWSA	June 24, 1992
3.2	Conceptual Plan of Water Supply Trunk Line	GCWSA	June 24, 1992
3.3	Conceptional Plan of Jacking Method at Railway Crossing for Water Supply Trunk Line	Egyptian State Railway	June 25, 1992
		GCWSA	June 24, 1992
3.4	Conceptual Plan of Aqueduct over Zoser Canal for Water Supply Trunk Line	Giza Irrigation Authority	June 25, 1992
		GCWSA	June 24, 1992
3.5	Conceptual Plan of Sewer Transfer Pump Station No.5(B)	GOSD	June 24, 1992
		CWO	June 25, 1992

Note;
GCWSA : Greater Cairo Water Supply Authority
GOSD : Greater Cairo General Organization for Sanitary Drainage
CWO : Organization for the Execution of the Greater Cairo Wastewater Project

PROCUREMENT LIST FOR MAIN EQUIPMENT AND MATERIALS

ITEM AND DESCRIPTION	PROCURED FROM EGYPT	PROCURED FROM JAPAN	REMARKS
1. Pump		O	
2. Motor		O	
3. Hoist Crane		O	
4. Transformer		O	
5. Switch Gear		O	
6. Flash Mixer		O	
7. Floculator		O	
8. Gate & Screen		O	
9. DCI.Straight Pipe(Push on joint) Less than 1000mm	O		
10.DCI.Straight Pipe(Push on joint) More than 1100mm		O	
11.DCI.Straight Pipe(Flange joint)		O	
12.DCI.Valve & Fitting		O	
13.Steel Valve & Fitting		O	
14.PVC.Straight Pipe	O		
15.Stainless Steel Pipe & Products		O	
16.Filter Sand	O		
17.Filter Gravel	O		
18.Perforated Block		O	
19.Fabricated Steel Stairs	O		
20.Hand Rail	O		
21.PVC.Lining Material (Harmless for Health)		O	for Sewer Basin
22.Special Water Proofing Material		O	
23.Water Proofing Mat	O		
24.Bitumen	O		

ITEM AND DESCRIPTION	PROCURED FROM EGYPT	PROCURED FROM JAPAN	REMARKS
25.Concrete Aggregate	O		
26.Cement	O		
27.Reinforcing Bar	O		
28.Timber	O		
29.Concrete Brick	O		
30.Blue Brick	O		
31.Sheet Pile		O	
32.Concrete Pipe	O		
33.Indoor Lighting Fixture & Wire	O		
34.Indoor Water Supply & Sewage Equipment	O		
35.Aluminum Sash Window	O		
36.Steel Door	O		
37.Tile	O		
38.Painting Material	O		
39.Fire Extinguisher	O		
40.Ventilator	O		
41.Blower		O	for Sewer Basin
42.General Construction Equipment	O		
43.Special Construction Equipment		O	Jacking, Under Pressure Drilling and Grouting Machine ect.

THE BASIC DESIGN STUDY
OF
THE PROJECT FOR
THE WATER SUPPLY AND SEWER SYSTEM UPGRADING (PHASE-2)
IN MONIB, GIZA CITY
IN
THE ARAB REPUBLIC OF EGYPT

CONCEPTUAL PLAN
OF
THE EXPANSION FOR EXISTING SOUTH GIZA WATERWORKS

JUNE, 1992

CONSULTANT TEAM OF BASIC DESIGN STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

TABLE OF CONTENTS

1. General

1.1 General conditions

Following general conditions of basic design have been confirmed through the data and information obtained by the Giza City, Greater Cairo Water Supply Authority (GCWSA) and other related authorities during the field survey.

(1) Project Area : Monib, Giza City
(2) Served area : 185ha
(3) Population
- at 2010 : 247,000
- at present(1990) : 133,000
(4) Maximum daily water demand: 140 lit/day/cap.

1.2 Relation between this Project and future extension plan

Design capacity of the treatment plant of this Project shall be maximum 35,000m^3/day which is included in the total design capacity of 200,000 m^3/day for the future expansion of South Giza Waterworks.

2. Major design conditions for this Project

2.1 Design capacity of treatment plant

Maximum 35,000 m^3/day excluding the water volume (7.5% of the design capacity) for backwashing, sludge discharge, etc.

2.2 Principle flow diagram

The flow diagram of this Project shall be based on the preliminary expansion plan of South Giza Waterworks which was discussed and planned with GCWSA on December 1991 (Refer to Fig.-1).

2.3 Layout of extension plan

The layout of this Project (design capacity: maximum 35,000m^3/day) is shown in Fig.-2 which also indicates the future 200,000 m^3/day expansion plan for GCWSA's reference.

2.4 Schematic flow diagram

Schematic flow diagram of this Project is shown in the Fig.-3.
Main components and specifications of each facility and equipment shown in the flow diagram are mentioned in Section 3.

2.5 Design standards

Japanese standards shall be basically applied to this Project.

2.6 Design water quality

(1) Raw water : to be determined by the data obtained by GCWSA.
(2) Clear water : to be determined by the data obtained by GCWSA.

2.7 Water level and temperature of Nile River

(1) High water level : AD+17.92m
(2) Middle water level : AD+17.21m
(3) Low water level : AD+15.18m
(4) Water temperature : to be determined by the data obtained by GCWSA.

2.8 Datum ground level of plan : AD+21.00m

2.9 Type of foundation of the plant

The foundation of this Project shall be designed according to the soil data. Necessity of pile foundation shall be determined by the Japanese side.

3. Main components for this Project

3.1 Raw water pump facility (Refer to Fig.-2, 5 to 7)

(1) Raw water pump
- Location : Inside the existing 6th October raw water pump station
- No. of unit : One(1) unit
- Design capacity : Maximum 100,000m^3/day
- Total head : 14 meters (same as the existing raw water pump of South Giza Waterworks)

(2) Raw water pipeline for this Project
- Location : Refer to Fig.-2
- Diameter : 1,000mm
- Connection point with existing raw water pipeline of South Giza Waterworks : Refer to Fig.-2

3.2 Treatment plant (Refer to Fig.-3 to 8, 10 to 14)

(1) Receiving well : Conventional type
(2) Mixing basin : Mechanical stirring type
(3) Flocculation basin : Vertical baffle type
(4) Sedimentation basin : Settling basin with slant board device
(5) Clean sand filter : Gravity rapid sand filter basin (Sand, gravel filtration and perforated block type underdrain system)

(6) Washing system of gravity rapid sand filter basin:
- First stage : Surface washing by water
- Second stage : Back washing by water

(7) Clear water reservoir
- Location : Under the gravity rapid sand filter basin and washing water basin
- Capacity : approx. 3,600m^3

(8) Sludge Basin : Settling basin type

(9) Chlorine system
Pre-chlorination system (Infusing percentage : max.3.5ppm)
- Chemicals : Chlorination gas
- Location : Receiving well
- Purpose : Sterilization of duckweed in raw water

Internal chlorination system (Infusing percentage : max.2.0ppm)
- Chemicals : Chlorination gas
- Location : Washing water basin
- Purpose : Sterilization

Post-chlorination system (Infusing percentage : max.1.0ppm)
- Chemical : Chlorination gas
- Location : Clear water reservoir
- Purpose : Disinfection

Total chlorination system
- Equipment capacity : approx. 1.0ton x 4units

(10) Alum-Sulfate system (Infusing percentage : max.50ppm)
- Chemicals : Liquid alum-sulfate or solid alum-sulfate
- Location : Mixing basin
- Storage volume of liquid alum-sulfate : approx. 20m^3
- Storage volume of solid alum-sulfate : approx. 2,000kg for one day
- Volumetric dosage of liquid alum-sulphate:
  37,600 m^3/day x 50ppm x 10^{-3}
  = 1,880kg/day (10% alum-sulphate)

(11) Pipeline material in the compound
- Above ground : Flanged steel pipe
- Underground : Ductile cast iron pipe
- Opening direction of valve : Anti-clockwise

(12) Building drawing for treatment plant house (Fig.-21 and 22)

3.3 Distribution pump (Refer to Fig.-14 to 17)
(1) Location : Under the washing water basin
(2) No. of unit : Three (3) including One (1) stand-by unit
(3) Capacity : approx. 15.8m^3/min
(4) Total head : 60 meter(same as the existing distribution water pump of South Giza Waterworks)
(5) Counter measure against water hammer : not considered

(6) Counter measure against water leakage
- No. and capacity of discharge pump : Two(2) x 0.2m^3/min
- No. and capacity of manual pump : One(1) x 0.75ltr/stroke

(7) Connection to the existing distribution line (Refer to Fig.-18)

3.4 Sludge discharge system of sedimentation basin (Refer to Fig.-1 and 2)
Direct gravity discharge shall be applied for the sludge discharge system.

3.5 Emergency dechlorination equipment
(1) Application
In order to neutralize the leaked chlorination gas from the chlorination equipment for this Project, an emergency dechlorination equipment shall be installed.
(2) Location : Chemical room (Refer to in Fig.-9)
(3) Type : Package type
(4) Capacity : 1,000kg/hr.Cl2 (mixed with air)

3.6 Instrumentation and control system (Refer to Fig.-19)
(1) Instrumentation system: Local indication system
(2) Control system : Local manual operation system

3.7 Substation system (Refer to Fig.-2, 9 and 20)
(1) Oneline diagram : Refer to Fig.-20
(2) Location of equipment
- 11KV main receiving board : Refer to Fig.-2
- Switchgear for treatment : In the electrical equipment room plant for this Project

3.8 Spare Parts
Two (2) years spare parts will be supplied.

4. Utilization of the existing facility

The following existing facilities shall be utilized for this Project:
(1) 6th October raw water pump station
(2) Raw water pipeline for South Giza Waterworks
(3) Chlorination storage room
(4) Laboratory
(5) Administration office

5. Undertakings by GCWSA

The following undertakings shall be carried out by GCWSA when this Project is implemented by Japan's Grant Aid.

(1) Acquisition of the additional land in accordance with the expansion plan (Refer to Fig.-2)

(2) Relocation of the existing sewer facility in the planned location for the expansion plant of this Project.

(3) Relocation of the existing trees in the planned location for the expansion plant of this Project.

(4) Relocation of the existing outdoor lighting facilities in the planned location for the expansion plant of this Project.

(5) Relocation of the existing gate house in the planned location for the expansion plant of this Project.

(6) Acquisition of temporary construction yard for warehouse, stock yard, site office, etc., in the future expansion yard.

(7) Chemicals, water and electricity shall be provided by GCWSA.

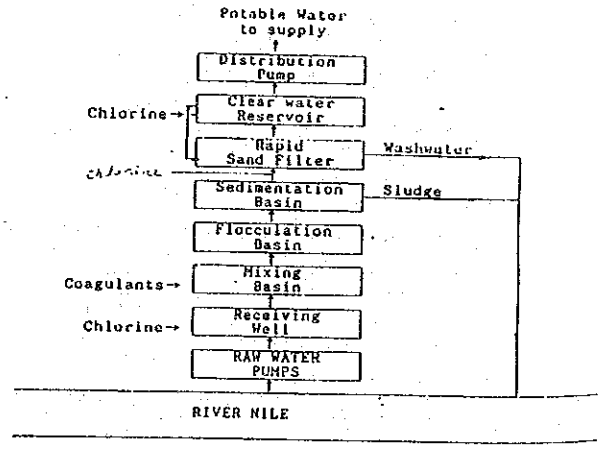


Fig.-1 Flow Diagram for Expansion treatment plant

Fig - 2 LAY OUT OF WATER TREATMENT PLANT

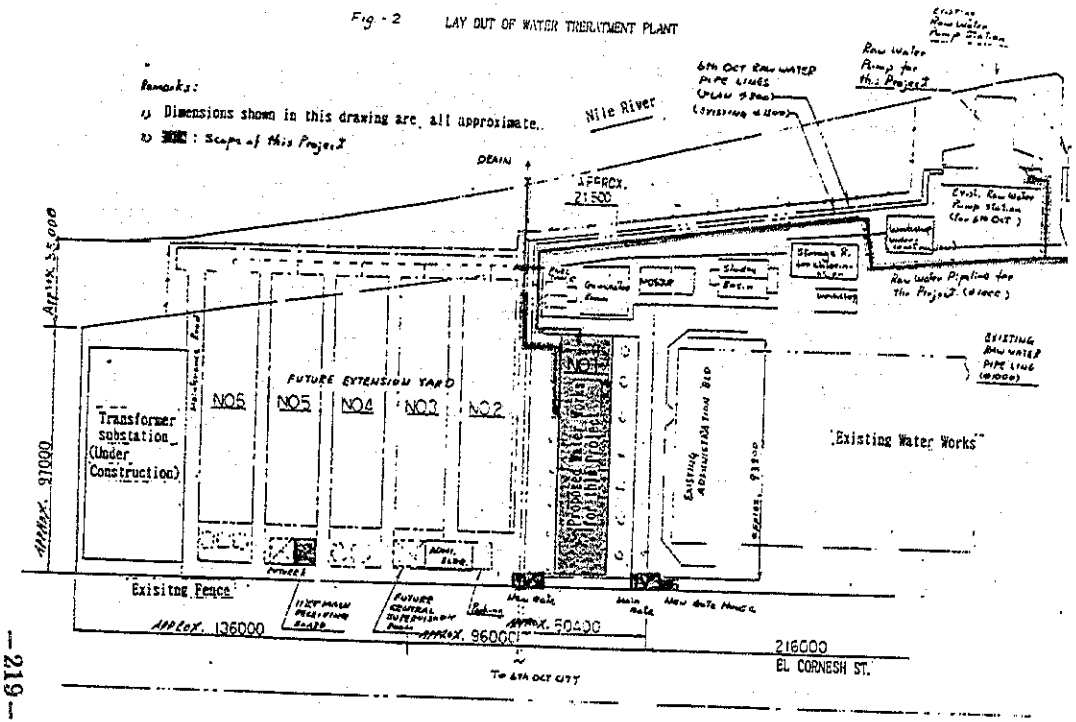
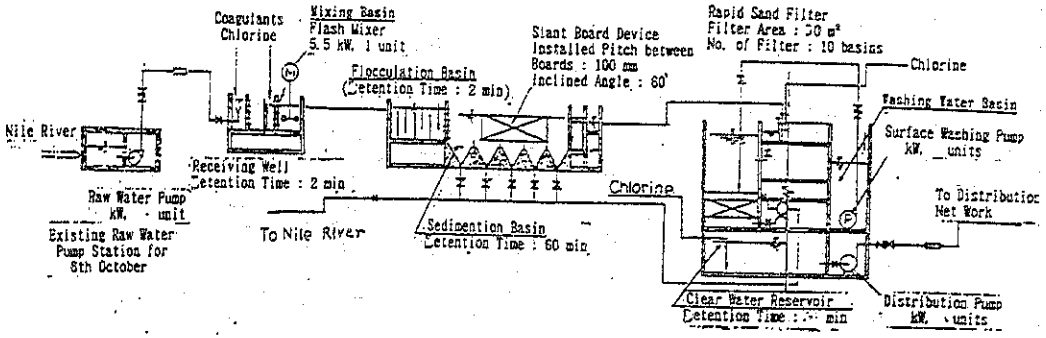
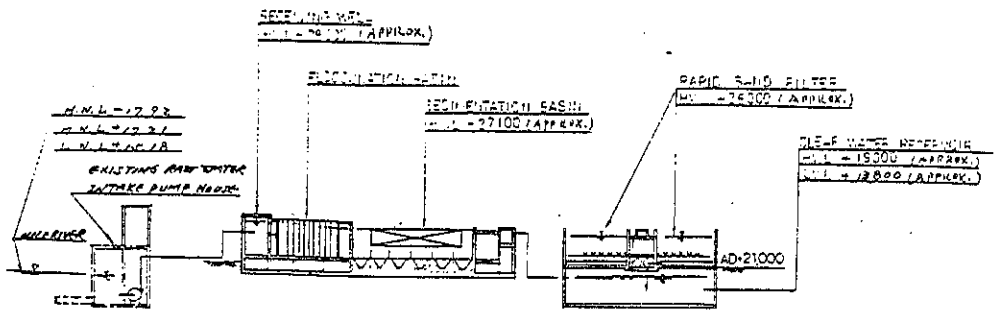


Fig - 3 SCHEMATIC FLOW DIAGRAM FOR THIS PROJECT



Note : Dimensions shown in this drawing are all approximate.

Fig - 4 WATER LEVEL PLAN



NOTE : Figures shown in this flow chart are all approximate.

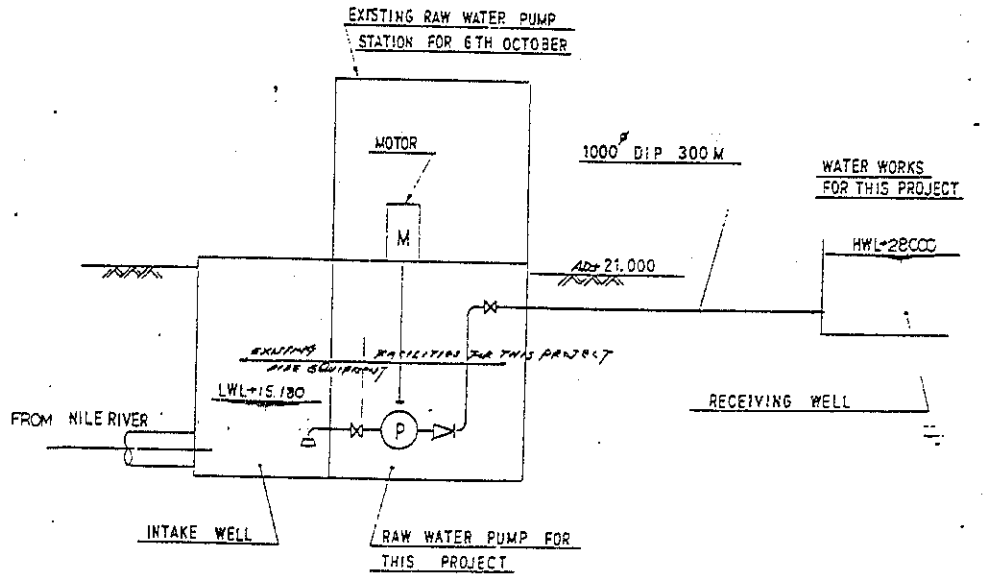


Fig - 5 SCHEMATIC DRAWING OF RAW WATER PUMP

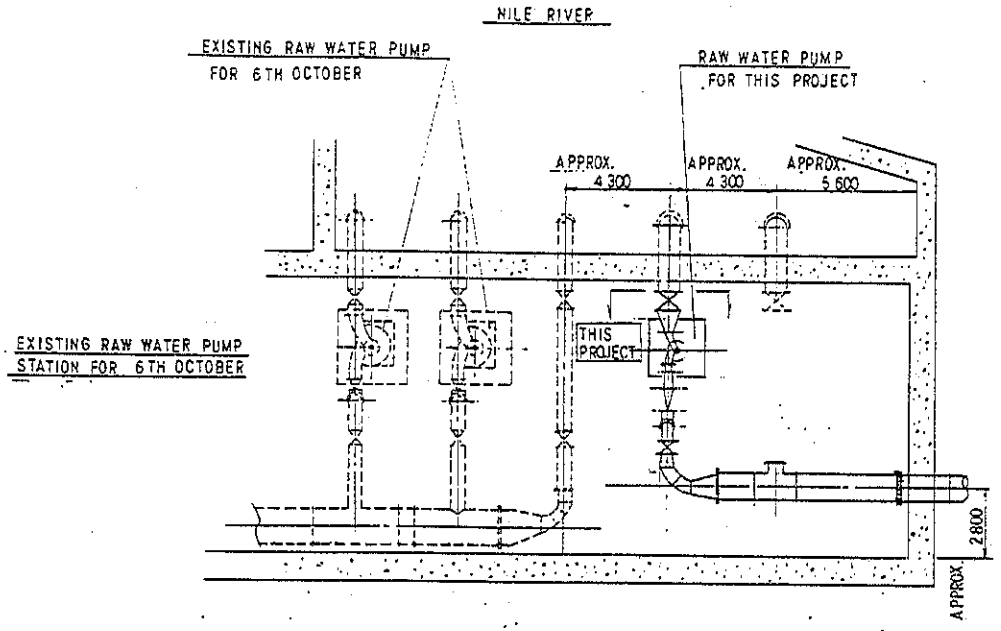


Fig.-6 PLAN OF RAW WATER INTAKE PUMP FOR THIS PROJECT

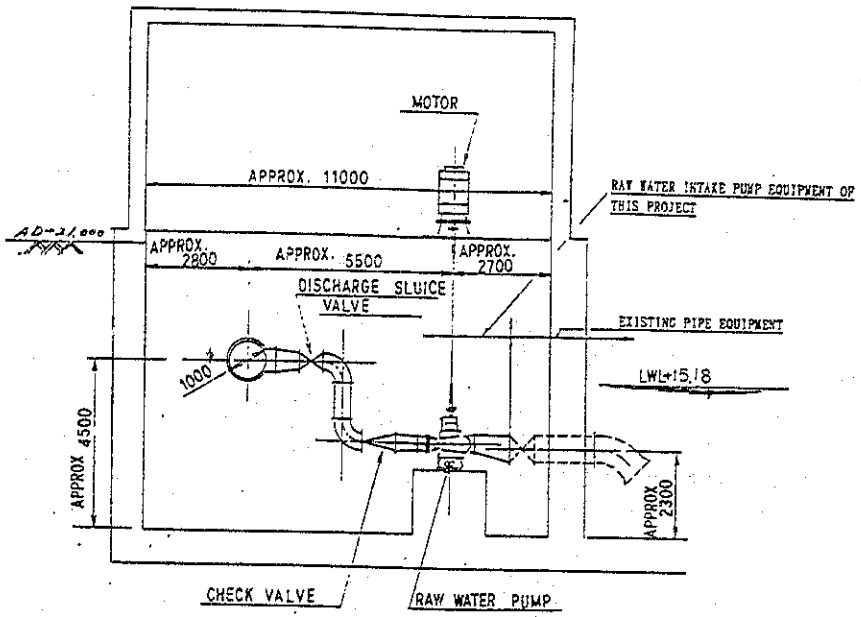


Fig.-7 SECTION OF RAW WATER INTAKE PUMP

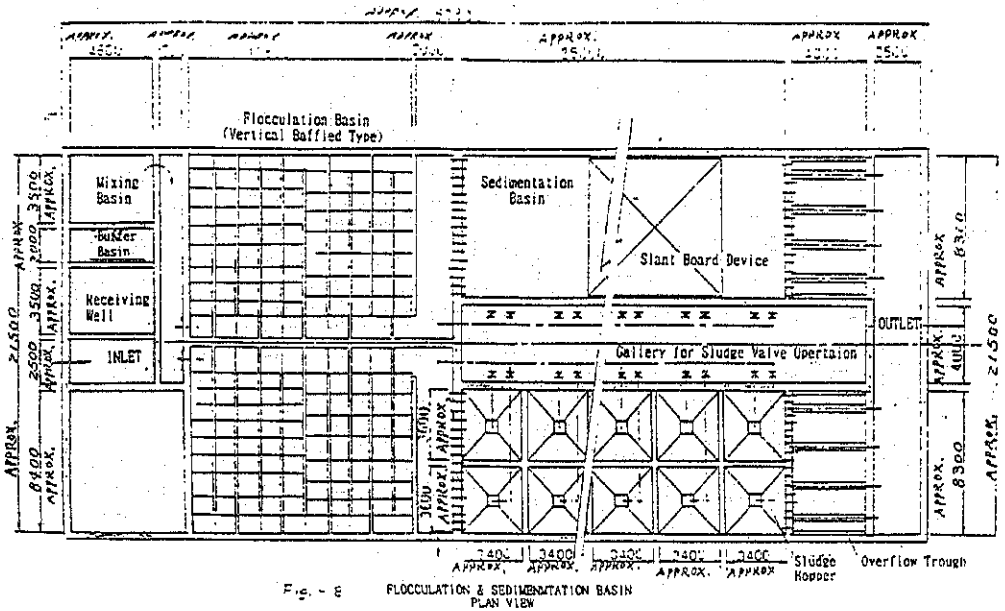


Fig.-8 FLOCCULATION & SEDIMENTATION BASIN PLAN VIEW

Note : Dimensions shown in this drawing are all approximate.

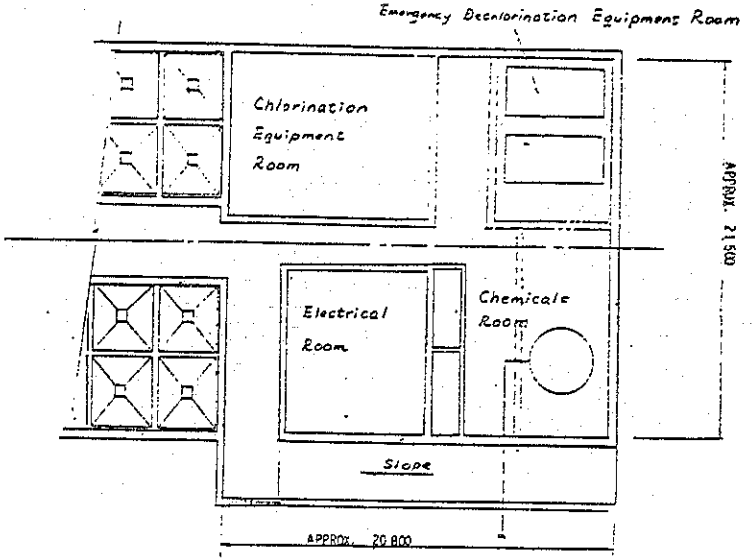
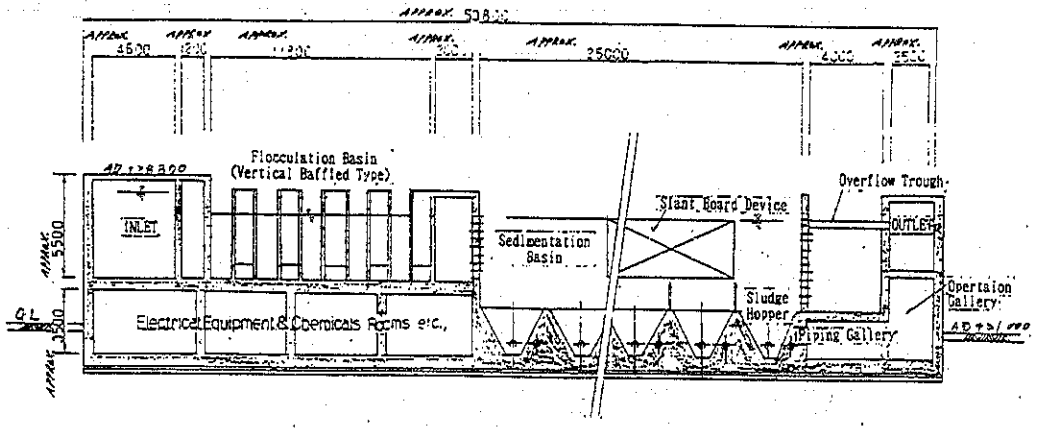


Fig.-9 PLAN OF ELECTRICAL, CHEMICALS AND CHLORINATION EQUIPMENT ROOM

Fig. - 10 FLOCCULATION & SEDIMENTATION BASIN
CROSS SECTION VIEW



Note : Dimensions shown in this drawing are all approximate.

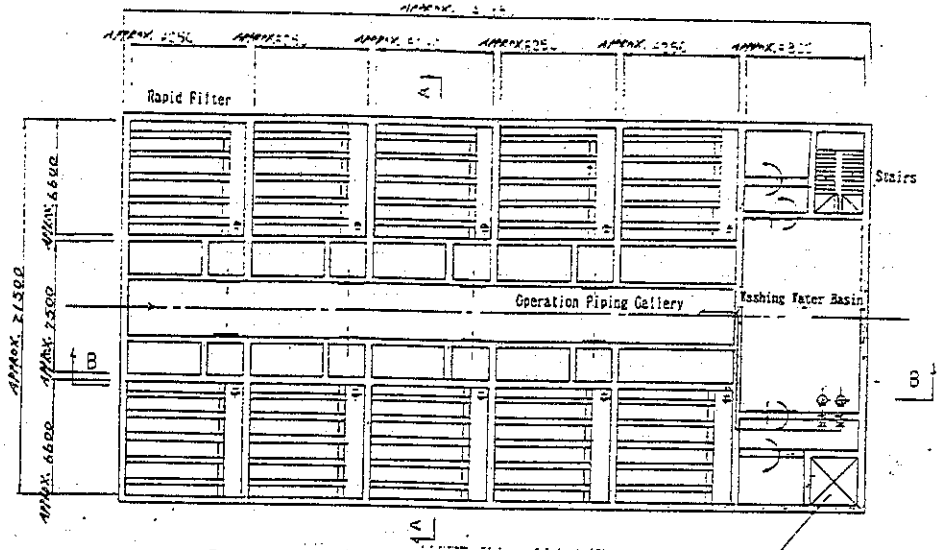


Fig. - 11 RAPID SAND FILTER & CLEAR WATER RESERVOIR
Rapid Sand Filter PLAN VIEW

Note : Dimensions shown in this drawing are all approximate.

Entrance for Pumps, Other Equipment & Materials

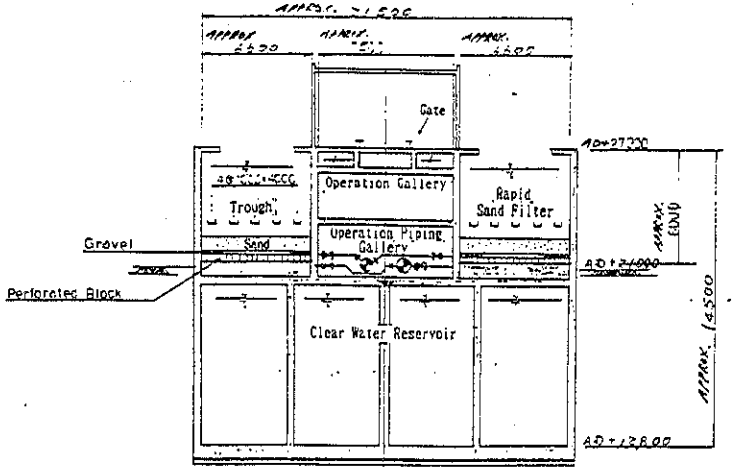


Fig. - 12 RAPID SAND FILTER & CLEAR WATER RESERVOIR
CROSS SECTION VIEW A - A

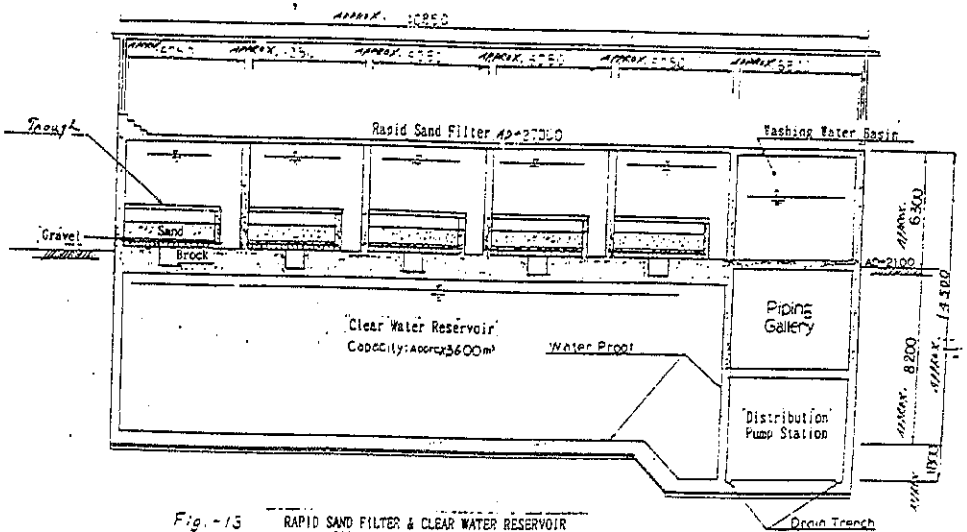


Fig. - 13 RAPID SAND FILTER & CLEAR WATER RESERVOIR
CROSS SECTION VIEW B - B

Note : Dimensions shown in this drawing are all approximate

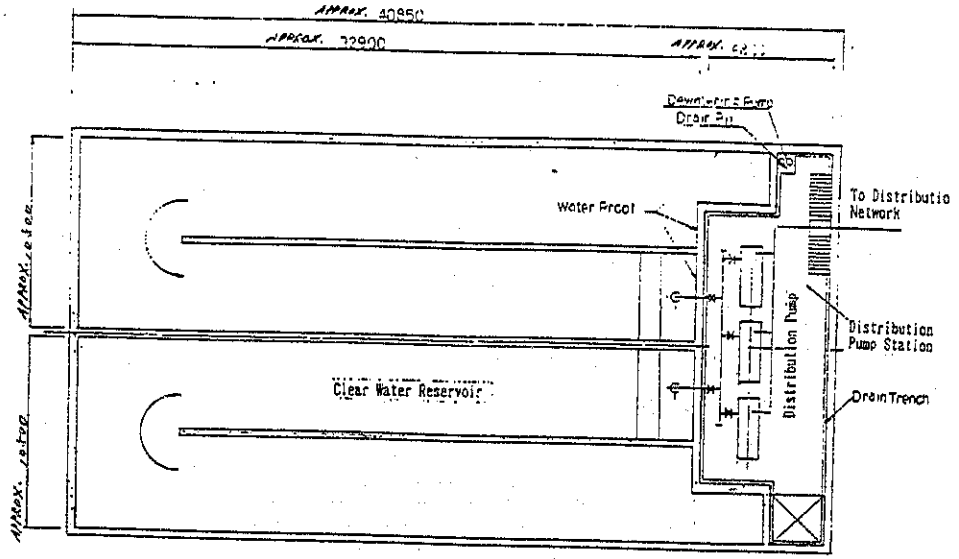


Fig. -14 RAPID SAND FILTER & CLEAR WATER RESERVOIR
Clear Water Reservoir PLAN VIEW

Note : Dimensions shown in this drawing are all approximate.

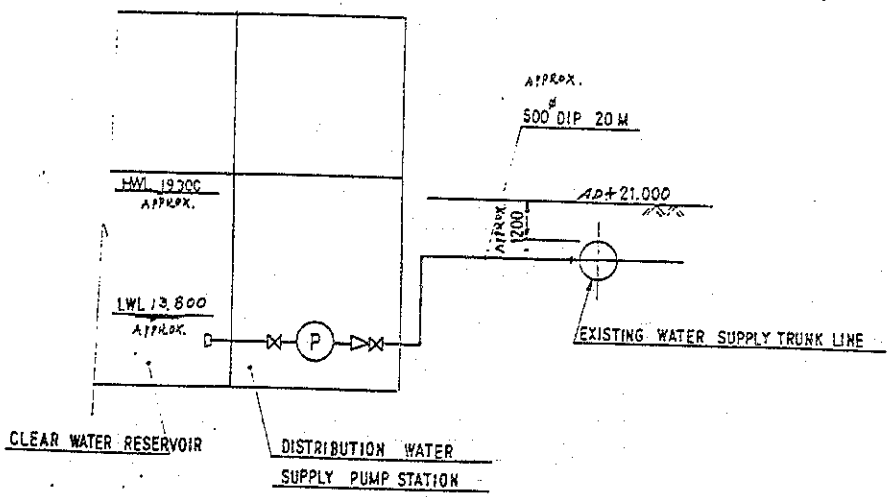


Fig. -15 SCHEMATIC DRAWING OF DISTRIBUTION PUMP

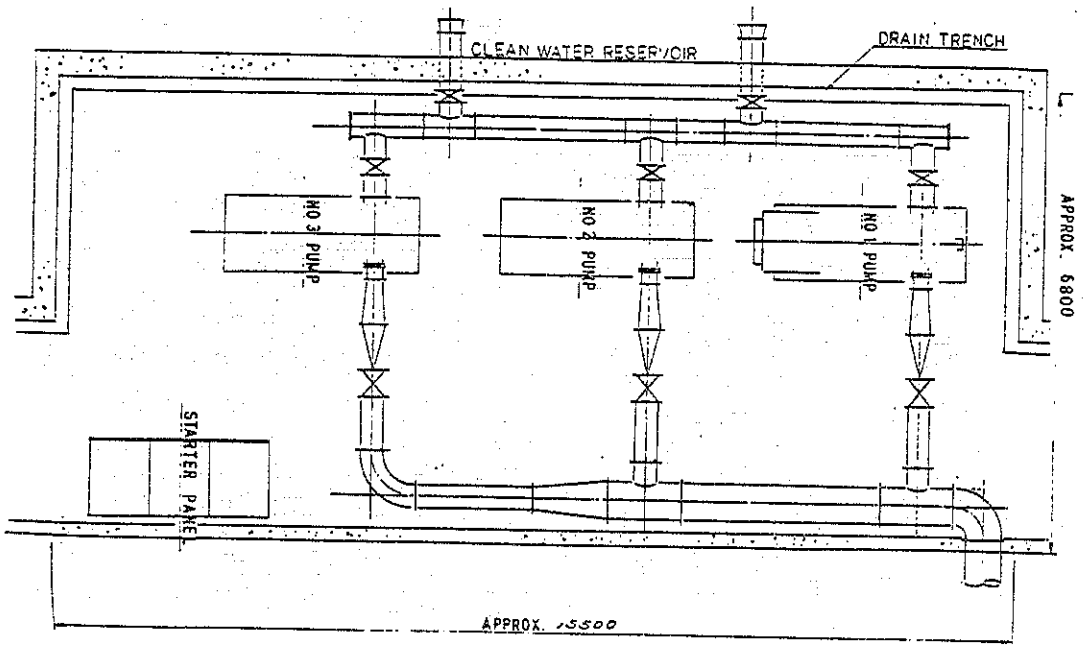


Fig. -16 PLAN OF DISTRIBUTION PUMP STATION

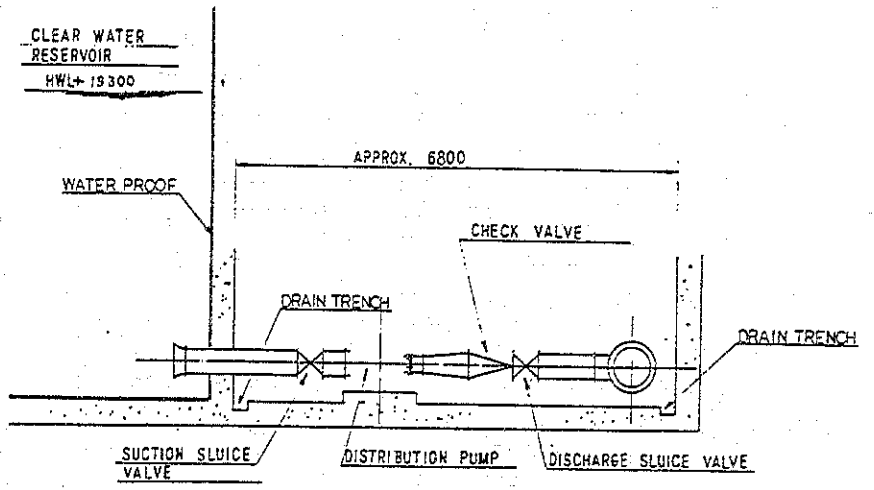


Fig. -17 SECTION OF DISTRIBUTION PUMP STATION

Fig. - 18 PLAN OF CONNECTION TO EXISTING PIPE LINE

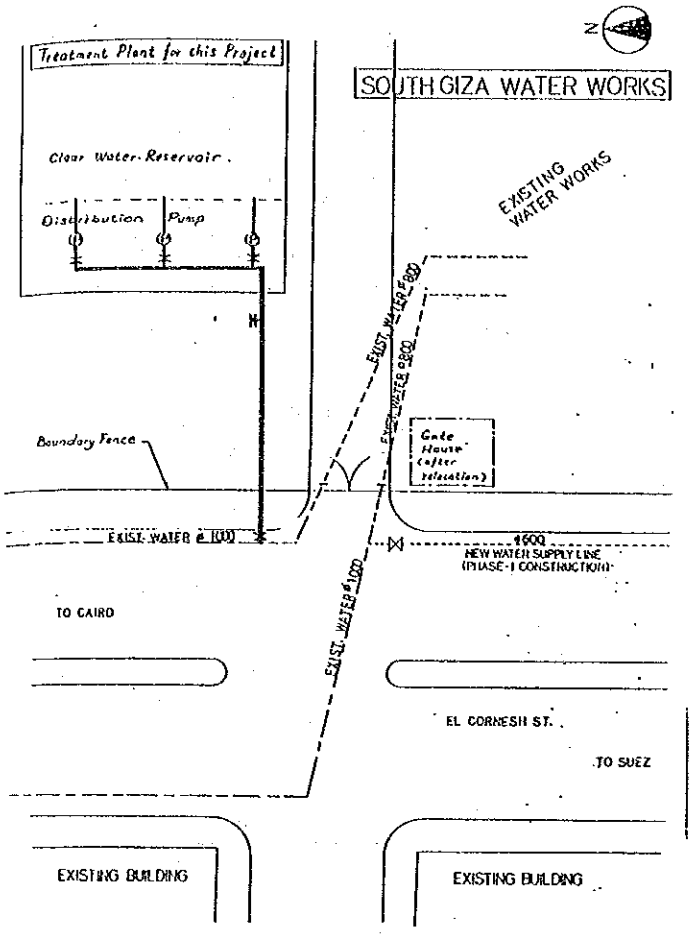
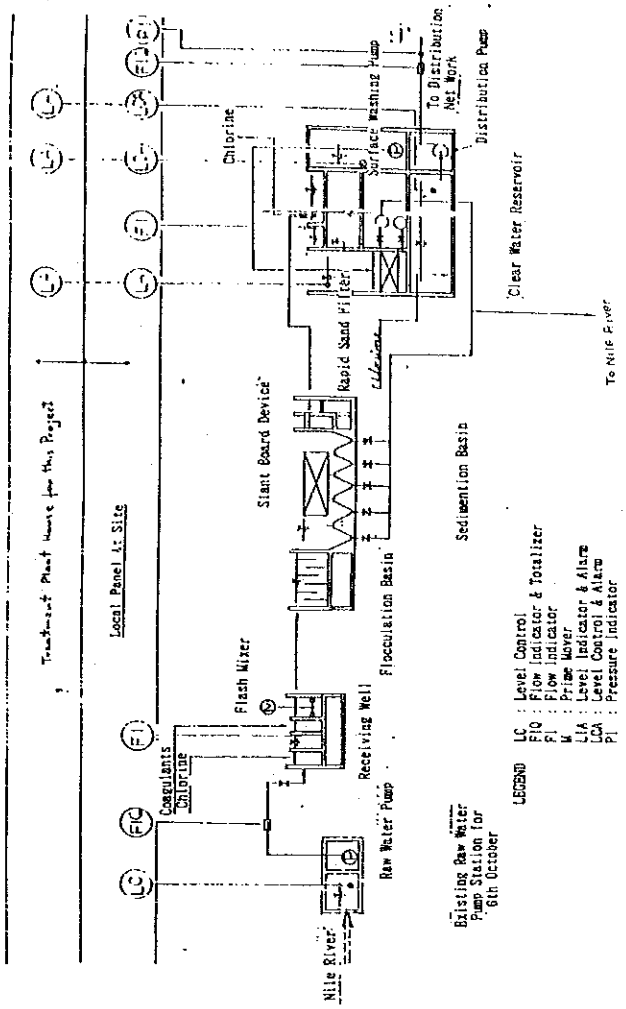


Fig. - 19 FLOW DIAGRAM OF ELECTRICAL EQUIPMENT & INSTRUMENTATION FOR THIS PROJECT



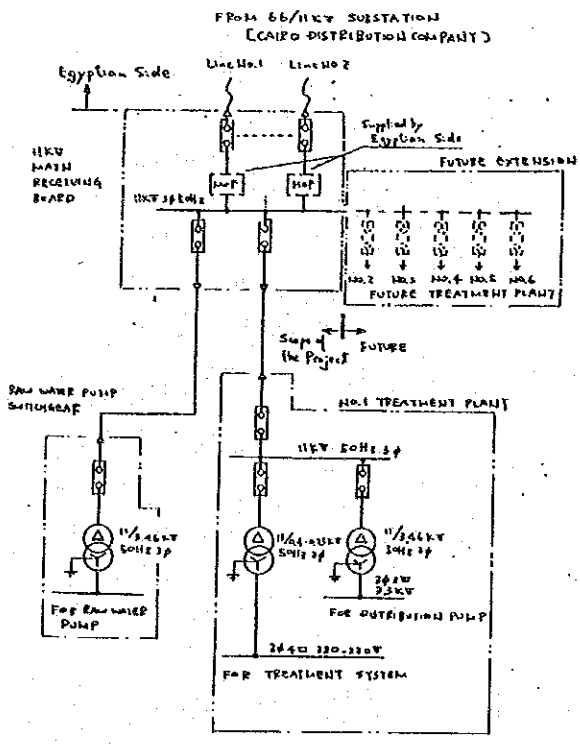


Fig. - 20 Single Line Diagram of South Giza Waterworks Extension

Fig. - 21 SOUTH GIZA WATER WORKS (TREATMENT PLANT HOUSE FOR THIS PROJECT) OPERATION GALLERY-ELEVATION

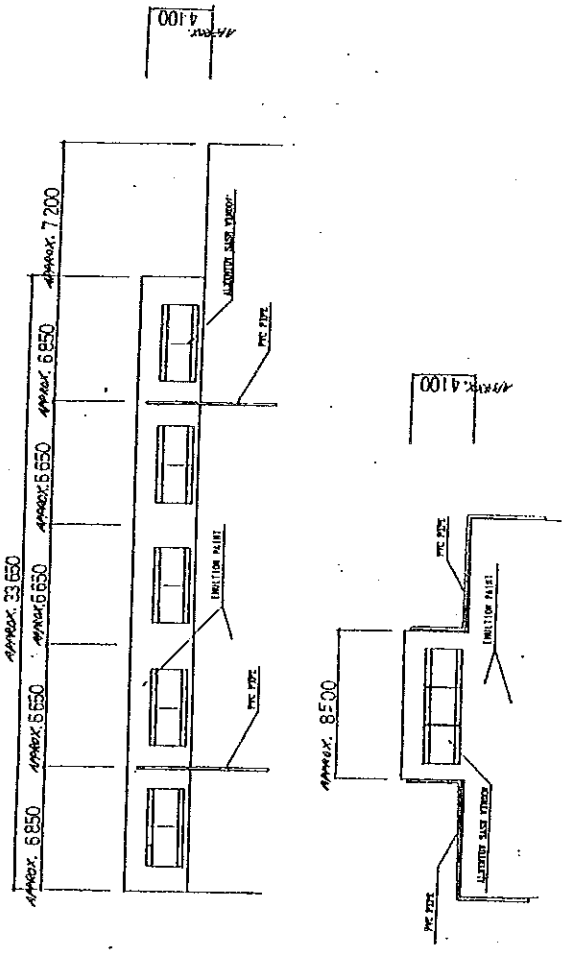
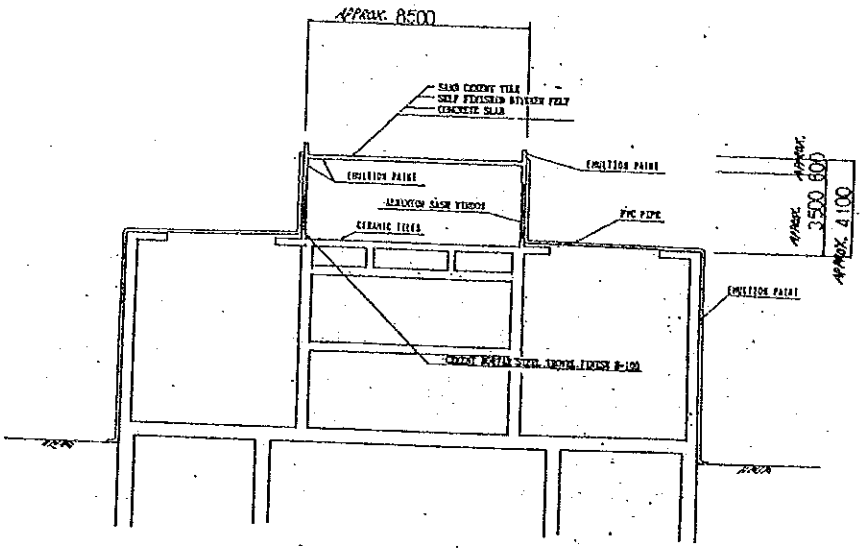


Fig - 22

SOUTH GIZA WATER WORKS
(TREATMENT PLANT HOUSE FOR THIS PROJECT)
OPERATION GALLERY-SECTION



THE BASIC DESIGN STUDY
OF
THE PROJECT FOR
THE WATER SUPPLY AND SEWER SYSTEM UPGRADING (PHASE-2)
IN MONIB, GIZA CITY
IN
THE ARAB REPUBLIC OF EGYPT

CONCEPTUAL PLAN
OF
WATER SUPPLY TRUNK LINE

JUNE, 1992

CONSULTANT TEAM OF BASIC DESIGN STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

[FIELD REPORT]

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[FIELD REPORT]

1. General

1.1 General conditions

Following general conditions of basic design have been confirmed through the data and information obtained by the Giza City, Greater Cairo Water Supply Authority (GCWSA) and other related authorities during the field survey.

(1) Project Area	:	Monib, Giza City
(2) Served area	:	185ha
(3) Population		
- at 2010	:	247,000
- at present(1989)	:	133,000
(4) Maximum water demand	:	140 lit/day/cap.

1.2 Route plan

The route, diameter and connection points of the proposed water supply trunk line for this Project (hereinafter referred to as "the proposed trunk line") shall generally comply with the master plan prepared by German consultant in 1987, "STUDY OF WATER SUPPLY FOR CITY OF GIZA".

The route and diameter of the proposed trunk line are shown on the attached Fig.WT-1. For the railway crossing and canal crossing, see following other Field Reports.

- Railway crossing	:	CONCEPTUAL PLAN OF JACKING METHOD AT RAILWAY CROSSING FOR WATER SUPPLY TRUNK LINE
- Canal crossing	:	CONCEPTUAL PLAN OF AQUEDUCT OVER ZONOR CANAL FOR WATER SUPPLY TRUNK LINE

2. Scope of work

Supply and installation of pipeline materials for the proposed trunk line shall be carried out by the Japanese side.

3. Material

Piping materials including all fittings, valves and accessories for the proposed trunk line shall be of ductile cast iron made in Japan since the ductile iron pipes of diameter more than 1000mm are not available in Egypt.

I

4. Construction method

4.1 General construction method (refer to Fig.WT-2)

Open cut method shall be applied in general except at the railway, trunk road and canal crossings.

4.2 Trunk road crossing

Sleeve jacking method shall be applied at the location as shown in Fig.WT-3 and the section in Fig.WT-4. Material for sleeve pipe shall be reinforced concrete pipe for jacking method and the diameter is 2000mm.

4.3 Connection method

Connection of the proposed trunk line to the existing trunk lines shall be as as shown in Fig.WT-5.

The connection work shall be done by under-pressure tapping and drilling method (refer to Fig.WT-6).

5. Major conditions of basic design for ancillary equipment and pipes

Major conditions of basic design for ancillary equipment and pipes for the proposed trunk lines are as follows:

5.1 Joint of pipe

Pipes shall be connected by T-shape joint (push-on joint) except the following cases.

- Pieces inside the water stop valve chambers which shall be connected by flange joints.
- Pieces between jacking pit and receiving pit in the railway and trunk road crossing which shall be connected by mechanical joint.
- Valves which shall be connected by flange joint.
- Pieces for existing pipe crossing which shall be connected by K-shape joint (mechanical joint).

5.2 Standard earth covering

Standard earth covering shall be approximately 1.2 meter.

5.3 Water stop valves

(1) Water stop valves shall be installed at the aqueduct, railway crossing, washout pipes, connecting points and future connection points of the proposed trunk line.
(2) Butterfly valve shall be installed for the proposed water supply trunk line of dia.1200mm (refer to Fig.WT-7 and WT-8).
(3) Sluice valve will be installed on the pipes of less than 400mm in diameter.
(4) Ductile cast iron pipe with paddle shall be installed in the wall of valve chamber.
(5) Opening direction of valves
- Butterfly valve : Anti-clockwise
- Sluice valve : Clockwise for all diameters
This practice shall be applied for the all kinds of valves in the network.

5.4 Washout facilities

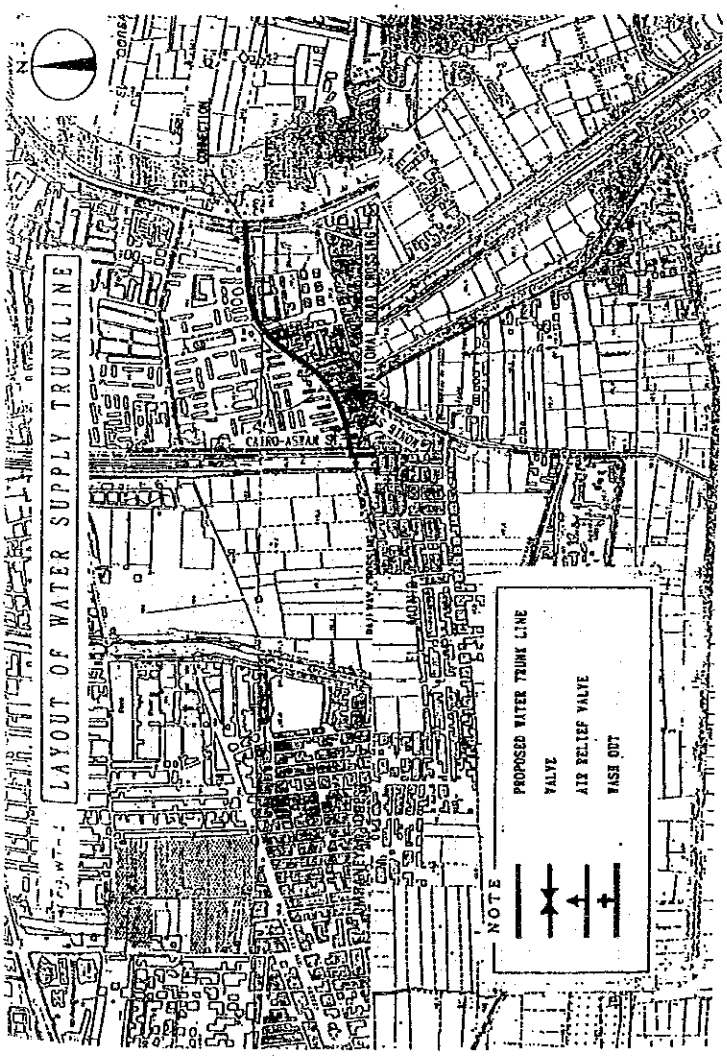
(1) Washout facilities shall be installed at certain lower part in the proposed trunk line and at the place near canal.
(2) The diameter of washout pipe shall be of 200mm.
(3) When the water surface of outflow at discharge places is higher than the bottom of the pipe, drainage chamber shall be provided.

5.5 Air valve

(1) Air valves shall be installed at certain convex parts in the proposed trunk line such as aqueduct.
(2) Dual mouthed air valves shall be installed on the proposed trunk line (refer to Fig.WT-9).

5.6 Support of pipe

Pipes shall be supported by the concreted anchor block. Standards of anchor block are shown on Fig.WT-10 and WT-11.



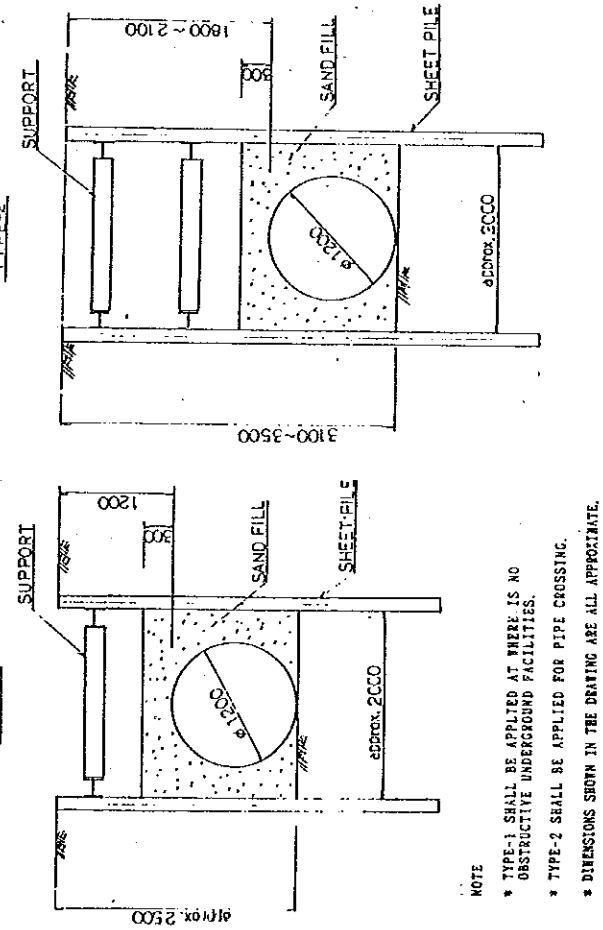
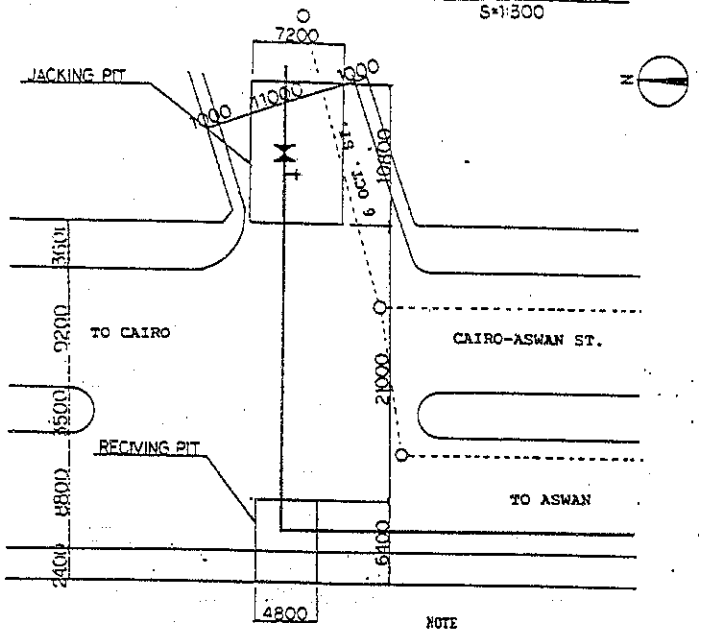
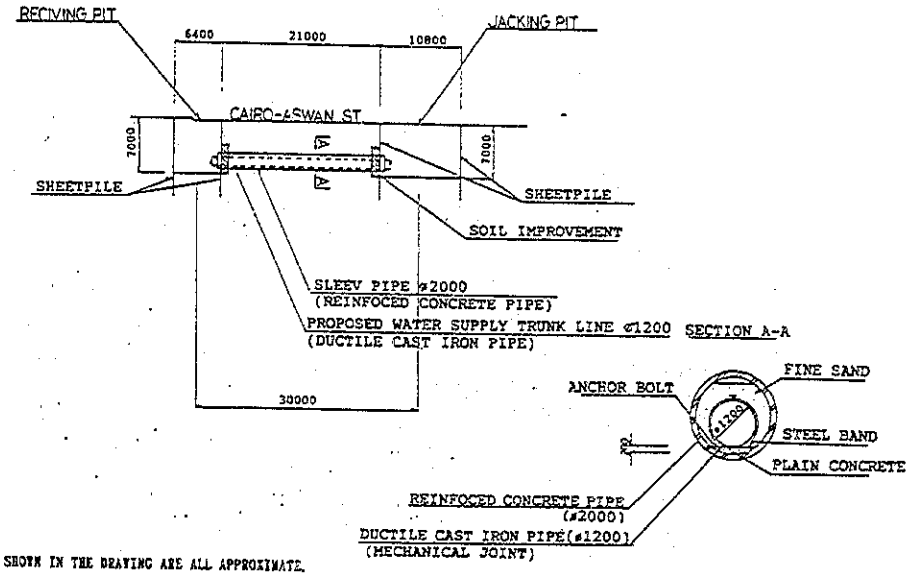


Fig. WT-3 PLAN OF JACKING METHOD AT NATIONAL ROAD CROSSING
S=1:300



NOTE
* DIMENSIONS SHOWN IN THE DRAWING ARE ALL APPROXIMATE.

Fig. WT-4 LONGITUDINAL SECTION AT ROAD CROSSING S=1:500



NOTE
* DIMENSIONS SHOWN IN THE DRAWING ARE ALL APPROXIMATE.

Fig. WT-5 PLAN OF CONNECTION TO EXISTING PIPE LINE
S=1:300

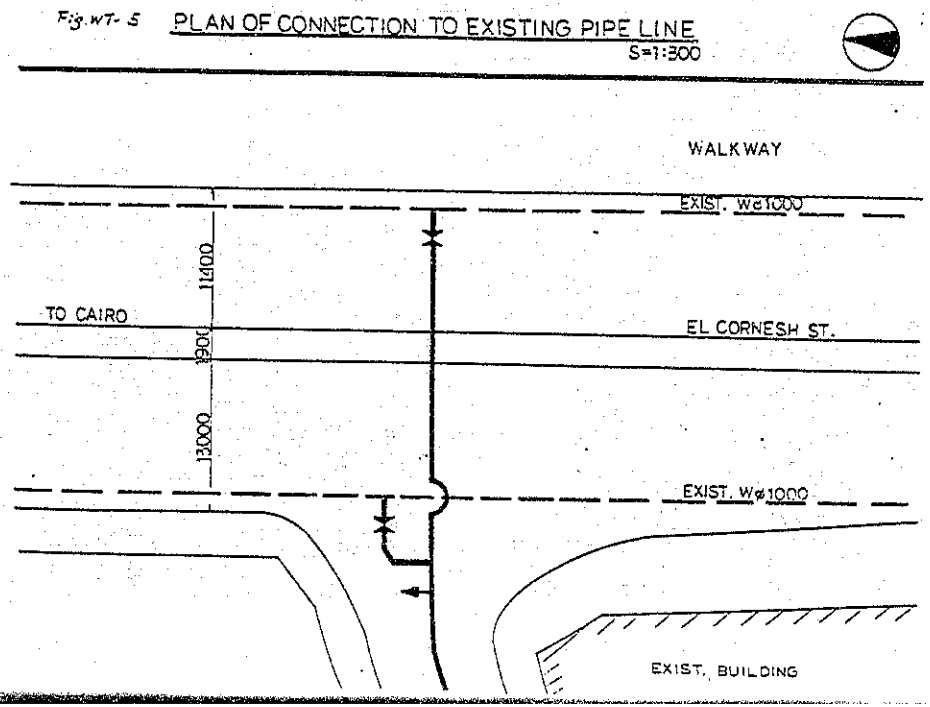


Fig. WT-6 PLAN OF CONNECTION WITH EXISTING WATER TRUNK LINE
(UNDER PRESSUR DRILLING AND TAPPING METHOD)
S=1:40

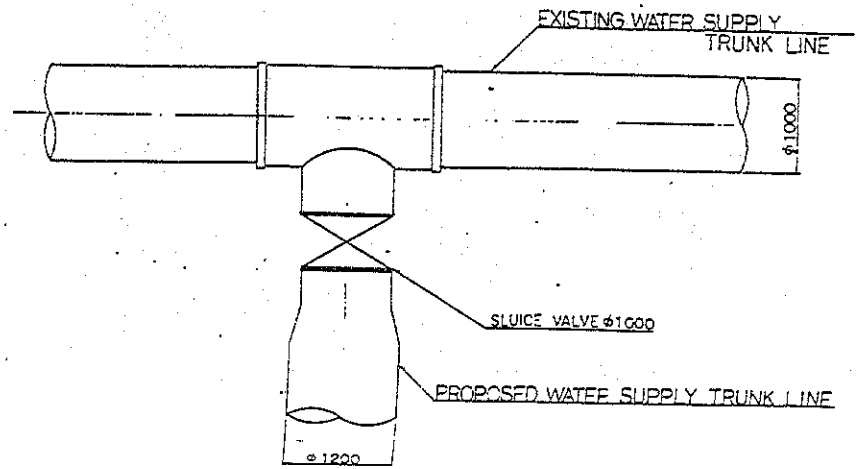
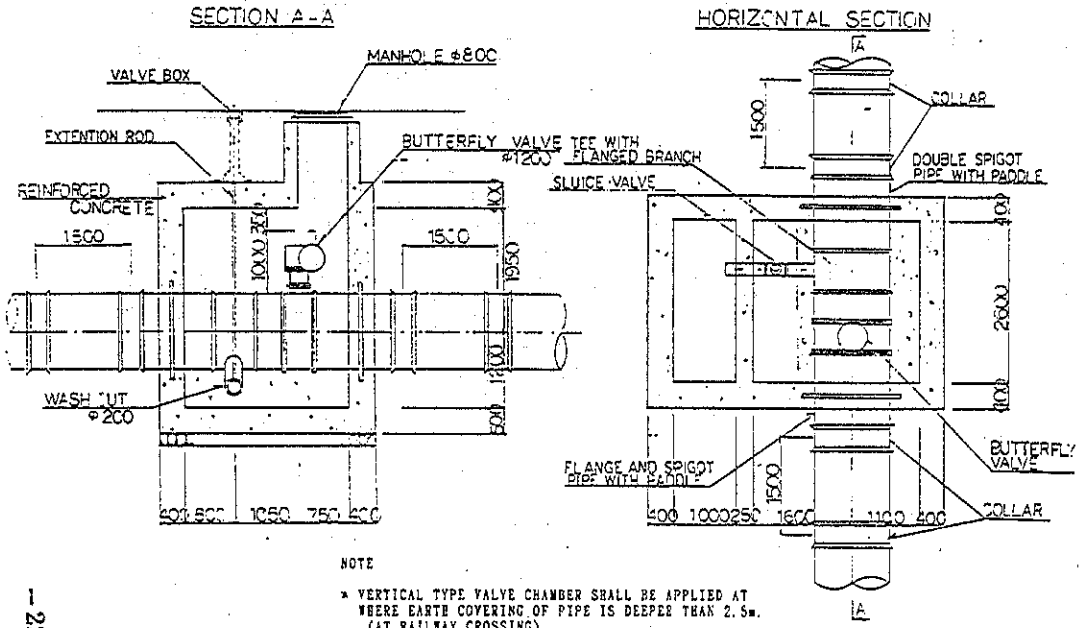


Fig. WT- 7 VALVE CHAMBER (VERTICAL TYPE)
S=1:60

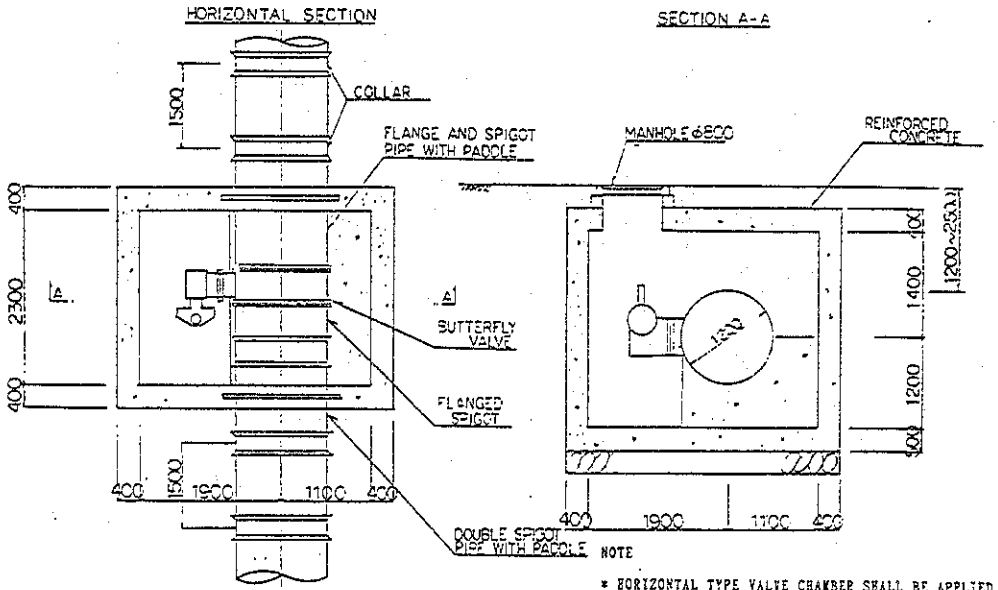


NOTE

* VERTICAL TYPE VALVE CHAMBER SHALL BE APPLIED AT WHERE EARTH COVERING OF PIPE IS DEEPER THAN 2.5m. (AT RAILWAY CROSSING)

* DIMENSIONS SHOWN IN THE DRAWING ARE ALL APPROXIMATE.

Fig. WT- 8 VALVE CHAMBER (HORIZONTAL TYPE)
S=1:50

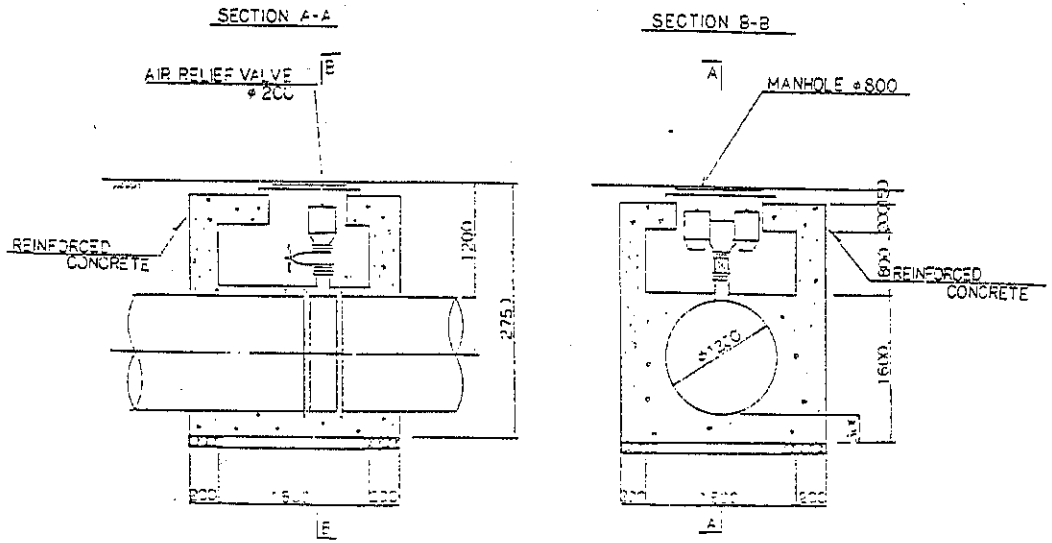


NOTE

* HORIZONTAL TYPE VALVE CHAMBER SHALL BE APPLIED A WHERE EARTH COVERING OF PIPE IS 1.2m TO 2.5m.

* DIMENSIONS SHOWN IN THE DRAWING ARE ALL APPROXIMATE.

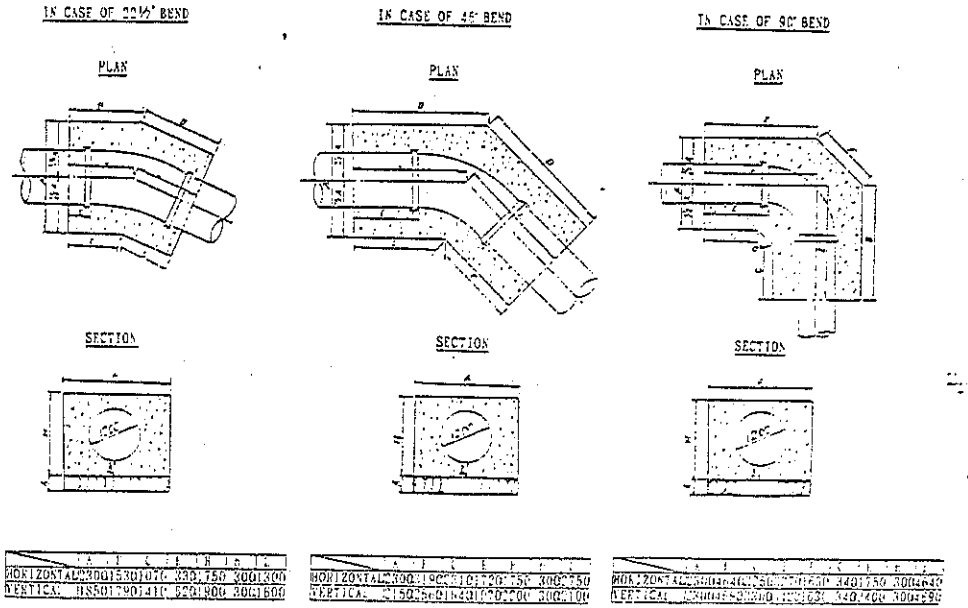
Fig. WT- 9 AIR RELIEF VALVE CHAMBER
S=1:40



NOTE

* DIMENSIONS SHOWN IN THE DRAWING ARE ALL APPROXIMATE.

Fig. WT- 10 ANCHOR BLOCK STANDARDS FOR WATER SUPPLY MAINLINE φ 1200



HORIZONTAL	300	1530	1070	230	750	300	1300
VERTICAL	1550	1790	1410	520	900	300	1600

HORIZONTAL	300	1900	1610	720	750	300	1750
VERTICAL	2150	2500	1940	1020	700	300	1700

HORIZONTAL	300	1900	1610	720	750	300	1750
VERTICAL	2150	2500	1940	1020	700	300	1700

THE BASIC DESIGN STUDY
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CONCEPTUAL PLAN
OF
JACKING METHOD AT RAILWAY CROSSING
FOR
WATER SUPPLY TRUNK LINE

JUNE, 1992

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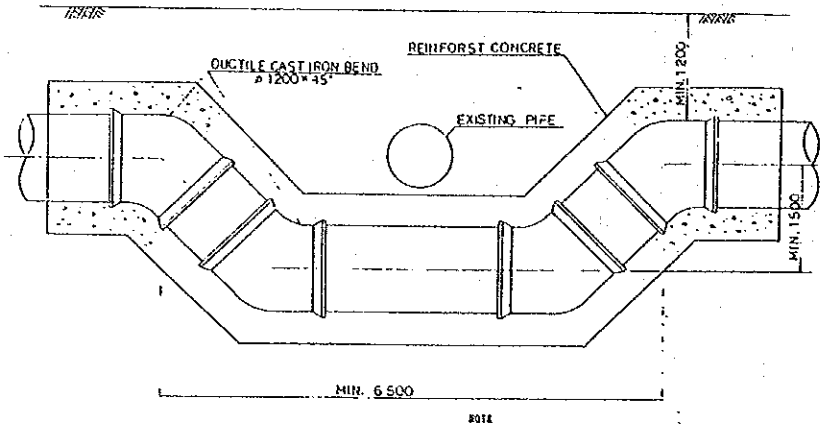
(JICA)

Fig AT - 11 TYPICAL SECTION OF PIPE CROSSING
S=1/40



NOTE
* DIMENSIONS SHOWN IN THE DRAWING ARE ALL APPROXIMATE.

[FIELD REPORT]

1. Major conditions of basic design

Major conditions of basic design for water supply trunk line at crossing of Egyptian State Railway between Cairo and Aswan are as follows:

1.1 The route of water supply line trunk line is crossing right angle as shown in Fig. RW-1 and the longitudinal section is shown in Fig. RW-2.

1.2 Diameter of pipe are as follows:
(1) Water supply pipe : 1200 mm
(2) Sleeve pipe : 2000 mm

1.3 Materials of pipe are as follows:
(1) Water supply pipe : Ductile cast iron
(2) Sleeve pipe : Reinforced concrete pipe for jacking method

1.4 The construction method shall be jacking method to keep the safety and transportation of railway.

1.5 The height between surface of ballast and top of jacking sleeve pipe shall be kept by not less than 3.5 m.

1.6 Distance between the nearest side of jacking pit and the nearest rail shall be kept by not less than 10 m.

1.7 Distance between the nearest side of receiving pit and the nearest rail shall be kept by not less than 10 m.

1.8 The soil improvement by cement mortar injection and so on will be applied to keep the safety in sheathing and prevent the leakage of underground water into the pit.

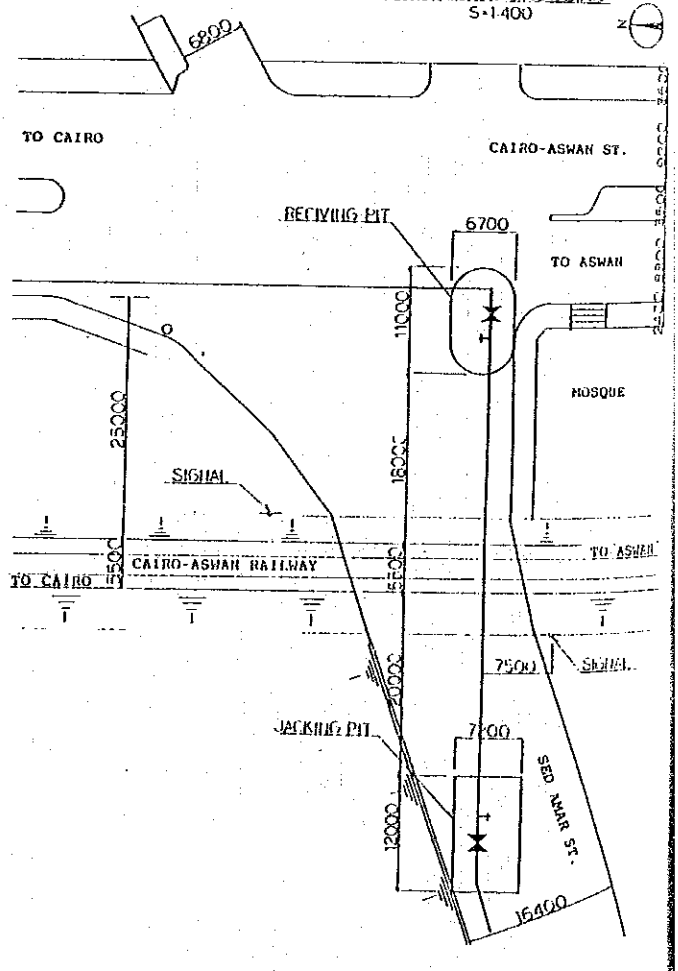
1.9 The pipes installed between the jacking pit and receiving pit shall be fixed by mechanical type joint and tighten by steel band.

1.10 The following auxiliary equipment at the chamber shall be installed in the jacking and receiving pit (refer to Fig. RW-3).
(1) Air valve
(2) Butterfly valves
(3) Wash out valves

2. Conceptional plan

Conceptional plan is shown on Fig. RW-1 to RW-3.

Fig. RW - 1 PLAN OF JACKING METHOD AT RAILWAY CROSSING
S=1:400



NOTE
* DIMENSIONS SHOWN IN THE DRAWING ARE ALL APPROXIMATE

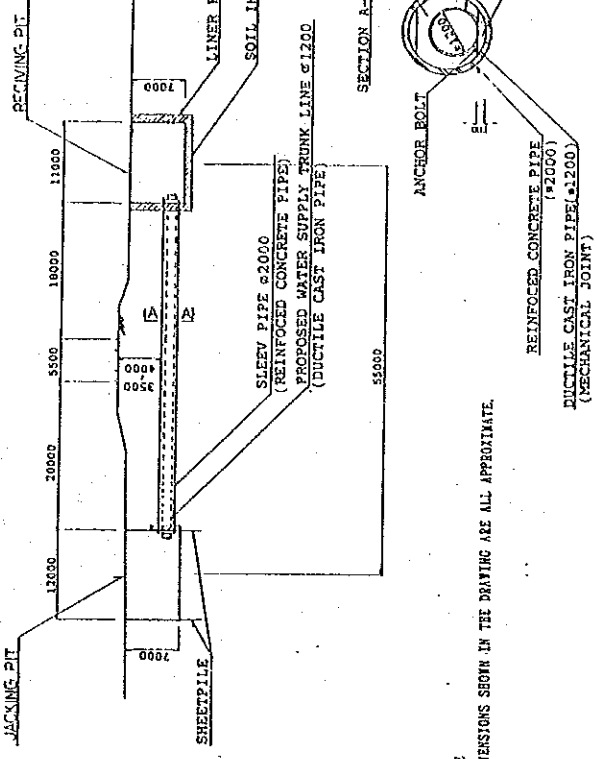


Fig. RW - 2 LONGITUDINAL SECTION AT RAILWAY CROSSING S=1:500

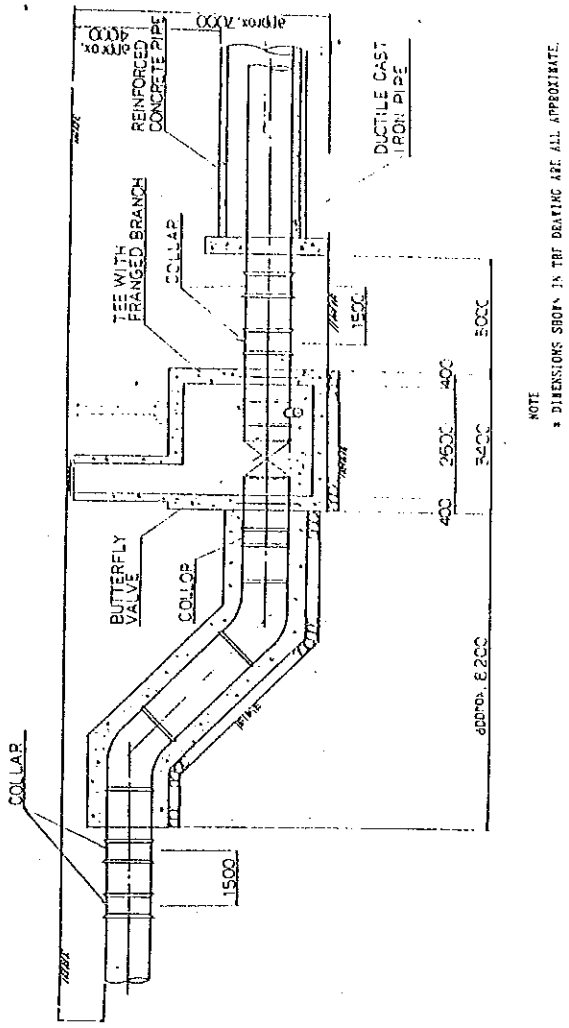


Fig. RW - 3 SECTION OF PIPE LINE AT RAILWAY CROSSING

THE BASIC DESIGN STUDY
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CONCEPTUAL PLAN
OF
AQUEDUCT OVER ZOMOR CANAL
FOR
WATER SUPPLY TRUNK LINE

JUNE, 1992

CONSULTANT TEAM OF BASIC DESIGN STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

1. Major conditions of basic design

Major conditions of basic design for aqueduct are as follows:

1.1 Location of the aqueduct

Location of the aqueduct is as shown in Fig. AQ-1.

1.2 Typical section of canal

Typical section of Zomor Canal is as shown in FIG. AQ-2.

- Width of canal : approx. 20.0m
- High water level : approx. AD+19.25m
- Side slope of canal : approx. 45°

1.3 Diameter of aqueduct : 1,200mm

1.4 Minimum clearance between the bottom level of aqueduct and high water level : minimum 1.0m

1.5 Rehabilitation and/or expansion of the canal : not included in the scope for this Project

1.6 Pipe material of aqueduct : Structure steel (with paint)

1.7 Auxiliary equipment

The air valve shall be installed on the top of higher point of the pipe. The expansion joints shall be installed adjacent to the ring supports on the both sides of support. The flexible couplings shall be installed on the both sides of buried pipes (refer to Fig.AQ-2).

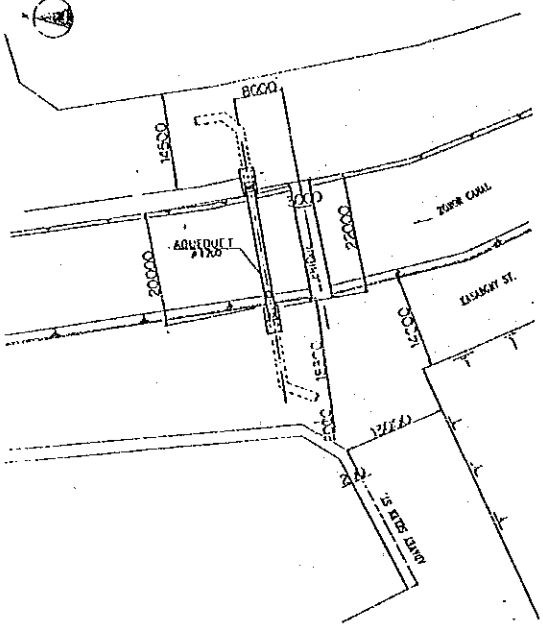
2. Conceptual plan

Conceptual plans are shown in Fig. AQ-1 and AQ-2.

Fig. AQ - 1.

PLAN OF AQUEDUCT OVER CANAL

S=1:500



NOTE

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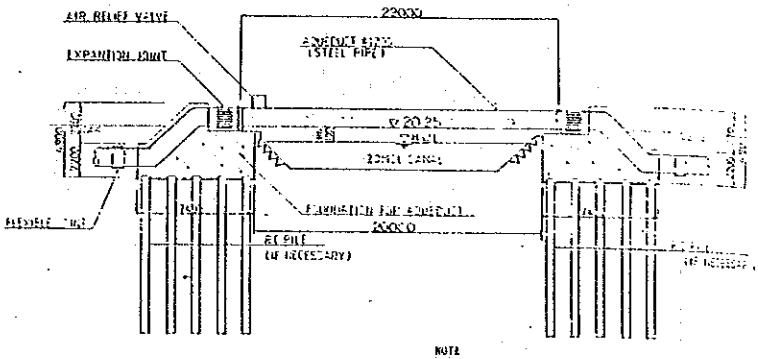
Fig. AQ - 2. TYPICAL SECTION OF AQUEDUCT OVER CANAL

S=1:200



NOTE

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(FIELD REPORT)

THE BASIC DESIGN STUDY
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THE WATER SUPPLY AND SEWER SYSTEM UPGRADING (PHASE-2)
IN MONIB, GIZA CITY
IN
THE ARAB REPUBLIC OF EGYPT

CONCEPTUAL PLAN
OF
SEWER TRANSFER PUMP STATION NO.5(B)

JUNE, 1992

CONSULTANT TEAM OF BASIC DESIGN STUDY
JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

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1. General

1.1 General conditions

Following general conditions of basic design have been confirmed through the data and information obtained by Giza City, General Organization for Sanitary Drainage (GOSD) and other related authorities during the field survey.

(1)	Project Area	:	Monib, Giza City
(2)	Served area	:	185ha
(3)	Population		
	- at 2010 (design year)	:	247,000
	- at present(1990)	:	133,000
(4)	Average discharge	:	140 ltr/day/cap.
(5)	Maximum discharge	:	190 ltr/day/cap.

1.2 Relation between this Project and other projects

The scope of work among this Project and other related projects such as USAID (Contract 27), the Project for the Water Supply and Sewer System Upgrading in Monib, Giza City (Phase-1) (hereinafter referred to as "Phase-1 Project") and El Aharam Wastewater Project of GOSD, is shown in Fig.-1.

2. Major design conditions for this Project

2.1 Design Sewage discharge

Design Sewage discharge of Sewer Transfer Pump Station No.5(B) (hereinafter referred to as "PS No.5(B)") shall be as follows:

(1) At 1996 (expected commencement year of PS No.5 (B): approx. 2.1 m^3/sec
(2) At 2010 (design year) : approx. 4.5 m^3/sec

In order to make a basic design of the planned PS No.5(B) with the reasonable size of the facilities taking into account the purpose of this Project to upgrade the sewer system in Monib district as well as the sewage volume increase year by year to be drained into PS No.5(B), the number of pump equipment to be provided under this Project shall be determined based on the sewage discharge to cover from 1996 (expected commencement year of PS No.5(B)) to 2001.

However the size of pump house shall be designed taking into account of the sewage discharge at 2010 (design year).

2.2 Climatic conditions at site

(1)	Mean air temperature in shadow	: 20°C
(2)	Maximum recorded summer air temperature in shadow	: 45°C
(3)	Maximum average summer air temperature in shadow	: 40°C
(4)	Maximum water temperature	: 30°C
(5)	Average water temperature in winter	: 15°C
(6)	Average water temperature in summer	: 32°C
(7)	Mean barometric reading	: 75.8mm/Hg
(8)	Minimum yearly relative humidity	: 40%
(9)	Average humidity during summer	: 60%
(10)	Average humidity during winter	: 65%

2.3 Design water level

(1)	Suction water level (LWL)	:	Gl. 9.79m (Alt 10.38m)
(2)	High water level of outlet pipe (HWL):		Gl.+1.90m (Alt 16.25m)
(3)	Discharge level of pump	:	Gl.+1.80m (Alt 17.25m)
(4)	Total head of pump	:	(Discharge Level - LWL) + 0.33 x (Diameter of pump) = (7.79-1.8)+0.33x(approx.2.6) = approx. 6.9m

2.4 Layout of pump station

Refer to Fig.-1.

2.5 Design standards

Japanese standards shall be applied to this Project.

3. Civil and building work

3.1 Civil work

The foundation of PS No.5(B) shall be designed according to the soil report obtained from GOSD and the necessity of pile foundation shall be determined by the Japanese side.

3.2 Building work

Building design of PS No.5(B) shall be designed taking into account the existing Pump Station No.5(A) and similar pump stations.

Conceptional drawings for the building work are shown in Fig.-4 to 7.

4. Mechanical and electrical work

4.1 Pump equipment

Pump equipment shall be design in accordance with the following basic specifications:

(1)	Type of pump	:	Screw pump
(2)	Number of pump to be installed	:	3 unit (2 duty + 1 stand-by)
(3)	Discharge per unit	:	1650 ltr/sec (1.65m^3/sec)
(4)	Lifting head	:	about 6.9m
(5)	Screw diameter	:	about 2,600mm
(6)	Inclination angle	:	38°
(7)	Pump speed	:	about 30 rpm
(8)	Screw type	:	three hold
(9)	Drive type	:	motor through speed reduction gear
(10)	Motor output	:	about 150 Kw

4.2 Electrical system

(1)	Oneline diagram	:	Refer to Fig.-8.
(2)	Location of equipment		
	- Switchgear for PS No.5(B)	:	In the pump house for PS No.5(B)
	- Emergency generator	:	In the existing generator room

4.3 Spare parts

Spare parts for two (2) years will be supplied.

5. Utilization of the existing facility

The following existing facilities in the Pump station No.5 shall be utilized for this Project:
(1) Substation (Refer to Fig.-8.)
(2) Storage room

6. Undertakings by GOSD

The following undertaking shall be carried out by GOSD when this Project is implemented by Japan's Grant Aid.
(1) Clear up of the land for the PS No.5(B)
(2) Acquisition of temporary construction yard for warehouse, stock yard, site office, etc., in and around the Pump station No. 5.
(3) Provision of outdoor lighting, landscaping, plantation, internal road, water supply sources close to the site of PS No.5(B).

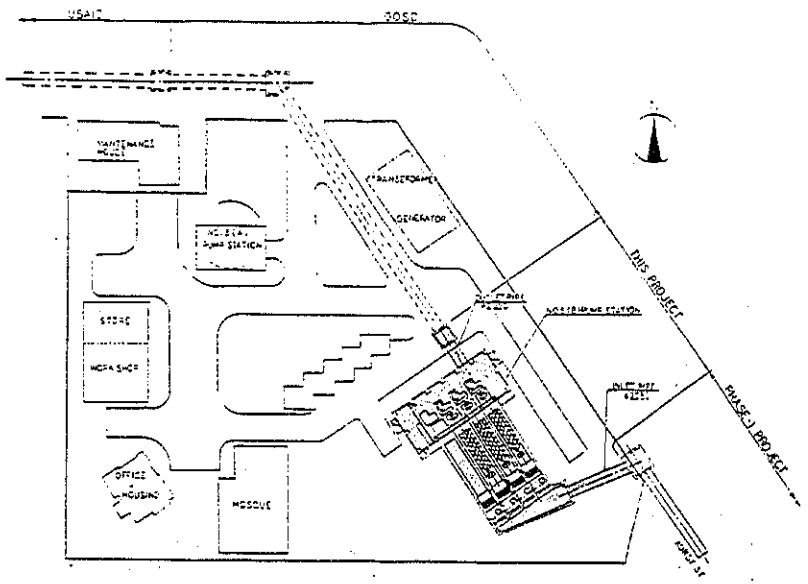


FIG-1 LAYOUT OF PUMP STATION NO.5(B) & SCOPE OF WORK

FIG.-2 PLAN OF SEWER TRANSFER PUMP STATION NO.5 (B)
S=1:200

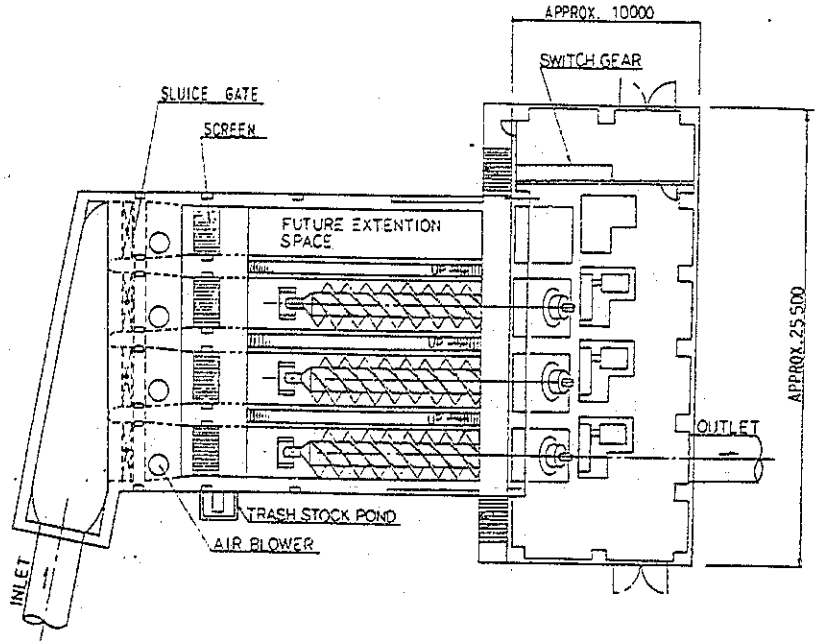


FIG.-4 PUMP STATION NO. 5 (B)

PUMP HOUSE-ELEVATION

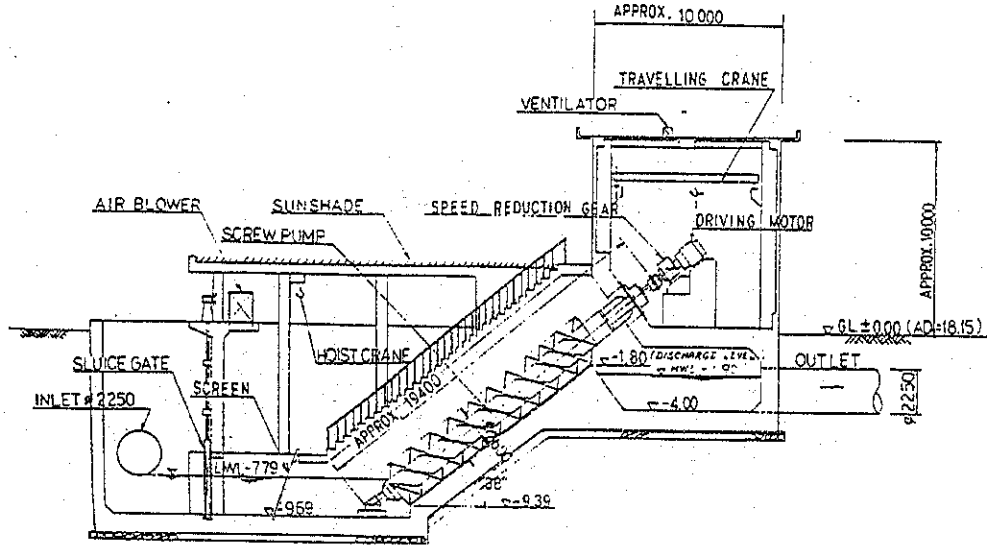


FIG-3 SECTION OF SEWER TRANSFER PUMP STATION NO.5 (B)
S=1:200

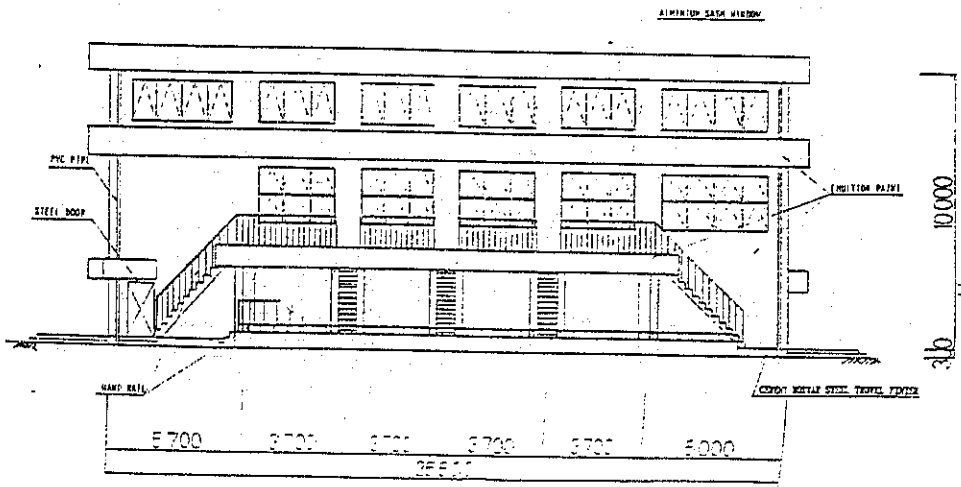


FIG.-5 PUMP STATION NO. 5 (B)

PUMP HOUSE-ELEVATION

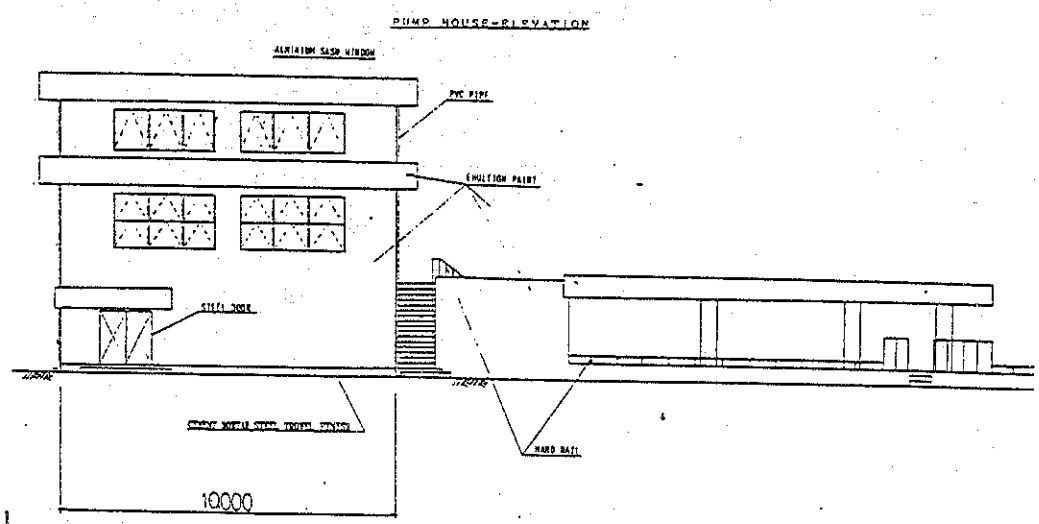


FIG.-6 PUMP STATION NO. 5 (B)

PUMP HOUSE - PLAN

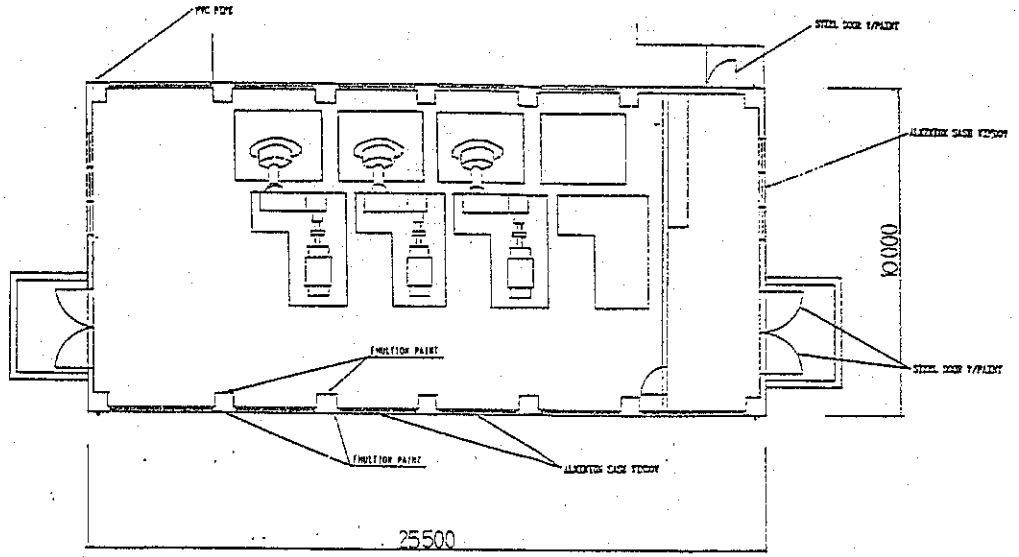
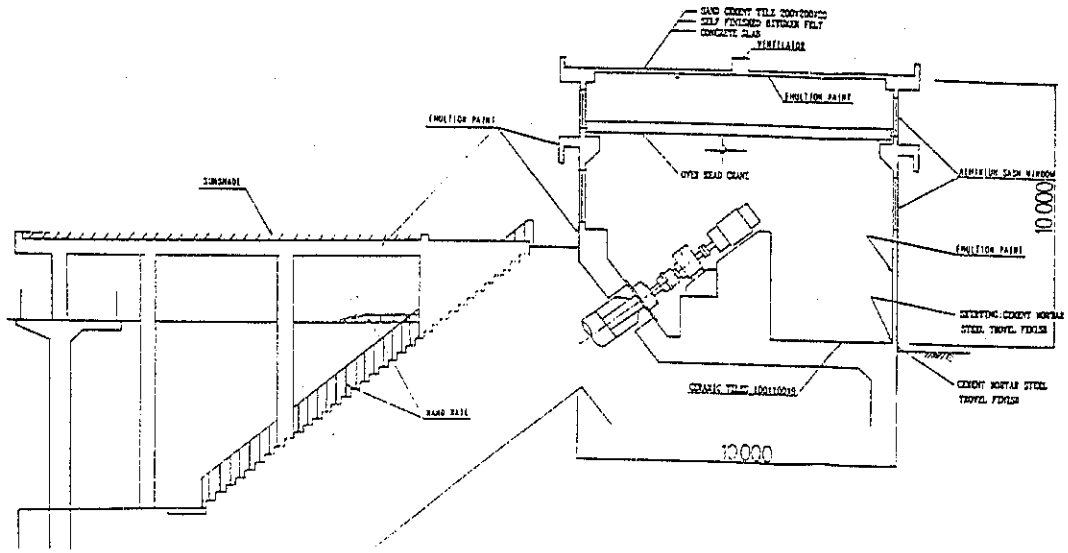
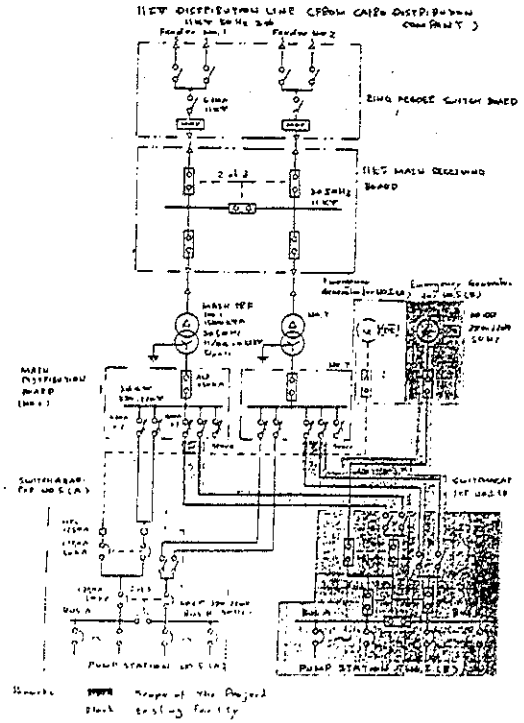


FIG.-7 PUMP STATION NO. 5 (B)

PUMP HOUSE-SECTION





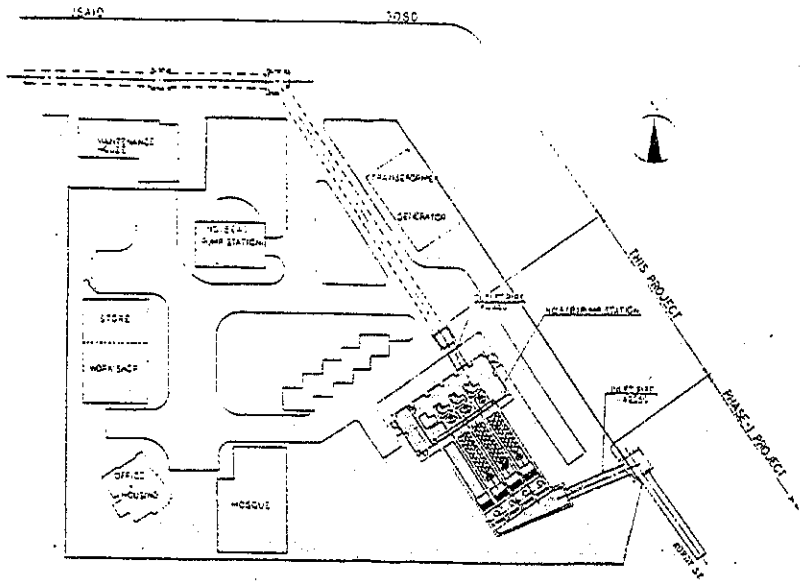


FIG.-1 LAYOUT OF PUMP STATION NO.5(B) & SCOPE OF WORK

FIG.-2 PLAN OF SEWER TRANSFER PUMP STATION NO.5 (B)

S=1:200

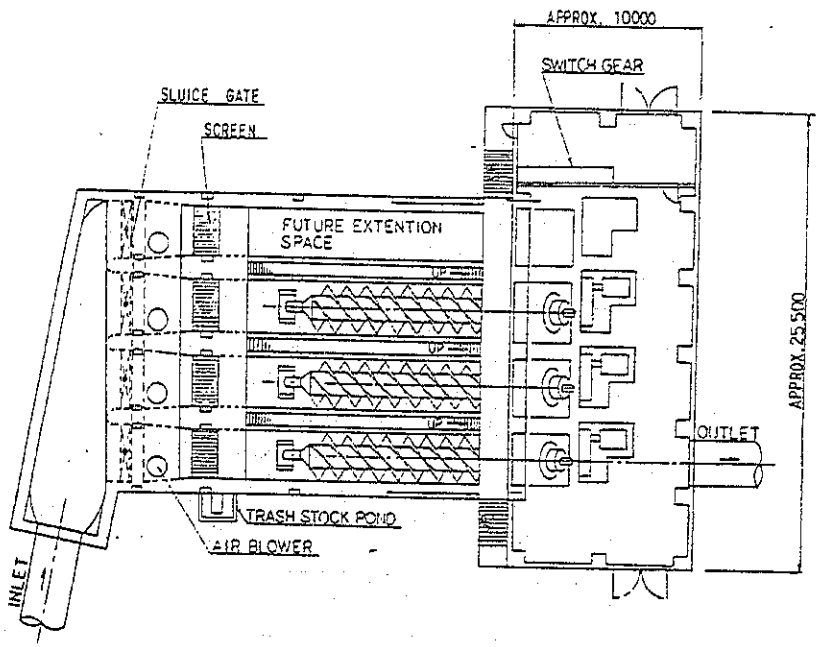


FIG.-4 PUMP STATION NO. 5 (B)

PUMP HOUSE-ELEVATION

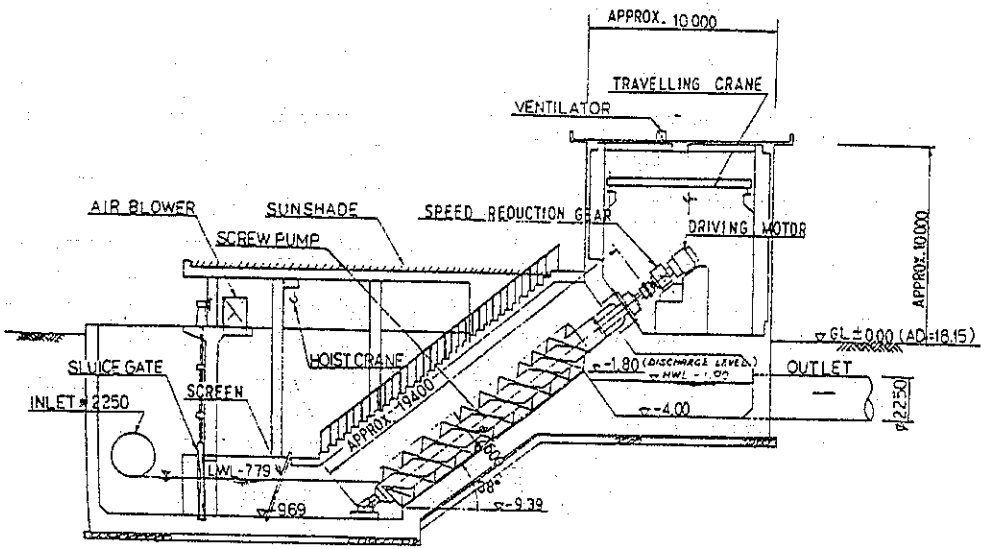
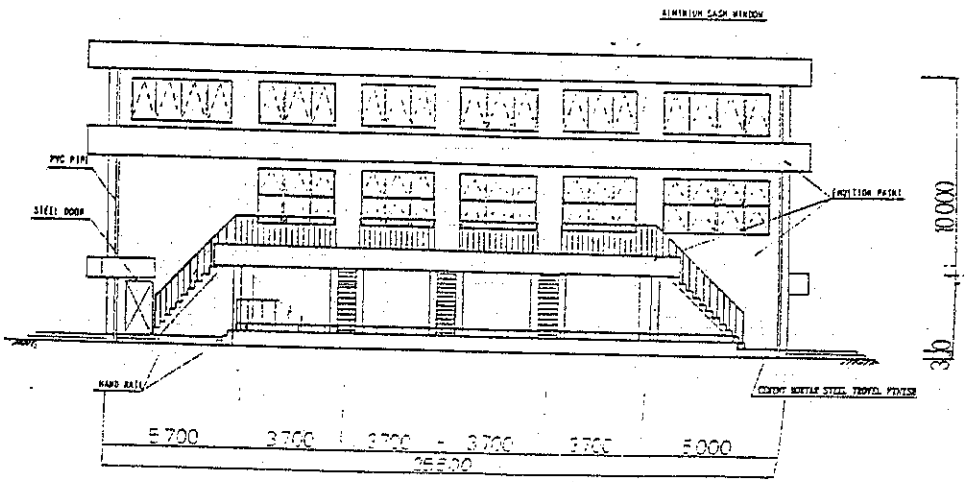


FIG.-3 SECTION OF SEWER TRANSFER PUMP STATION NO.5 (B)

S=1:200



APPENDIX 6

COUNTRY DATA

1. Basic Facts on the Arab Republic of Egypt

① Capital : Cairo

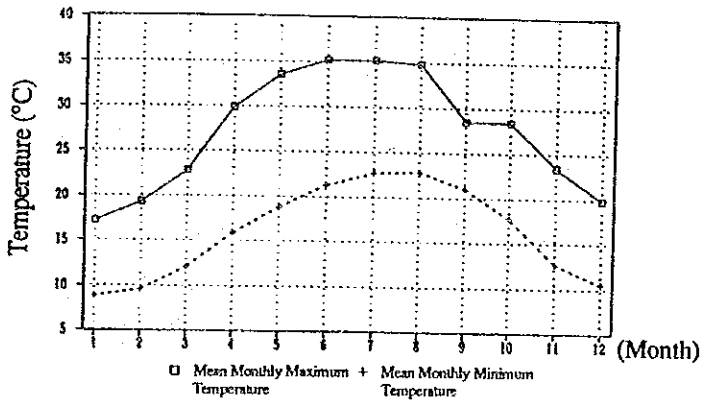
② Land Area : 1,001,499km^2
Population : approximately 54 million (1991 estimate)

③ Education : Compulsory education for 6 years between the ages of 6 and 12. School attendance ratio of school age children estimated to be approximately 78% in 1981.

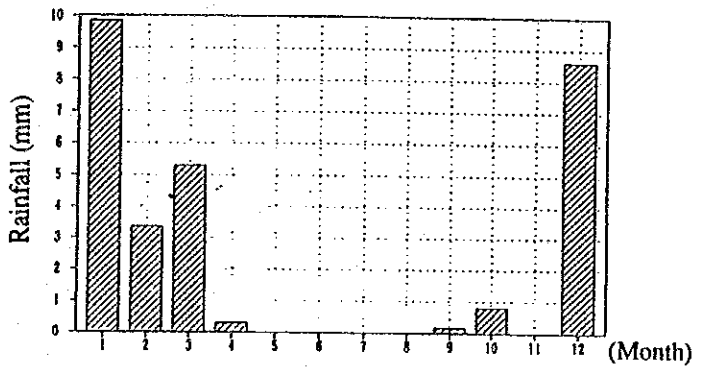
④ Currency : Egyptian pound (LE)
1 U.S. dollar = 3.31 LE (as of January, 1992)
The floating exchange rate system has been in force since January 30, 1985.

⑤ Climate : Mean Monthly Temperature, Rainfall, Humidity and Wind Velocity

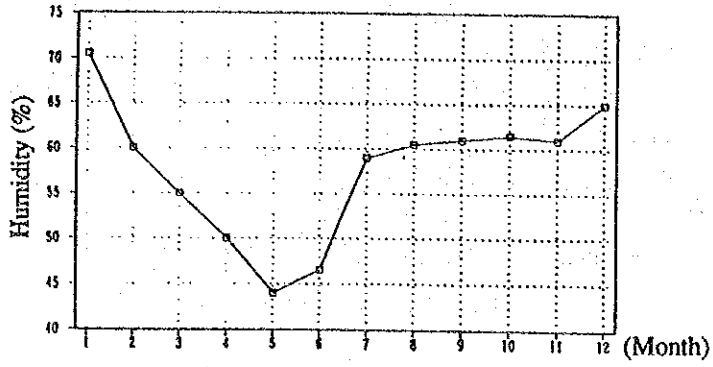
Mean Monthly Temperature



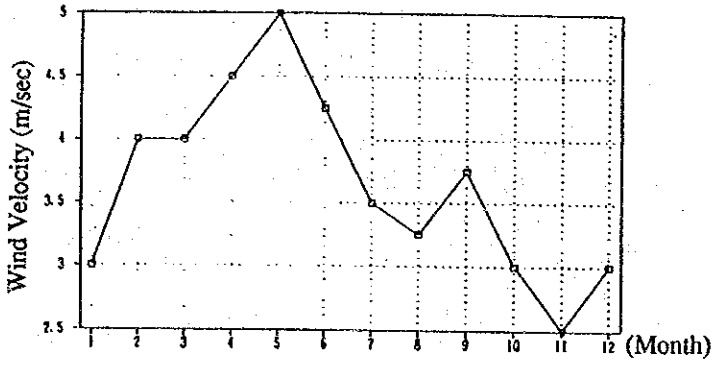
Mean Monthly Rainfall



Mean Monthly Humidity



Mean Monthly Wind Velocity



2. Social and Economic Data

① International Balance of Payments

(Unit: million U.S.$)

Fiscal Year	1987/88	1988/89	1989/90
Trade Balance	Δ6,567	Δ7,533	Δ7,567
Exports	3,274	2,546	3,206
(Crude Oil)	1,563	1,066	1,129
Imports	9,841	10.090	10,733
Invisible Trade Balance	1,940	1,764	1,530
Receipts	4,575	5,058	5,580
(Suez Canal)	1,269	1,307	1,472
(Tourism)	886	901	1,067
(Interest)	624	734	776
Payments	2,634	3,298	4,050
(Interest)	785	1,128	1,686
Balance of Transfer Account	4,082	4,240	4,824
(Government Transfer)	698	710	1,080
(Remittance from Abroad)	3,384	3,580	3,744
Current Balance	Δ535	Δ1,457	Δ1,214

Source: Ministry of Planning

② National Budget

(Unit: million LE)

Expenditure				Revenue			
Item	1989/90	1990/91	1991/92	Item	1989/90	1990/91	1991/92
Total	30,306	41,248	54,431	Total	25,416	32,523	45,083
General Account	18,749	27,245		General Account	20,342	27,845	39,264
Subsidies	2,061	3,579	4,520	Tax	5,730	7,915	9,085
Defence	3,711	3,133	3,742	Levies, etc.	7,520	7,980	9,547
Debt Service	3,614	8,362	14,381	Non-Tax	5,642	9,983	14,892
Wages	6,250	7,140	8,288				
Capital Expenditure	11,557	14,003	–	Capital Receipts	5,074	4,677	5,819.
Investment	6,350	6,751	10,700	Investment Receipts	2,231	2,111	–
Capital Transfer	5,207	7,252	–	Transfer Receipts	2,843	2,567	–
				Deficit	4,890	8,725	9,438

Note : Exchange Rate 1 U.S.$ = 3.24 LE (1991/92)
1 U.S.$ = 2.00 LE (1990/91)

Source : Ministry of Planning

③ Production Target by Industry Under 2nd 5-Year Plan and Actual Result

(Unit: million LE)

Fiscal Year / Item	1987/88 (1st Year)		1988/89 (2nd Year)		1989/90 (3rd Year)	1991/92 (Final Year)	Target Growth Rate
	Target	Result	Target	Result	Result	Target	(%)
Agriculture	8,960	8,930	9,205	9,180	9,440	10,500	4.1
Mining & Manufacturing	7,446	7,435	8,069	7,979	8,564	10,397	8.4
Petroleum	1,769	1,799	1,966	1,748	1,728	1,898	2.3
Electricity	560	559	599	612	649	729	7.1
Construction	2,128	2,145	2,259	2,259	2,381	2,637	5.9
Sub-Total (Merchandise Sector)	20,863	20,868	22,098	21,778	22,762	26,221	5.8
Transport & Communications	3,928	3,996	4,211	4,368	4,678	4,819	5.1
Commerce, Finance & Insurance	10,118	10,150	10,487	10,618	11,110	12,624	5.5
Tourism	424	533	483	644	694	688	10.9
Sub-Total (Productive Service Sector)	14,470	14,679	15,181	15,630	16,482	18,111	5.6
Public Facilities & Utilities	896	898	984	1,007	1,104	1,409	11.4
Services	1,923	1,930	2,009	2,018	2,112	2,375	5.2
Government Services & Insurance	4,898	4,874	5,212	5,170	5,451	6,010	5.5
Sub-Total (Social Service Sector)	7,717	7,702	8,205	6,195	8,667	9,794	6.2
Total	43,050	43,249	45,484	45,603	47,911	54,126	5.8

Source: Ministry of Planning

④ Price Trend

Fiscal Year	1965/66	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
Price Index (1965/66=100)	100	487.8	572.1	650.2	820.9	1,044.9	1,220.3

Source: Central Statistics Bureau

⑤ GDP Trend in Last 5 Years

(Unit: 100 million LE)

Fiscal Year	1986/87	1987/88	1988/89	1989/90	1990/91
GDP	477	587	776	840	860

Sources : 1986/87 Central Statistics Bureau
1987/88~1989/90 U.S. Embassy Estimate
1990/91 Economist Intelligence Unit (EIU) Estimate

3. Public Holidays (1992)

Eve of 1st Bairam	April 3
1st Bairam	April 4~6
Sinai Liberation Day	April 25
Sham El-Nessim	April 27
Laborers Day	May 1
Eve of 2nd Bairam	June 10
2nd Bairam	June 11~14
Evacuation Day	June 18
Hejri New Year	July 2
Revolution Day	July 23
Prophet Mohammed's Birthday	September 10
Army Forces Day	October 6
Suez City & National Liberation Day	October 24
Victory Day	December 23

APPENDIX 7

ESTIMATED COST FOR THE WORK TO BE UNDERTAKE BY THE EGYPTIAN SIDE

The Government of Egypt will bear the following construction costs.

1. South Giza Waterworks Upgrading Work

1.1 Relocation of Drainage Channel on Premises

(1) Earth Work

1) Excavation	1,300m³ ×	15 US$ =	19,500 US$
2) Refilling	1,230m³ ×	5 US$ =	6,150 US$
3) Breaking of Concrete	70m³ ×	53 US$ =	3,710 US$
4) Disposal of Surplus Soil	480m³ ×	17 US$ =	8,160 US$

(2) Manhole Work

1) Concrete	40m³ ×	70 US$ =	2,800 US$
2) Forms	200m² ×	7 US$ =	1,400 US$
3) Reinforcing Bars	4 tons ×	650 US$ =	2,600 US$
4) Covers and Steps	3 sites ×	800 US$ =	2,400 US$

(3) Pipe Laying

1) Concrete Pipes (500m dia.)	65m ×	36 US$ =	2,340 US$

1.2 Relocation of Standing Trees on Premises (20 Trees)

(1) Earth Work

1) Excavation	100m³ ×	8 US$ =	800 US$
2) Refilling	100m³ ×	5 US$ =	500 US$

(2) Relocation Work

1) Relocation of Trees	20 trees ×	60 US$ =	1,200 US$

1.3 Relocation of Outdoor Lighting on Premises (9 Posts)

(1) Earth Work

1) Excavation	60m³ ×	8 US$ =	480 US$
2) Refilling	60m³ ×	5 US$ =	300 US$

(2) Relocation Work

1) Relocation of Lighting Posts	9 posts ×	80 US$ =	720 US$

(3) Cost of Materials

1) Cable	140m ×	4 US$ =	560 US$
2) Miscellaneous	1 set ×	500 US$ =	500 US$

1.4 Relocation of Existing Guard House

(1) Earth Work

1) Excavation	50m³ ×	8 US$ =	400 US$
2) Refilling	45m³ ×	5 US$ =	225 US$

3) Breaking of Concrete	60m³ ×	53 US$ =	3,180 US$
4) Disposal of Surplus Soil	65m³ ×	17 US$ =	1,105 US$

(2) Building Work

1) Concrete	25m³ ×	70 US$ =	1,750 US$
2) Forms	100m² ×	7 US$ =	700 US$
3) Reinforcing Bars	2.5 tons ×	650 US$ =	1,630 US$
4) Blocks	120m² ×	18 US$ =	2,160 US$
5) Finishing	290m² ×	30 US$ =	8,700 US$

1.5 Water and Power Supply During Construction Work

(1) Water	4,000m³ ×	0.09 US$ =	360 US$
(2) Power	10,000KWH ×	0.07 US$ =	700 US$

1.6 Supply of Chemicals During Test Operation

(1) Chlorine (30 days' equivalent)	6,250kg × 0.515 US$/kg=3,200US$
(2) Aluminium Sulphate (30 days' equivalent)	25 tons × 125 US$/ton = 3,130 US$

Sub-Total: 81,380 US$

2. Sewer Transfer Pump Station No. 5 (B) Construction Work

2.1 Land Preparation of Construction Site

(1) Land Clearance	4,000m² ×	0.5 US$ =	2,000 US$
(2) Land Preparation	4,000m² ×	0.8 US$ =	3,200 US$

2.2 Outdoor Lighting (6 Posts)

(1) Earth Work

1) Excavation	30m³ ×	8 US$ =	240 US$
2) Refilling	30m³ ×	5 US$ =	150 US$

(2) Lamp Post Installation	6 sites ×	50 US$ =	300 US$

(3) Material Cost

1) Lamp Posts	6 ×	600 US$ =	3,600 US$
2) Cable	70m ×	4 US$ =	280 US$
3) Others	1 set ×	1,000 US$ =	1,000 US$

2.3 Landscaping

(1) Tree Planting (150mm x 3.0m)	10 trees ×	100 US$ =	1,000 US$
(2) Turfing	1,200m² ×	4 US$ =	4,800 US$

2.4 Premise Roads

(1) Asphalt Paving	1,500m² ×	10 US$ =	15,000 US$

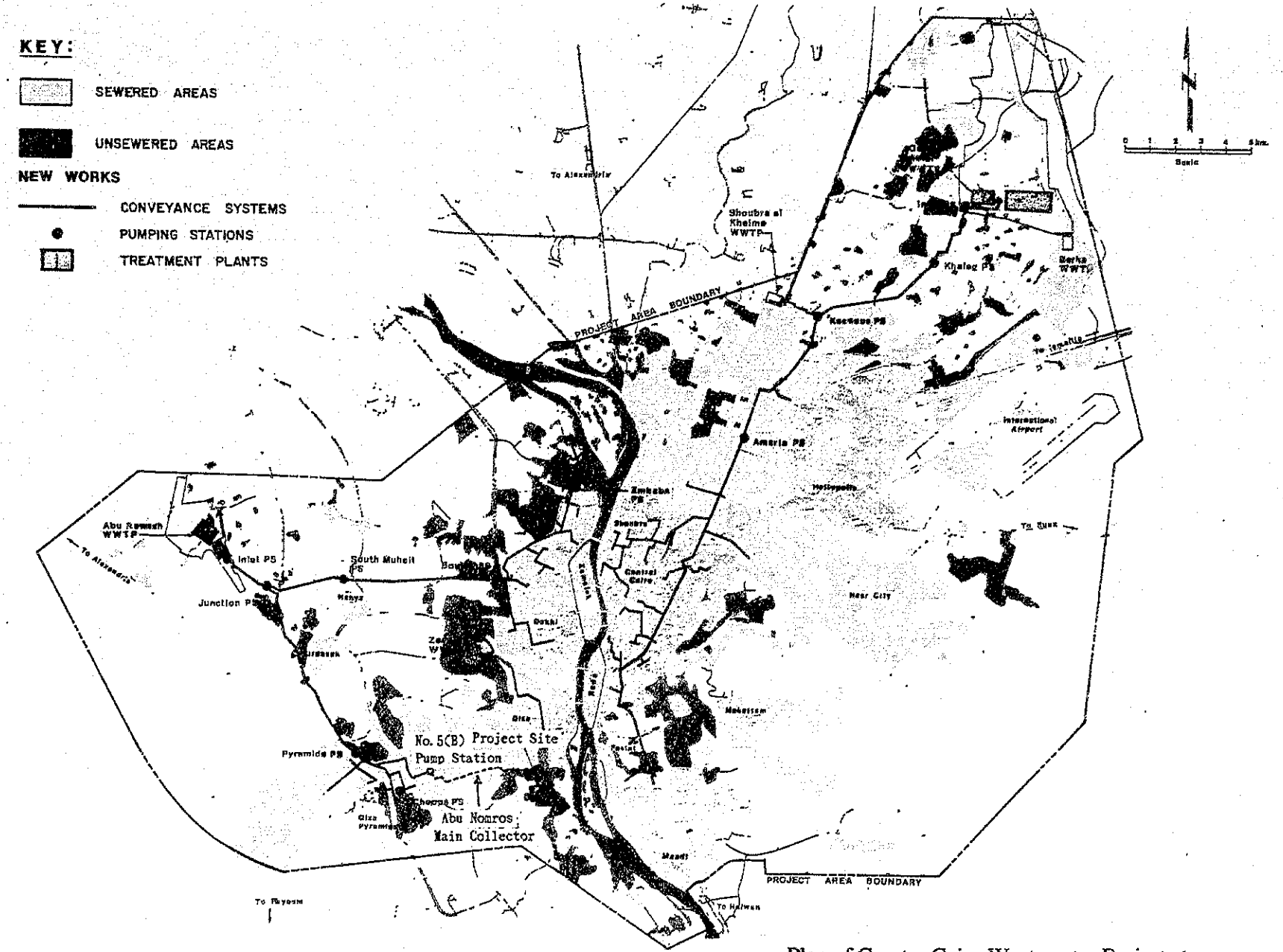
2.5 Laying of Water Supply Pipes

(1) Earth Work

1) Excavation	$36m^3$ ×	8 US$ =	290 US$
2) Refilling	$36m^3$ ×	5 US$ =	180 US$
(2) Pipe Laying (50mm dia.)	100m ×	18 US$ =	1,800 US$
		Sub-Total:	33,840 US$
		Total Construction Cost for Egyptian Side:	115,200 US$

APPENDIX 8

PROJECT PLAN OF GREATER CAIRO WASTEWATER PROJECT

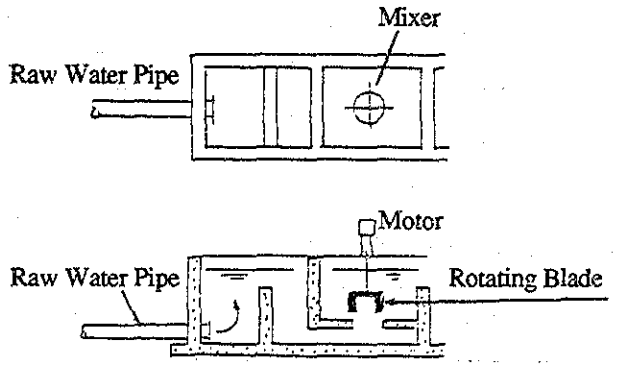
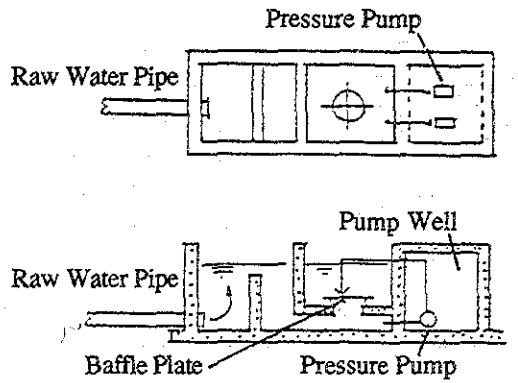


Plan of Greater Cairo Wastewater Project

APPENDIX 9

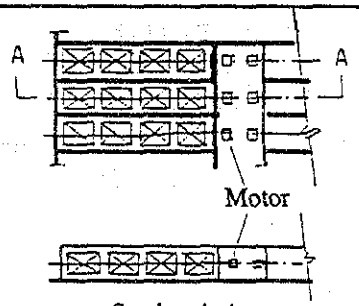
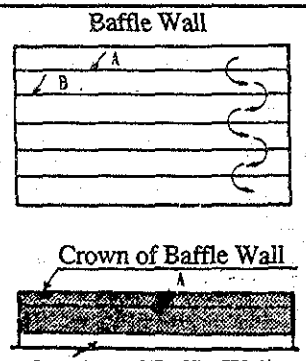
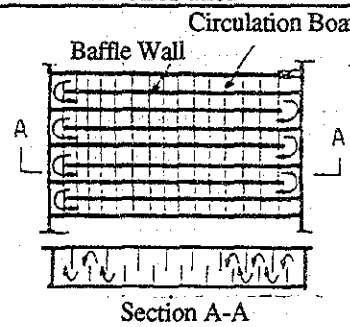
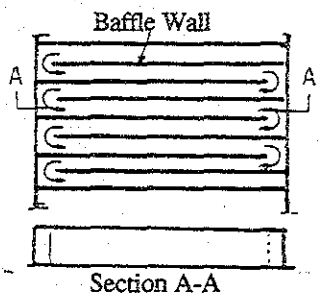
COMPARISON OF ALTERNATIVE FACILITIES FOR WATERWORKS

Table 1 Comparison of Alternative Rapid Mixing Basins

Item \ Method	Mechanical Mixing Method	Pump-Assisted Mixing Method
1) Structure	 Several rotating blades rotate around the vertical axis at a circumferential speed of 1.5m/sec to obtain the required mixing effect.	 Part of the raw water is pressurised by the exclusive pump for the mixing basin and is forcibly mixed with the rest of the raw water.
2) Reliability of Mixing Performance	Most popularly used at present with a highly reliable mixing performance.	Mixing performance reliability is inferior to the mechanical method.
3) Flexibility to Water Volume Fluctuation	- Mixing strength can be adjusted by changing the rotation speed. - Good adaptability to water volume fluctuation.	- Water volume fluctuation can be dealt with by changing the number of pumps in operation and the valve opening angle. - More complicated control operation than the mechanical method. - Difficult to change the mixing strength.
4) Maintenance	- Easier maintenance than the pump-assisted method as only the mixer is involved. - Regular overhaul of the driving device is necessary. - Use of a highly anti-corrosion material (such as FRP) for the blades and others can ensure continuous operation for a long period of time.	- Easy inspection as no mechanical movement parts are submerged. - Maintenance is rather more complicated than the mechanical method because of the integration of pumps and valves, etc. - Energy consumption is larger than the mechanical method. - Regular inspection of pumps and valves, etc. is necessary. - Regular inspection is also necessary to check the accumulation of baffle plate scale at the pump outlet.
5) Difficulty of Civil Engineering Work	- Simple structure makes construction work easy.	- Complicated structure makes construction work more difficult than in the case of the mechanical method.

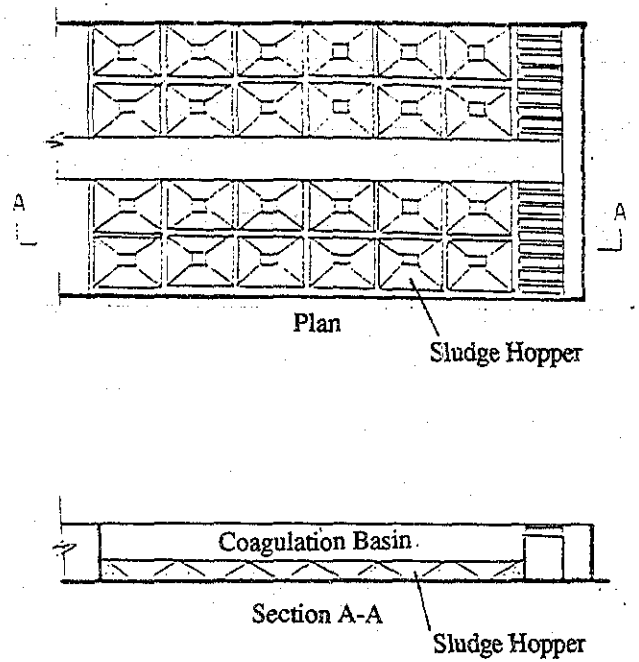
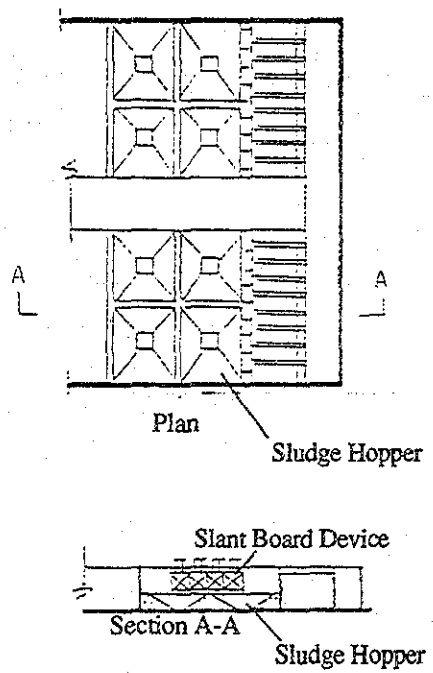
Item \ Method	Mechanical Mixing Method	Pump-Assisted Mixing Method
6) Head Loss	- Approx. 20cm	- Approx. 20cm
7) Space Requirement	- Small (approx. 16m^2)	- Slightly large (approx. 30m^2)
8) Maintenance Cost	- Slightly cheaper than the pump-assisted method.	- Slightly more expensive than the mechanical method.
Overall Evaluation	○ (Selected) 1) High mixing performance reliability due to mechanical mixing. 2) Low equipment cost due to simple, integrated structure of motor and blades. 3) Relatively easy maintenance. 4) Small space requirement.	× 1) Low mixing performance reliability due to mixing by clash. 2) High equipment cost due to the combination of many different pieces of equipment. 3) Relatively difficult maintenance due to the use of many different pieces of equipment and valves, etc. 4) Large space requirement.

Table 2 Comparison of Alternative Flocculation Basins

Item \ Type	Mechanical Mixing	Vertical Circulation	Combined Vertical-Horizontal Circulation	Horizontal Circulation
1) Structure	 - Mixing blades fixed around the horizontal axis are rotated at a circumferential speed of 15-80cm/sec.	 - Baffle boards are used to cause a sudden change of direction of the vertical water current, creating a turbulent flow to achieve efficient mixing. - In order to prevent the destruction of flocs made by the mixing process, the openings of the baffle walls are designed to slow down both the overflow and undercurrent speeds towards the bottom of the basin.	 - Circulation boards are used to cause a sudden change of the direction of the vertical and horizontal water currents, creating a turbulent flow to achieve efficient mixing. - In order to prevent the destruction of flocs made by the mixing process, the openings of the circulation boards are designed to slow down both the overflow and undercurrent speeds towards the bottom of the basin.	 - Baffle walls are used to cause a sudden change of the direction of the horizontal water current, creating a turbulent flow to achieve efficient mixing. - In order to prevent the destruction of flocs made by the mixing process, the distance between the baffle walls is gradually widened towards the downstream.
2) Efficiency of Flocculation Process	- Flocculation conditions can be made flexible vis-a-vis changes of the water volume to be purified and the water quality. Performance is excellent, especially when the turbidity is low. Mixing strength near rotating areas is rather weak, making it difficult to achieve uniform mixing. 3-4 steps are required to prevent short-circuiting of the current which tends to occur due to the structure.	- Good performance can be obtained when water volume fluctuation is minimal with a low short-circuit current occurrence level. - Due to the likely occurrence of drift current, the emergence of good size flocs is difficult. - Due to the wide openings, the baffle wall height is extremely high, making construction very difficult. - Adjustment of the opening size to deal with overflow and undercurrent is rather difficult.	- Problems associated with the horizontal circulation method are solved by the additional of circulation boards, creating a horizontal flow. The resulting flocculation performance is excellent. - Good performance can be obtained when the water volume fluctuation is minimal with a low short-circuit occurrence level.	- Compared to the combined method, this method is more flexible vis-a-vis water volume fluctuation. Little change of the water speed in the basin makes the production of good flocs difficult. - Short-circuit current tends to occur, reducing the flocculation performance.

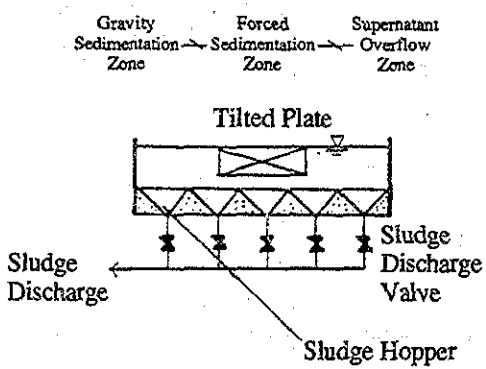
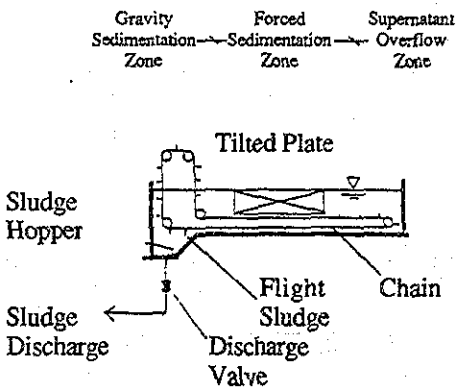
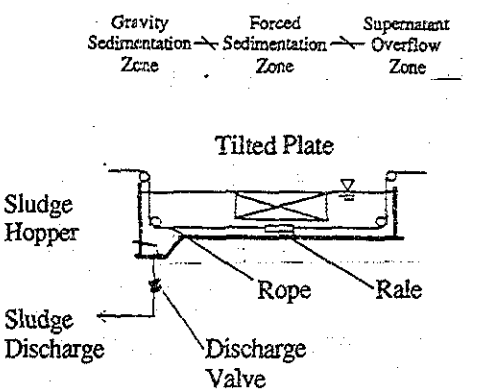
Item \ Type	Mechanical Mixing	Vertical Circulation	Combined Vertical-Horizontal Circulation	Horizontal Circulation
			- Construction is simple because of the absence of baffle wall openings. - Adjustment of the opening size of the circulation boards to deal with overflow and undercurrent is easy.	
3) Maintenance	- Maintenance is difficult as the mechanical operation parts are submerged. - Submerged ballbearings need to be replaced every 5 years or so due to abrasion, necessitating the stoppage of operation during replacement work. - Operation control is possible by changing the blade rotation speed in response to water volume and water quality fluctuation. - Removal of the scum is necessary. - Sludge accumulates at the bottom of the basin over a long period of time and requires removal.	- No specific maintenance problems occur as no mechanical elements are involved. - Poor mixing tends to create a drift current and to produce scum. - Water volume and water quality fluctuation affects the flocculation performance due to the absence of an adjustment mechanism vis-a-vis the changed water speed in the basin. - Sludge should be regularly removed as sedimentation is likely to occur in the basin.	- No specific maintenance problems occur as no mechanical elements are involved. - Chemical injection quantity and the circulation board position must be adjusted in response to water volume and water quality fluctuation. - Generation of scum is at a relatively low level. - Sludge removal is eventually necessary but the deposit volume (of sludge) is the lowest of all methods.	- No specific maintenance problems occur as no mechanical elements are involved. - As scum tends to be generated, removal measures are necessary. - The lack of an adjustment mechanism vis-a-vis a changed water speed means poor performance when the water volume and water quality fluctuate. - Sludge should be regularly removed as sedimentation is likely to occur in the basin.
4) Flexibility Vis-a-Vis Water Volume Fluctuation	Change of the mixing speed can achieve the required adjustment.	Openings of the baffle walls can be adjusted to a limited extent.	Flexibility is high by adjusting the openings of the circulation boards.	Openings at the bends and the distance between the baffle walls can be adjusted to a limited extent.
5) Head Loss	Negligible	Approx. 50-60mm	Approx. 500-600mm	Small
6) Maintenance Cost	High (Powered mixing necessitates spending on power, regular inspection and spare parts.)	Low (Use of gravity flow without mechanical elements makes operation inexpensive.)	Low (Use of gravity flow without mechanical elements makes operation inexpensive.)	Low (Use of gravity flow without mechanical elements makes operation inexpensive.)
7) Overall Evaluation	× - High construction cost. - Difficult maintenance due to the inclusion of mechanical elements; high maintenance cost. - Good flocculation performance.	○ - Poor flocculation performance. - Low construction cost. - Easy maintenance due to the absence of mechanical elements. - Low maintenance cost.	◎ - Good flocculation performance. - Low construction cost. - Easy maintenance due to the absence of mechanical elements. - Low maintenance cost.	× - Poor flocculation performance. - Low construction cost. - Easy maintenance due to the absence of mechanical elements. - Low maintenance cost.

Table 3 Comparison of Alternative Horizontal Coagulation Basins

Item \ Type	Standard Horizontal Sedimentation	Sloped Horizontal Sedimentation
1) Structure		
2) Residence Time	Long (3-5 hours)	Short (1 hour) Residence time within the slant board device is approximately 20 minutes.
3) Coagulation Performance	- Coagulation performance is the same as the sloped type vis-a-vis changes of the water volume, water quality, water temperature and air temperature. - Large water surface area makes the system susceptible to air temperature fluctuation, causing the ascending motion of flocs due to warmed water.	- Coagulation performance is the same as the standard type vis-a-vis changes of the water volume, water quality, water temperature and air temperature. - Small water surface area makes the system little affected by air temperature fluctuation with a resulting unlikelihood of the ascending motion of flocs. - Good coagulation performance is attainable by moving the slant board device to the optimal position.

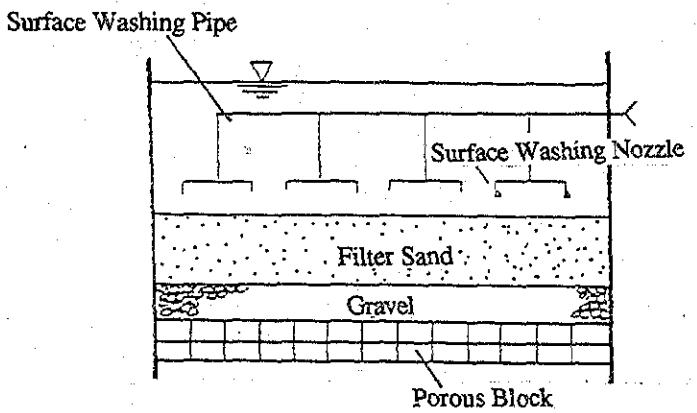
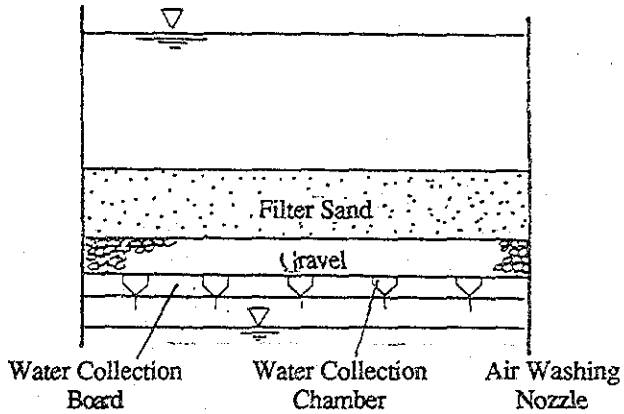
Item \ Type	Standard Horizontal Sedimentation	Sloped Horizontal Sedimentation
4) Maintenance	- As the basin is a civil engineering structure, little maintenance work is involved. - Larger size of the basin than the sloped type makes the sludge hopper size bigger with a larger cleaning work load. - The basin should be cleaned approximately once/year. - The maintenance work frequency of the auxiliary facilities is higher than that of the sloped type. - Water plug must be installed at the crown of the basin to clean the basin and sludge hopper.	- In principle, the maintenance requirements are the same as those of the standard type. - Basin should be cleaned approximately once/year. This work should be conducted in winter to avoid damage to the plates by strong heat and ultraviolet rays. - Tilted plates are designed to be movable so that cleaning work can be efficiently conducted. - Water plug must be installed at the crown of the basin, near the tilted plates, to clean the basin, particularly the tilted plates and sludge hopper. - At the time of cleaning, the water must be slowly emptied (approx. 50cm/hour) to avoid damage to the tilted plates by water pressure.
5) Space Requirement	Large (3-5 times larger than the sloped type) Coagulation process should take place throughout the basin.	Small - The required residence time within the tilted plate layers is some 20 minutes, making it possible to reduce the basin size. - While heavy flocs naturally sink in the open part of the basin, lighter flocs are assisted to sink by the tilted plate layers in the second part of the basin. Additional space is required at the later part of the basin to allow the overflow of supernatant.
6) Construction Cost	High - Large basin size. - Large sludge hopper and other auxiliary facilities.	Low - Small basin size due to the use of tilted plates. - Small size auxiliary facilities.
7) Maintenance Cost	Similar to the sloped type.	Similar to the standard type.
8) Overall Evaluation	× - Large space requirement due to the use of the gravity method makes its adoption impossible to for a limited project site. - Poorer coagulation performance that the sloped type. - Stronger ascending motion of flocs caused by water temperature increase.	○ - Shorter residence time makes the basin size smaller and can be used for a limited project site. - Low construction cost. - Good coagulation performance due to the mechanism to assist the coagulation process. - Weaker ascending motion of flocs caused by water temperature increase.

Table 4 Comparison of Alternative Sludge Removal Methods for Coagulation Basin

Item \ Method	Sludge (Diamond) Hopper Method	Flight Conveyor Method	Submerged Rope Traction Method
1) Structure (Illustration)			
2) System Outline	Sedimented sludge sinks to the sludge hopper for discharge by the manual operation of the sludge discharge valve.	Sedimented sludge is collected by the chain installed at the bottom of the basin and scraped to the sludge hopper and is then subsequently discharged by the manual operation of the sludge discharge valve.	Sedimented sludge is collected by the rake installed at the bottom of the basin and drops to the sludge hopper and is then discharged by the manual operation of the sludge discharge valve.
3) Sludge Discharge Capacity	Large: Discharge capacity can be adjusted by changing the opening frequency of the sludge discharge valve.	Medium: Capacity is determined by the number, height and scraping speed of the flights. An increased number of flights can improve the capacity to a limited extent.	Small: Capacity is determined by the height and scraping speed of the rake. As scraping is not continuous, this method may not be applicable for large amounts of sludge.
4) Mechanism	Sludge which sinks to the many sludge hoppers with a slope gradient of 60° or more is drained through the header pipe.	- The shoe of the flight directly touches the horizontal rail. The chain moves in one direction and the sludge is scraped off to the sludge hopper. - Elongation of the chain is manually readjusted.	- The wheels of the rake run on a horizontal rail and the reciprocating movement of the rake pushes the sludge into the sludge hopper. - Elongation of the rope is automatically readjusted by the counter-weight.

Item \ Method	Sludge (Diamond) Hopper Method	Flight Conveyor Method	Submerged Rope Traction Method
5) Maintenance	- Maintenance is easy as the system consists of manually operated valves and pipes. - Daily operation is very simple as it involves only the opening and closing of the valves. - There are few elements which can breakdown. - Daily inspection is not required except for annual inspection and cleaning. - Steep gradient of the hopper of 60° or more makes the sludge sink to the bottom of the hopper without fail, making discharge easy. - Good sludge collection performance.	- Maintenance is difficult as the mechanical elements are submerged. - Operation control is easier than the rope traction method as it only involves the starting and stopping of the motor. - The basin must be emptied when the chain is cut or replaced, requiring much work and time. - The basin must be emptied once/year to adjust the tension of the chain. - Daily inspection is essential because of the many mechanical elements. - Good sludge collection performance.	- Maintenance is difficult as the mechanical elements are submerged. - Operation control is complicated and difficult as motor operation needs to be reversed from time to time. - The basin must be emptied when the rope is cut or replaced, requiring much work and time. - Regular inspection of the rope is required although its tension is automatically adjusted. - Daily inspection is essential because of the many mechanical elements. - Poor sludge collection performance.
6) Construction Cost	Slightly high	Most expensive	Least expensive
7) Maintenance Cost	Least expensive	Most expensive	Slightly expensive
8) Overall Evaluation	○ - Low construction cost. - Easy maintenance. - Good sludge collection performance.	× - High construction cost. - Difficult maintenance due to the submerged mechanical elements. - Good sludge collection performance.	× - High construction cost. - Difficult maintenance due to the submerged mechanical elements. - Poor sludge collection performance.

Table 5 Comparison of Alternative Sand Filter Cleaning Methods

Item \ Type	Surface Water Washing + Backwashing	Air Washing + Backwashing
1) Structure (Illustration)		
2) Outline	Pressurised water is poured from the nozzles to destroy the sludge layer on the surface of the filtering sand using the shering energy of the water in order to improve the washing performance and is used in combination with backwashing.	Compressed air is blown out from the bottom of the sand filtration layers which are uniformly loosened by air expansion. Sludge, including the localised dense deposit on the sand filter surface, is effectively removed from the filtering sand and gravel. The system is used in combination with backwashing.
3) Washing Volume/Unit Area	- Surface washing: 0.15-0.2m^3/min/m^2 (4-6 minutes operation) - Backwashing: 0.6-0.9m^3/min/m^2 (4-6 minutes operation)	- Air volume: 0.8-1.5m^3/min/m^2 (approx. 5 minutes operation) - Backwashing: 0.6-0.9m^3/min/m^2 (approx. 10 minutes operation)
4) Characteristics	- Washing effect reaches some 10-20cm below the surface. The lower section of the filtering sand obtains appropriate fluidity by backwashing. Sand is cleaned by collision and abrasion caused by the sand flow and also by the shering energy of the water current. - Backwashing and surface water washing play their respective roles to achieve good washing of the sand filter. - Water collection unit is made of porous ceramic blocks and is not liable to damage or destruction by the filter weight (sand and gravel).	- A large volume of minute bubbles tends to remain in the sand layer, mixing sand, water and air in the filtration layer which disrupts the direct collision and abrasion between the sand granules with air acting as a cushion. As a result, the washing performance is poor. - Because of the absence of pipes, etc. above the filtration surface, replacement of the sand and gravel is simple.
5) Performance Stability	Excellent	Good
6) Maintenance	Although inspection or repair of the surface washing water pipes and nozzles is necessary, maintenance is generally easy due to the exposure of such pipes and nozzles.	Maintenance is difficult as all the components requiring inspection or repair are under the filtering sand (the sand and gravel must be removed to enable such work).

Type / Item	Surface Water Washing + Backwashing	Air Washing + Backwashing
7) Construction Cost	Slightly cheaper than the air washing method.	Slightly more expensive than the surface water washing method
8) Maintenance Cost	Less expensive	More expensive (additional cost incurred by the operation of the air compressor, etc.)
9) Overall Evaluation	○ - Excellent performance stability. - Easy maintenance. - Cheaper construction cost. - Cheaper maintenance cost.	× - Inferior performance stability compared to the surface water washing method. - Difficult maintenance. - Relatively expensive construction cost. - Relatively expensive maintenance cost.