

## **Chapter 3. Implementation Plan**



## **Chapter 3 Implementation Plan**

### **3-1 Implementation Plan**

#### **3-1-1 Implementation Concept**

This project is the improvement of the Mazoura Regulator including manufacturing and installation of gates and operation equipment and construction of a control house to accommodate the control equipment.

##### **1) Temporary Work Plan (preparatory work plan)**

###### **(1) Preliminary Temporary Works**

Preliminary temporary works are common to the whole components. They are temporary buildings such as the site office/worker lodgings, protection fences, testing devices for measurement/quality control, temporary electricity/water supply facilities for construction, and so on. As for the temporary buildings, beams and columns will be reinforced concrete structures and walls are concrete block structure as popularly employed in Egypt. The fences are for controlling the admittance so as to maintain the public order in the construction site.

###### **(2) Treatment of the Existing Facilities**

From the entire length 110m of the existing regulator, about 50m of the right-bank portion is to be demolished for the new construction. A section of remaining 60m has to be use for irrigation water control during the construction. As the existing regulator has much been decrepit, the demolition work shall be managed not to give vibration or shock to the existing body. Furthermore, the existing water pipes and telephone lines must be relocated prior to the demolition onto the temporary bridge. As there are a water purification plant for the water supply and a water intake pump on the left bank side in the lower reach of the existing regulator, some preventive and counter-measures shall be taken against water contamination during the construction.

(3) Temporary Road Construction for the Present Traffic and Construction Vehicles

After cutting the existing regulator body before the construction, the existing bridge will not be used any longer as it was. Therefore, the contractor shall assure the existing traffic during the construction. As the agriculture road along the Nile River has much dense traffic jam, the road is not suitable for transportation of construction materials and equipment to the construction site. A road to enter from the agriculture road to the Mazoura Regulator, has not fully been improved yet and there is a section passing through the densely populated village center. Therefore the road is not suitable for the purposes. It is decided to transport them from the desert road. As hauling of filling material is also made from the desert side, too, a temporary bridge is to be built on the left bank side by extending the closure wall of the double sheep pile cofferdam. The temporary bridge will assure traffic capacity of the existing attached bridge for general vehicles, while the present traffic regulations will remain. The bridge will allow the general vehicles up to 5-ton.

2) Construction Work Plan

(1) Foundation Work

i) Cofferdam

The new regulator is to be reconstructed in the canal bed. In order to secure dry work during construction, closure of the canal by double sheep pile cofferdam is planned. The sheet piles, after the closure and removal, will be partly reused for bank protection in the left-bank downstream and the right-bank upstream.

Closure by the double sheet pile cofferdam shall be made with due consideration in cutting of the existing foundation, pile driving, filling and removal, etc. The cofferdam will intersect the left bank, and attentions have to be paid onto boiling and slope failure during deep excavation.

Driving of steel sheet piles will be by a high-frequency vibro-hammer so as to minimize vibration influence to the decrepit regulator body. However, no high frequency vibro-hammer is available in the Egypt, and therefore it will be brought from Japan. Steel sheet piles will be set and driven into two parallel walls by a crane while securing the scaffolding on the fill between the walls.

Driving of H-steel piles for the temporary bridge will be by a low-frequency vibro-hammer. Width of the bridge is to be 8m and the design load shall meet that of construction machinery. Upon removal of the cofferdam after completion of the new regulator, less attention will be needed to the existing one. Therefore, their removal will be by a low frequency vibro-hammer. As for the protection wall on the left bank of the upper reaches and on the right-bank of the lower reaches, a part the steel sheet piles will be driven by the low frequency vibro-hammer.

ii) Earth Work

After closure and drainage in the work site, a road to haul earth materials in and out, will firstly be installed to the canal bed.

A hauling road will run along and be attached to the right-bank dike with a sufficient longitudinal slope for construction vehicles. Demolition of the existing regulator body will be by a concrete breaker, and the demolished stuff will be loaded by a back-hoe and hauled out by dump trucks. The demolished concrete and stone pieces will be placed in a stock yard in IID's work site, and be used for back-filling on the left bank side after completion of the regulator body. The excavated materials for foundation and regulator body in the upper reaches will also be kept in the same way, and will be used as refilling materials. The smaller pieces of concrete or stones will also be used as riprap materials. Sand for filling the cofferdam, will be hauled from some borrow area not further than 10 km from the site, and will be reused for filling after the removal.

After completion of the new regulator body, the earth above the road level in the left bank of the regulator will be removed and is used for back-fill and burial of the existing regulator body. For back-fill of the road face, silty sand excavated from the canal bed will be used and sufficiently be compacted by rollers or tampers for prevention of uneven settlement by hollows.

iii) Regulator Body

Reinforcing Bars:

Reinforcing bars brought into the site shall be covered by some sheet and stored to prevent the bars from oxidation (rust). The bars will be erected by

use of binding wires. Between the bars and forms or leveling concrete, spacers or mortars blocks shall be placed to secure the covering depth.

**Form:**

Form panels will be wooden panels.

**Concrete:**

As floor and side walls require a large concrete volume, the placing volume shall be divided and programmed in harmony with the daily work volume and capacity of the batcher plant.

Joint positions of two structural bodies shall be at where receives no substantial stress, while the positions of construction joints shall be programmed approved by the one-in-charge in advance to the placing.

Considering the base slab and the side walls beeing mass-concrete and the dry and hot (up to 40°C) climate in summer in Egypt, the placing and curing shall be carefully controlled.

iv) **Building of a Control House**

Finishing works such as tile work, plasterer, painting, fittings, and pipe arrangement, etc. will be undertaken by local agents.

v) **Concrete Supply or Production**

(a) **Possible Source of Concrete Supply**

- Purchase from local concrete plant.
- Production at site by a locally leased concrete plant.
- Production at site by a plant leased and brought from Japan.

(b) **Possible Local Concrete Plants and Lease Agents**

**Nearby Local Concrete Plant**

Company name	: Hassan Allam Son's
Location	: at about 50km point from Cairo along the Cairo-Fayoum desert road
Transport distance	: about one way 100km
Plant ability	: 20m <sup>3</sup> /hr.
Nos. of agitator trucks owned	: four 6m <sup>3</sup> agitator trucks

Judging from the degree of mechanical and maintenance conditions of the plant, continuous supply of quality-controlled concrete is not likely. Considering the transport distance and climate condition, separation of the aggregates may be suspected, while due to a small number of agitator trucks sufficient volume of supply may also be suspected. It accordingly concludes that supply from the local plant is not reasonable.

Possible Lease Agents.

Investigation of the following seven agents in the Cairo city has been made. However none of them has any plant only for lease, while there is not agents specialized for leasing either.

**Table 3-1 Name of Company possible to use**

No.	Name of Agent
1	Arab Contractor
2	Sunrise Engineering & Trading
3	Egyptian Trans. & Commercial
4	Shalaby Son's for Transp
5	Lamei A. Shahid
6	Mohey Gharib Co.
7	Hamdy Abu Talib Co.

There is no concrete plant only for the lease. Even if a plant can be leased, the maintenance system have not been established. Therefore, it is concluded that acquisition of a plant of the required 40m<sup>3</sup>/hr capacity for the project is not reasonable.

(c) **Conclusion**

Total volume of concrete for the construction amounts to about 7500m<sup>3</sup>. Particularly for the regulator body-portion as much as 7,000m<sup>3</sup>, it has to be constructed in 7.5 months. Quality control for the specific proportioning and continuous supply both in a large volume and a short period, are also required.

Considering the quality control and reliability of the plant, it is reasonable to acquire a plant from Japan and produce concrete in the site.

vi) Gate Installation

Guide-frame metal fittings have to be welded to anchor in grooves in the slab and pillars, and filled with and fixed by concrete before gate installation. After completion of the regulator body, each gate is hung and installed by a 60-ton crane on the attached bridge. The gates thus installed, shall be tested and examined for operation before removal of the cofferdam. After removal of the cofferdam, the final test operation shall be made under the water flowing conditions.

vii) Electric Equipment Construction

In parallel to the gate installation, the gate hoists, operation equipment, measuring device and a control panel shall be installed on the top of the pillars and other specific places. Their functions shall be tested and verified together with the test operations of the gates.

viii) Other Works

As canal-bed protection work requires relatively a long-term, it shall start as soon as the downstream apron is completed.

Side-bank protection work shall be implemented in parallel with removal of the cofferdam. Sheep piles from the cofferdam shall be repaired and will be reused for the protection work.

Riprap and other similar work around the cofferdam shall be made before removal of the cofferdam, while the back-fill portion in the downstream of the present canal shall be made when the filling is completed.

Road paving shall be made in a way to control traffic one of two lanes.

### 3-1-2 Implementation Conditions

#### 1) Engineering Capability of Local Contractors

Level of the engineering capability of the local contractors in Egypt is high, and they will have no problem for the project implementation to undertake the foundation, concrete and other works through their regular system for construction and finishing work by themselves.



The project intends to build a new regulator at the same location of the present one, so that it involves large-scale demolition and temporary closure works, which have not been experienced by them in Egypt. However, it may be judged that the works can be executed with help of proper guidance and supervisions by some experienced contractor from Japan. Therefore the local contractors may be employed in such manner.

## 2) Conditions of Local Construction Equipment

A variety of construction equipment is available in Egypt, while some very specialized equipment such as hydraulic sheep-pile drivers, which gives no vibration to the existing structures, are not available from the local contractors or lease agents due to limited needs in Egypt. In Egypt, lease of equipment is managed by local contractors by supplying their owned ones and is generally costly. Some types of equipment may be in poor condition on their workability and maintenance if they are to be leased, and therefore it is suspected that they might become some causes of quality and delay in construction. It therefore seems to be rational to examine whether they have to be brought from Japan or the third nation.

## 3) Manpower Situation

Quality of engineers, technicians and skilled laborers in Egypt is high enough as well as that of the local contractors. In current years due to expanding construction market in Egypt, it is becoming more difficult to assign quality engineers and skilled laborers. As Mazoura is a far remote site from Cairo by 170 km, and therefore some difficulties are anticipated in securing the engineers and technicians working at the site. The expected laborers in the vicinal villages have no experience in construction, so that securing the skilled laborers is also anticipated difficult..

### 3-1-3 Scope of Work

#### 1) Land Acquisition and Rent, and Compensation for Harvest

Land acquisition is not programmed in the project implementation. The land required for temporary works will be secured in the adjacent public land. In cases some private land becomes necessary for some work other than for temporary ones, the expense for

the portion will be borne by Japan. The crops illegally cultivated in the public land will be compensated and removed by Egypt before construction.

2) Marine and Inland Transportation Costs

Transportation costs for whole materials and equipment will be borne by Japan.

3) Supply of Electricity, Telephone Service and Domestic Water

Costs for the receiving facilities including service wires for mechanical and electric facilities and transformers will be borne by Egypt, while costs for the receiving facilities for temporary power supply to the construction site will be borne by Japan. As for telephone line, costs until the service wire will be borne by Egypt. Costs for laying of water supply pipes until the site will be borne by Egypt.

4) Exterior and Gardening

Egypt will undertake the surrounding fence and gardening in the land, while the lampposts on the bridge and operation platforms will be undertaken by Japan.

5) Others

Costs for customs and formalities relevant to import/re-export of the construction materials and equipment and those relevant to opening a bank account for disbursement of the grant fund, will be borne by Egypt.

3-1-4 Construction Supervision

1) Construction Supervision by Contractor

The project intends to remove a 50m-long section of the existing regulating weir out of the total 110m, and to construct a new regulating weir by maintaining functions of the existing structure during the work. Operation and management of the remained existing gates will be undertaken by the executing agency in accordance with the management method as provided separately. The contractor shall keep a close contact

to the executing agency and pay due attention for prevention of any faults in water management during the construction.

The project is composed of two portions: a civil work portion in the field and a factory work portion for manufacturing gates. As the civil work portion is mostly undertaken by local contractors and by use of local manpower and materials, it requires construction supervision by residential engineers who have an ample engineering knowledge and experience in construction in Egypt. The project involves a canal closure work, which has seldom been experienced in Egypt, and therefore some well-experienced engineers in river-closure work, will be required for assignment.

Moreover, partial demolition of the existing regulator body is a work under water, and requires divers. Diving work, as being practiced in Egypt, shall be carefully managed to prevent any accidents. Works by employed skilled and other laborers such as formwork, reinforcing bar erection, concrete work, etc. shall sufficiently and technically be supervised to maintain the required quality and precision.

Assignment of the residential specialists and the dispatched technicians for construction supervision, will be as presented in Table 3-2 and Table 3-3.

**Table 3-2 Residential Specialist Staffing Plan**

Post	Grade	Task
Manager	3	Overall management and control
Civil Engineer 1	4	Overall construction supervision, scheduling & progress control, and supervision for temporary work and civil engineering work.
Civil Engineer 2	4	Construction supervision and quality control of main structures, and safety control.
Architect	4	Supervision and quality control of building, and adjustment of building facilities.
Electric Engineer	4	Supervision and quality control of electric facilities.
Mechanical Engineer	4	Supervision and quality control of mechanical facilities.
Accountant	4	Custom clearance & transportation of equipment and materials, labor management , and public relations.

**Table 3-3 Dispatched Technician Staffing Plan**

Post	Grade	Task
Double Sheet Pile Cofferdam Instructor	5	Instruction for installation of double sheet pile cofferdam and guidance during the closure.
Steel Sheet Pile Driving Instructor	5	Instruction and guidance during the whole construction for sheep-pile driving, inspection, repair, removal and driving of the removed ones for bank protection.
Retaining Wall Timbering Instructor	5	Instruction and guidance for closure work and its removal.
Form Work Instructor	5	Instruction and guidance for form work.
Reinforcing Bar Instructor	5	Instruction and guidance for erecting reinforcing bars.
CJG Instructor	5	Guidance on foundation soil improvement.
CJG Instructor	5	Guidance on foundation soil improvement.
Gate Installation Instructor	5	Guidance for gate installation.
Electric Equipment Installation Instructor	5	Guidance for electric equipment installation.
Gate Operation Instructor	5	Inspection and guidance for gate operation before and after actual water operation.

## 2) Design and Construction Supervision by Consultants

### (1) Details Design

Personnel for detail design and preparation of bidding documents to be assigned programmed as shown in Table 3-4, while the work terms are as presented in the overall work schedule plan.

### (2) Construction Supervision

Domestic work (in Japan) and local work (in Egypt) in the construction phases are as follows.

Work Site	Contents
Japan	Approval of drawings, inspection of manufactured electric and mechanical equipment, inspections on packing, and confirmation of documents for export formalities.
Egypt	Approval of drawings, inspections on unpacking, site inspections, issuance of work progress certificates, completion inspections, and issuance of completion certificates.

The construction is complicated and involves removal a partial section of the existing regulating weir and reconstruction of a new regulating weir, so that the resident supervisors to be assigned shall be engineers who have ample knowledge on design, construction and O&M of irrigation facilities.

For construction supervision, staffing as shown in Table 3-5 will be programmed. Their work-term are as presented in the overall work schedule plan.

**Table 3-4 Staffing for Detail Design**

Post	Grade	Duties
Manager (chief engineer)	2	Compilation of design outputs, and finalization of detail design and tender documents.
Design Engineer for Civil Structures	3	Field investigations and design of civil structures. Structural calculations and production of design drawings included in charge.
Design Engineer for Civil Structures	4	Design of civil structures. Structural calculations and bills of quantity included in charge.
Architect	3	Field investigations of the existing buildings and design of buildings. Structural calculations and bills of quantity included in charge.
Mechanical Design Engineer	3	Specification of gates, structure calculations, production of design drawings and bills of quantity in charge.
Cost Estimate & Procurement Specialist	4	Cost estimation by the detail design for the project and examination of cost estimates under the Basic Design.
Specification Specialist for Civil Works	3	Production of technical specifications for civil structures and buildings designed by the detail design.
Specification Specialist on Gate Manufacturing and Installation	3	Production of technical specifications for manufacturing and installation of gates designed by the detail design.
Specification Specialist on Electric Equipment and Installation	3	Production of technical specifications for electric facilities employed by the detail design.
Tender Document Specialist f	3	Compilation of detail design outputs, and edition and finalization into the tender documents.

**Table 3-5 Staffing for Construction Supervision**

Post	Grade	Duties
Manager (chief engineer)	2	Technical evaluation of bids. Overall management of construction supervision.
Resident Supervisor	3	Inspection and coordination in the site on whole construction, electric and mechanical works, and providing advises on work schedule, quality and safety. Approval of construction drawings and design amendments and providing advises on operation and maintenance methods.
Electric Design Engineer (by spot)	3	A spot assignment at the required timing during construction to provide contractors with advice and guidance. Approval of electric work drawing
Mechanical Design Engineer (by spot)	3	A spot assignment at the required timing during construction to provide contractors with advice and guidance. Approval of amendment on mechanical work drawings..

### 3-1-5 Procurement Plan

Materials such as cement, aggregates, reinforcing bars, steel frames, lumber, electric cables, pipes and the similarities can be locally supplied. However, there is no manufacturer in Egypt to supply equipment relevant to the large sized gates and hoisting equipment, electric facilities and steel sheep piles for temporary earth retaining work, and therefore local procurement of them will be hardly possible. It accordingly requires procurement from Japan or the third nation.

Materials and equipment required for procurement from Japan or the third nation may be as follow.

#### ① : Large-Scale Water Gates

There is no manufacturer in Egypt to produce some complicated large-scale steel water gates as required for the project. Even the sole and largest steel processing maker (El Nasr Company) in Egypt produces only ductile cast iron pipes and their fittings.

② : Equipment for Gate and Hoisting, and Electric Facilities

In Egypt, manufacturing of large sluice gates has not been made yet. And therefore manufacturing of the relevant mechanical and electric equipment, have not been made either. As design of these equipment require integration between them and with gate manufacturing, the responsibility for procurement of the equipment will therefore be given to the gate manufacturer.

③ : Steel Sheet Pile

Popular steel products such as reinforcing bars, steel plates, form steel, etc. are being produced in Egypt, while those specialized for temporary work such as sheep piles have not been produced yet.

Steel sheep piles are imported as the material for temporary work and repeatedly used after repairs. Therefore, it is hardly possible to reserve sufficient and a large number of steel sheep piles in Egypt. Furthermore, the sheep piles are being used in the canal closure and will be reused for bank protection requiring high quality in water tightness. Reservation of steel sheep piles in number and quality will hardly be possible in Egypt, and therefore they will be procured from Japan or the third nation.

### 3-1-6 Implementation Schedule

#### 1) Construction Flow

The project demolishes a 50m-long right-bank portion of the existing 110m-long regulating weir and constructs a new regulating weir in the same place. Functions of the existing regulator and the traffic of the attached bridge shall be maintained during the construction. Even after the temporary closure, 14 gates are still operational in the left side. For the regular operation of the existing regulator, water control is made by operating only 3 to 6 gates so that there will be no inconvenience in water level control by the remained 14 gates.

After completion of the double sheet pile cofferdam, earth work for foundation excavation and concrete work will be followed. When structural construction is completed, installation of gates and electric facilities will be made. They will be tested for operation in no water load condition before removal of the closure. After the removal,



they will again be tested for operation with water loads, and closure of the left bank will be followed. Bank protection in the downstream on the right bank will be made in parallel to the main construction. After completion of the left side closure, a road connecting to the attached bridge will be constructed. The whole construction will thus be implemented and completed. Work schedule for implementation is as shown in the Fig. 3-1.

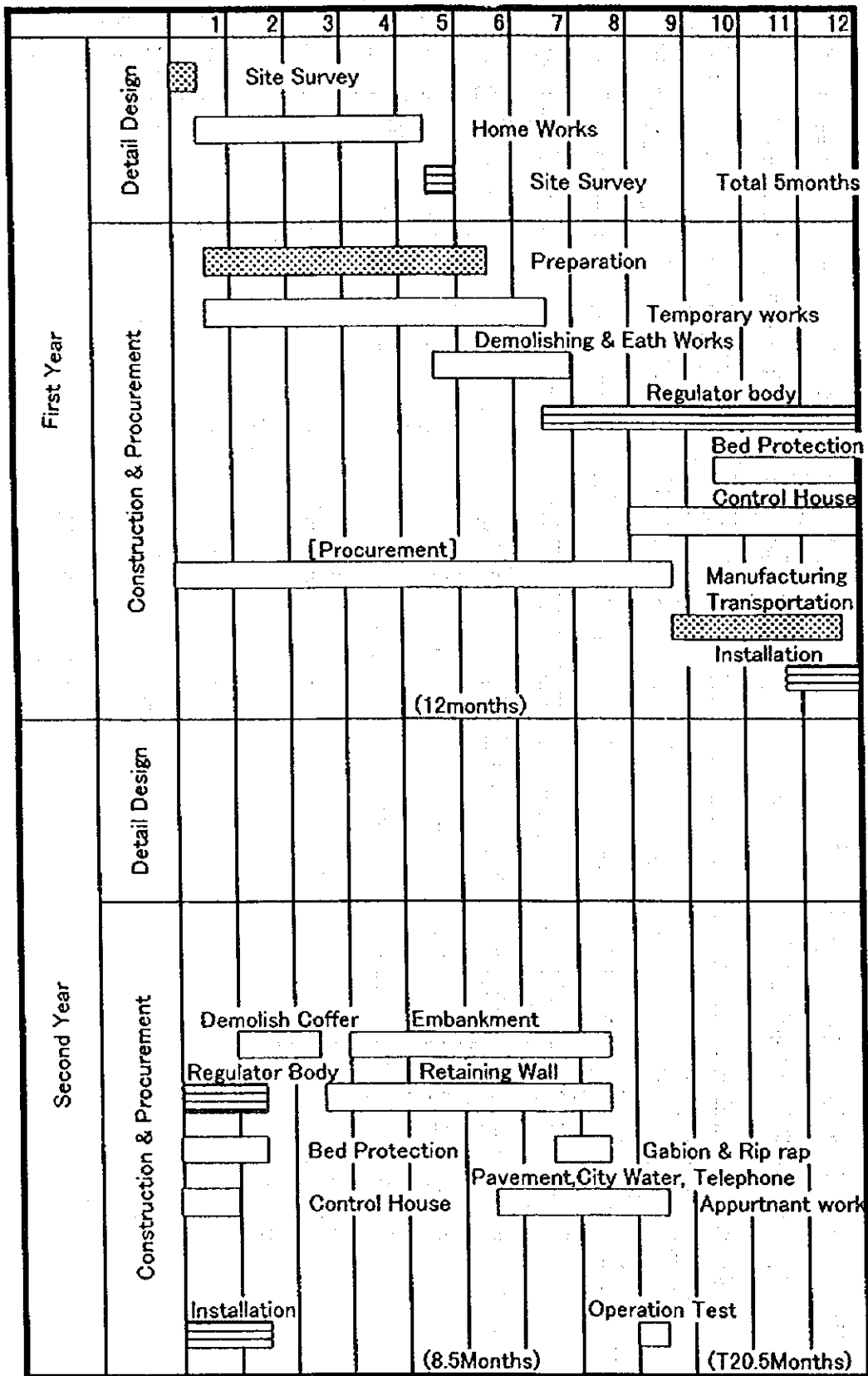
## 2) Work Day Plan for Major Works

Work days for major works are planned as shown in the table 3-6.

**Table 3-6 Work Day Period for Major Works**

Main Work Item	Work Period	Work Condition
Temporary Work	9 months	Installation of a double sheet pile cofferdam by maintaining function of the existing regulating weir. Maintaining the present traffic through the existing attached bridge, installation of a temporary bridge during construction. Removal of the cofferdam after completion of the weir body and installation of gates, equipment and test runs.
Earth Work	9 months	Under-water demolition of the existing structure during cofferdam installation. Fillings after bank protection and closure of the left side include.
Structural Construction	8 months	A concrete placing to be scheduled considering the work capacity (40m <sup>3</sup> /h). Structures have to be completed by the time of installation of mechanical facilities.
Architecture	7 months	The work other than finishing work shall be completed before commencement of mechanical and electric works.
Mechanical and Electric Works	9 months	5 months for manufacturing, and 3 months for transportation. Installation shall be made during the time the cofferdam is installed.
Other Construction Works	4 months	Steel sheet piles, used for the cofferdam, are used for bank protection. Road paving after removal of the cofferdam and partial removal of the left side closure dike.
Operation Guidance	1 month	After construction completion, operation guidance will be given during test runs and adjustment periods.

Fig. 3-1 Work Schedule for Implementation



### 3) Scheduling Conditions

In the work flow, the work components of temporary work (cofferdam installation), earth work, concrete work, installation of mechanical (gate) and electric facilities, temporary work (removal of cofferdam), flow switching and left-side closure work are critical. Manufacturing and transportation of mechanical and electric facilities and architectural work can be proceeded separately in parallel, it requires 21 months in total.

#### 3-1-7 Obligations of Recipient Country

The following necessary measures should be taken by the Government of the Arab Republic of Egypt on condition that the Grant Aid by the Government of Japan is extended to the Project.

1. To provide data and information necessary for the Project;
2. To secure the land necessary for the execution of the Project, such as the Right-of-way, Right-of-bridge, land for temporary office, working areas, storage yards and others;
3. To clear the sites prior to the commencement of the construction;
4. To make passable all roads and bridges leading to the Project sites before the commencement of inland transportation of materials and equipment;
5. To bear commissions to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement, namely the advising commission of the "Authorization to Pay" and payment commissions;
6. To ensure prompt unloading and customs clearance at ports of disembarkation in the Arab Republic of Egypt and prompt internal transportation therein of the materials and equipment for the Project purchased under the Grant Aid;
7. To exempt Japanese juridical and physical nationals engaged in the Project from customs duties, internal taxes and other fiscal levies which may be imposed in Egypt with respect to the supply of the products and services under the Verified contracts;
8. 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, according to the laws and regulation enforced in the Arab Republic of Egypt;
9. To provide necessary permissions, licenses and other authorizations for implementing the Project, if necessary, according to the laws and regulation enforced in the Arab

Republic of Egypt;

10. To maintain and use properly and effectively the facilities constructed and equipment provided under the Project;
11. To coordinate and solve any issues related to the Project which may be raised from third parties or inhabitants in the Project area during implementation of the Project;
12. To bear all the expenses, other than those covered by Japan's Grant Aid, necessary for the execution of the Project; and
13. To secure the safety of Japanese nationals engaged in the Project and to provide tight security against riot, insurrection, civil commotion, rebelling and usurped power.

## 3-2 Project Cost Estimation

### 3-2-1 Project Cost Estimation

Shares of the cost by and between Japan and Egypt, are estimated based on the assumptions as follows:

- 1) Price level: as of July, 1998
- 2) Foreign exchange rate: 1US\$= 130.24 yen, 1 LE = 38.93 yen
- 3) Construction period: the work is in two phases and their periods are as presented in the work schedule.

And the project will be implemented in conformity with the provisions of the Grant Aid program of the government of Japan.

### 3-2-2 Operation and Maintenance Cost

#### 1) Control and Management Organization

After the project construction, the local Irrigation Directorate of Beniuef Prefecture will undertake operation, maintenance and management of the regulator. IID has experienced many international cooperation projects through USAID, World Bank, Netherlands, etc. and therefore staff with ample knowledge and engineering technologies are available and many in its sections. In the local Irrigation Directorate

in Benisef Prefecture, civil engineering staff and mechanical and electric engineers are stationed and managing O&M of a large number of facilities. It therefore may be said that the staff having high-level engineering technology in O&M of modern facilities are many in number.

Modern irrigation facilities including pumps have been managed by them, however, management of electric-driven gates was the first experience for the staff when the Lahoun Regulator was reconstructed by the same Grant Aid project. At the time, OJT program was carried out to the engineering staff of ID on operation, inspection and repair of the facilities. OJT will also be programmed this time particularly to the operating staff in the field office on maintenance and repair work. Staff for daily water level control will also be in charge of daily inspection and cleaning as well as minor repairs.

For proper management, budgetary appropriation for carrying out the tasks as specified in the O&M manual is prerequisite. In order to maintain the level of water management, the appropriation will preferably be made with less annual variation from viewpoints of some medium to long-term program with help of subsidy from the government.

In case some large repairs or renewal of equipment coincide in a particular year, the required budget in the year becomes so much that smooth collection of levy may be hindered. Estimated annual cost for O&M of the Mazoura Regulator after reconstruction will be as shown in Table 3-7. The cost is as much as that for FY1996 budget, and will reasonably be allocated from the budget. In the Table, labor cost for removal of trash is included in the facilities management cost while costs for power and lubrication oil for gate operation are in repair cost.

**Table 3-7 Annual Cost Estimate for Management of Mazoura Regulator**

Item	Amount (LE)	Content	Remarks
<b>Facilities Management</b>			
Maintenance	10,000	Sheet pile cleaning and painting	Painting 200m <sup>2</sup> .
	10,000	Mechanical equip. cleaning	Painting 200m <sup>2</sup>
	1,000	Electric/communication equip.	Fuse, etc.
Electricity	13,500	Electricity, fuel, etc.	Switch, relay, fuse, etc.
Others	1,000	Recorder papers.	50kwx3hx360x0.25
<b>Water Management</b>			
Investigation	10,000	Survey, flow observation, etc.	IAS staff excluded.
Salary	36,000	A chief & 8 operation staff	
Office expense	5,000	Communication & consumables	
Transportation	2,400	Car rent	
Repair	120,000	L.S.	Costs for design & construction supervision included
<b>Total</b>	<b>208,900</b>		

## **Chapter 4 Project evaluation and Recommendation**





## Chapter 4 Project Evaluation and Recommendation

### 4-1 Project Effect

#### 4-1-1 Expected Effects

The project will give effects to some 600,000 fedans (252,000 ha) of the service area of the Bahr Yusef Irrigation Canal, which irrigates 770,000 fedans (320,000 ha) in total equivalent to 10% of the national total 780 million fedans (328 million ha) of agricultural area. In combination with the Lahoun Regulator, which had already been reconstructed under the same Grant Aid project, following effects can be expected by implementation of the project.

#### 1) Direct Effect

By reconstruction of the Mazoura Regulator, following direct effects may be expected.

- (1) The gate operation will be electric-driven and enable easy but efficient control of water in meeting the proper and timely operation. It will decrease ineffective water release, and contribute to control of irrigation water and its efficient distribution to directly-benefited some about 50,000 fedans (22,000 ha).
- (2) The present Mazoura Regulator is so decrepit and is maybe collapsed. In case it happens, a large damage directly in the downstream reaches and that on crops by stoppage of irrigation water supply, will emerge. Prevention of such damages by the project is also a direct effect.
- (3) By the project, gate operation will become easy and enables proper and timely water control. This can avail supply of irrigation water to 12,000 fedans (5,000ha) of land under planning for a new reclamation.

#### 2) Indirect Effect

By implementation of the project, following indirect effects may be expected.

- (1) By the project, gate operation and water control in Mazoura Regulator can be managed in harmony with changes of flow and water level at Lahoun Regulator.

This enables timely water control and efficient water distribution for 55,000 fedans (230,00 ha) of service area in the downstream of the Lahoun Regulator..

- (2) The attached bridge is to be improved, and a regulation to the vehicle over 5-ton, as presently being applied, will no longer be needed.
- (3) Ineffective release from both Lahoun and Mazoura Regulators will be minimized, and furthermore, canal storage effect between them will also be expected

#### 4-1-2 Project Justification

Beneficiaries of the project are;

- (1) 14,000 small scaled farm households holding 2 feddan (0.84ha) or less in the area served by the Mazoura Regulator for the direct benefits,
- (2) 20,000 small scaled farm households in the downstream area of Lahoun Regulator for the indirect benefits, and
- (3) expected immigrant farmers in a 12,000 fedans (5,000ha) newly reclaimed desert area along the left bank of Bahr Yusef Irrigation canal.

The project aims to contribute to the stable and improved life for farmers who have no way but relying irrigation water on the Nile. And the project plan has been programmed as a part of "Irrigation Improvement Program". The government of Egypt, however due to current financial circumstance, is facing difficulties in implementing the program as required, so that some financial assistance in the implementation from Japan, USA and Europe nations is being sought.

Reconstruction of the Lahoun Regulator, which had the highest priority for reconstruction, was implemented under the Grant Aid project of Japan. However, the Mazoura Regulator, ranked most urgent after the Lahoun Regulator, was also superannuated and about to collapse. Due to its operational difficulties for efficient water delivery, urgent reconstruction of the Mazoura Regulator is also prerequisite. The executing agency, MPWWR, has capable staff for the work but had to wait for financial and some technical assistance from outer sources as having been the case for the Lahoun Regulator. To the project, no assistance from outer sources has been programmed yet. It accordingly seems most appropriate for Egypt to implement the project through technology transfer from and under the Grant Aid program of Japan

After the project construction, ID of MPWWR, which reserves sufficient engineering technology, manpower and budget, will manage the project facilities for O&M.

MPWWR has already experienced a project implementation under the Grant Aid program of Japan for the Lahoun Regulator, and have known the system and proceedings. Accordingly, smooth implementation of the project under the program will reasonably be expected without any particular issues.

#### 4-2 Recommendation

As afore-mentioned the project has been justified since, by its implementation, it can expect not only considerable direct effects but also contribution to the life standard of the beneficial farm households. And as for O&M of the project facilities, they will be managed by Egypt with proper staff, fund and system without any particular issues.

Following to reconstruction of the Lahoun Regulator and the group regulators and at occasion of this project implementation, following aspects are recommended for improvement. By their improving, some impacts may be expected to other systems in Egypt.

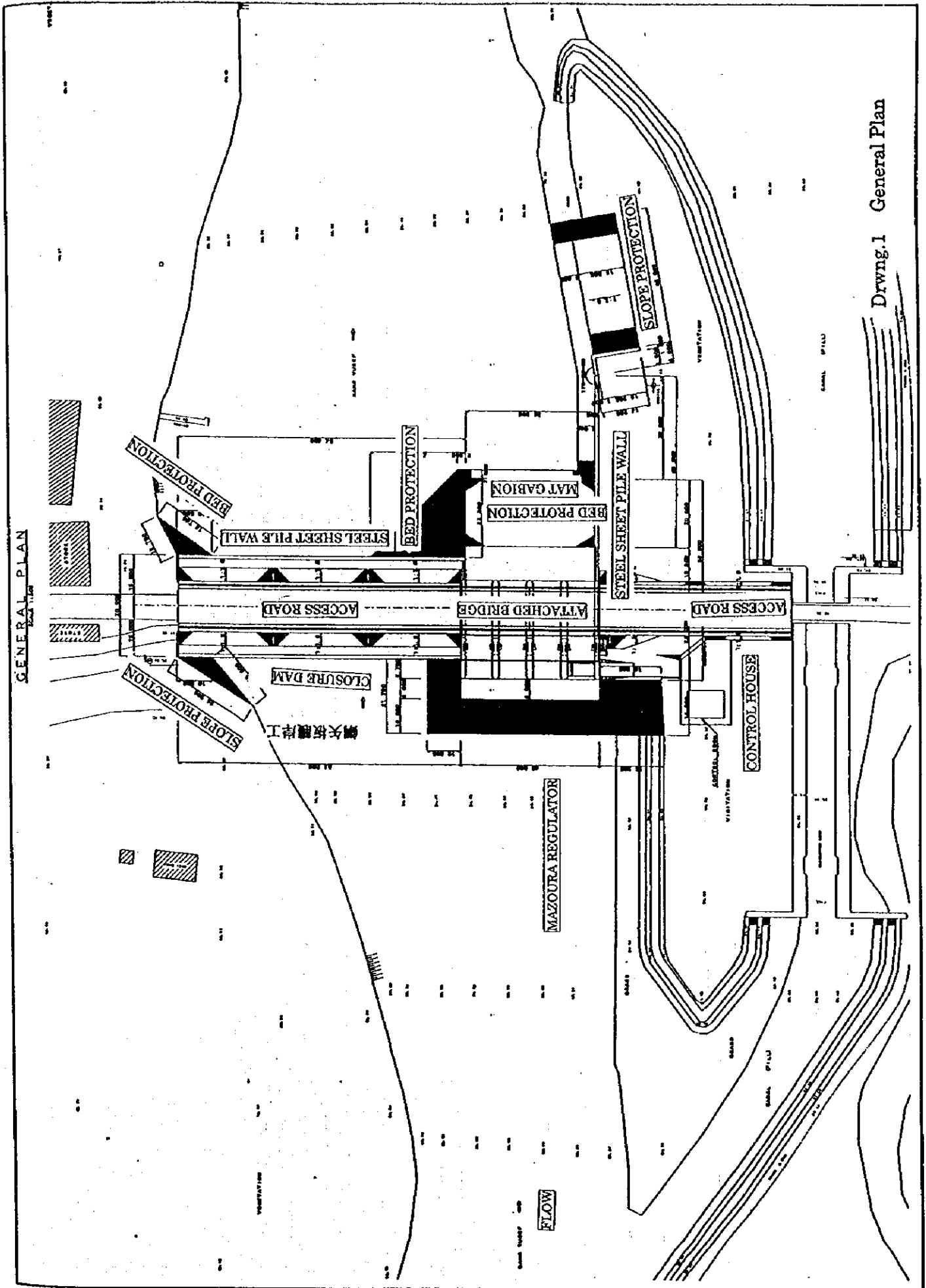
- 1) Formulation of effective water use plans and systematic operation and management of irrigation water for efficient uses, and, in cooperation with MPWWR, provision of guidance by ID to the farmers on proper water use.
- 2) By taking advantage of experience in and following to reconstruction of the Lahoun and Mazoura Regulators, continuous reconstruction of the superannuated existing regulators; the Saquara, El Dahab, Dairout and Ashut regulators in the upper reaches.
- 3) Assignment of qualified and experienced technical staff in irrigation water management to station at the control houses in the Lahoun and Mazoura Regulators. This shall be the models for other similar cases.
- 4) By formulation of an overall water management plan for the whole Bahr Yusef Irrigation canal system and by establishment of maintenance and repair program for the facilities, rehabilitation of the irrigation facilities shall be proceeded aiming at effective use of water resources by establishing a complete system for proper water management, maintenance and repair.

For further efficient and proper delivery and use of irrigation water, following aspects may be pointed out for reinforcement.

- (1) Staff training for more water managing specialists
- (2) Preparation of water management manual
- (3) Reinforcement of water users associations
- (4) Technical cooperation in a mini-project approach

## Drawings

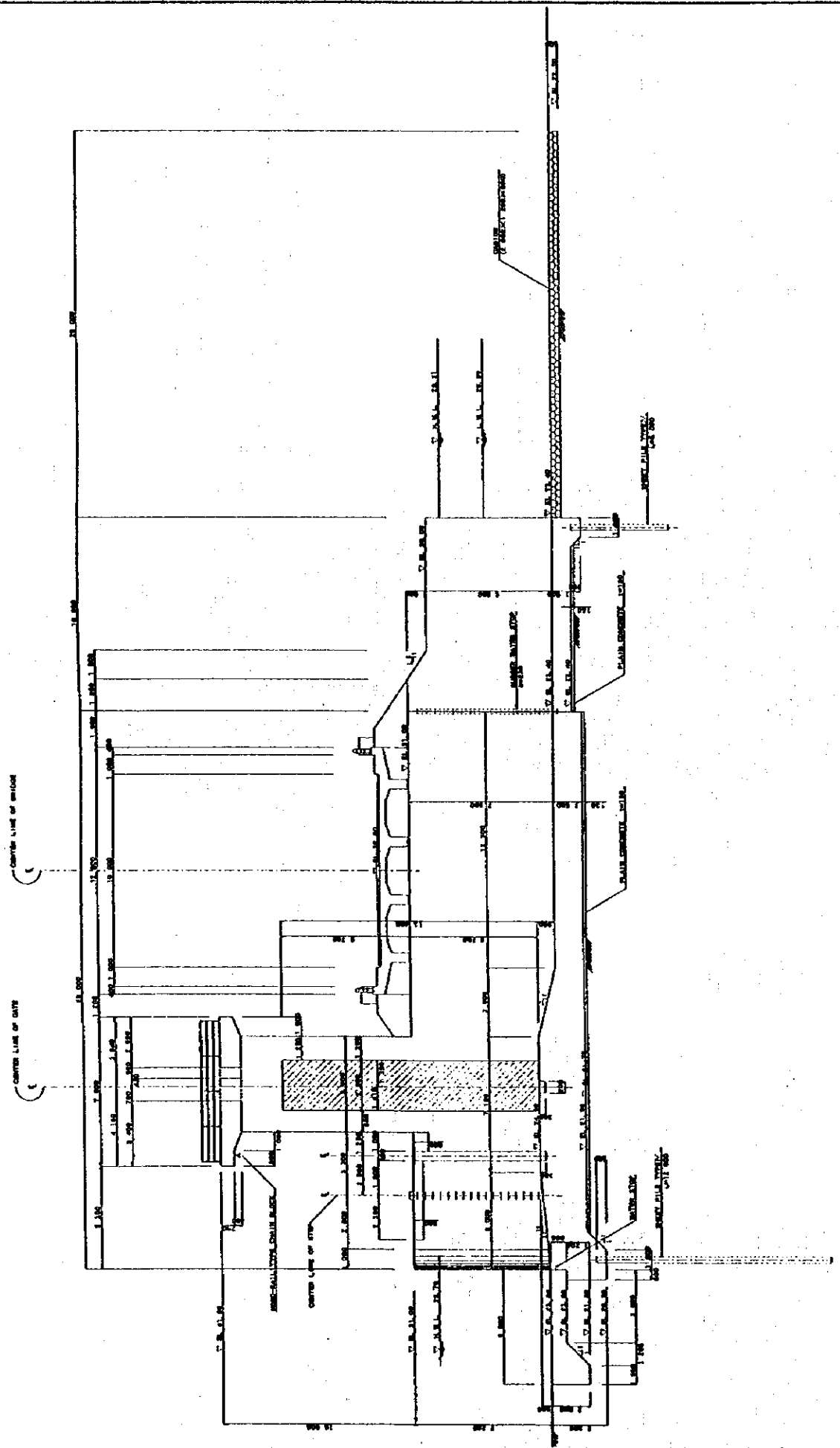




Drwg.1 General Plan

LONGITUDINAL SECTION OF MAZOURA REGULATOR

SCALE 1/100



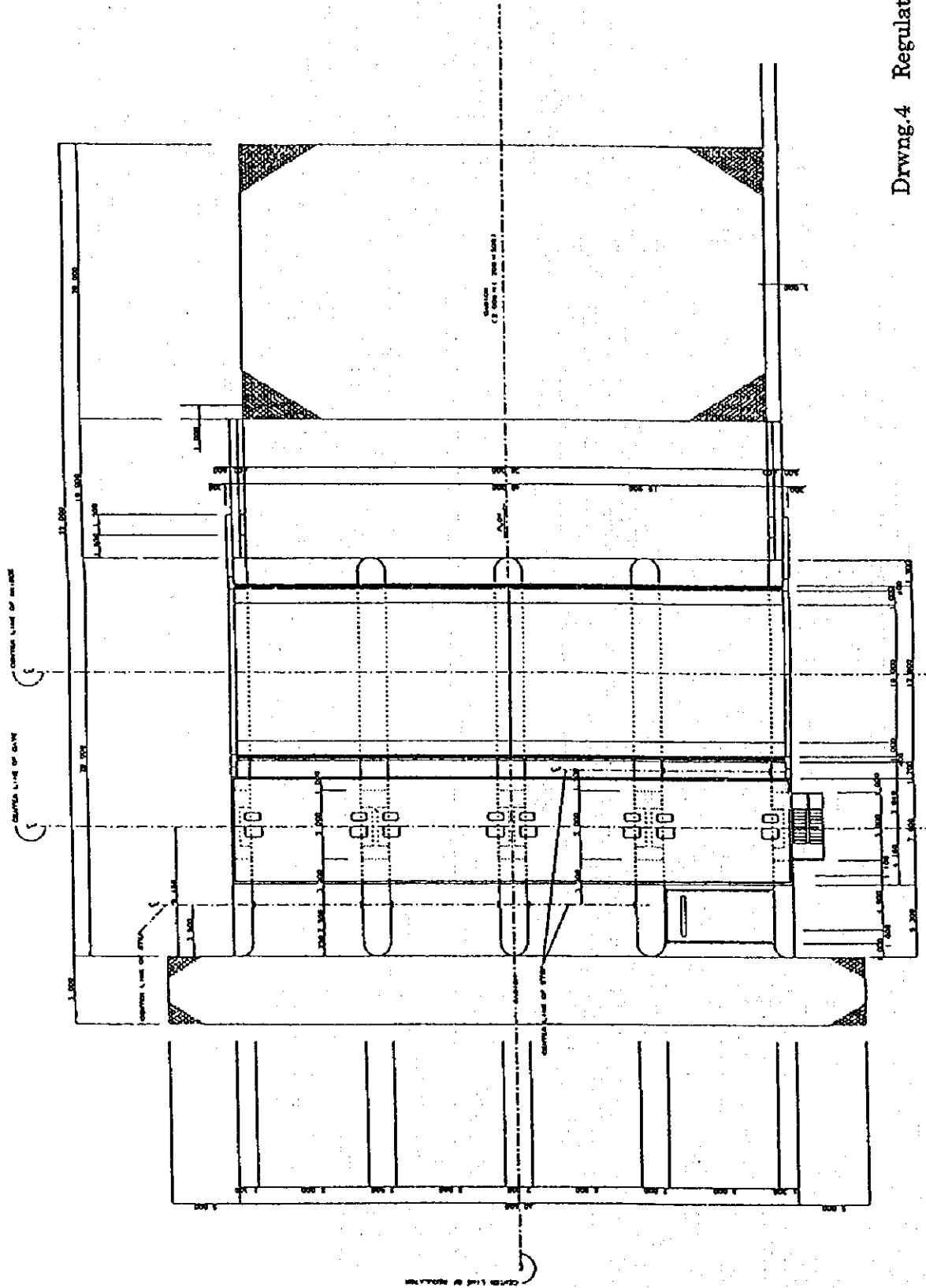
Drwg. 2 Vertical View





PLAN OF MAZOURA REGULATOR

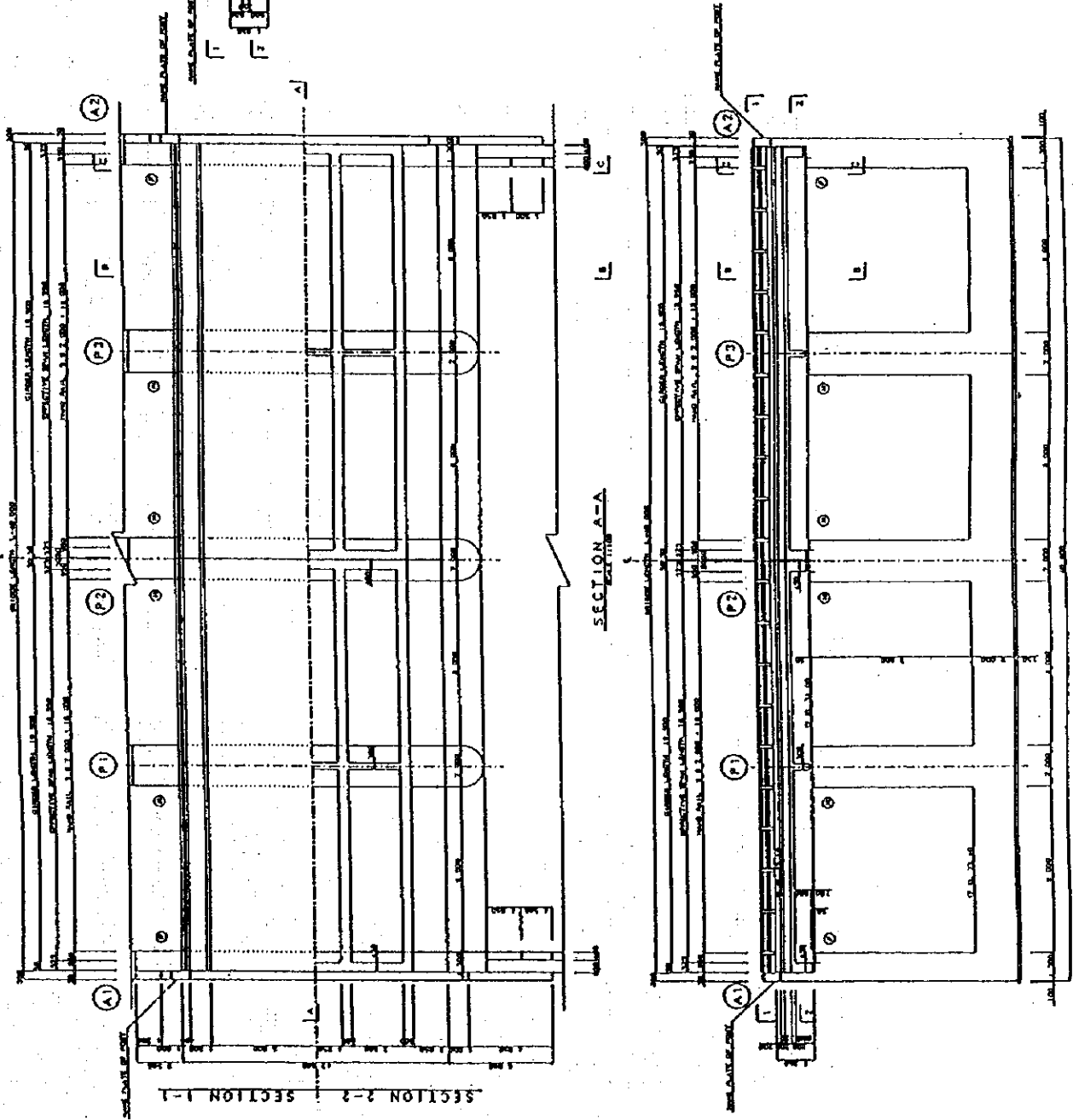
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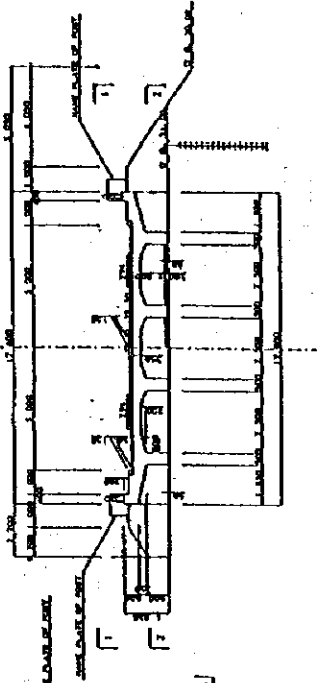
Drwg.4 Regulator Plan

MAZOURA REGULATOR BRIDGE

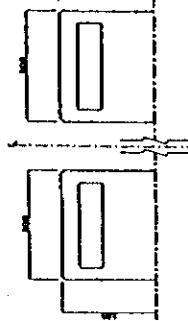
PLAN  
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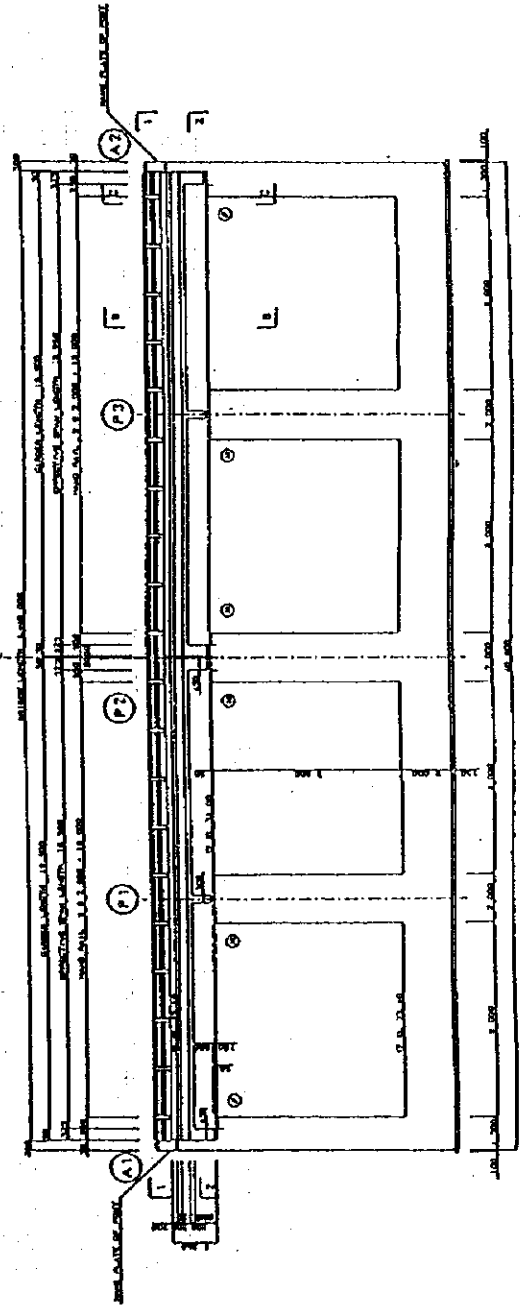
SECTION B-B  
SECTION C-C  
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NAME PLATE OF POST  
SCALE 1/100



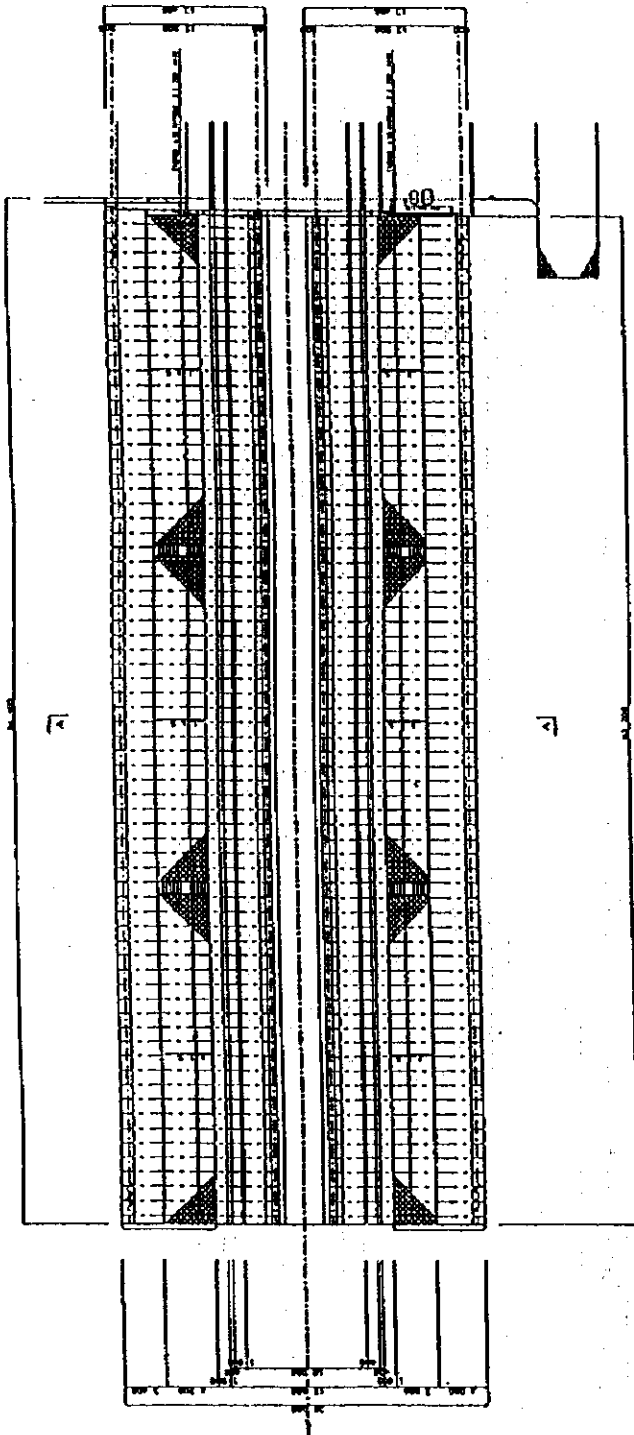
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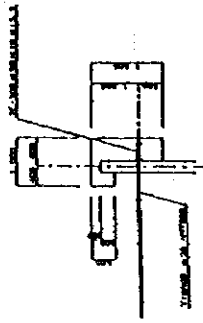
Drwng.5 Attached Bridge Plan

SIX FT PILE PROTECTION WALL (L)

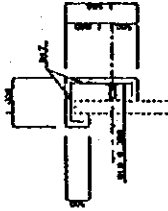
PLAN



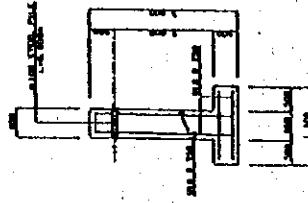
DETAIL OF COVER CONCRETE



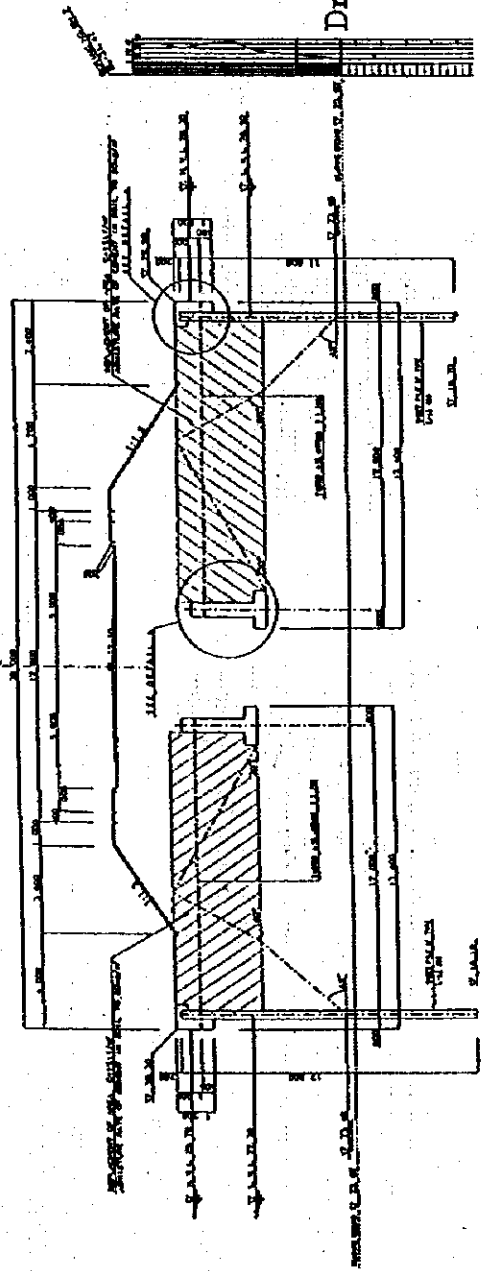
DETAIL A



DETAIL B



SECTION A-A

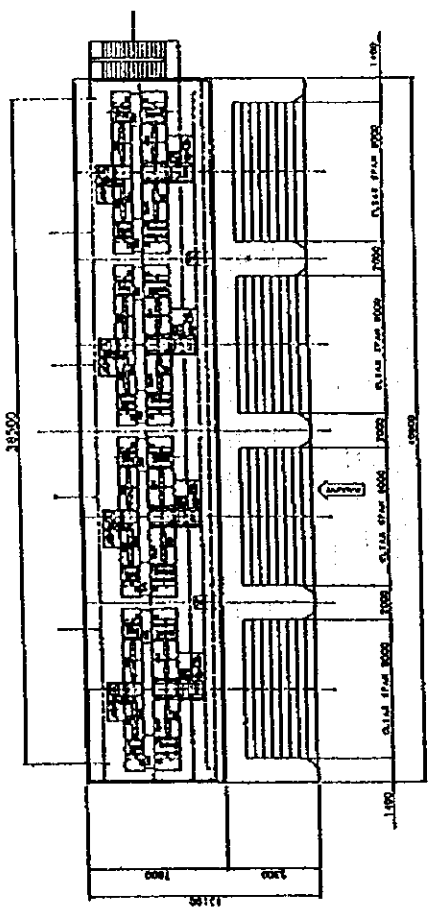


Drwg.6 Vertical View of Attached Road

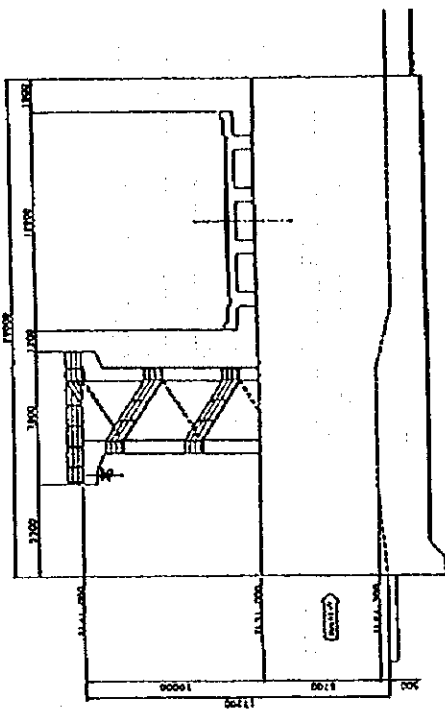
and Retaining Wall



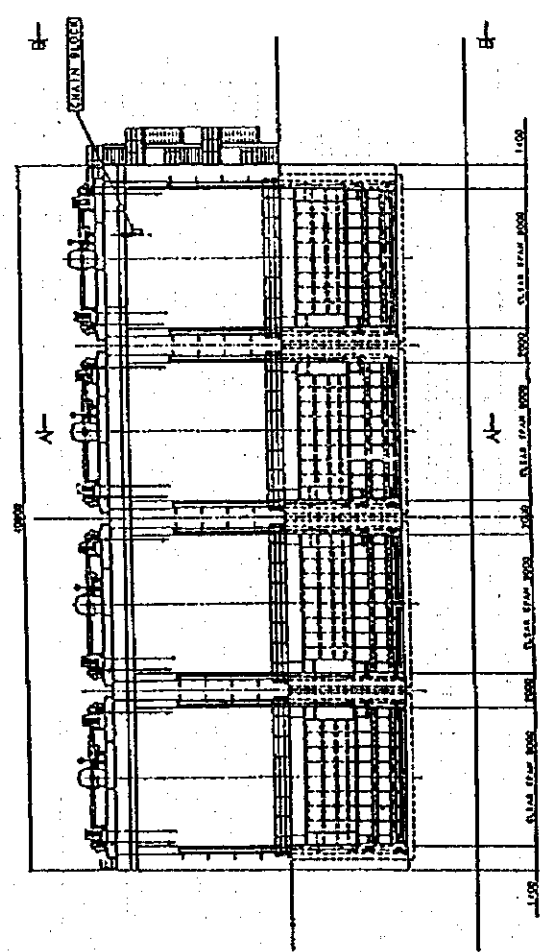
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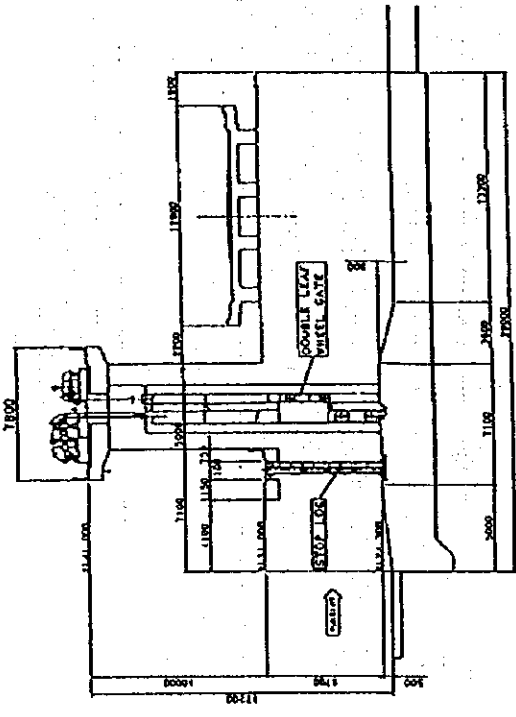
B-B 1:1150



ELEVATION 1:1150



A-A 1:1150



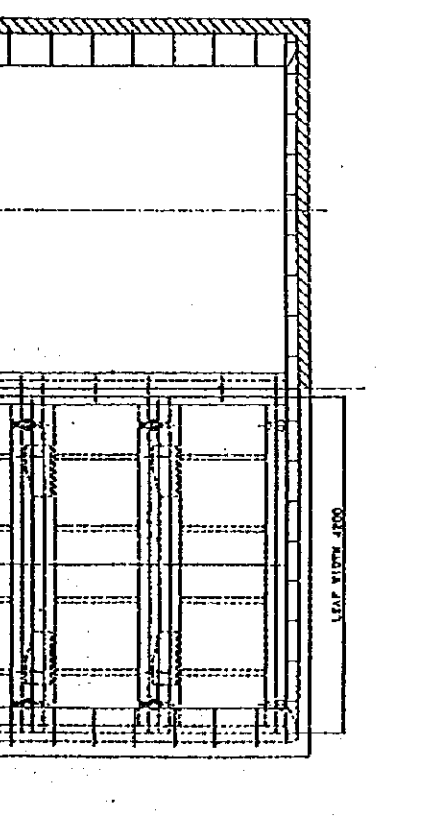
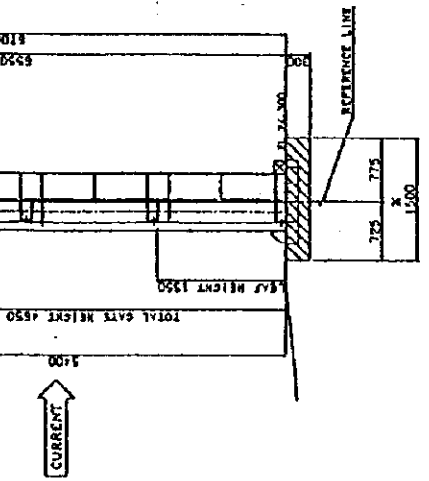
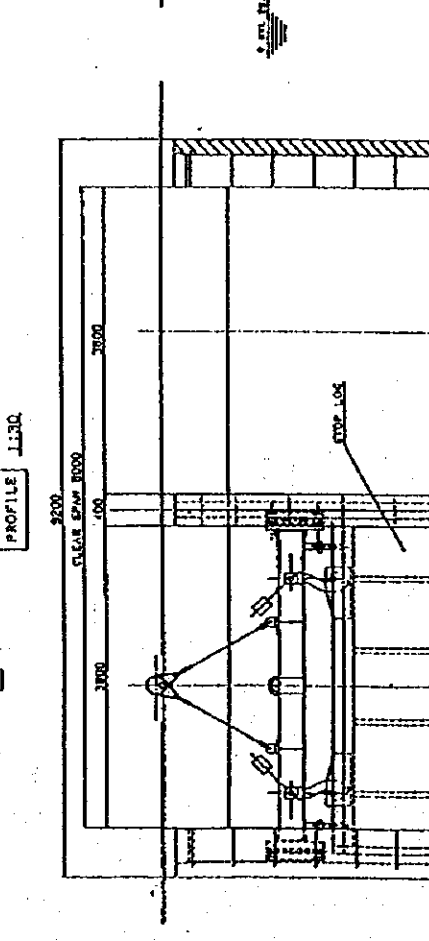
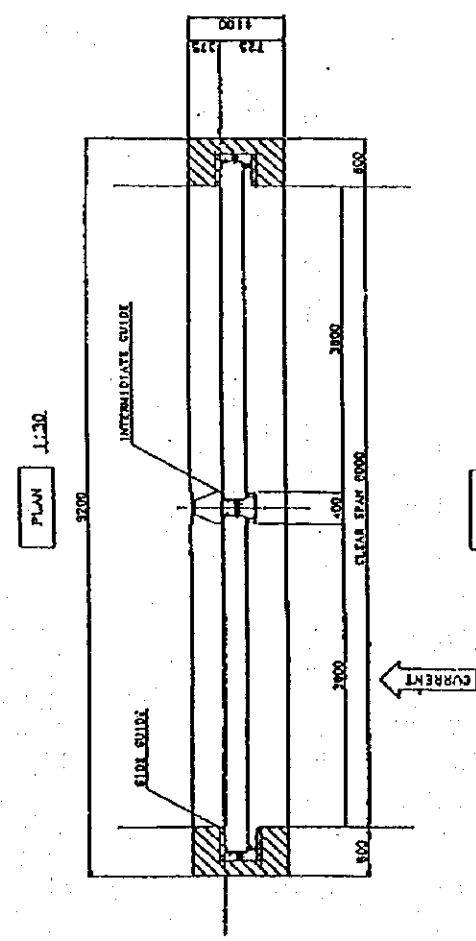
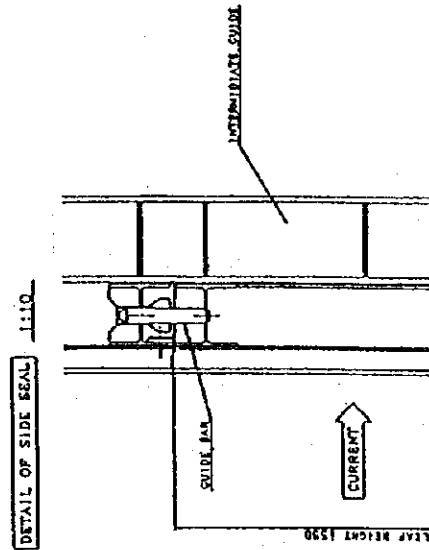
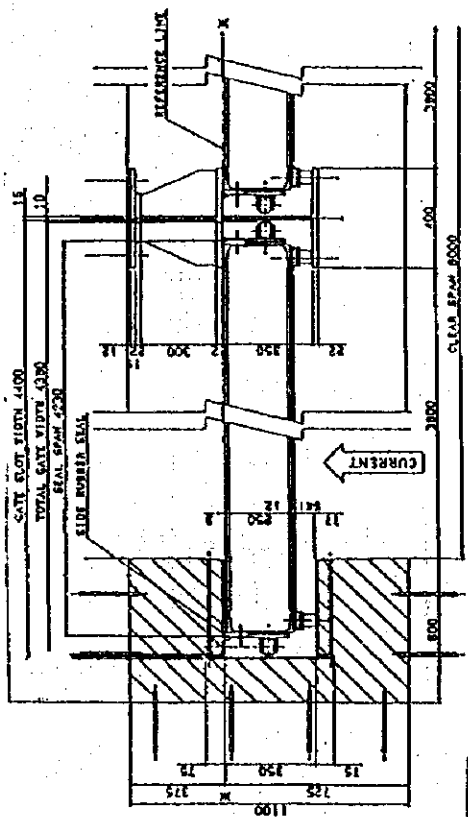
Drwng.8 Gate Facilities General Plan

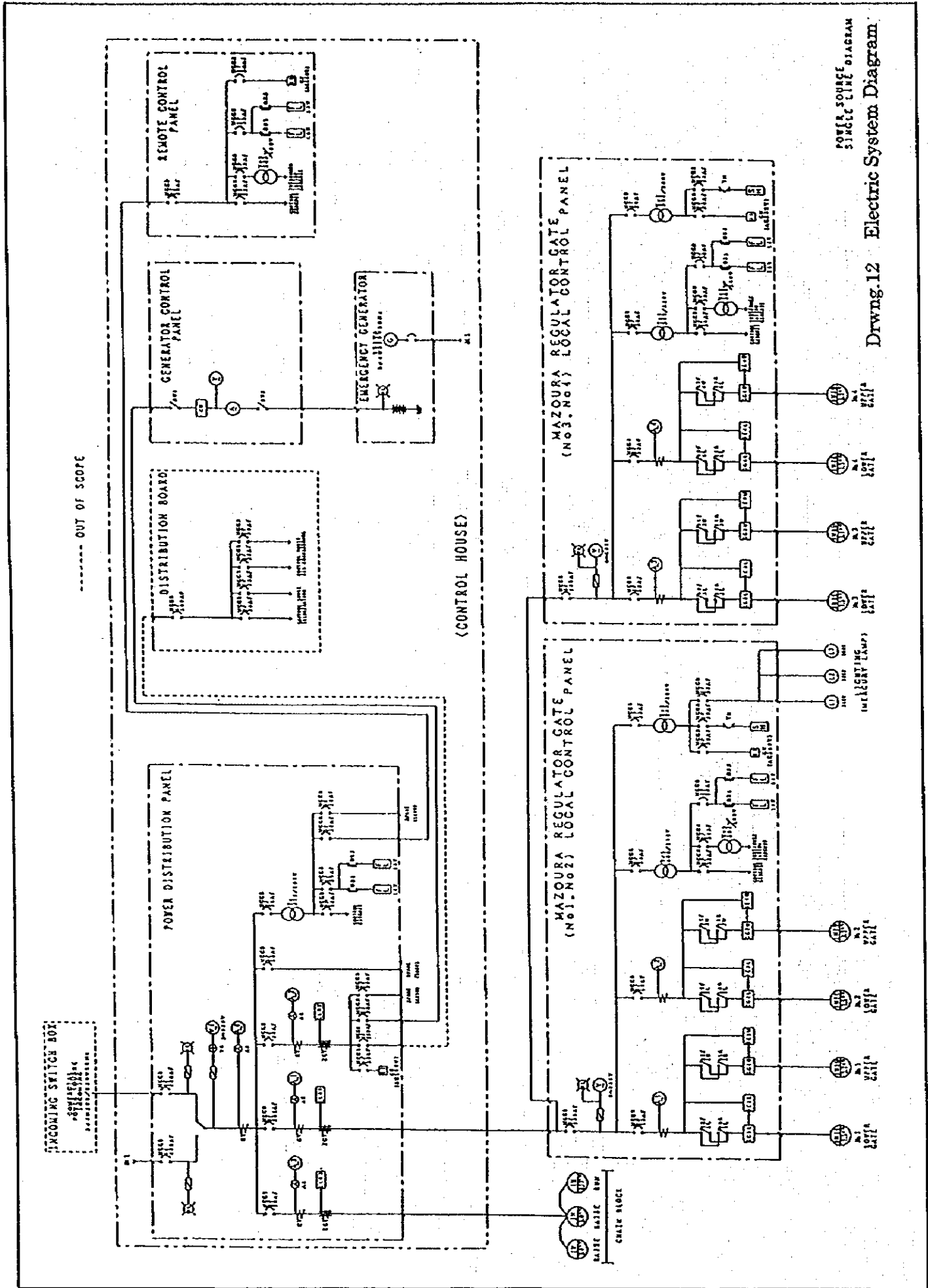


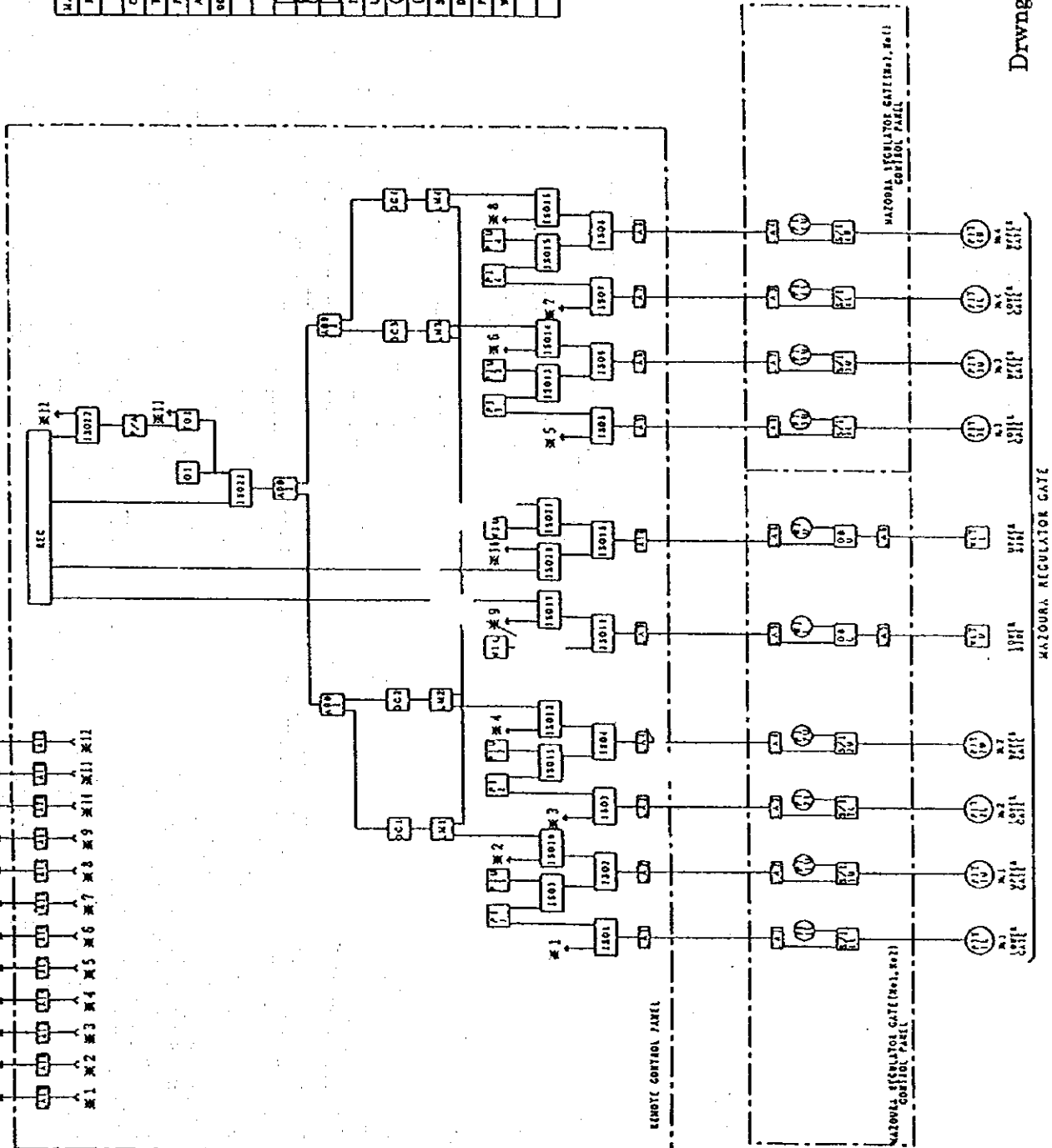
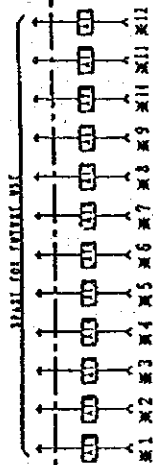




Drwg.11 Seal and Guide Plan







MARK	LETTER	NOTE
REC	RECORDER	
Q1	QUANTITY OF FLOW INDICATOR	DIGITAL
TQ1	TOTAL QUANTITY OF FLOW INDICATOR	DIGITAL
F/A	FRACTIONAL ANALOG TRANSMITTER	
ADD	ADD UNIT	
DC	DC SUPPLYING ELEMENT	
71	POSITION INDICATOR	DIGITAL
72	POSITION INDICATOR (OFFER GATE)	DIGITAL
73	WATER LEVEL INDICATOR	DIGITAL
ISO	ISOLATOR	
LA	LIGHTING ARRESTER	
①	POSITION INDICATOR	ANALOG
②	WATER LEVEL INDICATOR	ANALOG
S/I	STORAGE/CURRENT TRANSMITTER	
DB	DISTIBUTIVE	
P/T	POSITION INDICATOR TRANSMITTER	
W/T	WATER LEVEL TRANSMITTER	

Drwng.13 Instrumentation System Diagram  
INSTRUMENTATION SINGLE LINE DIAGRAM

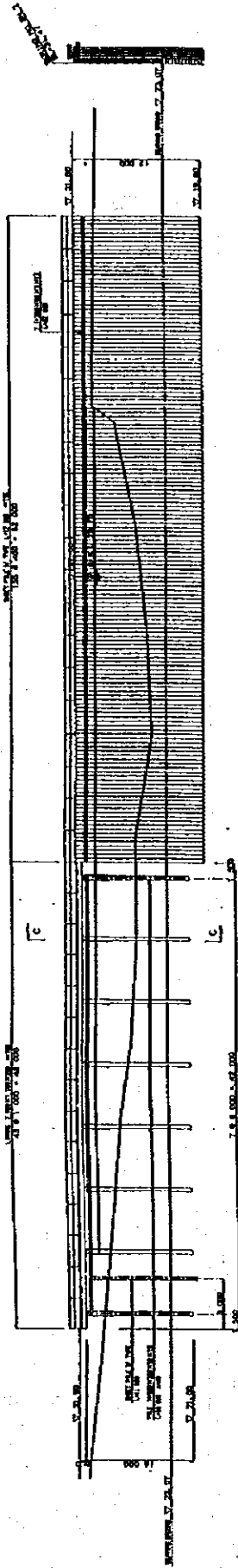
ERECTION DIAGRAM (1/3)



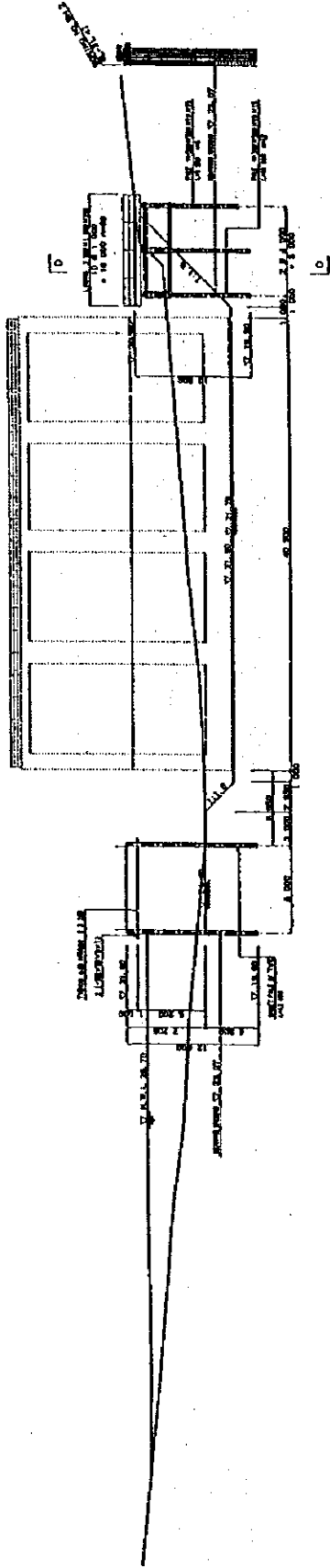
Drwg. 14 Temporary Facilities Plan

ERECTION DIAGRAM (2/3)

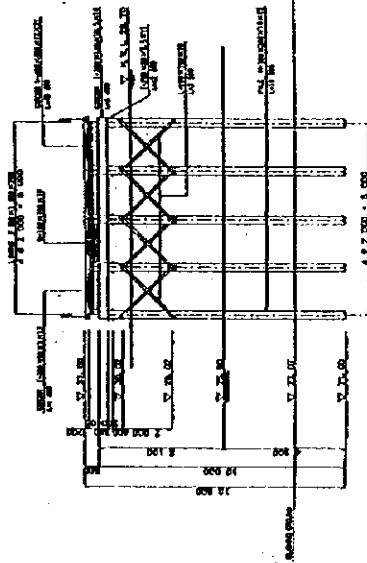
SECTION A-A



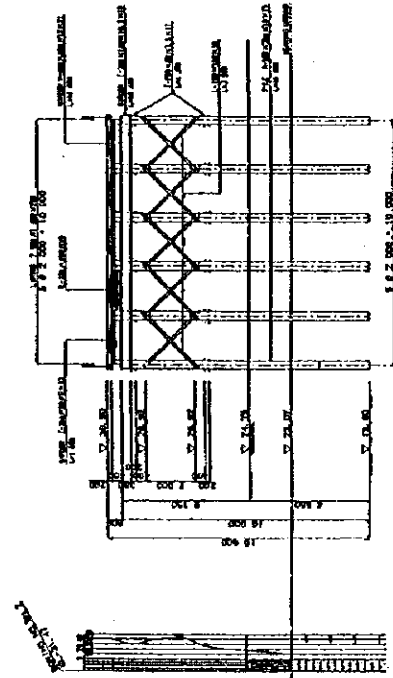
SECTION B-B



SECTION C-C



SECTION D-D



Drwg. 15 Temporary Facilities Plan  
(Temporary Bridge and Double Closing)



## Appendix





## **Data1. The List of the Study Team Members**

### **Basic Design Study on the Project for Rehabilitation and Improvement of Mazoura Regulator of Bahr Yusef Canal in the Arab Republic of Egypt**

#### **The List of the Study Team Members**

**Yasujiro SUZUKI, Leader**

**Deputy Director, Coordination and Appraisal Division, Grant Aid Project Study Department, JICA**

**Kenichi YOSHIDA, Technical Adviser**

**Section Chief, Office of Land Improvement Facilities Management, Administration Division, Agricultural Structure Improvement Bureau, Ministry of Agriculture, Forestry and Fisheries**

**Yoshiteru TSUJI, Coordinator**

**First Project Study Division, Grant Aid Project Study Department, JICA**

**Kazuo OHTSUBO, Project Manager / Operation and Management Planner**

**Shunichi HOSONO, Irrigation Facilities Planner / Designer**

**Toyotaka NIWA, Construction Planner**

**Yasuo TERAMURA, Cost Estimator / Procurement Planner**

### **The Explanation of Draft Basic Design Study on the Project for Rehabilitation and Improvement of Mazoura Regulator of Bahr Yusef Canal in the Arab Republic of Egypt**

#### **The List of the Study Team Members**

**Narihide NAGANO, Leader**

**Development Specialist, Institute for International Cooperation, JICA**

**Yoshiteru TSUJI, Coordinator**

**First Project Study Division, Grant Aid Project Study Department, JICA**

**Kazuo OHTSUBO, Project Manager / Operation and Management Planner**

**Shunichi HOSONO, Irrigation Facilities Planner / Designer**

Data 2. Schedule of the field Study

1) Schedule of the field study ( 1998 )

Date	Travel	Planned Action
March 22 (Sun)	arrive in Frankfurt	Leave Tokyo for Frankfurt
23 (Mon)	arrive in Cairo	Leave Frankfurt for Cairo
24 (Tue)		Make a courtesy visit to the Embassy of Japan in Cairo • Ministry of International Cooperation • Irrigation Improvement Sector, Ministry of Public Works and Water Resources • Egypt Office, JICA
25 (Wed)	arrive in Beni suef	Explain the study inception report and have a consultation to HIrrigation Improvement Sector. Leave Cairo for Beni suef. Give the on-the-spot explanation to the surveyors and boring contractors.
26 (Thu)	arrive at Cairo	Conduct a on-the-spot survey ( survey on the existing facilities : Mazoura Regulator and Rahoun Regulator ). Leave Beni suef for Cairo.
27 (Fri)		Arrange data and have a meeting.
28 (Sat)		Report the results of the on-the-spot survey and have a consultation on "Draft of the minutes" at Irrigation Improvement Sector.
29 (Sun)		Submit and explain "Draft of the minutes" to the official in charge at Irrigation Improvement Sector.
30 (Mon)		Have the final consultation on "Draft of the minutes" at Irrigation Improvement Sector.
31 (Tue)		Sign the memorandum of discussion (M/D). 2 members of the study team attend the on-the-spot survey and the measuring and boring survey. Cairo ⇄ Beni suef
April 1 (Wed)		Report the on-the-spot survey to Cairo office of JICA and the Embassy of Japan in Egypt.
2 (Thu)	Officials leave Cairo	3 officials return to Japan( leave Cairo for London). Members of study team conduct the on-the-spot survey( leave Cairo for Beni suef ). Visit the governorate of Ministry of Water Resources and Ministry of Agriculture.
3 (Fri)		On-the-spot survey : give the practical explanation of the method to survey the present condition of Mazoura Regulator, and observation of discharge and traffic to the site workers.
4 (Sat)		On-the-spot survey : conduct the survey on crop planting, farmers' consciousness, and management conditions of similar facilities. Leave Beni suef for Cairo.
5 (Sun)		Conduct a survey on the construction material market and transportation route of the imported materials by land.
6 (Mon)		Conduct a survey on the construction machinery market and constructors.
7 (Tue)		Conduct a survey on lease companies.
8 (Wed)		Inspect the construction sites of similar facilities.
9 (Thu)		Inspect the plants of electric machinery.
10 (Fri)		have a study team meeting
11 (Sat)		On-the-spot survey : leave Cairo for Beni suef and conduct a supplementary survey. Collect data, and examine the results of survey on discharge observation and traffic at the site office.
12 (Sun)		On-the-spot survey, inspection of similar facilities and data collection.

April 13 (Mon)		On-the-spot survey. Inspect similar facilities, receive the survey draft and draw the layout.
14 (Tue)		Visit the provincial office. Supplementary site survey. Examine the boring sample. Leave Beni suef for Cairo.
15 (Wed)		Report the results of on-the-spot survey at Irrigation Improvement Sector and Egypt office of JICA. Receive a report of the results of surveying and boring.
16 (Thu)		Have the final meeting on the design standard necessary for the layout and the basic design survey at Irrigation Improvement Sector. Report the results of the final site survey at the Embassy of Japan in Egypt and Egypt office of JICA.
17 (Fri)	Leave Cairo	Leave Cairo for Frankfurt.
18 (Sat)	Leave Frankfurt	Leave Frankfurt.
19 (Sun)	(Return to Japan)	- for Tokyo.

2) Schedule of explaining the draft of the report

Date	Travel	Planned action
August 15 (Sat)	Arrive in Frankfurt	Leave Tokyo for Frankfurt.
16 (Sun)	Arrive in Cairo	Leave Frankfurt for Cairo.
17 (Mon)		Inform the arrival to Irrigation Improvement Sector of Ministry of Public Works and Water Resources and Egypt office of JICA.
18 (Tue)	Officials arrive in Cairo.	Explain the survey draft report to Irrigation Improvement Sector. Officials arrive.
19 (Wed)		Make a courtesy visit to the Embassy of Japan in Egypt and Egypt office of JICA. Discuss the draft report at Irrigation Improvement Sector of Ministry of Public Works and Water Resources.
20 (Thu)		On-the-spot survey. Leave Cairo for Beni suef. Supplementary survey of Mazoura Regulator and Rahoun Regulator.
21 (Fri)		Leave Beni suef for Cairo. Have a team member meeting.
22 (Sat)		Submit and explain "Draft of the minutes" to the official in charge at Irrigation Improvement Sector.
23 (Sun)		Have the final consultation on "Draft of the minutes" at Irrigation Improvement Sector.
24 (Mon)		Sign the memorandum of discussion at Ministry of International cooperation. Report to Egypt office of JICA and the Embassy of Japan in Egypt. Officials Return to Japan.
25 (Tue)	Leave Cairo	Study team members return to Japan. Leave Cairo for Frankfurt.
26 (Wed)	Arrive in Tokyo	Leave Frankfurt for Tokyo.

### Data3. The List of Egyptian Members Concerned

#### JICA TEAM MEETINGS from 17 March – 17 April 1998.

Cairo:

Ministry of Public Works & Water Resources:

1. H. E. Dr. Mahmoued Abou Zied  
Minister of Public Works & Water Resources

The Japanese mission together with Mr. Nakano & Mr. Fuwa met him to introduce their selves, the purpose of the project and to ask for his assistance.

2. Eng. Yehia Abd El-Aziz  
Head of Irrigation Sector  
Tel. 3123763

We introduced our selves to him and the purpose of the mission's stay in Egypt.

3. Eng. Ramsis Bakhoun  
Head of Greater Dams & Barrages

We introduced our selves and the purpose of the mission in Egypt and asked him about the design or criteria of constructing the regulators in Egypt. He said that for designing the bridges upon regulators there are not any written document but all the engineers now it in mind.

4. Eng. Fayek Abd El-Said  
Head of Horizontal Extension  
& Eng. Zebada, his office Manager

We asked about the extension plan for the new lands around Mazoura regulator and they said there is not any plan for extension nearby Mazoura.

5. Eng. Liala El-Roby  
Head of Monitoring & Planning  
Tel. 3123709

We introduced ourselves to her and asked her about the five years plan for MPWWR and if Mazoura is mentioned or not. We also asked her about the National plan and she gave us a letter to mention that Mazoura is mentioned in the National Plan for the fiscal year 97/98 & it will be mentioned in the coming fiscal year upon the request of the MPWWR. She also gave us the actual costs of the MPWWR and its sectors for the last three years and the number of workers in the MPWWR.

Irrigation Improvement Sector (IIS)

6. Eng. Nabil Fawzy Nashid  
First Undersecretary, Head of Irrigation Improvement Sector  
Tel. 2204513

We held many meetings with him and discussed every thing related to the Project and he helped us in collecting the required data and take appointments with the responsible persons.

7. Eng. Alaa Ismail  
Technical Office  
Tel. 2203802

He helped in collecting the required data about the navigation lock and road authority and etc.

8. Eng. George  
Design

We discussed with him the possibility of designing Mazoura Regulator according to the MPWWR designs.

*BENI SUEF*

1. Eng. Mohamed Abd El-Hamed El-Orabie  
Head of Central Directorate for MPWWR in Beni Suef  
Tel. 082/322300

We introduced the mission purpose to him and we asked him for his assistance in collecting the required data and to fix appointment with the Governor. Also we explained to him the security situation. He said it is better if the Japanese demolish the old regulator and replace it with the new one.

We also met his assistant Eng. Eman Ismail, office Manager of the Technical Office.

2. Eng. Ahmed Farid  
Deputy General Director of Irrigation Directorate in Beni Suef.  
Tel. 082/312828

We asked him about the information about the water discharge of Mazoura Regulator and information about the maintenance and operation costs of Mazoura and Lahoun Regulators. We also asked him about the water distribution if it is by rotation or continuous flow. Especially about Koftan canal, he said it is by rotation system.

3. Eng. Said Mashady  
Irrigation Inspector & head of Water Advisory Service  
In Beni Suef  
Tel. 082/310404

We asked him about the water levels of Mazoura & Lahoun for the last three years. The number of intakes upstream & downstream Mazoura and map for Mazoura command area. If there is any area in the plan to be improved around Mazoura Regulator. We also asked him if there is letter to forbid the heavy loaded cars from Passing through Mazoura Regulator and he gave us two letters.

4. Eng. Mohamed Kamel  
Water Advisory Services

We asked him to take the measurements of water velocity around Mazoura Regulator and we gave him the equipment to use in measuring the velocity. We discussed with him the water advisory services and the number of Water Users Associations. We also asked him about the irrigation methods before the existing Water Users Association and were it good or not and why they change it by the Water Users Associations. We asked about Sheik El-Mesqa in the past and if he is still existing or not.

5. Eng. Adel Saleh  
Assistance of Eng. Said Mashady
6. Eng. Kamel Abd El-Zaher  
Undersecretary of Agriculture Directorate in Beni Suef  
Tel. 082/322182  
& His assistance Eng. Kamal Khair Hana,  
Director of Lands & Water

We introduced ourselves to him and we asked about the benefits of the project from the agriculture view and he said it will be very good because it will serve the new reclaimed lands which is about 6000 feddan at Sedmant El-Gabal and 18000 feddan at the New Graduated villages. It will give the best way to control the water level and it will replace the old bridge, which is about to collapse at any time. That is why he asked to implement the new Regulator as soon as possible because if it collapsed it will cause great problems, which we can not control.

We also asked him about the number of farmers and kinds of crops, which are cultivated.

Apart from this project he asked the Japanese people to introduce new irrigation methods for all the old lands.

7. Eng. Nour El-Dien Gamal El-Dien  
General Director of Road Department  
In Beni Suef

We asked him about the general criteria of roads and how the Egyptians design the curves. He gave us the plan of the road Authority for the fiscal year 97/98. He said that the width of the bridge upon Mazoura Regulator suppose to be 14 meters total width. He gave us a map about the roads in Beni Suef and he said that the project of Mazoura is very important project because Mazoura Bridge will be linked to the Desert road Asuit/ Cairo. Also because the newly graduate's villages which is near by Mazoura will benefit from this project.

8. Eng. Ahmed Abd El-Attie  
Somesta Irrigation Engineer  
& Eng. Moubarak Riad Moubarak  
Mazoura Irrigation & New Reclaimed Lands Engineer

We met them at the site of Mazoura and we asked them about the benefits of the new regulator and they said for sure it will facilitate the control of the water level and provide water to the new reclaimed areas.

9. Mr. Hussen Abd El-Kawe  
Secretary General of Beni Suef Governorate

We met him to introduce ourselves and to thank him very much about all the efforts of the security in the governorate. He said that the project will be very good for Beni Suef and he thanked the Japanese people for their efforts in Egypt. He hoped more faithful cooperation between the governments of Egypt & Japan.

#### *FAYOUM:*

We stayed at Queen hotel – Minshaat lotf Alla  
Tel. 084/346819  
Fax. 084/346233

1. Eng. Samir Yakoub  
Head of Fayoum Central Directorate for Irrigation Improvement  
Tel. 084/344936  
Fax. 084/343137

We explained to him the purpose of the Japanese mission and we asked for his assistance in arranging the security.

2. General / El-Said El-Badwie  
Head of Security in Fayoum

We explained to him the purpose of the Japanese mission in Egypt and we asked for his assistance for arranging security guards for the members of the mission during their stay in Fayoum & Beni Suef.



Data4. Minutes of Discussions

1)

MINUTES OF DISCUSSIONS  
ON THE BASIC DESIGN STUDY  
ON THE PROJECT FOR REHABILITATION AND IMPROVEMENT OF MAZOURA  
REGULATOR OF BAHR YUSEF CANAL  
IN THE ARAB REPUBLIC OF EGYPT

In response to a request from the Government of the Arab Republic of Egypt, the Government of Japan decided to conduct a Basic Design Study on the Project for Rehabilitation and Improvement of Mazoura Regulator on Bahr Yusef Canal (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Egypt the Basic Design Study Team (hereinafter referred to as "the Team") which is headed by Mr. Yasujiro Suzuki, Deputy Director, Coordination and Appraisal Division, Grant Aid Project Study Department, JICA, and is scheduled to stay in the country from March 23 to April 17, 1998.

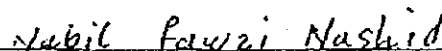
The Team held discussions with the officials concerned of Egypt and conducted a field survey at the study area.

In the course of the discussions and field survey, both parties have confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study report.

Cairo, March 31, 1998

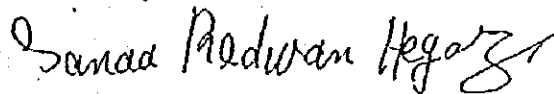


Mr. Yasujiro Suzuki  
Leader  
Basic Design Study Team  
Japan International Cooperation Agency



Eng. Nabil Fawzi Nashid  
Head of Irrigation Improvement Sector (IIS)  
Ministry of Public Works and Water Resources  
(MPWWR)

Witnessed by:



Mrs. Sanaa Radwan Hagazi  
Director General of Asia Department  
Ministry of International Cooperation (MOIC)

## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to provide irrigation water efficiently and stably for the beneficial area around Mazoura Regulator on Bahr Yusef Canal.

### 2. Project site

The Project site which is 58 km upstream from the Lahoun Regulator on Bahr Yusef Canal, as shown in ANNEX-1, is located in the vicinity of Mazoura village, Beni Suef Governorate.

### 3. Responsible and Executing agency

The Irrigation Improvement Sector (IIS), the Ministry of Public Works and Water Resources (MPWWR) is responsible for the administration and execution of the Project. The organization chart of MPWWR is shown in ANNEX-2.

### 4. Items requested by the Government of Egypt

After discussions with the Team, the following items were finally requested by the Egyptian side.

- Reconstruction of Mazoura Regulator including
  - attached road bridge
  - canal bed protection at downstream side
  - bank protection at upstream & downstream side
  - control house

However, the final components of the Grant Aid will be decided after further studies.

### 5. Japan's Grant Aid Scheme

(1) The Egyptian side has understood the Japan's Grant Aid Scheme explained by the Team, as described in ANNEX-3.

(2) The Egyptian side will take the necessary measures, as described in ANNEX-4 for smooth implementation of the Project, on condition that the Grant Aid by the Government of Japan is extended to the Project.

### 6. Schedule of the Study

(1) The consultants will proceed to further studies in Egypt until April 17, 1998.

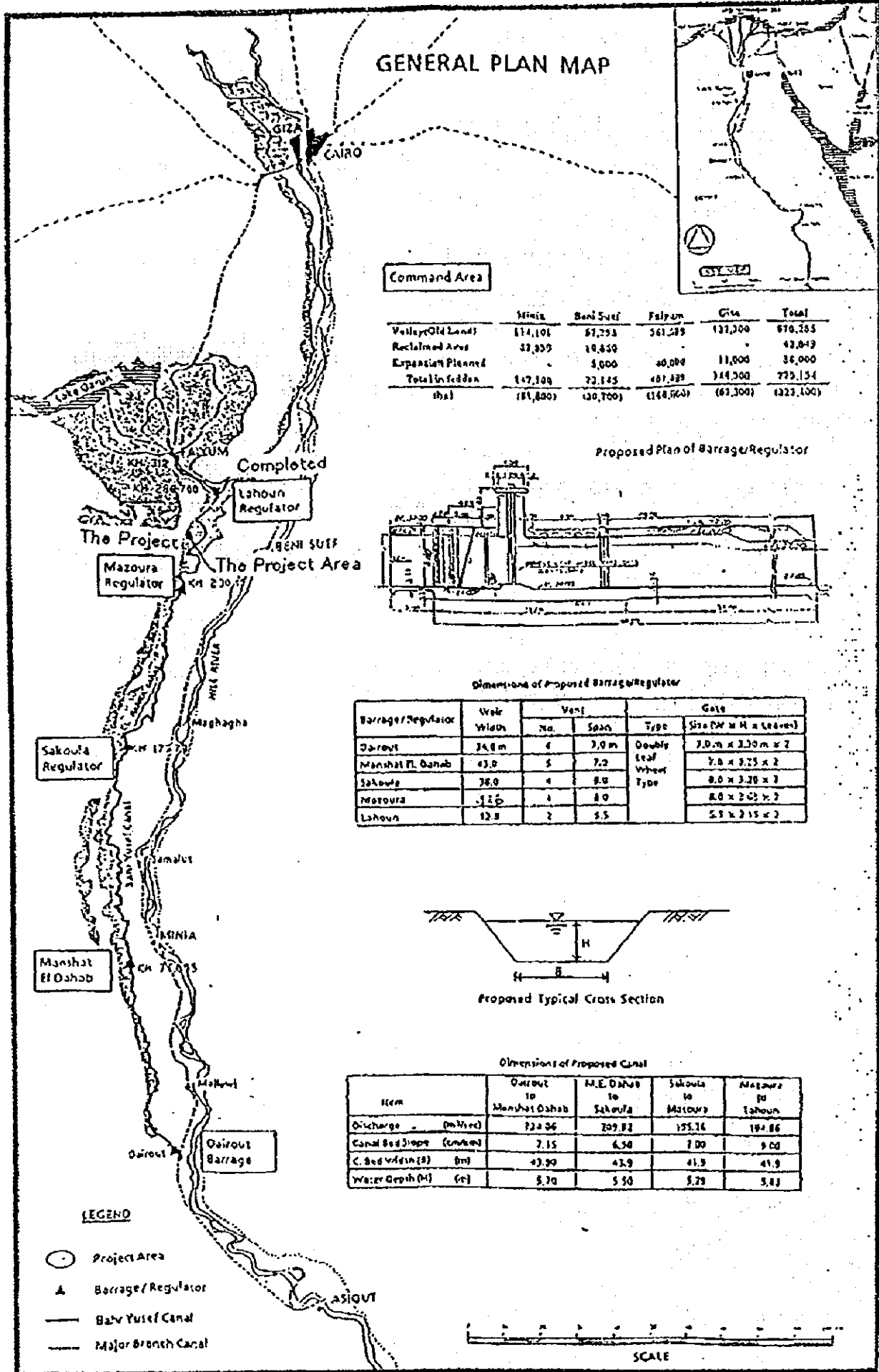
(2) JICA will prepare the draft report in English and dispatch a mission in order to explain its contents in June, 1998.

(3) In case that the contents of the report is accepted in principle by the Government of Egypt, JICA will complete the final report and send it to the Government of Egypt by the middle of September, 1998.

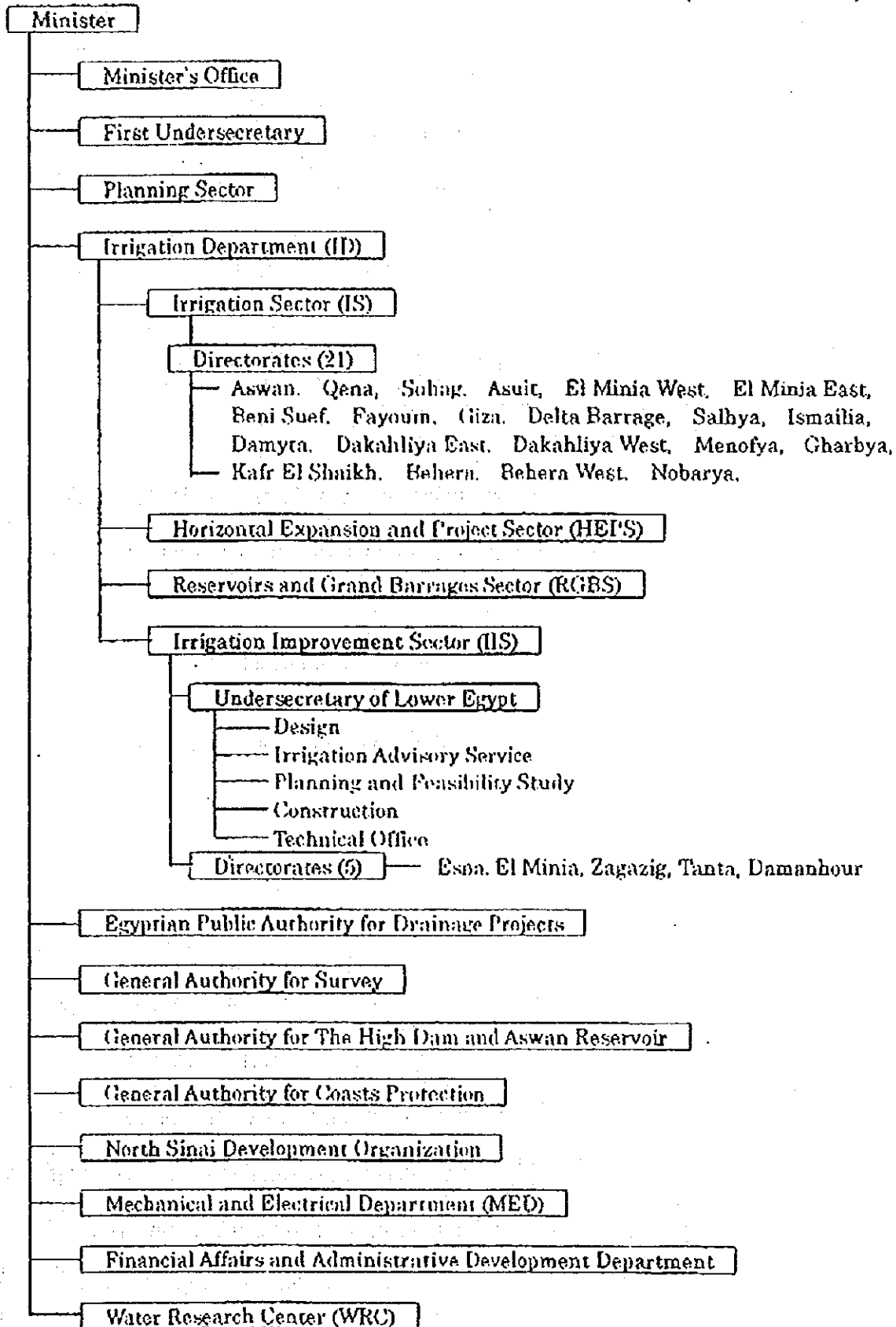
## 7. Other relevant issues

- (1) Since the land expropriation from the farmers might take a long time in Egypt, both sides agreed to formulate the rehabilitation and improvement plan of Mazoura Regulator which does not include expropriating any land properties.
- (2) The Egyptian side explained that the illegally cultivated lands in the Project site should be cleared by the Egyptian side before the commencement of the Project.
- (3) The Egyptian side agreed that the Team would set the appropriate width of the attached road bridge, taking into consideration the present traffic condition and the road development plan around the Project site.
- (4) Although the Ministry of Transportation has already transferred the property in the navigation locks on Bahr Yusef Canal to the Ministry of Public Works and Water Resources (MPWWR), it was confirmed that a written document on the reclamation of the navigation lock on Mazoura Regulator from the Ministry of Transportation should be taken by the Egyptian side and submitted to the Team by April 17, 1998.
- (5) It was confirmed that the Egyptian side should establish the appropriate implementation system including the necessary budget and staff for the operation and maintenance of Mazoura Regulator.
- (6) It was confirmed that the Egyptian side should take all possible measures to secure the safety of the Team during the site survey period in Beni Suef.

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**ORGANIZATION CHART OF  
MINISTRY OF PUBLIC WORKS AND WATER RESOURCES (MPWWR)  
(as of March 1998)**



## Japan's Grant Aid Scheme

### 1. Grant Aid Procedures

1) Japan's Grant Aid Program is executed through the following procedures.

Application	(Request made by a recipient country)
Study	( Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

### 2. Basic Design Study

#### 1) Contents of the Study

The aim of the Basic Design Study (hereafter referred to as "the Study"), conducted by JICA on a requested project (hereafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

- a) Confirmation of the background, objectives, and benefits of the requested Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
- b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
- c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- d) Preparation of a basic design of the Project
- e) Estimation of the costs of the Project

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The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid Project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations in the recipient country through the Minutes of Discussions.

## 2) Selection of Consultants

For the smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firms(s) based on proposals submitted by interested firms. The firm(s) selected carry (ies) out the Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consulting firm(s) used for the Study which is (are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

## 3. Japan's Grant Aid Scheme

### 1) What is Grant Aid ?

The Grant Aid Program provides a recipient country with non-reimbursable funds needed to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under the principals in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

### 2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant Aid" means the one fiscal year in which the Cabinet approves the Project for. Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed. However in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When both Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of the third country.

However the prime contractors, namely, consulting contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or

Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

6) Undertakings required of the Government of recipient country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as the following:

- a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.
- b) To provide facilities of the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.
- c) To secure buildings prior to the procurement in case the installation of the equipment.
- d) To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.
- e) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.
- f) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them as well as to bear all the expenses other than those covered by the Grant Aid.

8) "Re-export"

The products purchased under the Grant Aid shall not be re-exported from the recipient country.

9) Banking Arrangements (B/A)

- a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.

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Necessary measures to be taken by the Government of Egypt

The following necessary measures should be taken by the Government of the Arab Republic of Egypt on condition that the Grant Aid by the Government of Japan is extended to the Project:

1. To provide data and information necessary for the Project;
2. To secure the land necessary for the execution of the Project, such as the Right of Way, Right of bridge, land for temporary offices, working areas, storage yards and others;
3. To clear the sites prior to the commencement of the construction;
4. To make passable all roads and bridges leading to the Project sites before the commencement of inland transportation of materials and equipment;
5. To bear commissions to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement, namely the advising commission of the "Authorization to Pay" and payment commissions;
6. To ensure prompt unloading and customs clearance at ports of disembarkation in the Government of the Arab Republic of Egypt and prompt internal transportation therein of the materials and equipment for the Project purchases under the Grant Aid;
7. To exempt Japanese juridical and physical nationals engaged in the Project from customs duties, internal taxes and other fiscal levies which may be imposed in Egypt with respect to the supply of the products and services under the Verified contracts;
8. 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;
9. To provide necessary permissions, licenses and other authorizations for implementing the Project, if necessary;
10. To maintain and use properly and effectively the facilities constructed and equipment provided under the Project;
11. To coordinate and solve any issues related to the project which may be raised from third parties or inhabitants in the Project area during implementation of the Project;
12. To bear all the expenses, other than those covered by Japan's Grant Aid, necessary for the execution of the Project; and
13. To secure the safety of Japanese national engaged in the Project and to provide tight security against riot, insurrection, civil commotion, rebelling and usurped power.

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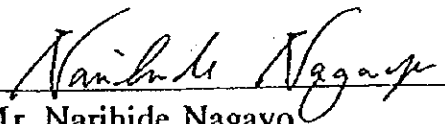
**MINUTES OF DISCUSSIONS  
ON  
THE BASIC DESIGN STUDY  
ON  
THE PROJECT FOR THE REHABILITATION AND IMPROVEMENT  
OF MAROURA REGULATOR OF BAHR YUSEF CANAL  
IN  
THE ARAB REPUBLIC OF EGYPT  
( CONSULTATION ON DRAFT REPORT )**


In March 1998, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study team on the Project for the Rehabilitation and Improvement of Mazoura Regulator of Bahr Yusef Canal in the Arab Republic of Egypt (hereinafter referred to as "the Project") to 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 Egypt on the components of the draft report, JICA sent to Egypt a study team, which is headed by Mr. Narihide Nagayo, Development Specialist, Institute for International Cooperation, JICA and is scheduled to stay in the country from August 18 to August 24, 1998.

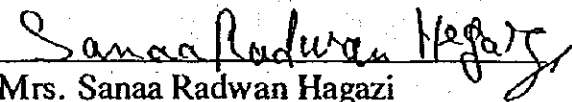
As a result of discussions, both parties have confirmed the main items described on the attached sheets.

Cairo, August 24, 1998

  
Mr. Narihide Nagayo  
Leader,  
Draft Report Explanation Team, JICA

  
Eng. Ramsis Bakhoun  
Head of Irrigation Improvement Sector  
Ministry of Public Works and Water  
Resources(MPWWR)

Witnessed by:

  
Mrs. Sanaa Radwan Hagazi  
Director General of Asia Department  
Ministry of International Cooperation(MOIC)

## ATTACHMENT

### 1. Components of the draft report

The Government of Egypt has agreed and accepted in principal the components of the draft report proposed by the Team.

### 2. Japan's Grant Aid System

(1) The Government of Egypt has understood the system of Japan's Grant Aid System as described in Annex 1.

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

### 3. Presentation of the final report

JICA will make the final report in accordance with the confirmed items and send it to the Government of Egypt by the end of October 1998.

### 4. Other Relevant Issues

(1) It was reconfirmed that the rehabilitation and improvement plan of Mazoura Regulator shall not include expropriate any land properties.

(2) It was reconfirmed that the Egyptian side shall clear the illegally cultivated lands in the Project site and report the completion of it to the JICA office by the end of March 1999.

(3) It was reconfirmed the Egyptian side shall not utilize the navigation lock on Maroura Regulator any longer, as described in Annex 3.

(4) It was confirmed that the Egyptian side shall accept the draft report's suggestion and establish the appropriate implementation system including the necessary budget and staff for the operation and maintenance of Maroura Regulator.

(5) It was confirmed that the Egyptian side should take all possible measures to secure the safety of Japanese national engaged in the Project.

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## Japan's Grant Aid Scheme

### 1. Grant Aid Procedures

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6) Undertakings required of the Government of recipient country

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- b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.

**Necessary measures to be taken by the Government of Egypt**

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3. To clear the sites prior to the commencement of the construction;
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5. To bear commissions to the Japanese foreign exchange bank for its banking services based upon the Banking Arrangement, namely the advising commission of the "Authorization to Pay" and payment commissions;
6. To ensure prompt unloading and customs clearance at ports of disembarkation in the Government of the Arab Republic of Egypt and prompt internal transportation therein of the materials and equipment for the Project purchases under the Grant Aid;
7. To exempt Japanese juridical and physical nationals engaged in the Project from customs duties, internal taxes and other fiscal levies which may be imposed in Egypt with respect to the supply of the products and services under the Verified contracts;
8. 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, according to the laws and regulation enforce in the Arab Republic of Egypt;
9. To provide necessary permissions, licenses and other authorizations for implementing the Project, if necessary, according to the laws and regulation enforce in the Arab Republic of Egypt;



10. To maintain and use properly and effectively the facilities constructed and equipment provided under the Project;

11. To coordinate and solve any issues related to the project which may be raised from third parties or inhabitants in the Project area during implementation of the Project;

12. To bear all the expenses, other than those covered by Japan's Grant Aid, necessary for the execution of the Project; and

13. To secure the safety of Japanese national engaged in the Project and to provide tight security against riot, insurrection, civil commotion, rebelling and usurped power.

S.H





التاريخ : ١٩ / /  
الموضوع :  
المرافقات :

١٢٠٦  
٥١٤

وزارة النقل  
الهيئة العامة للنقل النهري

ادارة :  
ملف : ٢٧/٢/٢٦٠

السيد المهندس / رئيس قطاع التوسع الاقنى ومشروعات تطهير البرى  
وزارة الأشغال العامة والموارد المائية  
تحية طيبة وبعد :

بالاحالة الى كتاب سهادتكم رقم ٦٦٢ بتاريخ ٢١ / ٣ / ١٩٩٨ بخصوص الافادة من حالة  
الملاحة النهرية والنقل واحتياجات البحر اليوسفى للاهوسة .  
المرجو التفضل بالاحاطة بان البحر اليوسفى ليس ضمن شبكة الطرق الملاحة حاليا لكثرة  
مع حركة الوحدات النهرية الآلية من حيث الأبعاد والحمولات مما يجعل أى مشروع للتطوير  
باهظ التكاليف وان عائد الاقتصادى ضعيف فى ظل تطور وسائل النقل البرى والسكة الحديدية  
وامتداد شبكة الطرق البرية المرصوفة .  
لذلك فان الهيئة ترى عدم جدوى تطهير البحر اليوسفى لخدمة أغراض الملاحة النهري  
الآلية ويستطلع رأى وزارة الادارة المحلية فى مدى حاجتها لاستخدام البحر اليوسفى فى أغراض  
الملاحة الشراعية .

وتفضلوا بقبول فائق الأحترام

فى : ٢٠ / ٥ / ١٩٩٨  
صحبى

رئيس الادارة المركزية للشئون الفنية

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٥١٤٠

مهندس / سحر حسين امسالم

٥٠١  
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**From : Ministry Of Transport  
Public Authority For Rivery Transport**

**To: Ministry Of Public Works And Water Resources**

**Att: Chief Sector Of Horizontal Expansion & Irrigation Developing Projects.**

**Dear Sir,**

Referring to your letter Ref. No. 667 dated 29/3/1998. Concerning your requests about conditions of Rivery Navigation and Transport and requirements of Canal Locks for Bahr- Youssef.

Kindly be informed that Bahr- youssef now is not included in navigation routes network due to many obstacles in its route such as Bridges. In addition , the water sector of bahr- youssef and its locks is not suitable to the movement of self propelled river boats concerning dimension and loads which makes any project for development extremely expansion and uneconomical in the view of vast developing of other means of transportation such as in-lands, railways and expansion of paved roads grid.

Therefore , the authority see that any project for developing bahr-youssef for Rivery Navigation is in-feasible.

Yours Faithfully,

**Chief Of Central Dept.  
of Technical Affairs**

**Eng. Samir Hussein Imam.**

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## Data5. Country Data

1994. 6.

Arab Republic of Egypt

### 1. General Index

Country Name	Arab Republic of Egypt
Politic Body	Republic Government
Head of State	President Mohamed Mubarak
Date of Independent	February 28, 1922
Racial Structure	Eastern Hamitic 90%
Language	Arabic, English
Religion	Sunny Islam 94%
United Nation	Entry on October, 1945
World Bank/IMF	Entry on December, 1945
National Area	1,001,000 square kilometer
Population	59,586 thousand person (1993)
Capital City	Cairo
Main City	Cairo, Alexandria, Port Said
Labor	15 million person (1989)
Education System	
Population Density	55.0 person / km <sup>2</sup> (1992)
Population Growth Rate	2.3% (1993)

### 2. Economic Index

Currency	Egyptian Pound (LE)	
Currency Exchange Rate	1 US\$ = 3.38 LE	
Fiscal Year	July to June	
National Budget		
Annual Income	41,406 million LE (1991)	
Annual Expenditure	47,563 million LE (1991)	
Balance of International Payment	3,360 million \$ (1992)	
Income from ODA	3,538 million \$ (1992)	
Gross Domestic Product (GDP)	34,602 million \$ (1992)	
GDP per Capita	610 \$ (1991)	
GDP ratio per Industry	Agriculture	18.0%
	Manufacture and Mining	30.0%
	Service Industry	52.0%
Employment Structure	Agriculture	42.0%
	Manufacture and Mining	21.0%
	Service Industry	37.0%
Economic Growth Rate	0.3% (1992)	
International Trade		
Export	3,051 million \$	
Import	8,245 million \$	
Main Export Product	Crude Oil, Petrochemical Product, Cotton, Textile, Meet	
Main Import Product	Machine and Equipment, Food, Fertilizer	

Export to Japan	92 million \$ (1992)
Import from Japan	584 million \$ (1992)
Foreign Currency Holding	12,681 million \$ (1994)
Foreign Currency Debt	40,431 million \$ (1992)
Debt Return Ratio	15.4% (1992)
Inflation Ratio	19.5% (1992)

### 3. Meteorological Data (1937 ~ 1979, Cairo)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mean
Maximum Temperature	18.0	21.0	24.0	26.0	33.0	35.0	36.0	35.0	32.0	30.0	26.0	20.0	28.1°C
Minimum Temperature	8.0	9.0	11.0	14.0	17.0	20.0	21.0	22.0	20.0	18.0	14.0	10.0	15.3°C
Mean Temperature	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0°C
Precipitation	5.0	5.0	5.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	5.0	29.0 mm

### 4. ODA Performance from Japan

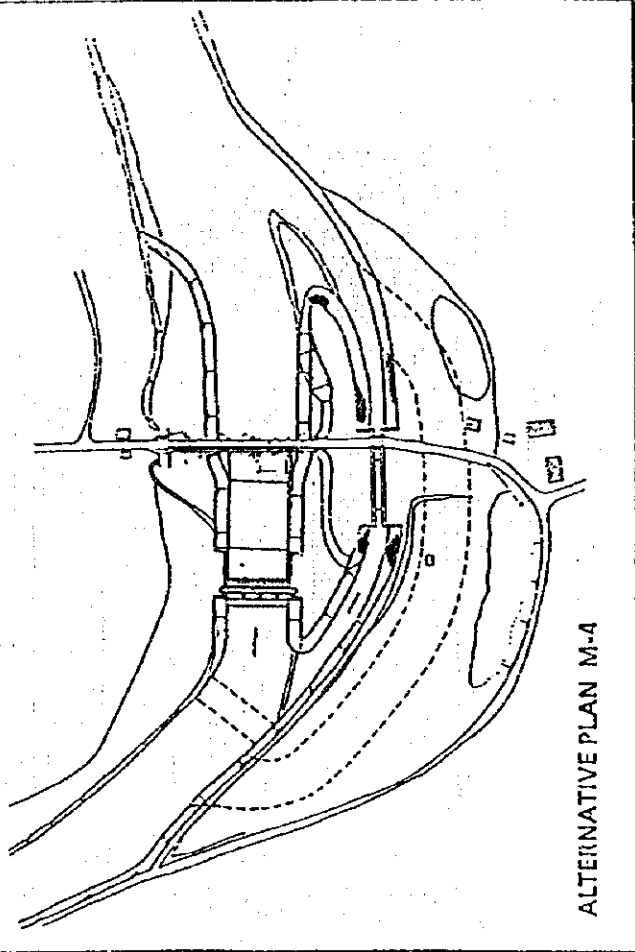
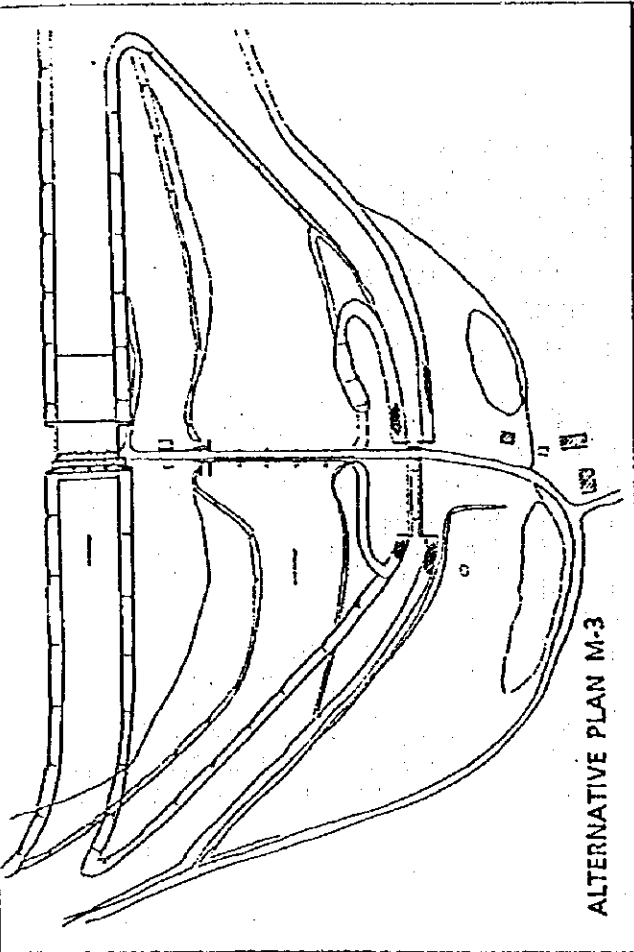
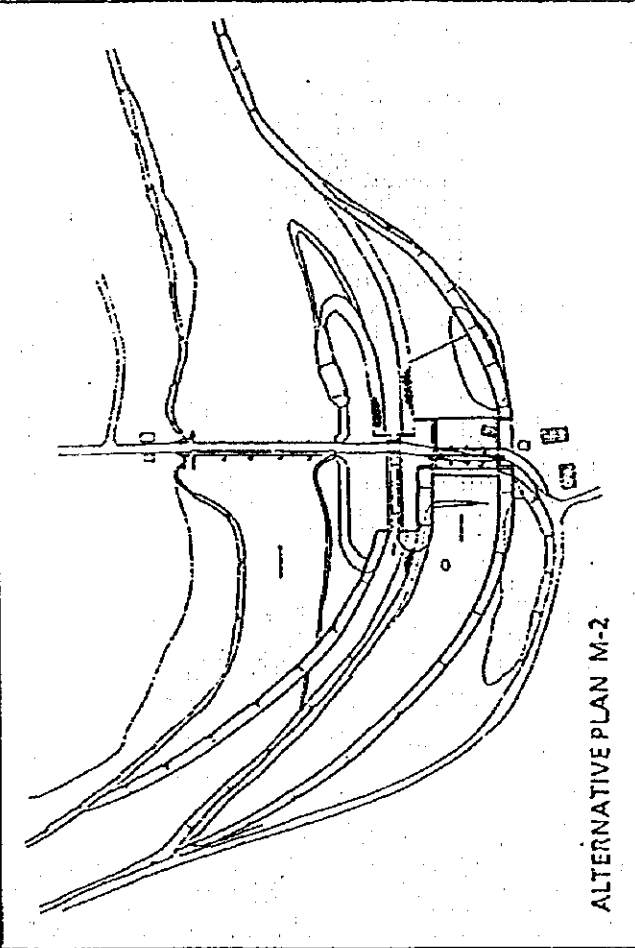
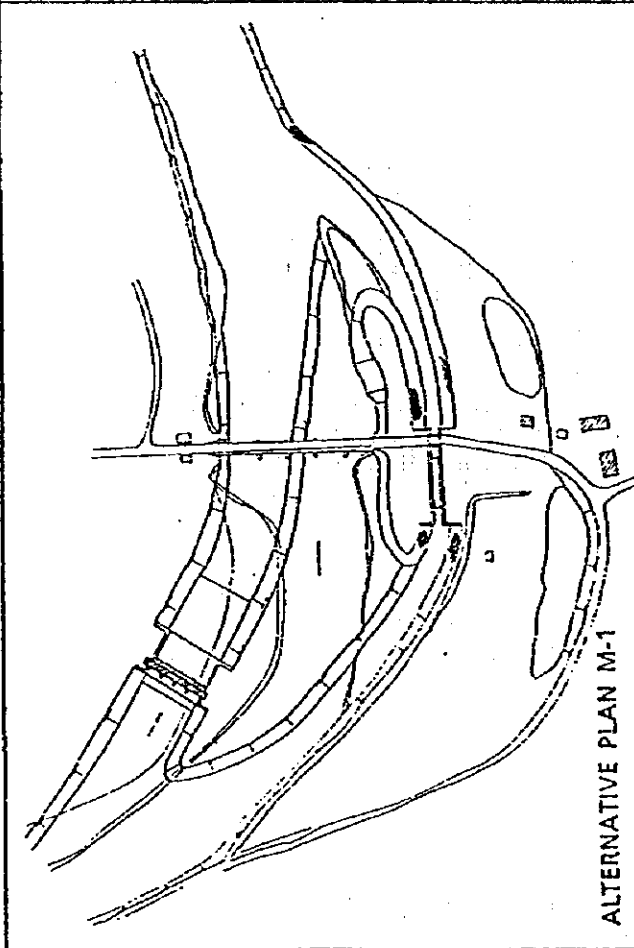
(Unit: Million US\$)

Description	Year			
	1989	1990	1991	1992
Grant Aid	18.61	19.14	17.05	24.46
Technical Cooperation	32.99	45.28	23.99	44.16
Loan Assistance	27.05	34.44	578.53	41.97
Total	78.65	98.86	619.57	110.59

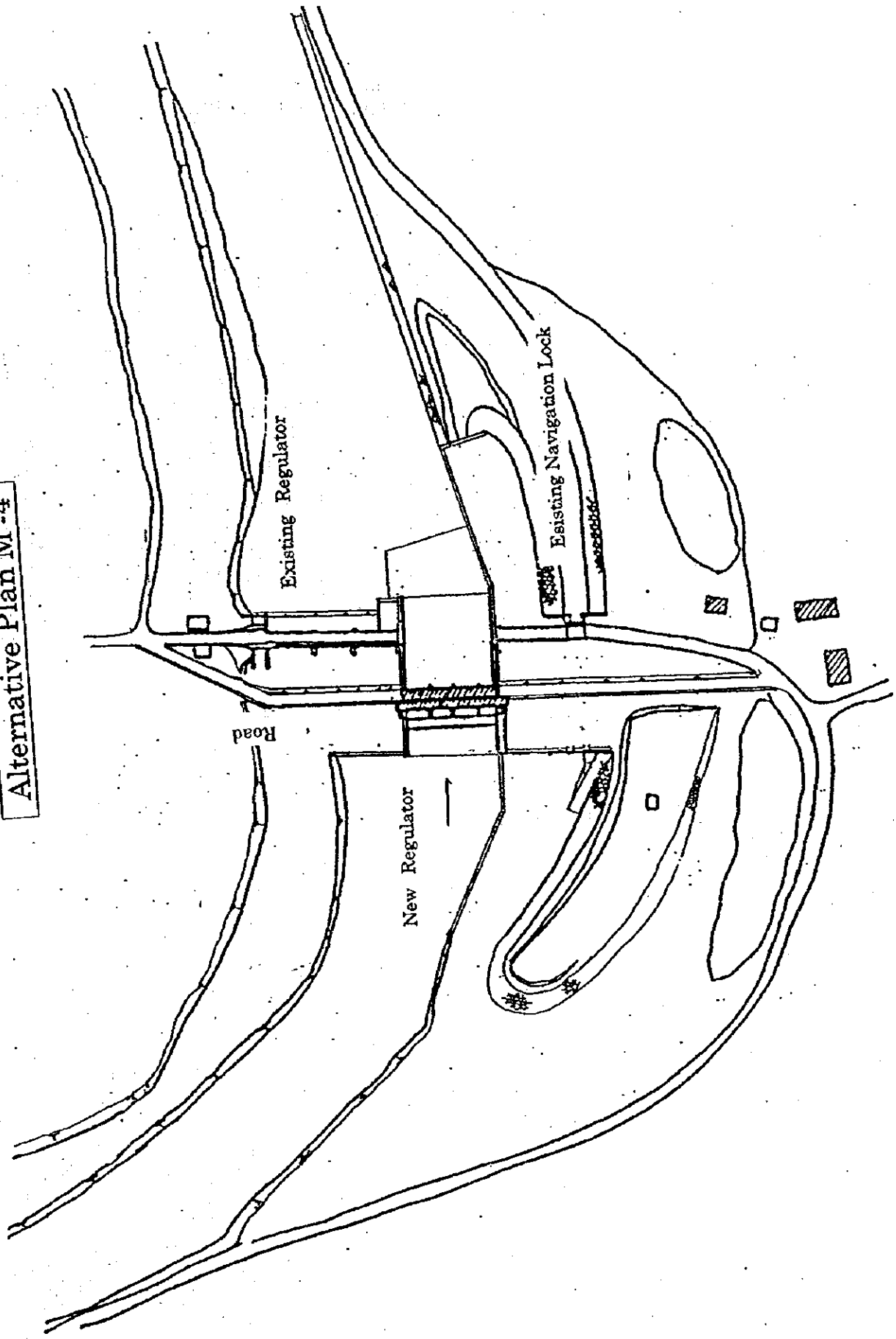
Reference: The World Factbook (C.I.A)  
 Human Development Report (UNDP)  
 International Financial Statistics (IMF)  
 World debt Tables (WORLD)  
 New World Handbook (Tokyo Publication)

6 Alternative Plans and Selected Plan

Alternative Plans



Alternative Plan M'-4



**Data 7. Unit Construction Cost for Attached Bridge (per m in length)**

Cost estimation is made for 2m in width

unit Yen

Work Item	Specification	Quantities	Unit	Unit Price	Price
Rubber Shoe	20te×4n	0.2	m2	542,000	108,400
Installation of Rubber Shoe		0.6	m	12,400	7,440
Anchor bar	Sp30	5	pcs	5,022	25,110
Flexible Joint		6	pcs	6,500	399,000
Hand Rail		0	m		
Steel Mesh		0.011	t	76,000	836
Stiero-Form	t=50	15	m2	1,980	29,700
Stiero-Form	t=20	3	m2	990	2,970
Concrete		84	m3	1,630	1,369,200
Form Work		84	m2	7,240	608,160
Reinforcing Bars		5.9	t	87,500	516,250
Scald form		20.3	m2	2,020	41,006
Total					3,108,072



## Data 8. Effects of the Water Level of the Lower Reaches by Gate Operation in Emergency Case

### Examination at an Emergency Case

An emergency case is examined in this clause that is the most dangerous case in an existing canal condition when the maximum existing discharge ( $Q=140\text{m}^3/\text{sec}$ ) is flow in the upstream of the Mozoula regulator and the upstream water level is raised up to HHWL 30.30m due to a mis-operation of the gates. Then all of the upper leaf gates are lowered completely up to the lowest gate top elevation GTL 27.2m as well as the Lahoun group gates shall be opened accordingly. In this case the maximum discharge is estimated as  $Q_{\text{max}}=172.16\text{ m}^3/\text{sec}$  and the downstream water level raises up to HHWL 30.20 as shown in the Over Flow Discharge Table. This condition may continue in about 14 hours to lower the upstream water level up to HWL 29.70m. This rough estimation is done by using the existing rating discharge curve at the Mazoula Regulator provided by th ID in Benisuef. Based on this estimation the following matters may occur in the down stream of the Mazoura Regulator.

1. The water flows down in the both sides of the existing dikes of the Bahr Yusef Canal not to overflow the dikes.
2. Some of the cultivated area between the both dikes in vicinity of the Mazoura Regulator may be inundated by 50cm in the lower places than EL 30.20m during 14 hours.
3. After the canal excavation is completed by 70cm as the proposal in the F/S report, this inundation ma not occur even in the Maximum discharge conditions ( $189.79\text{ m}^3/\text{sec}$ ).

Case 1 Existing Canal

### Over flow Discharge

Over Flow

Rectangular Type

Adopted Formula

Itaya/Tejima's Formula

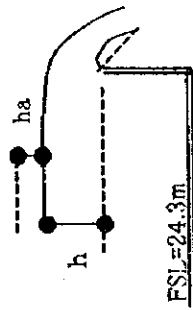
$$Q = Cbh^{3/2}$$

$$C = 1.785 + 0.00295/h + 0.237h/D - 0.428\sqrt{((B-b)h/(BD))} + 0.034\sqrt{(B/D)}$$

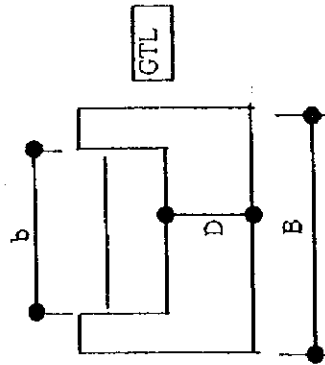
Source; Irrigation, drainage and reclamation engineering hand book

Francis's Formula

$$C = 1.84\{1 - 0.2(h/b)\}$$



HHWL



B=	8 m
b=	6.5 m
HHWL=	30.3 m
FSL=	24.3 m
HGTL=	30.1 m

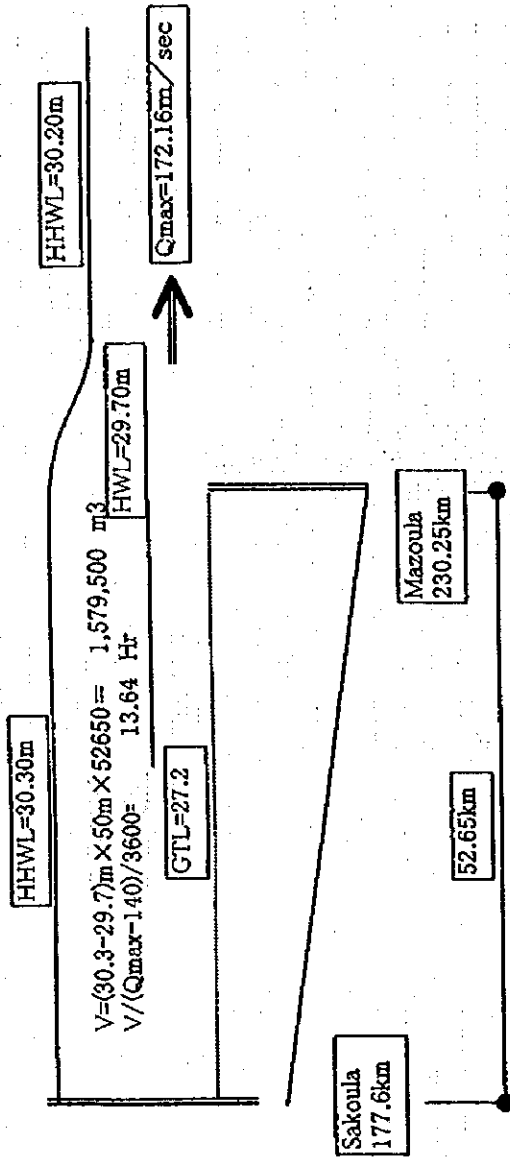
Gate Sill Elevation

# Perfect Over Flow Discharge

Gate Top Elevation		Gate Condition			IS Formula			Francis' Formula			Condition for POF			Condition for SOF	
		Flow Depth	Gate Depth	Gate Opening	Flow Coefficient $C_d$	Flow Discharge	Total	Flow Coefficient $C_t$	Flow Discharge	Total	Critical Water Level	Down Stream Water Level	Existing DSLW	Submerged Over Flow Discharge	Existing Water Level
CTL#	h=	D=	x=	C=	Q=	4XQ	C=	Q=	4XQ	hc	DWL		4XQ		
	30.1	0.2	5.8	0.0	1.778	1.034	4.136	1.829	1.063	4.252	0.00	30.10	26.147		
	30.0	0.3	5.7	0.1	1.770	1.891	7.564	1.823	1.947	7.788	0.00	30.00	26.232		
	29.9	0.4	5.6	0.2	1.765	2.903	11.612	1.817	2.988	11.952	0.01	29.91	26.333		
	29.8	0.5	5.5	0.3	1.763	4.051	16.204	1.812	4.164	16.656	0.01	29.81	26.446		
	29.7	0.6	5.4	0.4	1.761	5.319	21.276	1.806	5.456	21.824	0.02	29.72	26.571		
	29.6	0.7	5.3	0.5	1.760	6.700	26.800	1.800	6.852	27.408	0.04	29.64	26.706		
	29.5	0.8	5.2	0.6	1.760	8.184	32.736	1.795	8.349	33.396	0.06	29.56	26.850		
	29.4	0.9	5.1	0.7	1.760	9.767	39.068	1.789	9.929	39.716	0.08	29.48	27.003		
	29.3	1.0	5.0	0.8	1.760	11.443	45.772	1.783	11.590	46.360	0.11	29.41	27.164		
	29.2	1.1	4.9	0.9	1.762	13.210	52.840	1.778	13.333	53.332	0.14	29.34	27.332		
	29.1	1.2	4.8	1.0	1.763	15.063	60.252	1.772	15.141	60.564	0.18	29.28	27.507		
	29.0	1.3	4.7	1.1	1.765	17.002	68.008	1.766	17.014	68.056	0.23	29.23	27.688		
	28.9	1.4	4.6	1.2	1.767	19.024	76.096	1.761	18.961	75.844	0.29	29.19	27.876		
	28.8	1.5	4.5	1.3	1.769	21.128	84.512	1.755	20.957	83.828	0.35	29.15	28.069		
	28.7	1.6	4.4	1.4	1.772	23.312	93.248	1.749	23.008	92.032	0.43	29.13	28.267		
	28.6	1.7	4.3	1.5	1.775	25.577	102.308	1.744	25.127	100.508	0.51	29.11	28.472		
	28.5	1.8	4.2	1.6	1.779	27.922	111.688	1.738	27.282	109.128	0.60	29.10	28.680		
	28.4	1.9	4.1	1.7	1.783	30.348	121.392	1.732	29.484	117.936	0.70	29.10	28.893		
	28.3	2.0	4.0	1.8	1.787	32.854	131.416	1.727	31.751	127.004	0.81	29.11	29.112	127.004	
	28.2	2.1	3.9	1.9	1.792	35.442	141.768	1.721	34.043	136.172	0.93	29.13	29.333	133.449	
	28.1	2.2	3.8	2.0	1.797	38.112	152.448	1.715	36.376	145.504	1.07	29.17	29.558	139.684	
	28.0	2.3	3.7	2.1	1.802	40.867	163.468	1.710	38.770	155.080	1.21	29.21	29.790	145.775	
	27.9	2.4	3.6	2.2	1.809	43.709	174.836	1.704	41.181	164.724	1.37	29.27	30.023	151.546	
	27.8	2.5	3.5	2.3	1.815	46.640	186.560	1.698	43.628	174.512	1.53	29.33	30.259	157.061	
	27.7	2.6	3.4	2.4	1.822	49.663	198.652	1.693	46.135	184.540	1.71	29.41	30.501	162.395	
	27.6	2.7	3.3	2.5	1.830	52.782	211.128	1.687	48.649	194.596	1.91	29.51	30.744	167.353	
	27.5	2.8	3.2	2.6	1.839	56.000	224.000	1.681	51.194	204.776	2.11	29.61	30.990	172.916	
	27.4	2.9	3.1	2.7	1.848	59.325	237.300	1.676	53.800	215.200	2.33	29.73	31.242	178.560	
	27.3	3.0	3.0	2.8	1.858	62.760	251.040	1.670	56.404	225.616	2.56	29.86	31.494	184.493	
	27.2	3.1	2.9	2.9	1.869	66.313	265.252	1.664	59.035	236.140	2.81	30.01	31.748	188.912	

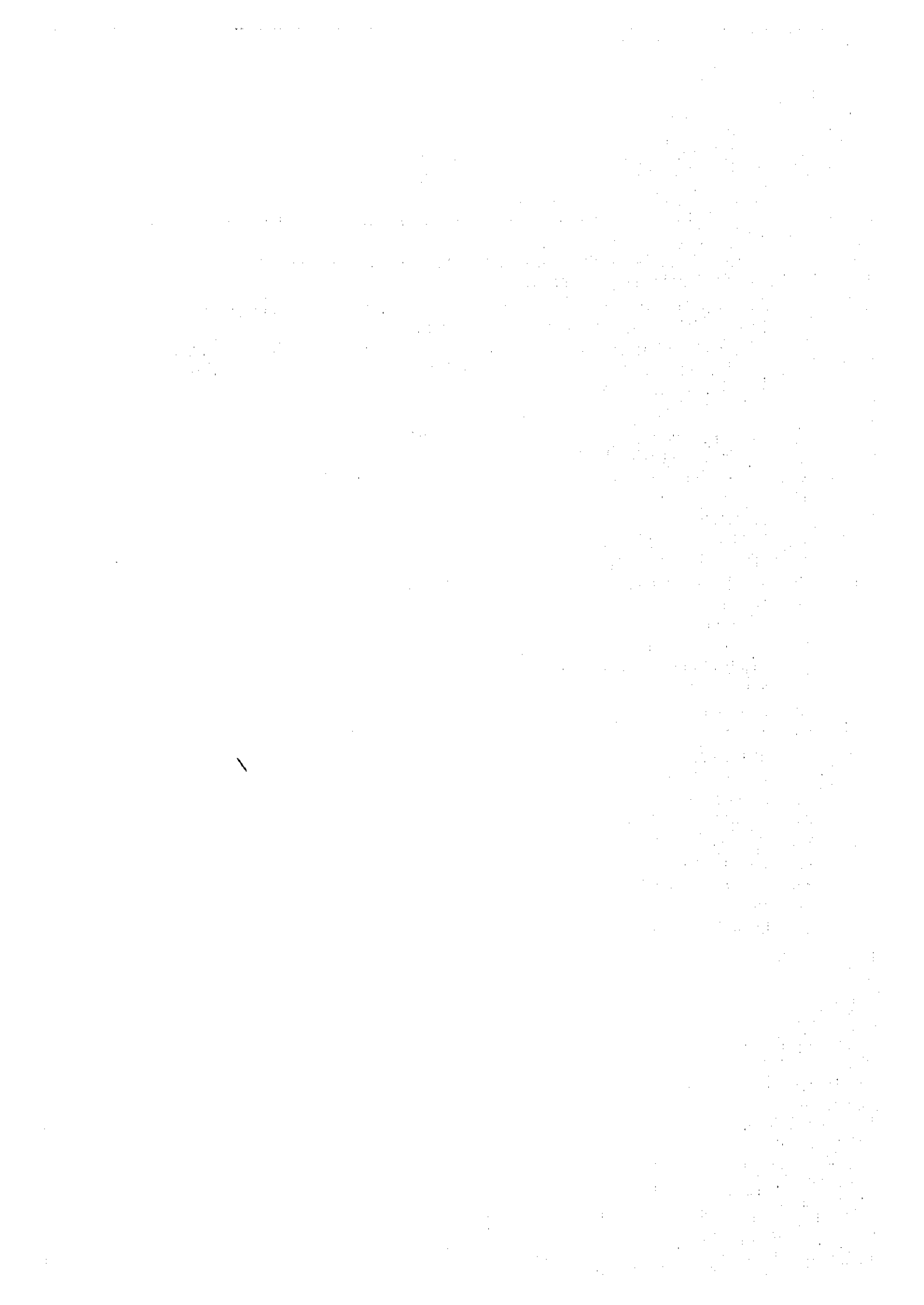
Down Stream Water Level and Discharge

Water Level at DS (m)	Discharge	
	(MCM/day)	(m <sup>3</sup> /sec)
27.7	6.00	69.0
27.8	6.30	73.0
27.9	6.60	76.0
28.0	6.90	80.0
28.1	7.30	84.0
28.2	7.65	93.0
28.4	8.00	97.0
28.5	8.40	102.0
28.6	8.80	105.0
28.7	9.50	110.0
28.8	9.85	114.0
28.9	10.20	118.0
29.0	10.55	122.0
29.1	10.95	127.0
29.2	11.27	130.0



## Data9. The List of Data

1. Statistical Year Book 1991-1996, June 1997, Central Agency for Public Mobilisation and Statistics.
2. The Five Year Plan for Economic and Social Development (97/1998 – 2001/2002), Sector of Agriculture, Ministry of Planning.
3. Information on Irrigation System in Egypt, Irrigation Improvement Project, IIS
4. The Budget Plan for IIS for 1998/1999, IIS, MPWWR
5. The approved budget and the actual used budget for 1992/1993 – 1996/1997, MPWWR
6. The Budget for three years for the Irrigation Improvement Sector (IIS) from 1994/1995 – 1996/1997, MPWWR
7. The Budget Plan for the fiscal year 1998/1999, MPWWR
8. The Irrigation Department Five Years Plan, 1997 – 2002, MPWWR
9. Investment Plan for the fiscal year 98/99, ID, MPWWR
10. Irrigation Improvement Supposed Plan till 2017, IIS, MPWWR
11. Operation and Maintenance for Dams & the Greater Barrages, fiscal year 1996/1997, MPWWR
12. Irrigation Management Systems (IMS), Main System Management (MSM), USAID
13. Telemetry Project, MPWWR
14. The Technical Study Report on Water Management
15. Drawings for Bridges at Towa Canal, Ahnasia District, Beni Suef Irrigation Directorate, MPWWR
16. The Water Level of Mazoura Regulator, Mar.95 – Mar.98, Beni Suef ID, MPWWR
17. The Water Level of Lahoun Regulator, Mar.95 – Mar.98, Beni Suef ID, MPWWR
18. Table for the discharges downstream Mazoura Regulator, Beni Suef ID, MPWWR
19. Organization Chart of MPWWR, Beni Suef ID and Somosta Irrigation District Office
20. The Rehabilitation and Improvement Plan for the Main Regulators on the Nile River & its branches distributed from 1997/2012, Greater Barrage and Dams Sector, MPWWR
21. General Holidays 1998
22. Japan / Mediterranean Freight Conference Freight Taruff No.2
23. Price of Vacant Land ; Minister Decrees
24. Proce of Agricultural Land in Mazoura Area
25. The Map for the Road Plan for the Benisuef Province
26. The Design Standard for Roads
27. Topographic Maps
28. Insurance of Contractors, Quarries and Salines





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