

5-3-3 Plan for Provision of Piping Materials

The provision of piping materials for the water supply and sewer branch lines under the Project is planned here based on the policies described earlier in 5-1-5-(4).

(1) Examination of Requested Quantities

The quantities of the materials for the water supply and sewer branch lines requested by the Egyptian side are given in Table 5-14.

Table 5-14 Requested Material Quantities for Water Supply and Sewer Branch Lines

	Item	Quantity (Length)
Water Supply Line	Branch Line (diameter: 300-600mm)	approximately 4.7km
	Branch Line (diameter: less than 300mm)	approximately 20km
Sewer Line	Branch Line (diameter: 300-600mm)	approximately 4.5km
	Branch Line (diameter: less than 300mm)	approximately 20km

Fig. 5-16 shows possible branch line networks covering the Project Site based simply on the quantities given in Table 5-14 while disregarding such factors as the population density and housing density in each part of the Project Site.

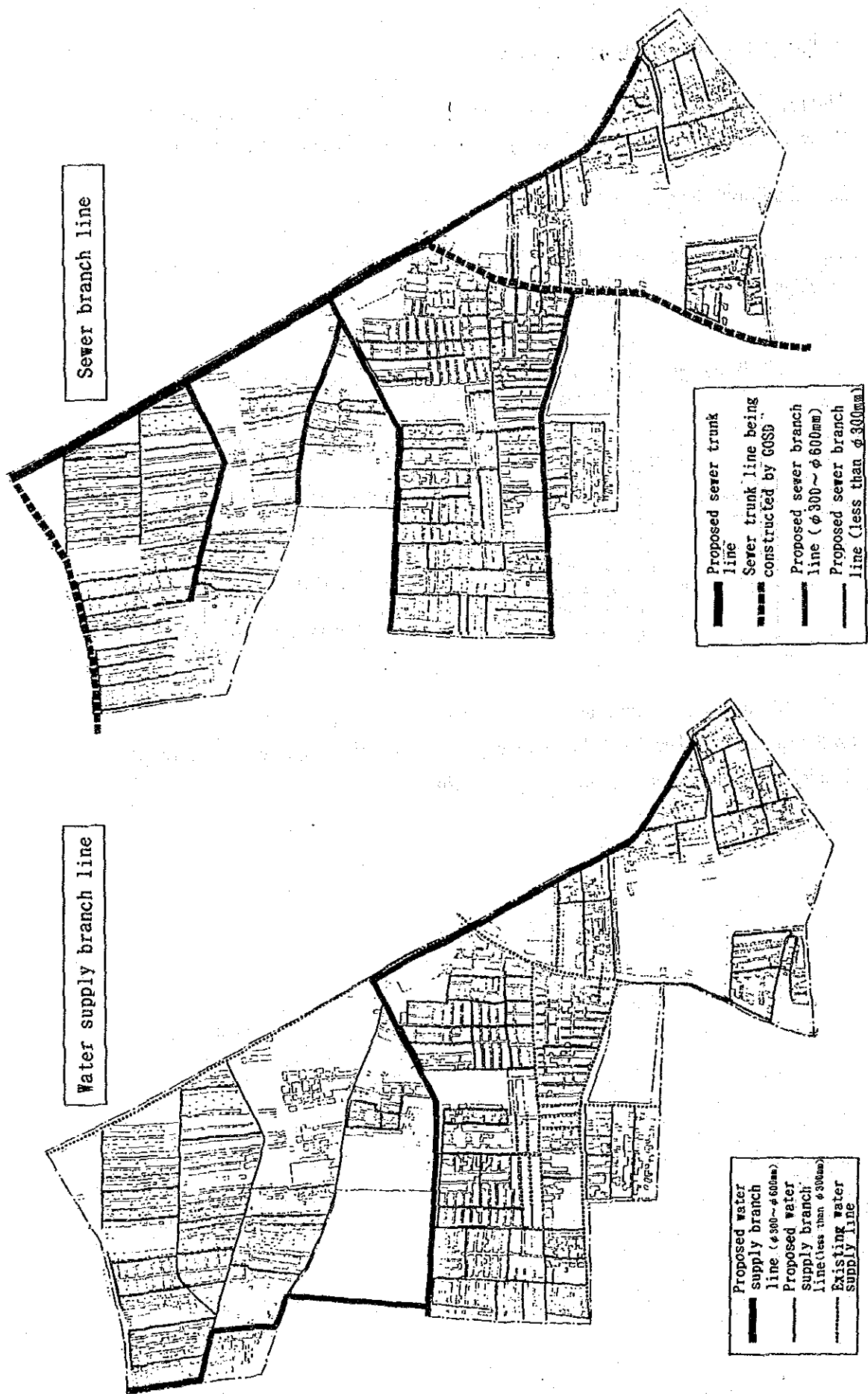


Fig. 5-16 Possible Water Supply and Sewer Branch Line Networks Based on Requested Quantities

As Fig. 5-16 shows, the requested quantities for the branch lines (diameter: 300-600mm) are almost sufficient to lay these lines under main roads. In comparison, the requested quantities for minor branch lines (diameter: less than 300mm) are insufficient to cover all branch roads in the residential quarters of the Project Site, thus failing to achieve the objective of the Project, i.e., area wide improvement of the water supply and sewer networks.

In view of the insufficiency of the available materials, the priority of the Project will be given to improving these services in densely populated areas where the need for improved services is particularly strong and where the benefits of improvement will be particularly large, fully taking the local characteristics of the Project Site into consideration. The quantities of the piping materials to be provided for the branch lines will, therefore, be the minimum to achieve this priority target.

(2) Conditions for Material Provision

As described earlier in 3-1-2, the housing density in the Project Site is not uniform. In fact, the Project Site can be divided into 4 blocks in terms of the housing density with main roads acting as the demarcation lines as shown in Fig. 5-17.

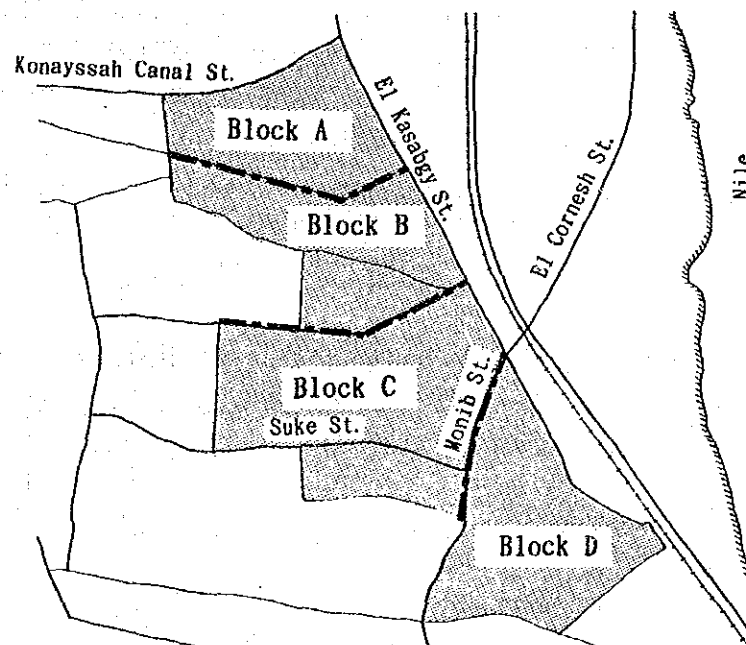


Fig. 5-17 4 Blocks of Different Housing Densities in Project Site

The population concentration is particularly prominent in Block A and Block C where there are many 6-10 storey buildings. The population in these 2 blocks has almost reached saturation point. Block C is the main commercial area in the Project Site and shops line the bustling Gamal Abd El Nasr Street for some 500m. The absence of a public sewer system, however, has resulted in a chronic overflow of sewage onto the street, creating a highly unsanitary environment. Housing development has been relatively slow in Block B and Block D where farmland still accounts for some 50%.

The conditions for improving water supply and sewer branch lines in each block shown in Table 5-15 have been determined based on the current state of housing development and the characteristics of each block.

Table 5-15 Conditions for Material Provision of Water Supply and Sewer Branch Lines

Block	Conditions
A	Block-wide improvement by laying branch lines along main roads and branch roads.
B	Improved service network by laying branch lines (diameter: 300-600mm) along main roads and minimum branch lines (diameter: less than 300mm) along branch roads.
C	Block-wide improvement by laying branch lines along main roads and branch roads.
D	Improved service network by laying branch lines (diameter: 300-600mm) along main roads and minimum branch lines (diameter: less than 300mm) along branch roads.

(3) Routes, Pipe Diameters and Pipe Types

1) Routes

The planned routes for the water supply branch lines and sewer branch lines, both decided based on the conditions specified in Table 5-15, are shown in Basic Design Drawings EMU-MP-01 and EMU-MP-02 respectively.

2) Pipe Diameters and Pipe Types

a) Water Supply Branch Lines

The pipe diameters of the water supply branch lines, decided based on the design conditions and basic design policies described in 5-2-1 and 5-3-1, are shown in Basic Design Drawing EMU-MP-01. The selected pipe material for the branch lines (diameter: 300-600mm) is ductile cast iron, also described in 5-2-1 and 5-3-1. In the case of branch lines (diameter: less than 300mm), PVC

is selected for straight pipes and bends (diameter: 100mm) while cast iron is selected for tee branches and bends (diameter: 200mm).

b) Sewer Branch Lines

The pipe diameters of the sewer branch lines, decided based on the design conditions and the basic design policies described in 5-2-1 and 5-3-1, are shown in Basic Design Drawing EMU-MP-02. As described in 5-3-2-(6), the selected pipe material is clay.

(4) Quantities to be Provided

The quantities of pipes to be provided for the water supply and sewer branch lines are determined as described in 1) and 2) below based on the relevant conditions set forth in the above sections. As described earlier in 5-1-5-(4), the length of the pipes to be provided will be increased by the following percents on the design length in view of cutting loss and detours, etc.

- water supply branch lines : approximately 2%
- sewer branch lines : approximately 3%

1) Water Supply Branch Lines

The length of the pipes to be provided for the water supply branch lines is shown in Tables 5-16 and 5-17.

Table 5-16 Length of Pipes to be Provided for Water Supply Branch Lines (Diameter: 300-600mm)

Diameter (mm)	Provided Length (m)	Requested Length (m)
600	20	
500	450	
400	1,590	
300	2,210	
Total	4,270	4,700

Table 5-17 Length of Pipes to be Provided for Water Supply Branch Lines (Diameter: Less than 300mm)

Block Diameter					(Unit: m)	
	A	B	C	D	Provided Length	Requested Length
200	2,150	1,290	1,920	1,210	6,570	
100	9,800	920	14,530	1,660	26,910	
Total	11,950	2,210	16,450	2,870	33,480	20,000

- 2) The length of the pipes to be provided for the sewer branch lines is shown in Table 5-18.

Table 5-18 Length of Pipes to be Provided for Sewer Branch Lines

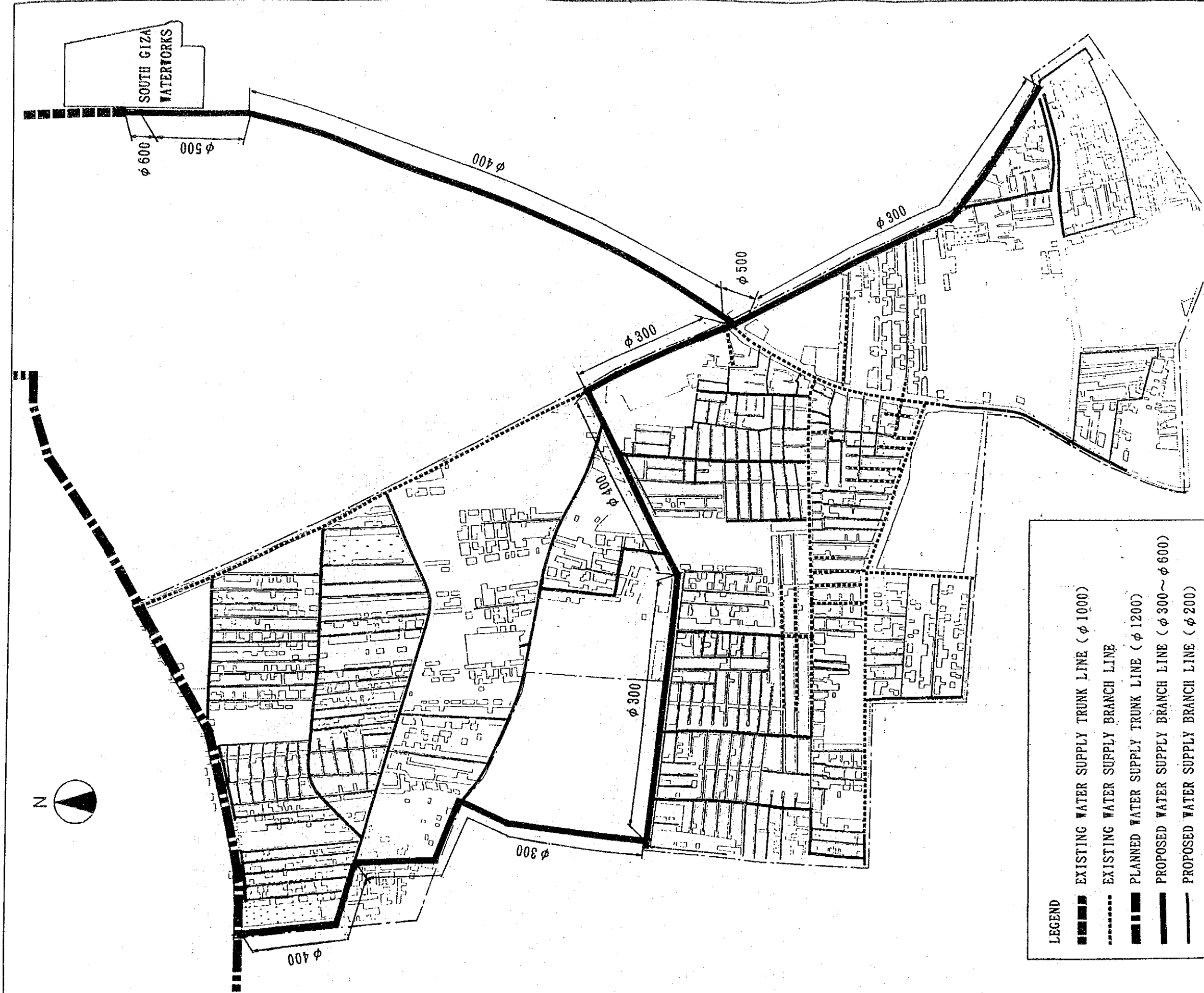
Block		A	B	C	D	Provided Length	Requested Length
Diameter(mm)							
Branch Line (Dia: 300mm - 600mm)	600	0	0	470	0	470	
	500	0	0	710	570	1,280	
	450	0	290	340	310	940	
	375	260	260	200	0	720	
	350	220	500	250	440	1,410	
	300	390	210	50	0	650	
	Sub-Total	870	1,260	2,020	1,320	5,470	4,500
Branch Line (Dia: Less than 300mm)	250	930	0	730	300	1,960	
	225	0	0	510	360	870	
	200	8,480	0	15,900	0	24,380	
	Sub-Total	9,410	0	17,140	660	27,210	20,000
Total		10,280	1,260	19,160	1,980	32,680	24,500

(5) Basic Design Drawings

The Basic Design Drawings for the plan for the provision of piping materials are listed below.

EMU-MP-01 Water Supply Branch Line-Route Plan

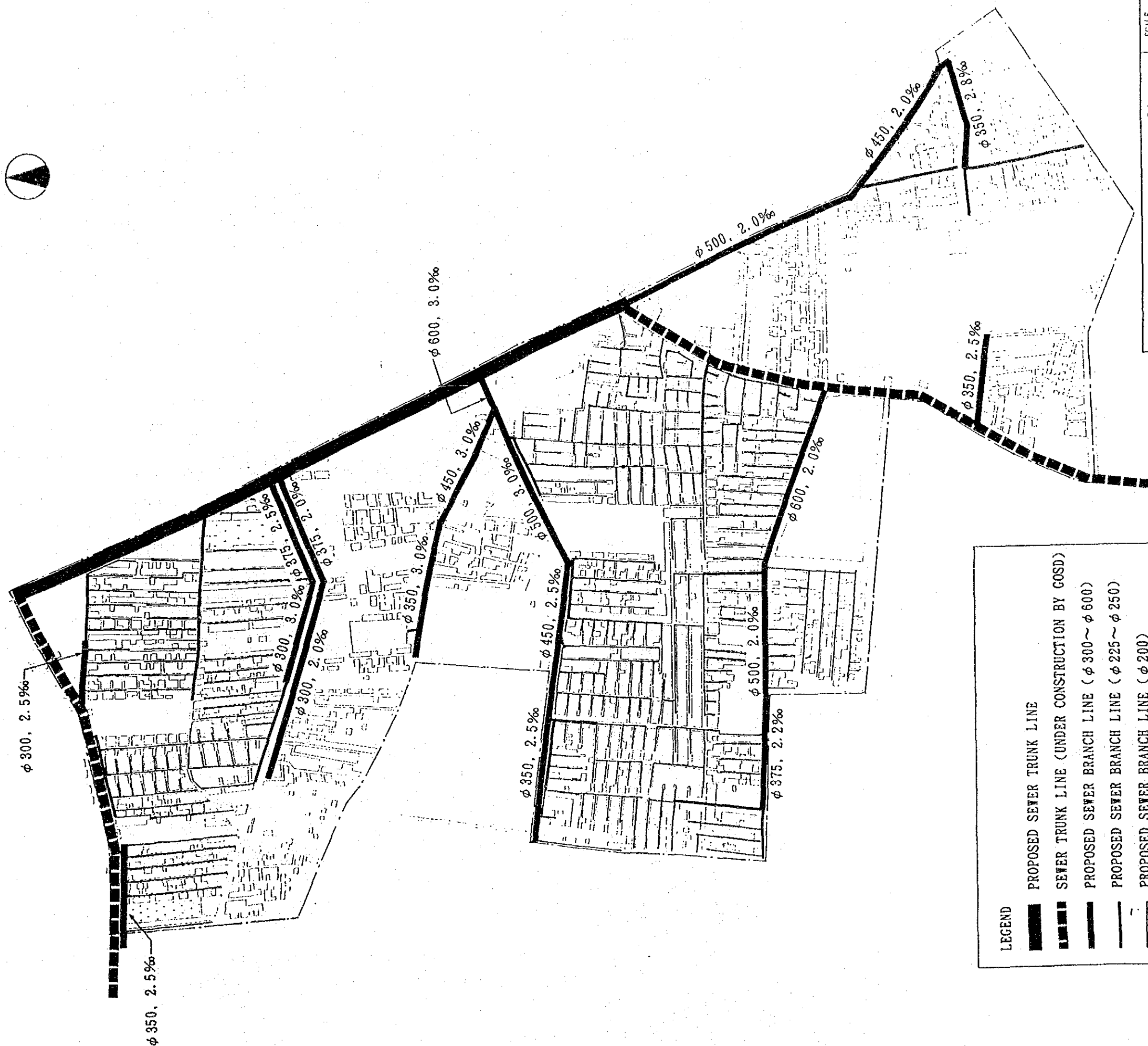
EMU-MP-02 Sewer Branch Line-Route Plan



LEGEND

- EXISTING WATER SUPPLY TRUNK LINE (φ 1000)
- - - EXISTING WATER SUPPLY BRANCH LINE
- PLANNED WATER SUPPLY TRUNK LINE (φ 1200)
- PROPOSED WATER SUPPLY BRANCH LINE (φ 300 ~ φ 600)
- PROPOSED WATER SUPPLY BRANCH LINE (φ 200)
- PROPOSED WATER SUPPLY BRANCH LINE (φ 100)

THE ARAB REPUBLIC OF EGYPT GIZA CITY, GIZA GOVERNORATE				SCALE 1:8000
THE PROJECT FOR THE WATER SUPPLY AND SEWER SYSTEM UPGRADING IN MONIB				DWG. No.
Water Supply Branch Line-Route Plan				EMU-WP-01
DATE	DESIGNED	CHECKED	APPROVED	REVISION
JAPAN INTERNATIONAL COOPERATION AGENCY				



- LEGEND
- PROPOSED SEWER TRUNK LINE
 - SEWER TRUNK LINE (UNDER CONSTRUCTION BY GOSD)
 - PROPOSED SEWER BRANCH LINE ($\phi 300 \sim \phi 600$)
 - PROPOSED SEWER BRANCH LINE ($\phi 225 \sim \phi 250$)
 - PROPOSED SEWER BRANCH LINE ($\phi 200$)

THE ARAB REPUBLIC OF EGYPT GIZA CITY, GIZA GOVERNORATE		SCALE 1:8000		
THE PROJECT FOR THE WATER SUPPLY AND SEWER SYSTEM UPGRADING IN MONIB		DWG. No.		
Sewer Branch Line-Route Plan		ENU-WP-02		
DATE	DESIGNED	CHECKED	APPROVED	REVISION
JAPAN INTERNATIONAL COOPERATION AGENCY				

5-4 Project Implementation Plan

5-4-1 Project Implementation Policies

The Project will be implemented within the framework of the Japan's grant aid system. Actual implementation will commence following the signing of the E/N after approval by the Governments of Egypt and Japan. Following the signing of the E/N, a Japanese consultant will be selected to proceed with the detailed design work. The procurement of materials and equipment will be conducted by a Japanese contractor to be decided on the open tender basis after approval of the E/N by the People's Assembly of Egypt. The basic issues and important points to note in the implementation of the Project are described below.

(1) Project Implementation Body

Giza Governorate will be responsible for the overall supervision of Project implementation while Giza City will be assigned to conduct the actual implementation. As described earlier in 2-1-1, the Project implementation system within Giza City will involve staff members of sections dealing with administration, civil engineering work, building work and public relations who will work together under the leadership of the technical adviser. As the E/N will only become valid with the approval of the People's Assembly of Egypt, the Project implementation body should make every effort to obtain such approval by the People's Assembly in view of the smooth implementation of the Project. The same body should also maintain good communications and hold consultations with both the Japanese consultant and contractor, appoint a person responsible for Project implementation and establish a committee within Giza City to facilitate Project implementation.

(2) Consultant

The Japanese consultant will enter into a design and supervision agreement with the Project implementation body to prepare the detailed design for the facilities to be constructed and the materials and equipment to be procured with Japan's grant aid for the Project and to supervise the construction work. The same consultant will prepare the tender documents and conduct the tender process on behalf of the Project implementation body.

(3) Contractor

The Japanese contractor, selected on the open tender basis pursuant to Japan's grant aid system, will construct the facilities and procure the necessary materials and equipment.

The prospective contractor must have sufficient knowledge of the local market, labour conditions and labour laws, etc. in view of the facts that many local products will be used in the Project and that the construction work will be conducted on a 24 hours/day basis.

(4) Necessity to Dispatch Engineers

The construction work envisaged in the Project will require special expertise relating to the pipe jacking method and the under-pressure drilling and tapping method. Since it will be impossible to secure the services of Egyptian engineers conversant with these technologies, it will be necessary to request the Japanese manufacturers of the machinery involved to dispatch engineers specialising in these technologies to Egypt.

(5) Important Points to Note for Construction Work

Particular attention should be paid to the following points as the construction work for the Project will be conducted in densely populated areas and at a railway crossing section. The fact that the Project will be implemented with grant aid should also be noted.

- 1) The purpose of the work should be fully understood by local inhabitants to secure their assistance and cooperation while measures should be taken to prevent Project-related accidents befalling them.
- 2) Careful consideration should be given to the selection of construction methods, machinery, etc., to minimise such disturbances as noise and vibration, etc. to both local inhabitants and their homes.
- 3) Every effort should be made to avoid any damage to existing underground public services (sewer pipes, water supply pipes, power cables and telephone cables) and buildings.
- 4) Every effort should be made to ensure the safe passage of pedestrians, vehicles and trains.

5-4-2 Conditions of Local Construction Industry and Points to Note

(1) Construction Industry in Egypt

- 1) The recruitment of engineers, coordinators and workers in Egypt is not difficult excepting engineers conversant with the pipe jacking method and the under-pressure drilling and tapping method.

- 2) The procurement of common construction materials and equipment in Egypt is not difficult excepting special items for the pipe jacking method and the under-pressure drilling and tapping method.
- 3) Ductile cast iron pipe fittings, valves, steel pipes for the aqueduct and liner plates, etc. should be imported from Japan as they are not available in Egypt.
- 4) Port Alexandria will be appropriate for the unloading of materials and equipment from Japan as it receives regular calls by Japanese vessels due to its good port facilities and due to it being a free port.
- 5) The so-called Desert Road will be appropriate for the transportation of materials and equipment from Port Alexandria to the Project Site due to its wide width and low traffic volume.

(2) Points to Note for Construction Work

- 1) In view of the presence of heavy traffic involving pedestrians, vehicles and carts and of many stalls, every effort should be made to ensure ongoing commercial activities and to secure safe traffic. The work plans for earth-retaining, excavating, pipe laying, refilling and paving work must be carefully prepared to that any temporary traffic restriction will be terminated as soon as possible.
- 2) As the planned construction period is very short, the construction work should be conducted on a 2 shift, 24 hours/day basis to meet the planned completion date.
- 3) It is necessary to plan the maximum use of locally produced construction materials and equipment and also local manpower to contribute to industrial development, vitalisation of the economy and increased employment in Egypt.

5-4-3 Work Supervision Plan

In accordance with the general policy of Japan's grant aid system and the main objectives of the basic design, the consultant will organize a consistent project team to conduct the detailed design and supervisory work for the smooth implementation of all the work. At the supervisory stage, the consultant will dispatch technically qualified supervisory personnel to the site for liaison and the provision of guidance on the execution of the work. The field supervisory personnel will be dispatched in accordance with the following schedule.

2 civil engineers full-time on site

In addition, the consultant will be required to dispatch engineers, each of which is responsible for a particular field of work, for a short period of time as required in accordance with the progress of the work to ensure the smooth implementation of the work to be conducted on a 24 hours/day basis.

(1) Basic Principles for Supervision of Construction Work

The consultant will be required to conduct appropriate supervision throughout the work period in view of the safe execution of the construction work and meeting all the requirements within the set construction period on the basis of the following principles.

1) Progress Control

The manufacture and installation of the pipes will be monitored and controlled with constant comparisons between the planned schedule and the actual production volume or performance. As there is only one local manufacturer of ductile cast iron pipes and 2 manufacturers of reinforced concrete pipes used with the pipe jacking method, it may be possible for their production schedule for other projects to overlap with the schedule of the Project. The consultant should, therefore, provide the contractor with proper guidance on order and delivery control so that the pipes will be delivered in time for each work stage to meet the overall schedule of the Project.

2) Quality Control

Quality control will mainly deal with pipe quality and the quality of the pipe jacking work. The pipe strength test and control of the pipe jacking progress will be conducted as stipulated in the construction agreement to ensure the required quality in these fields.

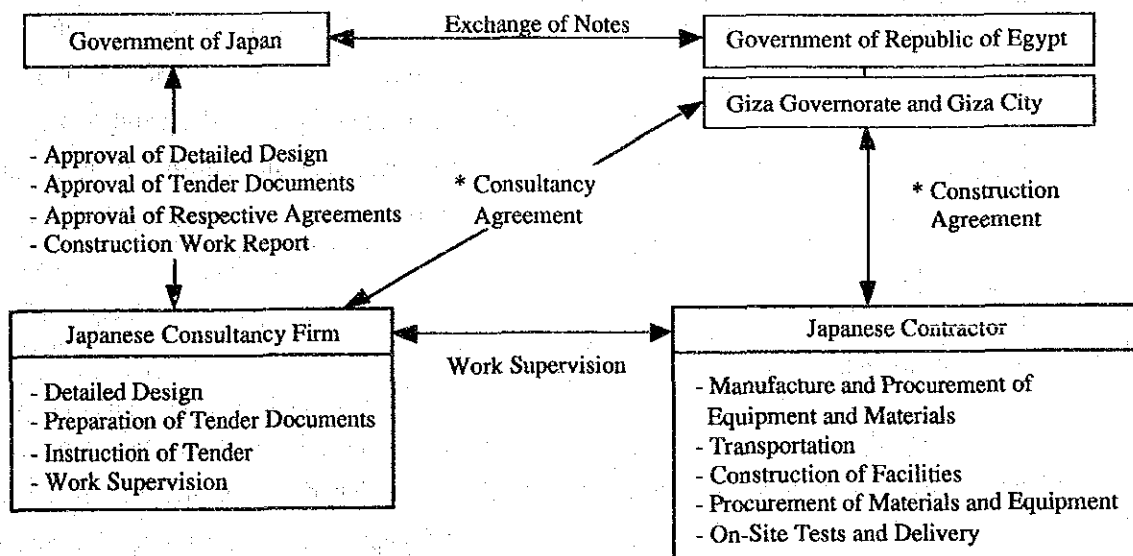
3) Safety Control

- a) Guidance will be provided to the contractor in view of raising the consciousness of all workers, down to those at the lowest level, of the need to prevent accidents while foreman class workers will be trained to foresee any dangers involved in the work.
- b) Heavy machinery, including cranes and wires, etc., must be regularly checked to prevent accidents.
- c) When transport vehicles and construction machinery, etc. travel on public roads, the local traffic rules must be strictly observed and every precaution

taken to prevent traffic accidents resulting in injury or death. Maximum care must also be taken to prevent damage to roads, buildings and existing underground public services, etc.

(2) General Relationships During Supervisory Control

The general relationships of the work supervision system and related organizations during the supervision period are shown in Fig. 5-18.



* Both the consultancy and construction agreements are subject to verification by the Government of Japan.

Fig. 5-18 Processes of Project Implementation

(3) Work Supervisors

In order for the contractor to complete the construction of the facilities conforming to the specifications given in the detailed design documents within the set construction period, work supervisors with the ability to smoothly manage joint work with local contractors and to provide adequate technical guidance to such local contractors are required. In addition, it is desirable that these supervisors have experience in similar projects in order to guarantee a high work quality. In view of the scale and contents of the facilities to be constructed and the expected work schedule, etc., the contractor stationed at the sites may require the following full-time supervisors.

Site Manager	: 1	(to consult and coordinate with related organizations and to obtain work permits from them)
Water Supply Work Supervisor	: 1	(to supervise construction work relating to water supply facilities and work progress)
Sewer Work Supervisors	: 4	(2 shifts with 2 each shift, to supervise construction work relating to sewer facilities and work progress)
General Work Supervisor	: 1	(to conduct the survey on existing underground public services and to supervise work to relocate service pipes/cables and pit construction work)
Personnel and Procurement Supervisor	: 1	(to conduct labour management and procurement)

5-4-4 Procurement Plan

(1) Sources of Construction Materials and Equipment

The construction materials and equipment to be used in the Project will be procured in Egypt so long as such conditions as specifications, quality, delivery time and price, etc. are satisfactory. Items which are not available in Egypt or of which local products are not satisfactory will be procured in Japan.

The procurement sources for the main construction materials and equipment to be used in the Project, decided in accordance with the policies described in 5-1-2-(5) and 5-1-3-(2) are listed in Table 5-19.

Table 5-19 Sources of Main Construction Materials and Equipment

Item	Egypt	Japan	Remarks
1. Sand, Gravel	○		constant supply available in Egypt
2. Sulphur-Resistant Cement	○		
3. Reinforcing Bar	○		
4. Wood	○		
5. Plywood Form	○		
6. Straight Ductile Cast Iron Pipe	○		locally produced in both good quality and quantity
7. Straight PVC Pipe	○		
8. Straight Reinforced Concrete Pipe for Pipe Jacking Work	○		
9. Clay Pipe	○		
10. Fittings for PVC Pipe and Irregular Cast Iron Pipe, etc.	○		
11. Manhole Cover	○		widely available in Egypt
12. Blue Brick	○		
13. Concrete Block	○		
14. Fuel/Lubrication Oil	○		
15. Electric Power/ Construction Water	○		
16. Back Hoe	○		to be leased from a local company
17. Dump Truck	○		
18. Trailer	○		
19. Power Shovel	○		
20. Clamshell Grabbing Crane	○		
21. Concrete Truck Mixer	○		
22. Water Tank Car	○		
23. Vacuum Car	○		
24. Concrete Mixer	○		
25. Truck Crane	○		
26. Rammer	○		
27. Generator	○		
28. Welding Machine	○		
29. Air Compressor	○		
30. Water Pump	○		
31. Ductile Cast Iron Pipe with Mechanical Joint		○	either not available in Egypt or difficult to procure or lease without affecting schedule
32. Fittings for Ductile Cast Iron Pipe		○	
33. Seat Pile		○	
34. Liner Plate		○	
35. Structural Steel		○	
36. Cover		○	
37. Steel Pipe for Aqueduct		○	
38. Facilities for Safety		○	
39. Jacking Machine with Accessories		○	
40. Special Concrete Pipe for Pipe Jacking Work		○	
41. Collar and Rubber Ring, etc. for Pipe Jacking Work		○	
42. Grout Pump with Accessories		○	
43. Piling Machine		○	
44. Concrete Cutter		○	
45. Concrete Breaker		○	
46. Grouting Machine with Grouting Materials		○	

(2) Transportation Method

Appropriate packing must be provided for the materials and equipment to be imported from Japan to withstand long maritime transportation, unloading at Port Alexandria, land transportation from Port Alexandria to the Project Site and storage.

A regular cargo ship will be used for the maritime transportation of materials and equipment from Japan to Port Alexandria while cargo trucks, which are the main means of transportation in Egypt, will be used to cover the land transportation of some 200km from Port Alexandria to the Project Site.

5-4-5 Implementation Processes

(1) Outline

In the event of the Project being implemented as a Japan's grant aid project, the facilities will be constructed and the materials and equipment procured in the following 3 stages following the signing of the Exchange of Notes (E/N) by the Governments of Japan and Egypt: (1) preparation of detailed design documents, (2) tender and agreement on construction work and (3) execution of construction work. These processes are illustrated in Fig. 5-18.

1) Detailed Design Work

Following the signing of the E/N, the Japanese consultant will immediately conclude a consultancy agreement with the Government of Egypt and commence the detailed design work.

Based on the confirmed results of the basic and detailed design field surveys, the consultant will prepare the tender documents, including the tender specifications and detailed design drawings. The consultant will hold thorough discussions with the responsible organizations in Egypt at both the initial and final stages of the detailed design and proceed with the tender process upon receipt of approval of the prepared tender documents and drawings, etc. by the implementation organization following approval of the E/N by the People's Assembly of Egypt. The required time for the above work will be approximately 3 months.

2) Awarding of Contract

Acting for the Egyptian side, the consultant will announce the tender, accept applications, evaluate the tenderers in terms of the necessary qualifications, hold briefings on the tender and distribute the tender documents. After allowing a certain

period of time for the preparation of the tenders, the consultant will then accept the tenders, promptly examine them and assist in the quick conclusion of a construction agreement between the Government of Egypt and the successful Japanese contractor.

The bids of the applicants will be opened in the presence of all the parties concerned. The applicant with the lowest price will be selected as the successful bidder if the contents of the tender are found to be appropriate and will conclude a construction agreement with the Government of Egypt.

The period from the commencement of the tender process to the conclusion of the contract is expected to be approximately 2 months.

3) Construction Work and Procurement of Materials and Equipment

Following the signing of the construction agreement, the contractor will commence work upon verification by the Government of Japan. In view of the scale of the Project and the contents of the facilities, if the preparatory work for which the Egyptian side is responsible is smoothly conducted and if procurement is smoothly carried out, the construction work and the procurement of materials and equipment are expected to be completed in 12 months.

The consultant will hold discussions with the contractor prior to the commencement of the work, provide materials guidance and instructions to the contractor on the transportation of the materials and equipment to the sites, construction methods and construction schedule, conduct process and quality control and ensure that all the work is completed within the period set forth in the E/N.

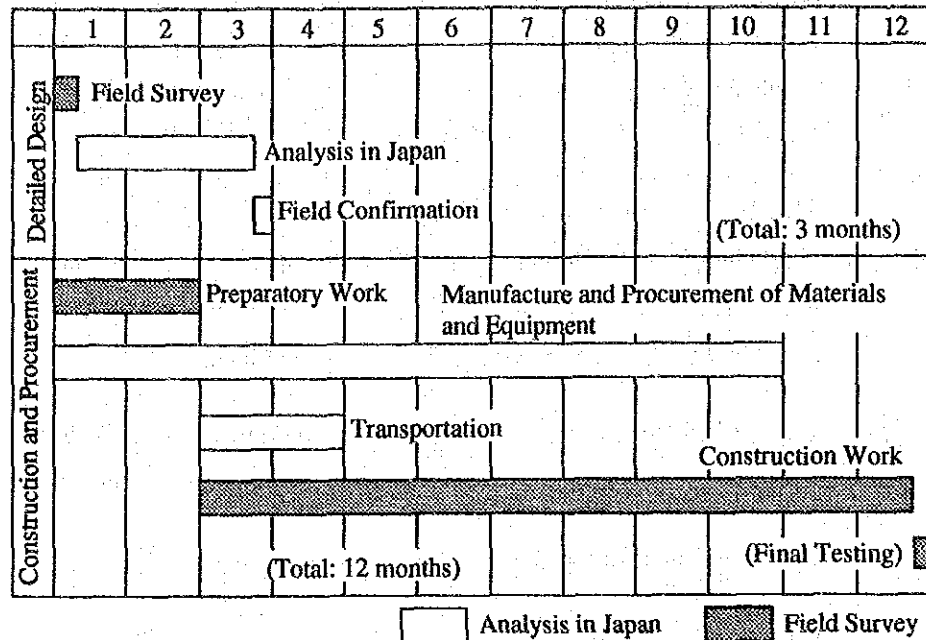


Fig. 5-19 Project Implementation Schedule

5-4-6 Scope of Works

The Governments of Japan and Egypt will undertake the following work to complete the Project.

1) Work to be Undertaken by Government of Japan

a) Water Supply Facilities

- construction of a water supply branch line (diameter: 500mm, approximately 60m at railway crossing section)
- provision of materials for water supply branch lines (diameter: 300-600mm, approximately 4.3km)
- provision of materials for water supply branch lines (diameter: less than 300mm, approximately 33km)
- under-pressure drilling and tapping work (connection between the 1,000mm existing trunk line and the 600mm new branch line at one point)

b) Sewer Facilities

- construction of a sewer trunk line (diameter: 1,800-2,000mm, approximately 1.8km, gravity-flow system)

- provision of materials for sewer branch lines (diameter:300-600mm, approximately 5.5km)
- provision of materials for sewer branch lines (diameter: less than 300mm, approximately 27km)

2) Work to be Undertaken by Government of Egypt and Giza Governorate

a) Recommendations for Undertakings by the Government of the Arab Republic of Egypt in case Japan's Grant is executed:

- ① to undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the site.
- ② to construct the access road to the site prior to the commencement of the construction.
- ③ to provide facilities for distribution of electricity, water supply, telephone, drainage and other incidental facilities to the Project Site.
- ④ to ensure prompt unloading and customs clearance at ports of disembarkation in the Arab Republic of Egypt and internal transportation therein of the products purchased under the Grant.
- ⑤ to secure, with respect to the supply of the products and services under the verified contracts that Japanese nationals shall not be subject to any customs duties, internal taxes and other fiscal levies which may be imposed in the Arab Republic of Egypt.
- ⑥ to accord Japanese Nationals whose services may be required in connection with the supply of the products and services under the verified contract such facilities as may be necessary for their entry into Egypt and stay therein for the performance of their work in accordance with the relevant laws and regulations of the Arab Republic of Egypt.
- ⑦ to maintain and use properly and effectively the facilities constructed and equipment under the Grant.
- ⑧ to bear all the expenses other than those to be borne by the Grant, necessary for the execution of the Project.

b) Required Assistance from Giza Governorate in case Japan's Grant is executed:

- ① to secure land for water supply and sewer system and other related facilities.
- ② to provide temporary land for a construction liaison office, warehouse, stockyard, jacking pit plant, etc., during the construction period.
- ③ to provide necessary data and information for detailed design. These data and information are not eligible to be delivered to third parties or brought to their notice unless there is a written consent by Giza Governorate.
- ④ to give permission required for test pitting to check underground services at the time of detailed design, if necessary.
- ⑤ to take necessary actions to expedite the approval for executions of the Project by Giza Governorate.
- ⑥ to give permission required for all the works related to the Project. e.g., opening of manholes, entering into railway and canal lot, surveying on the road, etc.
- ⑦ to witness and confirm by the authorities concerned when test pitting and protection and relocation of services are carried out.
- ⑧ to take necessary measures for inhabitant's cooperation and traffic control.
- ⑨ to take necessary measures for historical remains which may be encountered during the construction period, if any.
- ⑩ to provide disposal places of the water including silt, clay, etc., discharged during the construction period.
- ⑪ to secure suspension of water supply during the connection works of the proposed water supply trunk line and the existing line.
- ⑫ to form a steering committee in Giza City to expedite the Project.

5-5 Survey on Present Conditions of South Giza Waterworks and Its Expansion Plan

The completion of the water supply facilities planned under the Project will establish new water distributing routes to households and public buildings in the Project Site. As described in 2-4-2, the Government of Egypt has also requested the Japan's grant aid to expand the South Giza Waterworks, the water supply source for the Project Site, to achieve the desired upgrading of water supply system in the Project Site. The target year of the expansion is the year 2010 and the capacity is 35,000 m³/day.

The South Giza Waterworks is currently operating at some 60% above its design clear water production capacity and cannot be expected to increase production any further. Consequently, it will be difficult for the South Giza Waterworks to achieve the average water supply of 140 ltr/person/day planned for the target year 2010 at the time of the completed construction of the branch lines planned in the Project in 1995, necessitating the expansion of the Waterworks as requested by the Government of Egypt.

GCWSA has already prepared an expansion plan in which a new purification plant with a clean water production capacity of 200,000m³/day will be constructed on the present premises of the South Giza Waterworks. However, the actual implementation of this plan has been indefinitely postponed due to the poor prospects of securing the necessary funds.

The present conditions of the South Giza Waterworks, the expansion plan prepared by GCWSA and the necessity to expand the water supply capacity to meet the likely water demand in the Project Site were studied and confirmed during the field survey for the basic design of the Project on the grounds that expansion of the South Giza Waterworks is essential to upgrade the water supply system in the Project Site.

5-5-1 Present Conditions of South Giza Waterworks

The South Giza Waterworks was constructed with the assistance of Czechoslovakia and commenced operation in 1970. Its design clear water production of 140,000m³/day is the second largest of the 3 existing waterworks in Giza City although the actual production rate is 220,400m³/day. The present conditions of the South Giza Waterworks are described below.

(1) Layout and Water Flow

The present layout and water flow of the South Giza Waterworks are shown in Fig. 5-20. The existing waterworks has 2 intake facilities. One of these, located to the south (upstream of the Nile), supplies raw water to the existing waterworks while the

other, located to the north (lowerstream of the Nile), supplies raw water to the waterworks at 6th October City, some 25km west of Giza City. The latter was constructed by Egypt's own funds and commenced operation in 1985. The raw water intake pump house has 5 pumps to send raw water to 6th October City.

(2) Raw Water Intake Facility

Raw water is obtained from the Nile. There is no grit chamber and pressurized raw water is sent to the distribution basin. The intake rate of raw water is calculated from the operation duration of the pumps and the flow rate of each pump as the flowmeter is out of order.

(3) Dosing Apparatus for Coagulation

The coagulant used is liquid aluminium sulphate. Polymer is added when the raw water is highly turbid.

(4) Mixing Basin/Flocculation Basin

The mixing basin also acts as the distribution basin and the water current agitation method is used. Liquid aluminium sulphate and polymer solution tanks are provided above the mixing basin and these chemicals are mixed using the gravity flow method. The level circulation method is used at the flocculation basin.

(5) Coagulation Basin

1) Type of Coagulation Basin

The coagulation basin uses the horizontal sedimentation method.

2) Sludge Removal Method

Sludge deposited at the bottom of the coagulation basin is removed not by the mechanical method but through a sludge hopper provided at the bottom of the coagulation basin. The removed sludge is fed to a sludge basin for further sedimentation and supernatant is discharged to the Nile. No baffle wall to improve the sedimentation rate is provided along the inlet.

(6) Rapid Sand Filter

1) Filtering Method

A rapid sand filter of water level control type in the constant rate filtering method is used for the filter basin.

2) Flushing Method

Backwashing and backwashing by air are used side-by-side and operation is manually conducted using an on-site control panel. Discharged water by the flushing is fed to the sludge basin and supernatant after sedimentation is discharged to the Nile.

(7) Disinfection Facility

1) Chlorine

Liquid chlorine produced in Egypt and supplied in 1 ton cylinders is used for the disinfection of potable water.

2) Chlorination Points

Both pre-chlorination (prior to the coagulation basin) and post-chlorination (after the filter basin) are used. The rate of injection is manually controlled to maintain the right proportion for the raw water volume. The injection chamber is located in a building near the injection point but cylinders are stored in a separate building.

(8) Water Quality Analysis

The water quality laboratory is equipped with the main instruments, including a turbidimeter and jar tester. Analysis results, such as raw water quality and purified water quality, are regularly recorded in a water quality ledger.

5-5-2 Examination of South Giza Waterworks Expansion Plan

(1) Overall Expansion Plan and Status of Requested Expansion Project related to the Project

1) GCWSA has prepared a plan to increase the water supply capacity of the South Giza Waterworks by 200,000m³/day by the year 2010 as described earlier. The layout of the facilities and the water flow envisaged by the plan are shown in Fig. 5-21.

2) The expansion plan of the South Giza Waterworks, for which GCWSA hopes for assistance by Japan in succession to the construction of water supply facilities under the Project, involves the expansion of the water production capacity to meet the estimated water demand of 35,000m³/day in the target year of 2010 in the Project Site. At the time of the basic design field survey for the Project, GCWSA was still examining the required scale of expansion. As a result, a water production capacity of 25,000m³/day was assumed to be the expansion volume. The status of the new facility within the overall expansion plan was then examined and it was

confirmed by GCWSA that the expansion plan to follow the Project would form part of an overall expansion plan. Fig. 5-22 shows the layout of the purification plant with a production capacity of 25,000m³/day within the configuration of the facilities for the overall expansion plan.

- 3) GCWSA believes that the components of the overall expansion plan for the South Giza Waterworks other than those for which Japan's grant aid is sought can be constructed by its own efforts and assistance provided by foreign countries to achieve the target daily water production of 200,000m³.

(2) Points to Note for Basic Design Study for South Giza Waterworks Expansion Project

The following points must be noted in the case of the basic design study for the South Giza Waterworks Expansion Project requested by the Government of Egypt being implemented.

- 1) The site to accommodate the extra facilities to increase the supply to 200,000m³/day has already been secured right next to the present premises. As shown in Fig. 5-21, the construction of a substation to supply power to the new purification plant and surrounding areas is expected to commence in 1992 with completion in 2 years. A staff office building and raw water pipeline to 6th October City are currently located on the above site. It will, however, be necessary to confirm their locations through surveying and trial excavation.

2) Locations of Intake Pumps

Five (5) pumps are installed at the raw water pump station on the north side of the premises to send raw water to 6th October City. In addition, intake channels and foundations for four (4) raw water pumps have already been completed to serve the planned increased water production capacity of 200,000m³/day.

3) Flocculation Basin

In view of the performance and easy maintenance of the existing flocculation basin, either the level circulation method or the vertical circulation method should be adopted.

4) Coagulation Basin

The introduction of the following should be considered to increase the coagulation efficiency in order to achieve the most efficient use of the expansion site.

- a) installation of a baffle wall along the inlet
- b) installation of a sedimentation slope

5) Dosing Apparatus for coagulation

The dosing apparatus should use liquid aluminium sulphate which is available in Egypt. The existing storage equipment shall be utilized and only new dosing equipment shall be provided taking into account this expansion capacity which is about one sixth of the whole expansion capacity and the easy operation and maintenance of the dosing equipment.

6) Filter Basin

The use of a rapid filter basin is deemed the most appropriate in view of its filtering capacity and actual performance in Egypt. The actual type of the rapid filter basin must be decided taking easy operation and maintenance into consideration.

7) Clear Water Reservoir

The overall expansion plan of GCWSA (Fig. 5-21) envisages the installation of an underground clear water reservoir below the lower part of the filter basin. Since a clear water reservoir requires a wide area at a low elevation, its installation below the lower part of the filter basin is appropriate.

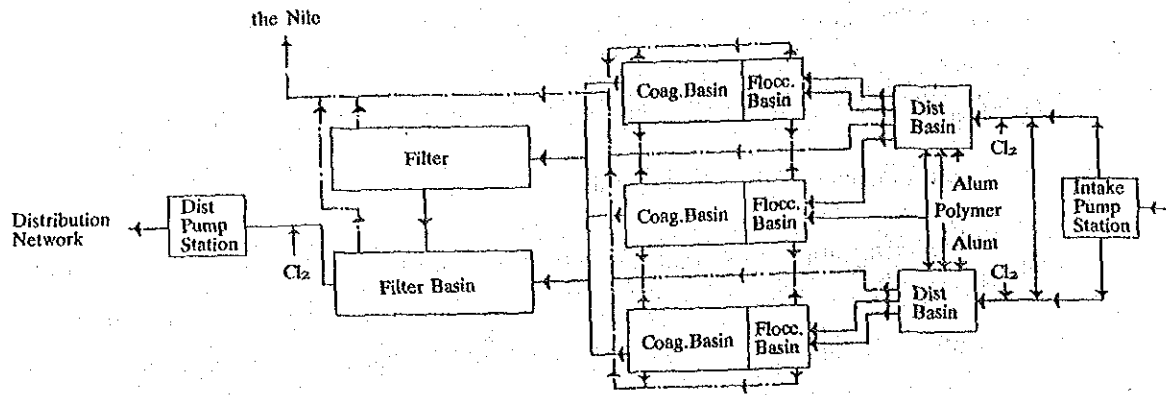
8) Distribution Pump Station

In case that there is an extra space at the existing distribution pump station, it shall be utilized for the expansion project.

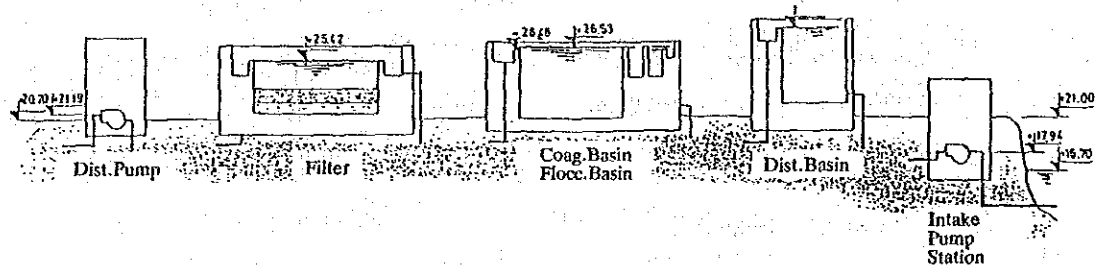
9) Disinfection Facility

The disinfection facility should use chlorine gas which is available in Egypt. The existing storage equipment shall be utilized and only new dosing equipment shall be provided taking into account this expansion capacity which is about one sixth of the whole expansion capacity and the easy operation and maintenance of the dosing equipment.

Systematic Flow Diagram



Hydraulic Profile



Layout

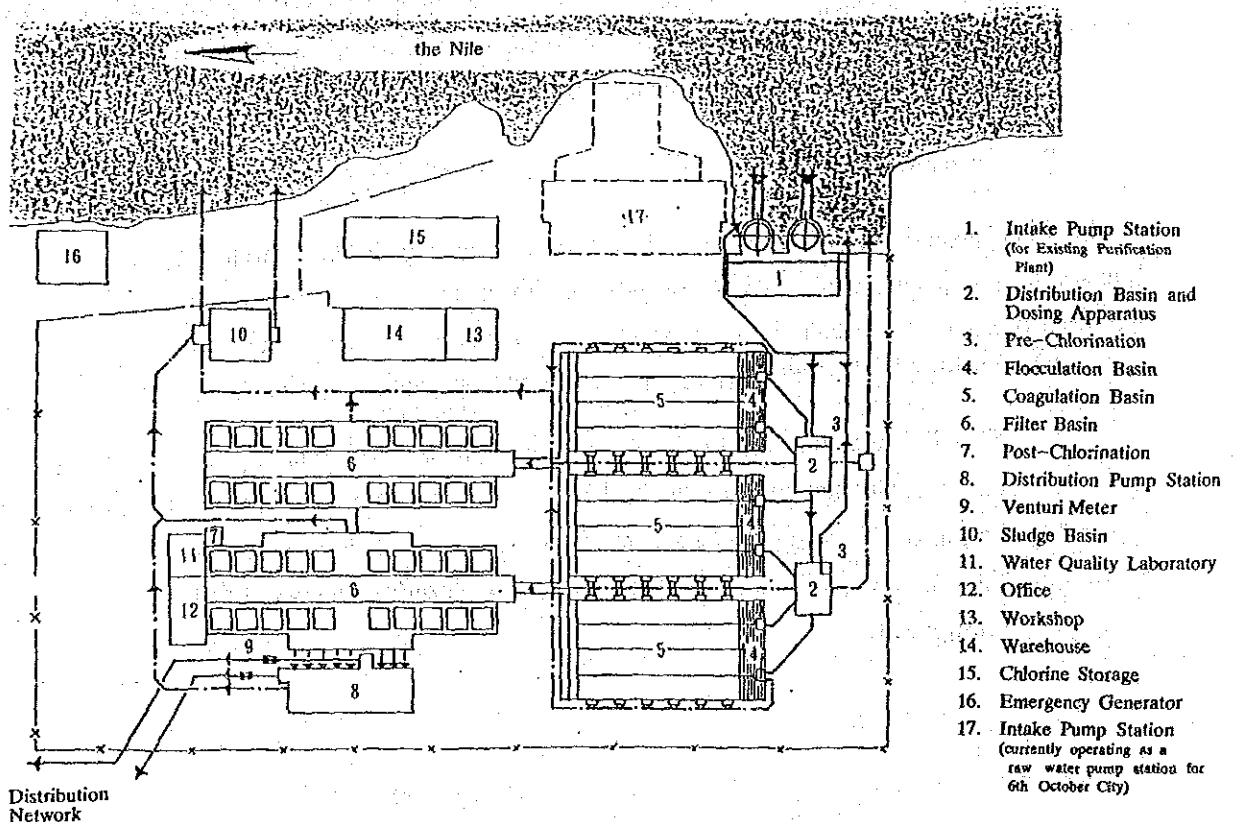
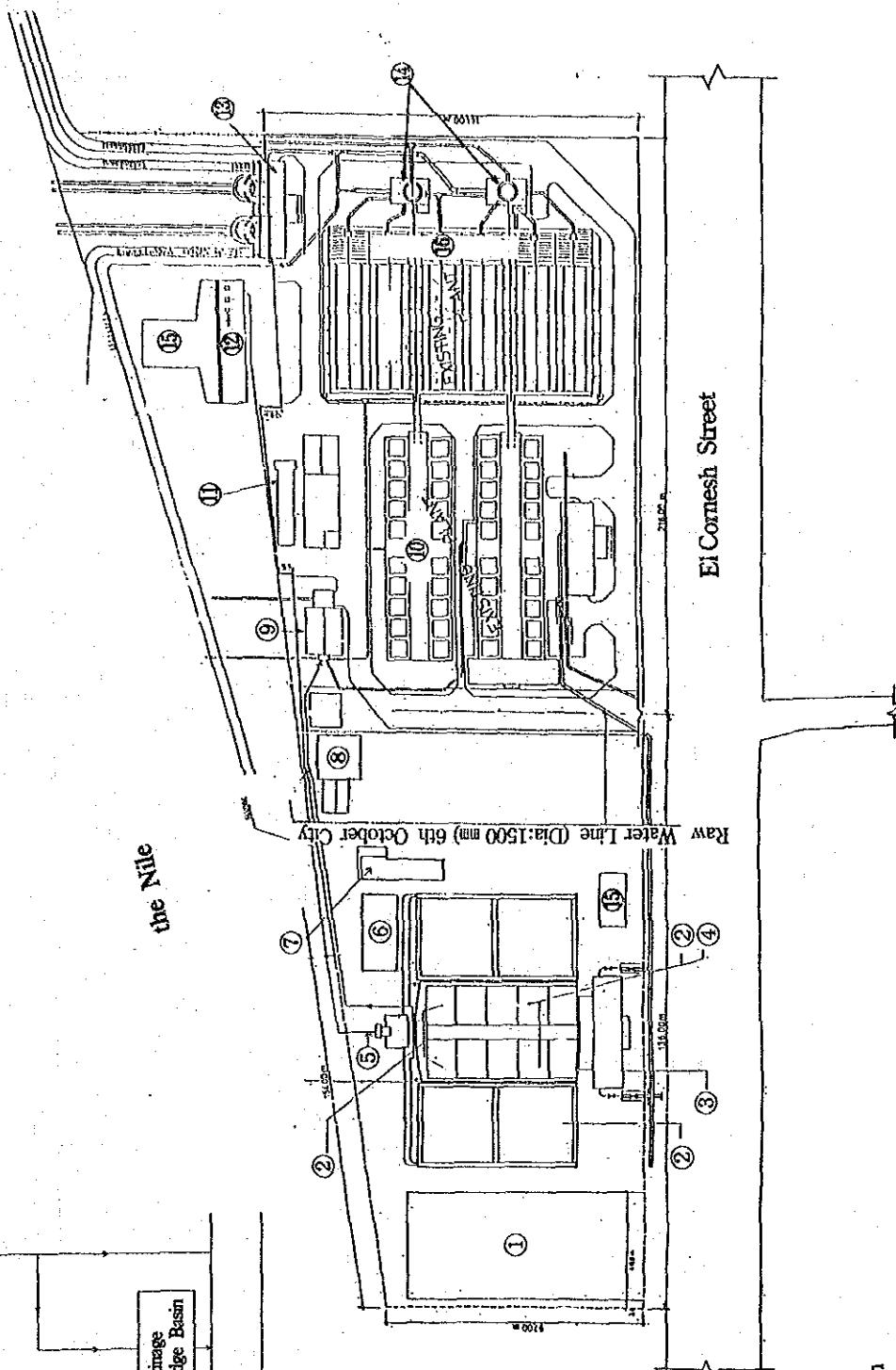
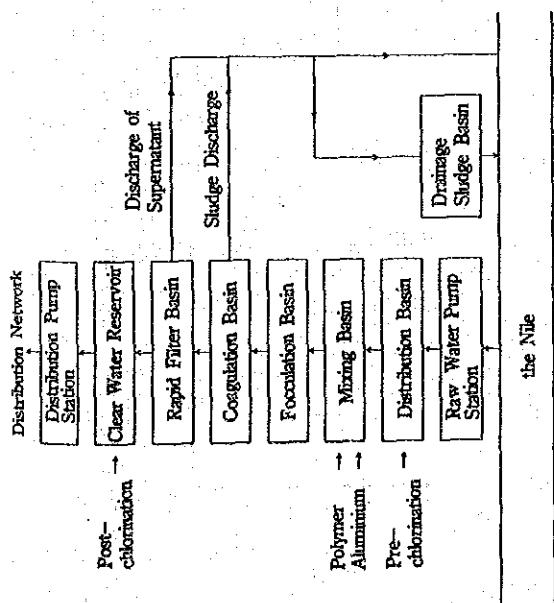


Fig. 5-20 Layout and System Configuration of Existing South Giza Waterworks



(For future extension)

- ① Substation
- ② Filter basin
- ③ Distribution pump station
- ④ Clear water reservoir
- ⑤ Raw water pipe
- ⑥ Dosing apparatus
- ⑦ Chlorine injection facility
- (Existing facility)
- ⑧ Emergency generator
- ⑨ Drainage basin and sludge basin
- ⑩ Filter basin
- ⑪ Chlorine storage
- ⑫ Space for future pump
- ⑬ Intake pump station
- ⑭ Distribution basin and mixing basin
- ⑮ flocculation basin
- ⑯ Intake pump station for 6th October City

Fig. 5-21 Expansion Plan of GCWSA and Water Flow

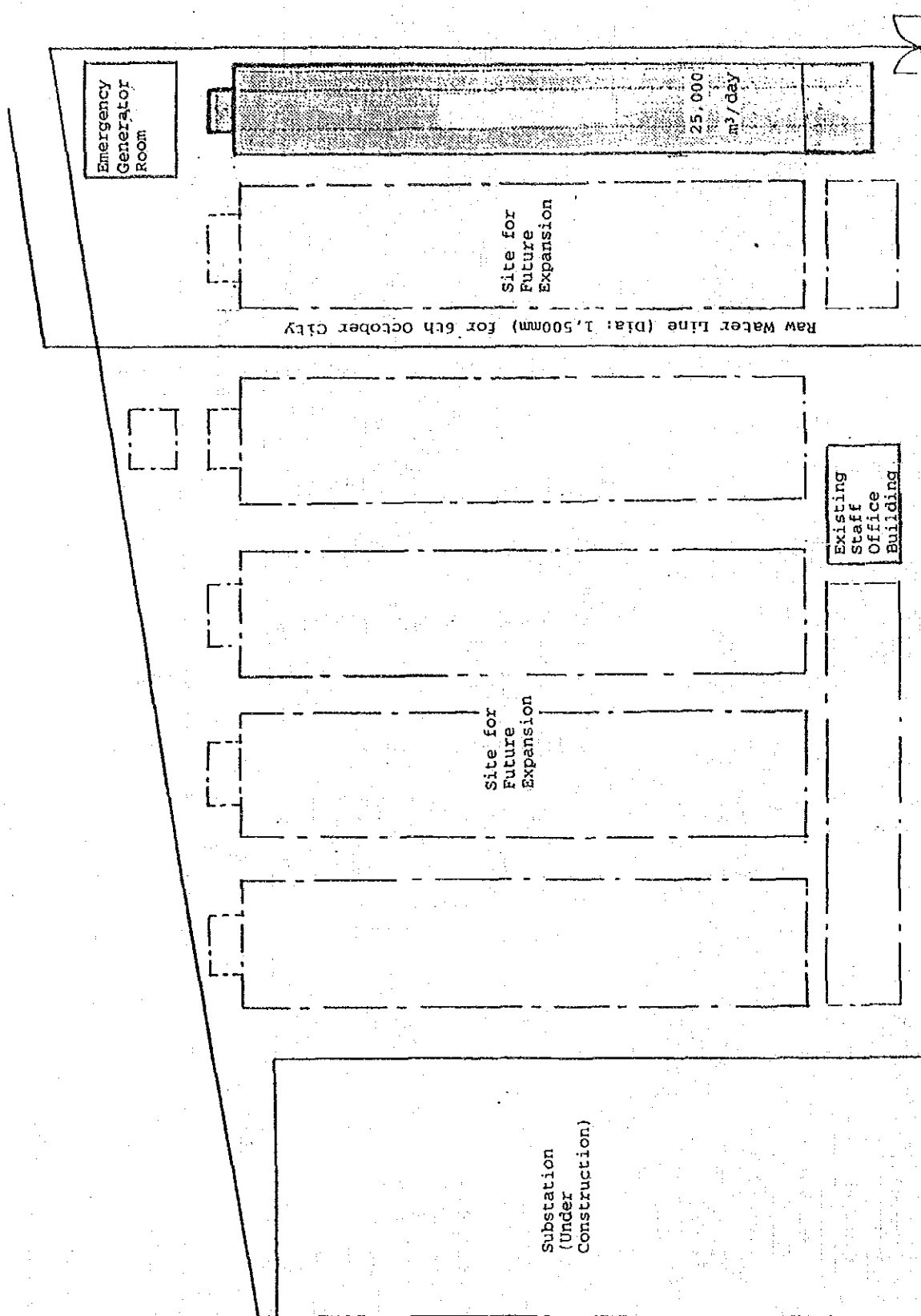


Fig. 5-22 Location of Requested Project-Related Purification Plant Expansion in Overall Expansion Plan

CHAPTER 6 PROJECT EFFECTS AND CONCLUSION

CHAPTER 6 PROJECT EFFECTS AND CONCLUSION

6-1 Effects

Multiple effects can be expected as a result of the implementation of the Project with both water supply and sewer facilities being improved with uniform objectives and the same rationale. The direct beneficial effects for local inhabitants will be a stable supply of potable water which is essential for daily life and the adequate and reliable drainage of sanitary sewage.

In addition, implementation of the Project will also have such indirect effects as improved living conditions, improved health and sanitation conditions and the prevention of canal contamination, etc., in addition to economic and technical effects. These direct and indirect effects are described below.

6-1-1 Direct Effects

Implementation of the Project is expected to have the following direct effects (impact).

(1) Water Supply Facilities

The present water service ratio in the Project Site is as low as some 5% as already stated in 3-4-1-(1). Although most inhabitants receive potable water from public taps, travelling water wagons or wells, they suffer from a chronic water shortage.

The construction of water supply facilities under the Project will improve this water supply situation and make the provision of a reliable water service for local inhabitants of the Project Site possible.

The current conditions of water supply facilities in the Project Site and the expected improvement following the completion of the Project are shown in Table 6-1.

Table 6-1 Current Conditions of Water Supply Facilities and Expected Improvement by the Project

Item	Current Conditions (1990)	Improvement by the Project	
		1995	2010 (Target Year of the Project)
		After Construction of Branch Lines (but Before Completion of Expansion of South Giza Waterworks)	After Expansion of South Giza Waterworks
-Service Population (person)	approx. 6,650	150,500	247,000
-Service Area (ha)	approx. 9.25	185	185
-Service Ratio (%)	approx. 5	100	100
-Water Supply (m ³ /day)	66-133	10,535	34,580
-Average Water Supply (ltr/person/day)	10-20	70	140

Conditions:

- 1) The construction of branch lines using materials to be supplied by the Japanese side under the Project will be completed by the end of 1995 by the Egyptian side.
- 2) The average annual population growth rate in the Project Site is assumed to be 3.135% based on Giza City statistics.
- 3) It is assumed that the extension of the South Giza Waterworks which will supply potable water to the Project Site will not be completed by the end of 1995 (the planned completion year of the Project). Water supply to the Project Site will be based on the supply capacity of the existing South Giza Waterworks. Therefore, it appears impossible to secure the target daily maximum water supply quantity of 140 ltr/person/day in 1995 and the provisional water supply is set at 50% of the target volume (i.e., 70 ltr/person/day).
- 4) However, it is assumed that the expansion of the South Giza Waterworks will be completed by 2010, the target year for the Project, and that the target water supply volume will be achieved.

(2) Sewer Facilities

There are currently no public sewer facilities in the Project Site as described in 3-4-2 and the overflow of sewage onto the roads has created a highly unsanitary situation.

The construction of sewer facilities under the Project will provide the Project Site with the needed public sewer system, enabling adequate and reliable discharge of sewage.

The current conditions of sewer facilities in the Project Site and the expected improvement following the completion of the Project are shown in Table 6-2.

Table 6-2 Current Conditions of Sewer Facilities and Expected Improvement by the Project

Item	Current Conditions (1990)	Improvement by the Project	
		1995	2010 (Target Year of the Project)
		After Construction of Branch Lines (but Before Completion of Expansion of South Giza Waterworks)	After Expansion of South Giza Waterworks
-Service Population (person)	0	150,500	247,000
-Drainage Area (ha)	0	185	185
-Service Ratio (%)	0	100	100
-Average Sewage (ltr/person/day)	10-20	70	140
-Maximum Sewage (ltr/person/day)	14-27	95	190

Conditions:

- 1) The construction of branch lines using materials to be supplied by the Japanese side under the Project will be completed by the end of 1995 by the Egyptian side.
- 2) The average annual population growth rate in the Project Site is assumed to be 3.135% based on Giza City statistics.
- 3) The daily average sewage discharge quantity in 1995 will be set at 70 ltr/person/day to be in line with the expected water supply volume in that year as the expansion of the South Giza Waterworks will not be completed as described in condition 3) of Table 6-1.
- 4) The ratio between the daily average sewage discharge quantity and the maximum daily sewage discharge quantity is set at approximately 75% based on the relevant standard set by GOSD.
- 5) It is assumed that the expansion of the South Giza Waterworks will be completed by 2010, the target year for the Project, and that the wastewater flow will be the same as the target water supply volume.

6-1-2 Indirect Effects

Implementation of the Project is expected to have the following indirect effects (impact) and no negative impacts are foreseen.

(1) Economic Effects

- 1) The improved water supply service to each household will reduce local inhabitants from the hard work of water transportation, thus contributing to the productive activities and the stabilisation of local life.
- 2) The construction of water supply and sewer facilities will improve the living and commercial environments, thus contributing to the vitalisation of industrial activities.
- 3) The planned maximum use of local construction equipment, materials and manpower under the Project will contribute to the development of local industries, vitalisation of the economy and increased employment, etc.

(2) Technical Effects

- 1) The adoption of the pipe jacking method, import of new technologies from Japan, and implementation of the work with appropriate instructions and supervision by Japanese engineers will facilitate the training of engineers and the transfer of technology relating to the construction method which will widen the scope of conducting construction work at a railway crossing point or in a densely populated residential area where it is impossible or extremely difficult to employ construction methods currently available in Egypt.
- 2) The adoption of the under-pressure drilling and tapping method, and implementation of the work with appropriate instructions and supervision by Japanese engineers will facilitate the training of engineers and the transfer of technology relating to the construction method which will not disrupt ongoing daily life, industrial activities and disaster prevention activities, etc.

(3) Effects on Other Projects

- 1) The implementation of the Project will contribute to the progress of an "consolidation of basic infrastructure", one of the main objectives of the Long-Term Perspective Plan.
- 2) The implementation of the Project will facilitate the implementation of various master plans prepared with the assistance of the U.S., Britain, Germany, etc., to improve water supply and sewer services in Egypt.

(4) Regional Effects

- 1) The construction of the sewer trunk line in line with the overall sewer improvement plan will enable the discharge of sewage from areas lying upstream of the Project Site, thus facilitating the implementation of sewer improvement projects in the future and widening the scope of areas which can enjoy the secondary effects of the Project.
- 2) The quality of life, medical activities and educational activities are expected to improve or become more active with the improved water supply and sewer services.
- 3) The improved quality of daily life and medical activities, etc., will reduce the number of sick people and will promote health.

- 4) The installation of fire hydrants will strengthen the disaster prevention system, thus contributing to the creation of a safe urban environment.

(5) Environmental Effects

- 1) The simultaneous construction of water supply and sewer facilities over a wide area with uniform objectives will prevent or eradicate the unsanitary situation caused by the infiltration of sewage into well, greatly improving the health and sanitation conditions for local inhabitants.
- 2) The provision of an adequate sewer network following the construction of sewer facilities will prevent the overflow of sewage onto roads and squares, etc., thus improving the living and sanitation conditions.
- 3) The improved sewer network will establish a drainage route to transfer the sewage, which is sometimes illegally dumped in the Zomor Canal, to Abu Rawash Wastewater Treatment Plant, thus contributing to the preservation of the water quality of the canal and the Nile to which the canal water flows, and also to the improvement of the general environment.

6-2 Conclusion

The provision of public infrastructure in the Project Site has lagged far behind other parts of the Greater Cairo Region because the area has been omitted from urban development programmes. This fact is particularly noticeable in the case of water supply and sewer facilities which are considered facilities for basic human needs (BHN). The water supply service ratio in the Project Site of approximately 5% is extremely low and no public sewer system is provided. As a result, local inhabitants of the Project Site are suffering from a chronic shortage of water and are being forced to live under poor living and health sanitation conditions caused by the poor drainage of sewage and other factors.

The Government of Egypt has prepared a series of master plans to consolidate the water supply and sewer facilities with foreign assistance to improve the living environment. However, it has found it difficult to implement any water supply or sewer improvement work in the Project Site because of the deteriorated financial situation of the government of Egypt and the low profitability of these services.

The Project aims at conducting the coordinated construction of water supply and sewer facilities over a wide area and will contribute to ensuring a stable life and to improving the health environment as well as medical and educational activities in the Project Site

which is characterised by a dense concentration of low income people. Together with the positive effects of the Project in terms of vitalising commercial and industrial activities and creating employment, the benefits of the Project will be tremendous given.

The Project is in line with the relevant master plans prepared by the Government of Egypt and it appears that the Egyptian side has sufficient manpower, technical capability and budget to conduct the operation and maintenance of the new facilities to be constructed under the Project. Consequently, it is judged that implementation of the Project will not pose any organizational, technical or financial problem for the Egyptian side.

Furthermore, the Project will contribute to the achievement of a consolidation of public infrastructures, which is an important target of the Long-Term Perspective Plan prepared by the Government of Egypt, and will be efficiently conducted with no special difficulties under Japan's grant aid.

Given the great effects of the Project, including improved living and sanitation conditions for local inhabitants of the Project Site, it is deemed significant and highly appropriate for the Project to be urgently implemented under Japan's grant aid.

6-3 Recommendations

Egyptian side will be required to conduct the following measures to successfully accomplish the objectives of the Project and to maximise the positive effects of the Project.

Prior to Project Implementation

- (1) To ascertain the will of beneficiaries to pay a water charge after completion of the Project in order to secure a continuous revenue flow to cover the operation and maintenance expenses of the new facilities.
- (2) To obtain the agreement of local inhabitants not to dispose of vinyl objects, cloth, paper, etc., into the sewer facilities through enlightenment to local inhabitants, to maintain their proper functioning and to reduce the operation and maintenance expenses.
- (3) To conduct public relations activities in order to secure cooperation for the construction work, especially 24 hours/day working, possible traffic jams and construction noise, etc.

- (4) To secure the necessary budget for the work to be undertaken by the Egyptian side.
- (5) To establish the Project Steering Committee in order to secure the smooth implementation.
- (6) To obtain the official permission for the sewer trunk line, water supply and sewer branch lines (diameter 300-600mm) which will be buried under the existing road.
- (7) To take necessary measures to the "feedback of evaluation results" as stated in 3-4-3-(8).

During Project Implementation

- (8) To appoint several full-time engineers at the initial stage of Project implementation with a view to improving their expertise which will enable them to be responsible for the plan, construction, operation and maintenance of water supply and sewer facilities, to learn the technical aspects of the Project for the maintenance work in the future.
- (9) To ensure that the materials provided by the Japanese side are used for their original purposes.

After Completion of Project

- (10) To secure adequate budget of operation and maintenance for the facilities by surely collecting the water service charge based on (1) above.
- (11) To take the necessary measures to transfer the authority for the new facilities to GCWSA and GOSD, and to clarify where the responsibility.
- (12) To ensure that GCWSA and GOSD conduct the operation and maintenance of the transferred facilities in a responsible manner.
- (13) To maintain regular contact with the Fire Department to ensure the proper functioning of fire hydrants in order to create an urban environment in which the lives and assets of local inhabitants are protected.

APPENDIX 1

BASIC DESIGN STUDY TEAM

List of Study Team Members (Basic Design Study)

Name	Assignment	Position
Mr. Haruo Iwahori	Leader	Water Supply and Sanitation Development Specialist, Institute for International Cooperation, JICA
Mr. Takumi Matsuda	Grant Aid Planner	Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs
Mr. Shuji Nakaoka	Water Supply Planner	Water Supply division, Water Supply & Environmental Sanitation Department, Ministry of Health and Welfare
Mr. Ryosuke Teranishi	Water Supply and Sanitary Drainage Planner	Yachiyo Engineering Co., Ltd.
Mr. Hiroyoshi Shishido	Water Supply System Designer	Yachiyo Engineering Co., Ltd.
Mr. Masahiro Takeuchi	Sanitary Drainage Designer	Yachiyo Engineering Co., Ltd.
Mr. Masatsugu Komiya	Mechanical Designer	Yachiyo Engineering Co., Ltd.
Mr. Kyoji Sakakiyama	Civil Engineer	Yachiyo Engineering Co., Ltd.
Mr. Yutaka Muraki	Cost Estimator	Yachiyo Engineering Co., Ltd.

List of Study Team Members (Draft Final Reporting Team)

Name	Assignment	Position
Mr. Haruo Iwahori	Leader	Water Supply and Sanitation Development Specialist, Institute for International Cooperation, JICA
Mr. Ryosuke Teranishi	Water Supply and Sanitary Drainage Planner	Yachiyo Engineering Co., Ltd.
Mr. Hiroyoshi Shishido	Water Supply System Designer	Yachiyo Engineering Co., Ltd.
Mr. Masahiro Takeuchi	Sanitary Drainage Designer	Yachiyo Engineering Co., Ltd.

APPENDIX 2

FIELD SURVEY SCHEDULE

1. Field Survey Schedule (Basic Design Study)

No.	Date	Day of the week	Weather	Place of stay	Schedule	Detail of Study Items
1	Nov. 23	Sat.	Fine	London	Lv. Tokyo at 11:00 on BA 008 Ar. London at 14:55	Departure of Consultant Team from Japan
2	" 24	Sun.	Cloudy	Cairo	Lv. London at 16:00 on BA 155 Ar. Cairo at 23:00	Arrival of the team in Egypt
3	" 25	Mon.	Fine after rain	Cairo		Courtesy visits to and discussions at JICA Cairo Office and Japanese Embassy, team meeting.
4	" 26	Tue.	Fine	Cairo		Courtesy visit to and discussions at Giza City Council on Inception Report, questionnaire, grant aid cooperation system and survey schedule, etc.
5	" 27	Wed.	Fine	Cairo		Preparations for field surveys and team meeting, visit to CWO to discuss questionnaire, field investigation of facilities constructed under Omrania West Project (Japanese Friendship Pump Station and others), sorting of collected data.
6	" 28	Thu.	Cloudy	Cairo		Courtesy visit to GCWSA to discuss questionnaire, visit to JICA Office to report progress, site survey and surveying.
7	" 29	Fri.	Fine	Cairo		Team meeting, sorting of collected data.
8	" 30	Sat.	Fine	Cairo		Discussions with GCWSA, collection of data and site survey and surveying at existing South Giza Waterworks and railway crossing point of water supply branch line (diameter: 500mm).
9	Dec. 1	Sun.	Fine	Cairo		Discussions with GCWSA and collection of data, joint site survey with Giza City Council, field investigation at Omrania West Project sites (water supply and sewer trunk lines, manholes and housing conditions along routes, etc.) and surveying, team meeting and sorting of collected data.
10	" 2	Mon.	Fine	Cairo		Visit to EEA and district power distribution companies to study power supply plans, existing grids and other data, visit to Giza telephone exchange to study existing network, discussions with GOSD, sorting of collected data, site survey and surveying.

No.	Date	Day of the week	Weather	Place of stay	Schedule	Detail of Study Items
11	Dec. 3	Tue.	Fine	Cairo		Visit to Giza telephone exchange to study existing network, visit to JICA Office to report progress, discussions with Giza City Council and GCWSA, collection of data and recovery of questionnaires, visit to and surveying at South Giza Waterworks, sorting of collected data.
12	" 4	Wed.	Fine	Cairo		Discussions with GOSD, GCWSA, Giza City Council and CWO, collection of data and recovery of questionnaires, team meeting, sorting of collected data, arrival of second consultant team (Muraki and Sakakiyama) in Cairo.
13	" 5	Thu.	Fine	Cairo		Discussions with GOSD and GCWSA, collection of data and recovery of questionnaires, visit to JICA Office to report outline of survey findings, market survey, surveying, team meeting, sorting of collected data.
14	" 6	Fri.	Fine	Cairo		Sorting of collected data, team meeting.
15	" 7	Sat.	Fine	Cairo		Discussions with GOSD and GCWSA, study of operation of facilities constructed under Omrania West Project, sorting of collected data, preparation of rough survey report, market survey, surveying, arrival of government members of Study Team in Cairo (KL 668).
16	" 8	Sun.	Fine	Cairo		Courtesy visits to and discussions at Japanese Embassy, JICA Office, Giza City Council and MOIC, discussions with GOSD and Embaba Office of GCWSA, collection of data and recovery of questionnaires, study of operation and management of facilities constructed under Omrania West Project, market survey and surveying, sorting of collected data.
17	" 9	Mon.	Fine	Cairo		Joint site survey with GOSD on No.5 pump station, planned sewer trunk line route for Project and Abu Rawash sewage treatment plant, discussions with Network Section of GCWSA, collection of data and recovery of questionnaires, study of operation and management of facilities constructed under Omrania West Project, market survey and surveying, sorting of collected data.

No.	Date	Day of the week	Weather	Place of stay	Schedule	Detail of Study Items
18	" 10	Tue.	Fine	Cairo		Visits to and discussions at GCWSA and CWO, collection of national statistical data and related data, market survey and surveying.
19	" 11	Wed.	Fine	Cairo		Discussions with GCWSA and GOSD, courtesy visit to Governor of Giza, visit to NOPWASD to explain and discuss questionnaire, market survey and surveying, sorting of collected data.
20	" 12	Thu.	Fine	Cairo		Discussions with MOIC and Giza City Council on M/D, courtesy visit to and discussions with Chairman of GOSD, discussions with GCWSA, collection of national statistical data and related data, market survey and surveying.
21	" 13	Fri.	Cloudy/ odd showers	Cairo		Team meeting, sorting of collected data.
22	" 14	Sat.	Cloudy	Cairo		Discussions with GCWSA and GOSD, survey on facilities constructed under Omrania West Project, market survey and surveying, sorting of collected data.
23	" 15	Sun.	Cloudy	Cairo		Signing of M/D with MOIC and Giza City Council, discussions with GCWSA and GOSD, survey on facilities constructed under Omrania West Project, market survey, site survey, sorting of collected data.
24	" 16	Mon.	Fine	Cairo		Visits to Japanese Embassy and JICA Office to report study progress and findings, discussions with GOSD, survey on sewer facilities constructed under Omrania West Project, discussions with NOPWASD, market survey, site survey, team meeting, sorting of collected data.
25	" 17	Tue.	Fine	Cairo		Departure of government members from Egypt (LH 683), discussions with Giza City Council, collection of data and recovery of questionnaires, discussions with GOSD, survey on facilities constructed under Omrania West Project, market survey, site survey, sorting of collected data.
26	" 18	Wed.	Fine	Cairo		Discussions with GOSD, survey on facilities constructed under Omrania West Project, market survey, site survey, sorting of collected data, preparation of field report.

No.	Date	Day of the week	Weather	Place of stay	Schedule	Detail of Study Items
27	Dec. 19	Thu.	Fine	Cairo		Market survey, sorting of collected data, preparation of field report.
28	" 20	Fri.	Fine	Cairo		Sorting of collected data, preparation of field report.
29	" 21	Sat.	Fine	Cairo		Preparation of field report, market survey, sorting of collected data, departure of consultant members (Komiya, Sakakiyama and Muraki) from Egypt.
30	" 22	Sun.	Fine	Cairo		Submission of field report to Giza City Council, GCWSA, Giza Irrigation Authority, CWO and Egyptian State Railway and explanation of and discussion on its contents, sorting of collected data.
31	" 23	Mon.	Fine	Cairo		Submission of field report to GOSD and explanation of and discussion on its contents.
32	" 24	Tue.	Fine	Cairo		Farewell visits to Japanese Embassy, JICA Office and Giza City Council to report field survey findings.
33	" 25	Wed.	Fine	Amsterdam	Lv. Cairo at 07:50 on KL 554 Ar. Amsterdam at 11:45.	Final departure of consultant members (Teranishi, Shishido and Takeuchi) from Egypt.
34	" 26	Thu.	Fine	in air-plane	Lv. Amsterdam at 13:40 on KL 861	
35	" 27	Fri.	Fine		Ar. Tokyo at 09:15	Arrival of consultant members (Teranishi, Shishido and Takeuchi) in Japan at 09:15.

2. Schedule of Draft Final Reporting Team

No.	Date	Day of the week	Weather	Place of stay	Schedule	Detail of Study Items
1	Apr. 14	Tue.	Cloudy	Amsterdam	Lv. Narita at 11:50 on KL862 Ar. Amsterdam at 16:55	Departure of the team from Japan
2	" 15	Wed.	Fine	Cairo	Lv. Amsterdam at 13:15 on KL561 Ar. Cairo at 17:45	Arrival of the team in Egypt
3	" 16	Thu.	Fine	Cairo		Courtesy visit to and discussions at Japanese Embassy, Courtesy visit to and briefing of Draft Report to MOIC and Giza City
4	" 17	Fri.	Fine	Cairo		Team meeting, sorting of collecting data
5	" 18	Sat.	Fine	Cairo		Courtesy visit to and briefing of Draft Report to Mayor of Giza City, visit to and briefing of Draft Report to GCWSA and CWO
6	" 19	Sun.	Fine	Cairo		Visit to and briefing of Draft Report to GOSD, preparation of Memorandum on Draft Report
7	" 20	Mon.	Fine	Cairo		Briefing of Draft Report to GOSD
8	" 21	Tue.	Fine	Cairo		Discussion of M/D and Memorandum with Giza City, signing of M/D and Memorandum, preparation of report to Japanese Embassy and JICA Egypt Office
9	" 22	Wed.	Fine	Cairo		Farewell visits to Japanese Embassy, JICA Office and MOIC
10	" 23	Thu.	Rain	Vienna	Lv. Cairo at 6:40 on OS384 Ar. Vienna at 10:40	Departure of the team from Egypt
11	" 24	Fri.	Fine	in air-plane	Lv. Vienna at 11:25 on OS555	
12	" 25	Sat.	Fine		Ar. Tokyo at 8:20	Arrival of the team in Japan

APPENDIX 3
LIST OF INTERVIEWEES IN EGYPT

List of Interviewees in Egypt

<u>Place of Work and Name</u>	<u>Position</u>
Embassy of Japan in Egypt	
Mr. Teruaki Nagasaki	First Secretary
Mr. Kazuhiro Kikuchi	First Secretary
Mr. Naoaki Kurumada	First Secretary
JICA Egypt Office (Cairo)	
Mr. Kenji Iwaguchi	Resident Representative
Mr. Hiromasa Kawazoe	Deputy Resident Representative
Mr. Shigeru Okamoto	
Ministry of International Cooperation (MOIC)	
Mr. Hamid Moustafa	Undersecretary
Mr. Mohsen Sadek	Director of Japan Department
Giza Governorate	
Gen. Yousef Afify	Governor
Giza City	
Gen. Fouad Khalil	Mayor
Dr. Nabil Makhlouf	Technical Advisor
Mr. Zein Adam	General Secretary
Mr. Said Said Mohmoud	Manager of Engineering Department
Mr. Ahmed El Darmely	Administrator
Greater Cairo Water Supply Authority (GCWSA)	
Mr. Saad El Deen El Deeb	Chairman
Mr. Adel El Toweiry	Vice-Chairman
(Technical Advisor Section)	
Mr. Mahmoud Abo Khalaf	Technical Advisor to Chairman
Mrs. Laila Ada El Monem	Chief Engineer of Technical Advisor Section
(Network Department)	
Mr. Mohamed Hassan Dessaky	Manager of Piping Sector in Project Department
Mr. Bahali S. Shenouda	Undersecretary of Water Network Department

Mr. Gamil Khallaf	General Manager of Maintenance of Water Network Department
Mr. Fathy Kandeel	Chief of Sakiat Mekey Network Section of Network Department)
Mr. Gad Abd Elaziezgad	Chief of Halam Network Section of Network Department
Mr. Al Hag Mohamed Morsey	Chief of Draftsmen
Mr. Ahmed Darwish	Mechanical Engineer and Network Engineer
Mr. Morcus Farag	Mechanical Engineer of Sakiat Mekey Network Section
Mr. Abdel Saeed	Draftsman

South Giza Waterworks (GCWSA)

Mr. Saliman Wahken Aly	General Manager
Mrs. Nagwa Zaghloul	Maintenance Engineer (Mechanical)
Mr. Mohamed Shawky	Maintenance Engineer (Electrical)
Mr. Said Kasen	Maintenance Engineer (Mechanical)
Mr. Mohamed Abdel Backy	Operation Engineer (Electrical)
Mr. Ashraf Ahmed	Operation Engineer of Raw Water (6 Oct.Line)
(Laboratory)	
Mr. Nagy Gayed	Chief of Chemists
Mr. Mohamed Basem Ali	Laboratory Chemist
Mr. Zein Sayd Ali	Laboratory Chemist
Mr. Mostafa Ahmad Hassan	Laboratory Technician

Greater Cairo General Organization for Sanitary Drainage (GOSD)

Mr. Ahmed Abd Maksoud	Chairman
Mr. Issak Metry	Director of Operation and Maintenance Department
Mr. Abdel Gaward Abu Zaid	Director of Project Department
Mr. Abdel Kadr Hamdy	Technical Advisor to Chairman
Mr. Obeid Faheem Girgis	Assistant to Project Department Manager
Mr. Samir Abdel Moneim	General Manager of West Bank
Mr. Saleh S. Wanees	General Manager of South Cairo Area in O & M Section
Mr. Hamed Waly	Director of Mechanical Cleaning Department
Mr. Dia Shaewkey Miehail	Technical Officer of Project Section (Civil Engineer)
Mrs. Azza Sayed Mohamed	Design Engineer
Mr. Ahmed Hameza Ahmed	Electrical and Mechanical Department (Mechanical Engineer)
Mr. Yafeh Youssif	Manager of Design Department

Mrs. Faten Zakry Kobrial	Electrical and Mechanical Department (Electrical Engineer)
Miss Nahed Saleh El Din	Design Engineer
Mr. Mohamed Tahaiman	Electrical and Mechanical Department (Electrical Engineer)
(Pyramid Pump Station)	
Mr. Salah Mhmoeud Mousa	Director of Pyramid Station
Mrs. Nancy Farag	Chief of Japan Pump Station
Giza Sewer Pump Station	
Mr. Mohamed Ibrahim Hassan	Manager of Giza Pump Station
Mr. Mohamed Ahdel Gelil	Mechanical Engineer
Mr. Roshdi Mohamed Ahmed	Driver of Japanese Sewer Cleaning Vehicle
Garage and Workshop of GOSD for Vehicles and Machines	
Mr. Adel Fahime	Mechanical Engineer for Vehicle Maintenance
Mr. Abdel Moneam	Mechanical Engineer for Vehicle Maintenance
Abu Rawash Waste Water Treatment Plant	
Mr. Soliman Fetian	Operation Manager of Existing Plant
Mr. Alsaeldin	Civil Engineer for USAID Project
Organization for Execution of Greater Cairo Waste Water Project (CWO)	
Mr. Talat Abu Seda	Vice-Chairman
National Organization for Potable Water and Sanitary Drainage (NOPWASD)	
Mr. Mohamed Negm	Head of Central Administration for Research
Mrs. Samira Necola	General Manager of Mechanical and Electrical Research Department
Mr. Gala El Din Abuzeid	Head of Design Department
Mr. Mohamed Mostafa Hassan	Design Department Engineer
Mr. Serag M. Elkitka	Design Department Engineer
Egyptian Electricity Company (EEA)	
Mr. Roshdy	Manager of Network Affairs
Dokki Area Electric Company	
Mr. Ismail Helal	General Manager for Dokki Area

Giza North Distribution Company

Mr. Mohamed Ahmed Aba El Fahd General Manager

Mr. Tallat Shaltoot Manager of Low Tension Network

Cairo Electricity Distribution Company

Mr. M. Khairy S. Attia Deputy Chairman

Giza Telephone Exchange

Mr. Hamdy Mammoud Chairman

Mr. Yettia Maser Assistant to Chairman

Egyptian State Railway

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

Mr. Ahmed El Bestawi Manager of Technical and Research Department

Giza Irrigation Authority

Mr. Mostafa Naba General Manager

**Mrs. Sohair Ahmed Mokhtar Giza Section Inspector
Arit**